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GREEN INDUSTRIAL GROWTH: MAINSTREAMING ENVIRONMENTAL SUSTAINABILITY IN PAKISTAN'S INDUSTRIAL SECTOR

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In memory of Gajanand Pathmanathan

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ACRONYMS

CETP	Common Effluent Treatment Plant
CP	Cleaner Production
CPI	Cleaner Production Institute
CPC	Cleaner Production Center
BOD	Biochemical oxygen demand
EIA	Environmental Impact Assessment
EMS	Environmental Management System
EPA	Environmental Protection Agency
EU	European Union
GDP	Gross Domestic Product
GoP	Government of Pakistan
ISO	International Organization for Standardization
MoI&P	Ministry of Industries and Production
NCPC-F	National Cleaner Production Centre-Foundation
NEQS	National Environmental Quality Standards
NGO	Non Governmental Organization
NLTA	Non-Lending Technical Assistance
NPSL	National Physical and Standards Laboratory
Pak-EPA	Pakistan Environmental Protection Agency
PSQCA	Pakistan Standards and Quality Control Authority
PEPA	Pakistan Environmental Protection Act of 1997
PEPC	Pakistan Environmental Protection Council
PKR	Pakistani Rupee
PNAC	Pakistan National Accreditation Council
REACH	Regulation, Evaluation, Authorization, and Restriction of Chemicals
SME	Small and Medium Enterprise
SPS	Sanitary and Phytosanitary
UNEP	United Nations Environment Programme
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
USD	United States Dollars
WHO	World Health Organization
WTO	World Trade Organization

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EXECUTIVE SUMMARY

The enormous damage to human health and the environment caused by Pakistan's industrial pollution would, in itself, be sufficient to justify major interventions by the Government of Pakistan (GoP) to improve industrial environmental performance. However, there is another important reason to undertake such interventions: inadequate industrial environmental management is contributing to the weak export performance of Pakistan's industries.

Inadequate industrial environmental management is linked to poor export performance because, at the international level, the gradual reduction of tariff barriers to facilitate trade has been accompanied by an increase in two types of non-tariff-related conditions: government environment-related regulations and voluntary environmental standards that often serve as *de facto* requirements. These government trade barriers are permitted under the World Trade Organization (WTO) Technical Barriers to Trade Agreement and the Sanitary and Phytosanitary Agreement, which allow governments to impose rules to protect the health and safety of their citizens and the environment. Trade barriers can also take the form of voluntary standards established by national, regional and international bodies, such as the International Organization for Standardization (ISO); an example is the ISO 14,001 standard for environmental management systems. Private standards have also been established by consortiums of firms and individual retailers.

In the interest of having a solid analytic foundation for enhancing Pakistan's industrial competitiveness, the GoP requested non-lending technical assistance (NLTA) from the World Bank. The NLTA, the results of which are summarized here, examined how sustainability considerations could be mainstreamed into Pakistan's industrial sector, taking into account the strong linkages between business competitiveness, environmental protection, and the sustainable use of natural resources.

Making efforts with national environmental regulations is an important prerequisite for ISO-14001 certification; however a survey of firms conducted as part of the NLTA demonstrated industry's widespread lack of compliance with Pakistan's National Environmental Quality Standards (NEQS). In particular, of 57 leather tanneries and textile processing mills included in the survey, most of the 15 large firms knew of the NEQS, but only one-third of the 42 small and medium sized enterprises (SMEs) had even heard of the standards. Only three of the 57 firms were in compliance with the NEQS; all three compliant firms were large and engaged in exports. The one surveyed firm that elaborated on the subject indicated that his firm's motivations to comply with NEQS were "international customer demands" and "increased competitiveness."

Of 53 surveyed firms that responded to questions about ISO 14,001, only 56% of the 39 SMEs were aware of ISO 14,001, while nearly 93% of the 14 large firms had heard of it. A strong correlation exists between ISO 14,001 awareness and export-orientation, with firms that were engaged in exports being much more likely to be cognizant of ISO 14,001. The result that sales overseas appears to play a key role in firms' awareness of ISO 14,001 is not surprising given the increasing importance attached to the environmental performance of suppliers by business customers in the European Union (EU) and the US, Pakistan's two largest export markets. In contrast to awareness of ISO 14,001, the levels of *compliance* with ISO 14,001 were very low, even for large firms. Only 2 of the 39 SMEs (5%) in the sample were ISO 14,001 certified; the corresponding figures for large firms were 7 out of 14 (50%). Large firms clearly have more opportunities to hire staff members that specialize in ISO-related issues, and they, at least in this sample, are more likely to export some or all of their outputs

Overall, Pakistan has a low rate of compliance with ISO standards. For example, the pace of certification to ISO quality management standards (ISO 9,001), which are widely used in international trade, has remained stagnant in Pakistan since 2005. Data from the ISO indicate that the number of Pakistani firms

certified to ISO 9,001 in 2010 (2013 firms) was only about 5% higher than it was in 2005, despite a major effort by the Export Promotion Bureau of Pakistan to increase the number of ISO 9,001 certifications. Also, in countries throughout the world, the number of certifications for ISO 14,001 is lower than those for ISO 9,001, but in Pakistan the numbers are *much* lower. In particular, the ratio of ISO 14,001 to ISO 9,001 certifications, using worldwide data for 2010, was 0.23, but in Pakistan, the corresponding ratio was only 0.13. This further suggests that the attention paid by Pakistani firms to environmental management is lagging.

Pakistan's industry is outdated and risks losing markets at a time when it may have the opportunity to occupy the space being left by manufacturing giants like China. The growth strategy for the economy, as outlined in the 2011 Framework for Economic Growth, calls for increased exports and a reinvigorated industrial sector. Unless careful attention is given to environmental management during industrial expansion, economic gains will be accompanied by huge environmental and social costs in the form of human morbidity and mortality and environmental damage from increased industrial pollution. Moreover, improved industrial environmental performance is essential if Pakistani firms are to be competitive in export markets like the EU in which business customers demand high environmental performance from their suppliers and often require certification to international standards, such as ISO 14,001. Pakistan is behind many of its competitors in export markets in terms of environmental management. As mentioned, a notable number of Pakistani firms are not even aware of domestic environmental regulations or the ISO-14001 standards.

Regulatory enforcement is not likely to motivate firms to improve in the near term while the devolution of environmental responsibilities to the provinces (pursuant to the 18th amendment to Pakistan's Constitution) is underway. However, the lack of pressure to comply with regulations should not deter improved industrial environmental performance by firms motivated out of self-interest to improve their competitive positions. Recommended actions are summarized below:

- *Support for Environmental Institutions* — The Ministry of Climate Change should receive the budget and staff needed to carry out key coordination functions on environmental matters with provinces and international bodies. In addition, environmental protection agencies (EPAs) and other units at the provincial level should be strengthened at levels needed to undertake their new roles pursuant to the 18th Amendment. Also, an environmental unit should be created within the Ministry of Industries.
- *Extension of Cleaner Production (CP) Activities* — The aforementioned survey of firms examined the performance of Pakistan's existing CP centers and found that these were successful in persuading firms to adopt CP options, and that relationships between centers and firms had produced efficiency improvements. The work of these centers should be expanded; new CP centers should be created, including a national center for CP; centers should improve the transfer of information to firms about integrating both CP and ISO 14,001 into business operations; and all centers should have advisory boards to guide them on how to operate on a sustainable financial basis and help firms integrate CP, NEQS compliance and ISO 14,001 certification into their business strategies.
- *Common effluent treatment plants (CETPs)* — End-of-pipe treatment can complement CP in the short-term to help firms enhance environmental performance, become certified to ISO 14,001 and hence become more competitive internationally. Thus, priority should be given to constructing and operating CETPs in industrial clusters.
- *Use of pollution taxes and study of a tax on chromium* — Pakistan's pollution charge system should be revived and revenues collected should subsidize CETP construction and provincial

EPA operations. The potential for a tax on chromium sulfate to manage the challenges associated with chromium wastes from tanneries should be analyzed. These wastes have the potential for increasing ambient environmental levels of hexavalent chromium, a highly toxic chemical.

- *National Environmental Quality Standards (NEQS)* — In the short term, the aforementioned measures concerning CP and CETPs will not be enough to allow many firms to meet existing NEQS and become certified to ISO 14,001. The NEQS should therefore be relaxed on an interim basis so that they can be met using relatively inexpensive waste treatment methods. The interim standards should prioritize protecting human health and avoiding major nuisance conditions. More rigorous permanent standards can be implemented after CETP construction is under way.
- *Public Information Disclosure* — The Pakistan EPA and provincial EPAs should foster the creation of an environmentally informed citizenry by distributing information regarding firms' violation of environmental regulations and regarding the health impacts of environmental degradation. Other countries have piloted innovative public disclosure programs: Indonesia has a "Program for Pollution Control, Evaluation, and Rating," commonly referred to as "PROPER," that uses a color-coded rating scheme to inform citizens of the environmental performance of firms; and a Chinese non-governmental organization (NGO), the Institute for Public and Environmental Affairs, has created the China Water Pollution Map and the China Air Pollution Map to allow citizens to conduct computer searches that identify violators of environmental regulations in their communities.
- *Pakistan's Quality Infrastructure* — National infrastructure linked to quality management (widely referred to as "quality infrastructure") consists of institutions engaged in standardization, metrology, testing, inspection, certification and accreditation. Pakistan has made a good start on development of quality infrastructure by creating Pakistan Standards and Quality Control Authority (PSQCA), and related institutions. PSQCA should be allocated the resources and staff needed to serve as a communications bridge between standard-setting organizations affecting exports and Pakistani exporters. This bridging activity would have two key goals: (i) make Pakistani exporters aware of environment-related trade issues and standards so that they can make necessary adjustment in a timely way; and, (ii) provide information representing the perspectives of Pakistani exporters to organizations engaged in setting standards.

CHAPTER 1. INTRODUCTION

Pakistan's growth strategy for the economy, as outlined in the 2011 Framework for Economic Growth, calls for reinvigorating the industrial sector and increasing exports. The industrial structure of the country has not experienced any significant changes in the past thirty years. Indeed, the slow structural transformation in Pakistan reflects the manufacturing sector's unsatisfactory growth performance. Manufacturing grew at an average 10.6% during the 1998-2007 period, but the growth rate deteriorated from 14% in 2004 to 5.4% in 2008 (Asian Development Bank, 2008). One of the several items that the Government of Pakistan (GoP) considers critical for sustained economic growth is the "liberalization of Pakistan's trade and investment regime" (Planning Commission, 2011, p.12). Indeed, the 2011 Framework report highlights the role of international trade and the need to keep abreast of changes in international markets in order to compete effectively in them.

Inadequate industrial environmental performance is an important contributor to the weak export performance of Pakistan's industrial sectors. The linkage between environmental management and poor export performance results because, at the international level, the gradual reduction of tariff barriers to facilitate trade has been accompanied by an increase in two types of non-tariff-related conditions: government environment-related requirements and voluntary environmental standards that often serve as de facto requirements. These government trade barriers are permitted under the WTO Technical Barriers to Trade Agreement and the Sanitary and Phytosanitary Agreement, which allow governments to impose rules to protect the health and safety of their citizens and the environment.¹ Trade barriers can also take the form of voluntary standards established by national, regional and international bodies, such as the International Organization for Standardization (ISO); an example is the ISO 14,001 standard for environmental management systems. Private standards can also be established by consortiums of firms and individual retailers (e.g., Wal-Mart's sustainability index).

The relationship between Pakistan's goals for industrial expansion and export growth and the environmental performance of Pakistani firms is the central theme of this report, which is framed as follows: Pakistan's industry is outdated and risks losing markets at a time when it may have the opportunity to occupy the space being left by manufacturing giants like China. The growth strategy for the economy, as outlined in the 2011 Framework for Economic Growth, calls for increased exports and a reinvigorated industrial sector². Unless careful attention is given to environmental management during industrial expansion, economic gains will be accompanied by huge environmental and social costs in the form of human morbidity and mortality and environmental damage from increased industrial pollution. Moreover, improved industrial environmental performance is essential if Pakistani firms are to be competitive in export markets like the EU in which business customers demand high environmental performance from their suppliers and often require certification to international standards, such as ISO 14,001. Pakistan is behind many of its competitors in export markets in terms of environmental management; in

¹ For details, see the WTO Website at http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm4_e.htm ; quoted material is from Sanitary and Phytosanitary Measures and Technical Barriers to Trade Summary, Center for International Development at Harvard University, <http://www.cid.harvard.edu/cidtrade/issues/spstbt.html> Accessed August 3, 2011.

² Annex 2 provides inputs for the debate on Pakistan's sustainable industrialization.

addition, a significant number of Pakistani firms are not even aware that their waste discharges are supposed to satisfy domestic environmental regulations.

In the interest of having a solid analytic foundation to mainstream sustainability in Pakistan's industrial sector, the GoP requested a non-lending technical assistance (NLTA) from the World Bank. The NLTA's objective was to examine how sustainability considerations could be mainstreamed into Pakistan's industrial sector, taking into account the strong linkages between environmental protection, sustainable use of natural resources, and business competitiveness (Annex 1 describes the NLTA's methodology).

One conclusion arising from this NLTA is that regulatory enforcement is not likely to motivate improved industrial environmental performance in the near term. This is because of the limited institutional capacity of Pakistan's environmental agencies; an institutional deficit that will be exacerbated by the time and resources needed to devolve environmental regulations to the provincial level pursuant to the 18th Amendment to the Constitution. But this lack of pressure to comply with regulations need not deter improved industrial environmental performance. Based on analyses conducted as part of this NLTA, which are summarized herein, adoption of cleaner production (CP) by firms and end-of-pipe treatment using common effluent treatment plants (CETPs) can work as complements in the short-term to help firms enhance environmental performance, become certified to ISO 14,001 and, hence, become more competitive internationally. In addition to using resources more effectively, CP methods can reduce the costs of (and potentially reduce reliance on) end-of-pipe treatment. These measures, together with a relaxation (on an interim basis) of the National Environmental Quality Standards (NEQS) will make it possible for more firms to satisfy standards required for certification to ISO 14,001 and other environment-related standards important in international trade.

This report is organized as follows: Chapter 2 sets the stage for the remaining chapters by discussing the relationships between industrial development and environmental degradation in Pakistan. Chapter 3 summarizes empirically established linkages between environmental performance and export competitiveness, and provides insights into the extent of compliance with ISO 9,001 and 14,001 by firms surveyed as part of this NLTA. Chapter 4 analyzes the institutional, regulatory, and firm-level impediments to improved environmental performance, including barriers to cleaner production and ISO 9,001/14,001 certification by Pakistani firms. Chapter 5 evaluates the effectiveness of current CP initiatives carried out by Pakistan's cleaner production centers, and Chapter 6 recommends potential interventions that could be undertaken by the Government of Pakistan to maintain and enhance the competitiveness of Pakistan's firms by improving their environmental performance.

CHAPTER 2. INDUSTRIAL DEVELOPMENT AND ENVIRONMENTAL DEGRADATION

Industries are a major source of both air and water pollution in Pakistan, and some of the major issues associated with each are discussed below. Of the 6,634 registered industries in the country, 1,228 are considered to be highly polluting (Sial, et al., 2006). Because of urban expansion, most industrial estates, which were originally in the suburbs, are now within the municipal boundaries of cities like Karachi, Lahore, Islamabad and Peshawar and are surrounded by commercial and residential areas. Many firms are located in industrial estates that house clusters of industries of different types. Industrial pollution problems also exist in rural areas, with affected zones generally being adjacent to industrial estates.

The majority of cement, fertilizer, sugar units, power plants and steel furnaces located in the vicinity of cities cause excessive air pollution (Ghauri, 2011; World Bank, 2011). In addition to emissions from large firms, many SMEs (e.g., brick kilns, steel recycling facilities, and plastic molding plants) cause a disproportionate share of pollution because they often use old tires, wood, and textile waste as fuels (Colbeck et al., 2010; World Bank, 2011).

Air pollution in Pakistan is increasing, especially in urban areas. Particulate matter (PM) is the most serious air pollutant, but in addition to PM, ambient levels of SO₂, CO, NO₂, and Pb have been reported at levels many times higher than World Health Organization (WHO) air quality guidelines. A 2010 review of available air quality monitoring data reported that Pakistan “is facing alarming levels of particulate matter” and cited Karachi as “the most polluted city in the world with respect to TSP [total suspended particulates].”³ The aforementioned review also noted that “present high concentrations are most probably due to industrial activities such as iron and steel production, copper smelting and refining, and manufacture of lead-containing compounds.”

Challenges associated with particulate matter that is less than 2.5 μ in diameter (PM_{2.5}) are especially notable because of their strong link to morbidity and mortality from respiratory diseases. The transport sector contributes the vast majority of PM emissions, but industries’ share is notable: roughly 12.2 percent of PM_{2.5} and 21.6 percent of PM₁₀ (i.e., particulate matter less than 10 μ in diameter) is linked to industrial activity. The Pakistan Environmental Protection Agency (Pak-EPA) reports that the main sources of particulate matter are vehicles, industry, the burning of solid waste, brick kilns and natural dust; it also characterizes PM as the most damaging air pollutant affecting human health in Pakistan. Monitoring studies conducted in 2000 by Pak-EPA showed that levels of particulate matter and lead in the ambient air of three cities—Lahore, Rawalpindi, and Islamabad—greatly exceed WHO guidelines.⁴

In addition to contributing to major adverse health effects from PM emissions, industrial activities have been associated with increases in lead poisoning, a major environmental health threat affecting children in Pakistan. Lead in outdoor air that comes from industrial sources is associated with waste incinerators, smelters, utilities, and lead-acid battery manufacturing and

³ This paragraph, including quoted material, is based on Colbeck et al. (2010).

⁴ Information in this paragraph is from: Ilyas (2007); Colbeck (2010); Pak-EPA (2005) and World Bank, 2011

repair facilities.⁵ A study by Khan et al. (2011) found that in areas located near industries in Punjab, 30% of children had blood lead levels (BLL) greater than 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$).⁶ Khan et al. also reported that the mean BLL for children between the ages 1-6 located 30 km from industries in Punjab was 10.9 $\mu\text{g}/\text{dL}$. Even at $\text{BLL} < 10 \mu\text{g}/\text{dL}$ there are adverse effects, such as impairment of childhood cognitive function, IQ losses in children under five years of age, and abnormal infant behavior (Mendelsohn et al., 1999).⁷

Industrial water pollution sources cause huge problems in Pakistan, especially sources that discharge heavy metals, complex organic compounds of various types, and pathogenic organisms. Heavy metals in wastewaters include arsenic, copper, cadmium, lead, chromium, nickel, mercury and zinc. Biochemical oxygen demand (BOD) and suspended solids (SS) can be problematic, damaging ecosystems and causing nuisance conditions of various types.

Although data limitations make it difficult to obtain accurate statistics, wastewater treatment levels are low: it has been estimated that only about 8 percent of the urban wastewater in Pakistan is treated before discharge, and the corresponding figure for industries is only 1 percent (Azizullah, et al., 2011; World Bank, 2006; WWF, 2007). Most wastewater is released untreated into drains, canals and rivers. In rural areas, proper collection and disposal systems are almost non-existent; sewage is often collected in open drains and disposed of in fields and open ponds. As a consequence, groundwater contamination is extensive, and some sections of rivers have been converted into the equivalent of open sewers. Much raw sewage is used for irrigation, and, as noted below, this may pose long term health risks that have not been studied carefully.

Major industrial contributors to water pollution in Pakistan include textiles, leather, pharmaceuticals, ceramics, petrochemicals, food processing, and steel, which are spread over Pakistan's four provinces, with the largest numbers located in Punjab and Sindh. SMEs in the manufacturing sector are of special significance because they number in the tens of thousands, making it a challenge for even well funded environmental authorities to keep track of waste releases.

Textiles and leather are two of Pakistan's major export products and they contribute substantially to water pollution in the country. A 2009 assessment of effluents from Pakistan's textile industries found pH, BOD, and total dissolved solids concentrations in effluent to be substantially higher than the NEQS (Irfan, 2009; World Bank, 2011). That assessment also examined leather tanning and concluded that most of the tanning firms were discharging chromium and other heavy metals in their effluents along with very high loadings of BOD. The tanning industry also releases wastes containing sulfides, chromate salts and organic compounds of various types. As an example, effluents from tanneries in Kasur have been linked to contamination of soil and water, including drinking water (Muneer, 2005). Electroplating is

⁵ The many sources of lead in the environment are summarized in the New York State Department of Health website: <http://www.health.ny.gov/environmental/lead/sources.htm> accessed January 24, 2012. Occupations classified as having a risk of exposure to lead (e.g., battery processing, painting, and ship repairs) are summarized by Gloag (1981).

⁶ This is the cutoff value defining BLL that is "elevated"—and a cause for concern—used by the US Centers for Disease Control and Prevention (CDC) and WHO guidelines.

⁷ IQ losses associated with BLLs $> 10 \mu\text{g}/\text{dL}$ were established many years ago.

another major source of industrial water pollution, with wastewaters that are highly acidic and contaminated with heavy metals.

Adverse human health effects of heavy metals have been extensively documented, and they include reduced growth and development, cancer, and damage to organs and nervous systems.⁸ In extreme cases, heavy metals can cause death to humans (Akpore and Muchie, 2010). In Pakistan, concern has been raised about the uptake by food crops of heavy metals originating in industrial effluents used for irrigation (Latiff, 2009; Lone, et al., 2003; Khan, et al., 2001 and Khan, 2011). For example, one study showed that use of industrial effluents from tanneries and a sugar mill near Peshawar for irrigation increased the contamination of heavy metals in edible portions of vegetables to levels that cause long-run potential risks to humans. The study found “27% [of the soil] samples were beyond safe limits of Ni, 73% for Cd, 64% for Cr, 100% for Cu, 36% for Pb, 73% for Zn and 100% for Mn” (Kahn, et al., 2007). In a study examining use of effluents containing heavy metals from Hattar Industrial Estate to grow vegetables and cereal crops, Sial et al. (2009) noted a “dire need to determine if these effluents are hazardous for soil and plant growth.” They also noted that: “Eating food or drinking water with very high levels of heavy metals severely irritates the stomach leading to vomiting and diarrhea. Similarly high levels of lead may decrease reaction time, and cause anemia, a disorder of blood in human beings.” These and many other adverse effects of heavy metals in food supplies were recently summarized by Marmiroli and Maestri (2008).

The economic consequences of air and water pollution have been documented, but the results do not separate out the effects of industrial sources. Nevertheless, the results suggest that the economic stakes involved in improving industrial environmental performance are substantial. A World Bank (2006) study found that environmental degradation in Pakistan amounts to *at least* 6% of Gross Domestic Product (GDP). In addition, World Bank (2008, 2012) studies estimated the total cost of effects of environmental risk factors on Pakistan’s economy and populace, particularly on Sindh, at more than 15% of GDP. This figure reflects direct and indirect costs linked to different aspects of environmental degradation, such as water pollution, forest degradation, agricultural soil salinity and erosion, and lead exposure, among others. Industrial activities figure prominently in this estimate.

Compliance of firms with NEQS is among the key issues discussed in this report. Pakistan has NEQS covering air quality, but data on compliance is scarce. According to Colbeck et al. (2010), “little has actually been done [to implement the Pakistan Clean Air Program] and the current air quality monitoring framework and facilities are wholly inadequate in scale, technical capacity, and operational methods.” This makes it challenging to comment on compliance with emissions limits by individual industrial sources. As reported later in this report, part of the NLTA involved a survey of firms, and those firms mentioned many challenges in complying with the industrial effluents portion of the NEQS, but not with the part concerning gaseous emissions. The lack of comment regarding gaseous emissions may be entirely a result of the paucity of emissions data and the widely acknowledged shortfalls in air quality monitoring within Pakistan. Water quality monitoring appears to be more widespread. The survey respondents generally interpreted lack of

⁸ Threats to public health are a special concern for two reasons: (i) metals can persist in natural ecosystems for extended periods; and (ii) they are subject to biomagnification (i.e. accumulation in successive levels of the biological chain, with potential for entering agricultural systems and contaminating foods at levels that can cause acute and chronic diseases).

compliance with NEQS to mean lack of compliance with the industrial effluent requirements portion of the NEQS. When the discussion below recommends relaxation on an interim basis of the NEQS, it is referring to the effluent limitations.

The discussion above clarifies the importance of industrial environmental management in terms of effects of environmental degradation within Pakistan. In the next chapter, the importance of industrial environmental management is addressed in a different context: the ability of Pakistani exporters to remain competitive.

CHAPTER 3. LINKAGES BETWEEN CLEANER PRODUCTION AND EXPORT COMPETITIVENESS

The integration of environmental considerations into a firm's business strategy—for example, through adoption of cleaner production and environmental management systems (EMS)—offers firms the opportunity for growth either by creating new products (e.g., via product differentiation) or by accessing new segments in the same market (e.g., niche markets). In this report, cleaner production is defined as “the continuous application of an integrated environmental strategy to processes, products and services to increase efficiency and reduce risks to humans and the environment.”⁹ This definition, which has been promoted for many years by the UN Environment Programme (UNEP), views CP as involving a comprehensive review of all aspects of business operations to identify opportunities to improve a firm’s business and environmental performance simultaneously. In addition to economic and environmental benefits, CP can be used to reduce occupational injuries, enhance staff morale, improve regulatory compliance, control pollution, and increase a firm’s profile among its competitors (Kahn, 2004).

In potentially lucrative export markets for Pakistan, such as the EU and the US, consumers and non-governmental organizations (NGOs) are increasingly demanding that environment be considered in product development, and in some cases, they are urging that the environment be considered in all aspects of a product’s life cycle.¹⁰ These demands have been reflected in both national policies of major trading partners and the policies of firms purchasing Pakistani exports. Increasingly countries in the EU and elsewhere are placing restrictions on environmental dimensions of imports as well as domestically manufactured items. Examples from the EU, Pakistan’s largest trading partner, include the Cosmetics Directive; the Waste Electrical and Electronic Equipment Directive; Restriction of Hazardous Substances in Electrical and Electronic Equipment; and Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). The latter has a particularly broad scope and restricts chemicals used in goods produced in and imported into EU member states. In addition, an increasing number of large international business customers of Pakistani exporters are requiring their suppliers to create environmental management systems and have them approved by independent auditors so they can be certified to ISO 14,001.

While they are not technically considered non-tariff barriers, the voluntary industry standards imposed by firms purchasing inputs can have the effect of excluding companies that fail to meet standards from trading with business customers that require compliance by suppliers. Voluntary standards issued by ISO are particularly notable because they are so widely used. Of all the ISO standards, the two of greatest relevance in the context of this NLTA are ISO 9,001 (from the ISO 9,000 series of *quality* management system standards) and ISO 14,001 (from the ISO 14,000 series of *environmental* management system standards). ISO 9,001 and ISO 14,001 contain specific requirements for a management system, against which a firm’s system can be

⁹ United Nations Environment Program <http://www.unep.fr/scp/cp/> accessed November 19, 2011.

¹⁰ A typical life cycle that a product pass through includes stages: raw material extraction, material processing of product inputs, transportation of inputs to production site, production of product/parts, assembly/packaging, and transportation to points of sale.

“certified.” When an organization’s quality (or environmental) management system is said to be certified, it means the requirements of the standard have been met by the organization’s management system, as verified by external audits conducted by an accredited “certification” (or “registration”) body. Of the two standards, ISO 9,001 is older and has been adopted by many more organizations. ISO 9,001 and ISO 14,001 are different from the vast majority of ISO standards, which are specific to a particular product, material, or process. In contrast, ISO 9,001 and ISO 14,001 are *generic standards*; they can be applied to many different types of organizations.

Many companies and agencies use a firm’s environmental performance as a criterion when choosing their suppliers of products and services. This practice, known as “green procurement,” is common in both the private and public sector (Ambec and Lanoie, 2007). In an OECD study examining the policies of 4,000 companies in 7 OECD countries, including France, Germany, Japan and the United States, 43% of the companies analyzed the environmental performance of their suppliers in making purchasing decisions.¹¹ Indeed, many ISO 14001 or ISO 9001 certified companies across the globe refuse to do business with non-certified companies.

Given the proliferation of the types of standards and procurement practices introduced above, adverse human and environmental health impacts are not the only impact of poor industrial environmental management. Failing to adequately consider environmental concerns can seriously reduce a firm’s competitiveness. According to Khan (2006), the general absence of quality consciousness in industrial operations, products and services in developing countries is costing them millions of dollars in terms of rejects and returned consignments.

Box 2.1. Cleaner Production and Improved Productivity

A growing body of empirical literature demonstrates the linkages between cleaner production and business performance measures, such as firm competitiveness. Indeed, some analysts postulated that improved environmental performance enhances financial performance (e.g. Porter and van der Linde, 1995; Hart, 1995). For example, Cohen et al. (1995) demonstrate a strong correlation between environmental performance and firm profitability. Russo and Fouts (1997) in their study of 243 firms, find that environmental performance and return on assets are positively linked, and that returns to environmental performance are higher for high-growth industries. Nehrt (1996) analyzes the relationship between the intensity of investment in pollution prevention and timing on firm profit growth in a sample of 50 pulp and paper firms. His findings confirm a positive relationship between early movers in pollution prevention and profit growth.

An empirical study in South East Asia by Rao and Holt (2005) demonstrated a significant correlation between greening the supply chain and the competitiveness and economic performance of the firms involved. For this study, a conceptual model was developed from literature sources and data collected using a structured questionnaire was given to a sample of ISO 14001 certified firms in South East Asia. A linear structural equation modeling approach was used to determine if relationships existed among greening different phases of the supply chain, competitiveness, and economic performance. The study found that, as a result of savings in raw material and energy and water usage, greening of production and operations enhances competitiveness and economic performance of firms.

¹¹ Johnstone, et al. (2007), as cited in Ambec and Paul Lanoie (2007, p.5).

A case involving Pakistani surgical equipment manufacturers provides evidence that firms in Pakistan can respond positively to pressure to meet international quality standards.¹² In the mid-1990s, exports from Sialkot surgical equipment companies were excluded from the United States for failing to meet US quality assurance standards, and they were subsequently required to have ISO 9000 certification in order to sell in the EU market. In order to conform to international quality assurance standards, Sialkot firms took measures to improve efficiency in production processes and the result was reduced costs and increased productivity, as well as enhanced product quality. Indeed, the *awareness* of the necessity to upgrade was rapid, even though the process of upgrading production practices was gradual. By 2000, over two-thirds of Sialkot's surgical equipment manufacturers met the quality assurance standards imposed by both the US and the EU. Currently, over 170 firms in the Sialkot surgical equipment manufacturing cluster are certified to ISO 9000 standards, and this has come about with little or no support from external buyers or local institutions. Knowledge spillovers within the cluster concerning quality management practices and the increasing presence and availability of specialist local consultants and auditors facilitated certification to the standards. Although the cluster has not yet fully recovered from the adverse impacts resulting from the product bans during the mid-1990s, the sector has taken strong measures to adhere to international standards, with consequent increases in competitiveness.

A survey of leather tanneries and textile processing firms conducted as part of this NLTA provides insights into the extent of compliance with ISO 14,001 by surveyed firms, as well as the reasons for compliance.¹³ The survey centered on leather tanneries and textile processing for two reasons: (i) textiles and leather are two key sectors in Pakistan's manufacturing economy; and (ii) textiles and leather are among the most polluting industrial sectors, and, within these sectors, production of cloth and tanning leather are the most polluting processes. While leather is not as important as textiles in terms of contributions to Pakistan's economy, the pollution from leather elevates its significance from an environmental perspective.

Of the companies included in the survey, 53 firms—35 tanneries and 18 textile processing firms—provided complete responses to questions concerning ISO 14,001 awareness, firm size and whether or not they exported their outputs. In distinguishing SMEs from large firms, enterprises with up to 250 employees were categorized as SMEs; this is the employee cutoff used by Pakistan's Small & Medium Enterprise Development Authority.¹⁴ Only 56% (22 out of 39) of the SMEs were aware of ISO 14,001, but nearly 93% (13 out of 14) of the large firms (almost all of which were in the textile sector) had heard of it (Figure 3.1). The term “engagement in exports” in the caption for Figure 3.1 is a shorthand way of saying a firm either sold all of its

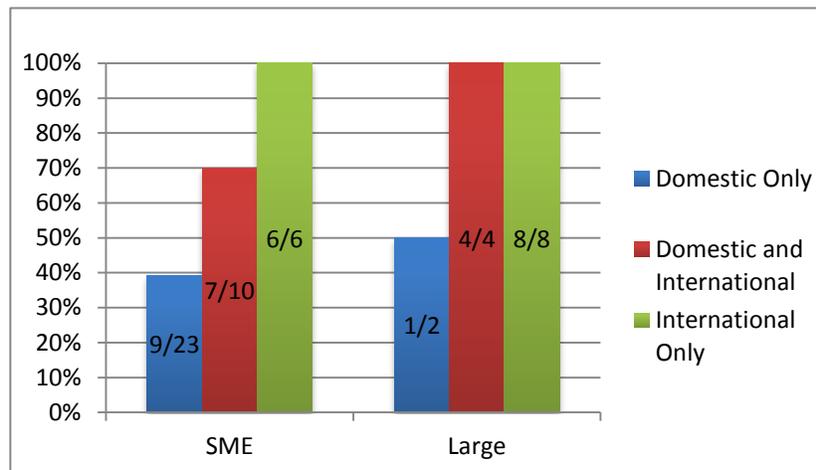
¹² This paragraph is based on Nadvi (1999), Nadvi et al. (2005) and Agency for Toxic Substances & Disease Registry, 2006.

¹³ The survey involved structured interviews with CEOs and senior managers at randomly selected firms in three cities: Sialkot, Lahore and Karachi. The survey involved interviews by Pakistani consultants that lasted three to five hours per session. It included about 25% of the 222 leather tanneries in Sialkot using the services of the Cleaner Production Center and about 25 % of the 45 tanneries served by the Cleaner Production Institute in Lahore and Karachi. CPI also provides services to 45 textile firms in the Lahore area, 51 in Faisalabad, and 21 in Karachi, and a random sample of those firms were included in the survey. The firms to be surveyed were all randomly selected. Results concern a subset of survey responses, namely those for which all relevant questions were answered; in all figures, “n” represents the size of the sample that contained usable responses for the variables presented.

¹⁴ Small & Medium Enterprise Development Authority,¹⁴ <http://www.smeda.org.pk/main.php?id=2> accessed January 19, 2012.

output in international markets or sold part of its output domestically and part internationally. A strong correlation exists between ISO 14,001 awareness and target market (domestic only vs. international *or* domestic and international), with firms engaged in exports being much more likely to be cognizant of ISO 14,001. The result that sales overseas appear to play a key role in firms' awareness of ISO 14,001 is not surprising given the increasing importance attached to the environmental performance of suppliers by business customers in the EU and the US, Pakistan's two largest export markets. Interestingly, the one large firm that was not aware of ISO 14,001 was a textile -processing firm that sold only in domestic markets. Since the variable used to reflect overseas sales is also correlated with firm size, it is not possible to say which is more important: market or firm size.¹⁵ Large firms clearly have more opportunities to hire staff members that specialize in ISO-related issues, and they are, in this sample at least, the firms that are more likely to export some or all of their outputs.

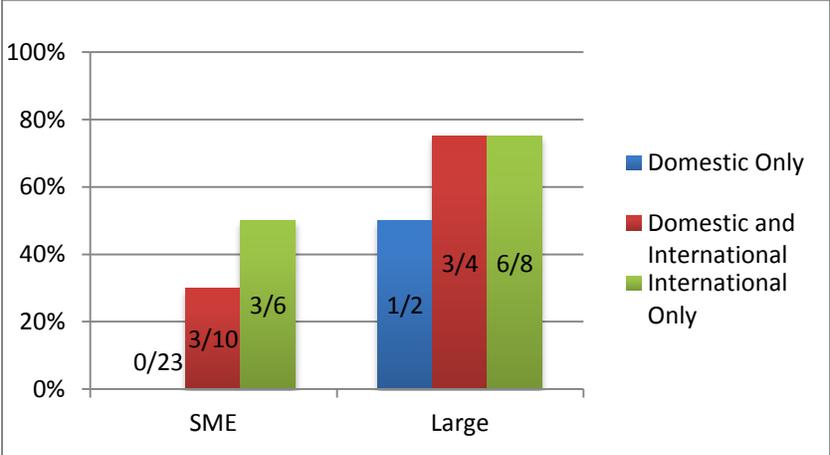
Figure 3.1. ISO 14,001 Awareness in Terms of Firm Size and Engagement in Exports
 (Labels correspond to total firms aware out of total firms responding; n=53)



In comparison to firms that are ISO 14,001 certified, many more firms have an environmental management system: 16 of the 53 firms have an EMS, but only 9 of the 53 firms were ISO 14,001 certified. The differences are notable for SMEs: only 2 of the 39 SMEs (5%) were ISO 14,001 certified, while 6 of those 39 enterprises (15%) had an EMS (Figure 3.2). The comments from respondents suggest that a number of firms found the creation of an EMS worthwhile. However, unless their foreign business customers required it, firms generally did not perceive any additional value in having their environmental management systems certified to ISO 14,001. They felt they could obtain the benefits of an EMS without incurring the costs and time needed for certification and surveillance.

¹⁵ Details on correlations and other aspects of the survey are given in Annex 4: Cleaner Production in Pakistan's Leather Tanneries and Textile Processing Firms

Figure 3.2. Existence of an EMS in Terms of Firm Size and Engagement in Exports (Labels correspond to total firms with an EMS of total firms responding; n=53)

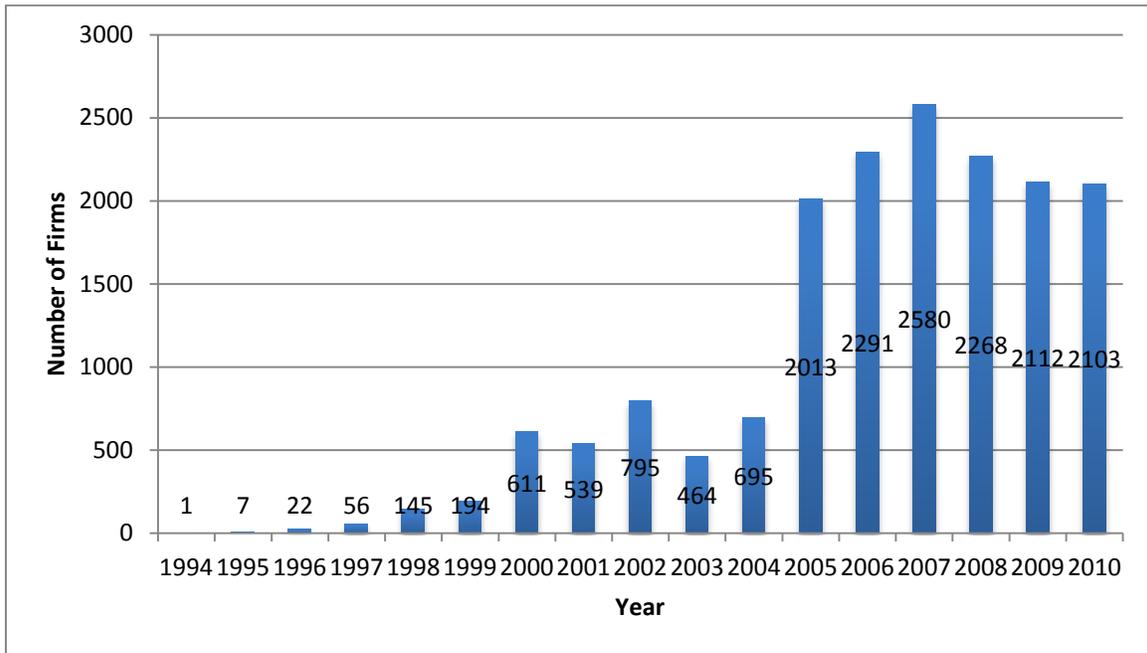


In general, the pace of ISO 9,001 certifications since 2005 has remained relatively stagnant in Pakistan. Data from the 2010 ISO Survey of Certifications (ISO, 2010) reveal that from 2005 through 2010, the pace of ISO 9,001 certifications did not change notably. In fact, the number of firms certified to ISO 9,001 in 2010 (2013 firms) was only about 5% higher than it was in 2005 (see Figure 3). Significantly, the growth in number of certifications was slow despite efforts by the Export Promotion Bureau of Pakistan.¹⁶ The Bureau’s initiatives to promote certification have included: preparation of “how-to booklets,” mass media campaigns, training courses and seminars, and partial reimbursements for costs of ISO 9,001 certifications. In addition, the Pakistan National Accreditation Council (PNAC) has approved more than a dozen ISO certification bodies. Of these the two most significant, in terms of numbers of clients in 2006, were Moody International (Pvt.) Limited and Bureau Veritas Quality International.

In countries throughout the world, the number of certifications for ISO 14,001 is lower than those for ISO 9,001, but in Pakistan the numbers are *much* lower. In 2010, there were about 251,000 firms certified to ISO 14,001 worldwide compared to about 1,110,000 certified to ISO 9,001. For that year, the ratio of ISO 14,001 certifications to ISO 9,001 certifications worldwide was about 0.23. In Pakistan, the ratio was only slightly more than half the ratio based on global statistics in 2010: the ratio of ISO 14,001 certifications to ISO 9,001 certifications in Pakistan was 258/2103, or about 0.12. As in the case of ISO 9,001, these relatively low levels of ISO 14,001 certifications persist despite the efforts that the Government of Pakistan, the provincial environmental protection agencies (EPAs) and others have made to promote ISO 14,001. However, while the absolute number of ISO 14,001 certifications is still low, the number has significantly increased in the last five years (Figure 3.4).

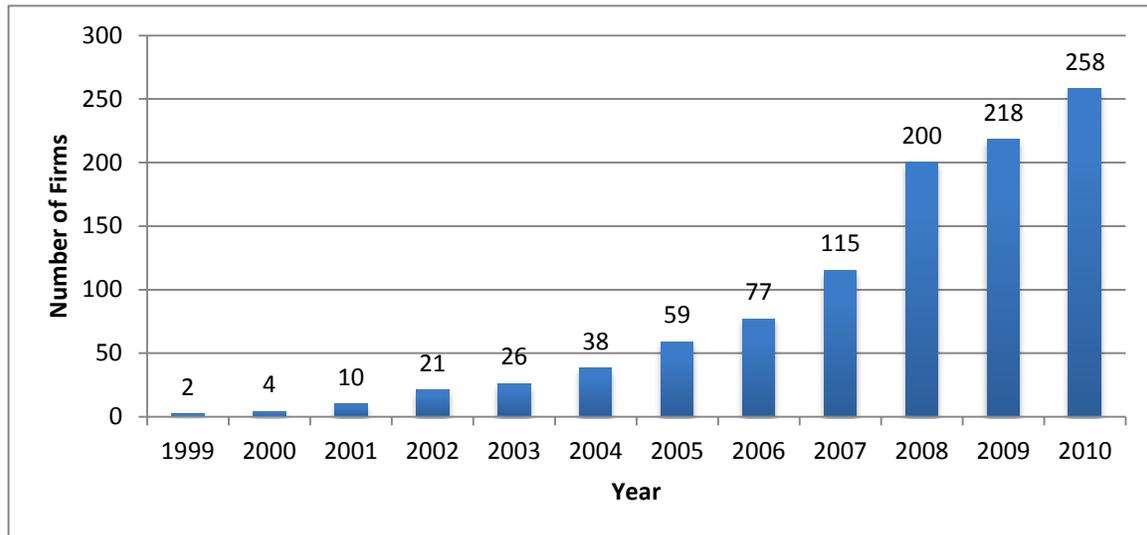
¹⁶ The remainder of this paragraph is based on information in Malik and Zhuang (2006).

Figure 3.3. Number of Industrial Firms Certified to ISO 9,001 in Pakistan: 1994-2010



Source: ISO Survey of Certifications 2010

Figure 3.4. Number of Industrial Firms Certified to ISO 14001 in Pakistan: 1999-2010



Source: ISO Survey of Certifications 2010

The next chapter examines how shortfalls in industrial environmental performance may impede expansion of Pakistani exports, and it is followed by a chapter that centers on ways that cleaner production measures are being used to improve environmental performance. Results in these

chapters provide a foundation for recommendations (in the final chapter) on how Pakistan's industrial environmental performance and export competitiveness can be improved.

CHAPTER 4. IMPEDIMENTS TO IMPROVED ENVIRONMENTAL PERFORMANCE, CLEANER PRODUCTION IMPLEMENTATION, AND ISO CERTIFICATION

Analytic work conducted in the course of this NLTA demonstrates that there are significant institutional factors at the firm level that are preventing Pakistan from enhancing its industrial environmental performance. These factors are examined below.

4.1. Institutional Constraints

Following passage of the 18th Amendment to Pakistan's Constitution in April 2010, the institutional context for environmental management changed. The amendment called for the transfer, from the federal government to the provinces, of responsibility for creating and implementing environmental laws and regulations. Pursuant to the 18th Amendment, the Ministry of the Environment was dissolved. In October 2011, the Prime Minister announced creation of the Ministry of Disaster Management (MDM), which was later transformed into the Ministry of Climate Change (MCC). Following creation of the new Ministry, many of the environmental-management-related functions that had been formerly under the purview of the Ministry of the Environment, were placed within the MCC. It is expected that by mid-2012, the new Ministry will begin actively carrying out its environment-related functions, particularly coordination in the context of international protocols and environmental management among the provinces.

The Pakistan Environmental Protection Agency, which had originally been under the Ministry of the Environment, was made an attached department of the Capital Administration & Development Division soon after that Ministry was eliminated. However, after the new Ministry of Climate Change was formed, Pak-EPA was moved under the new Ministry. Until the devolution process moves further forward, Pak-EPA will remain responsible for implementing the Pakistan Environmental Protection Act (PEPA), 1997.

The provincial EPAs, which are charged with implementing the existing legal and regulatory framework, have ambitious mandates, but, in general, they face obstacles in their work because they have insufficient staff, small budgets, low political prestige, little or no administrative autonomy, and high staff turnover rates. The agencies have rarely been adequately staffed with experts to: monitor and enforce ambient air, water, and soil quality standards; protect valuable natural resources, review environmental impact assessments (EIAs) of major and complex projects and monitor their implementation; and carry out meaningful public consultations with affected communities. As a result, enforcement of environmental regulations is lax, and the strict penalties that are sometimes available under the law are almost never imposed. This occurs for numerous reasons, including a lack of sufficient technical capacity to provide sound evidence of infractions, and the fear of political retribution. Furthermore, use of the provincial EPA's limited resources is not typically based on priority setting supported by sound analytical work, including assessments of cost-effectiveness. The consequences for Pakistan are, among others: (i) poor ambient air and water quality; (ii) continuing destruction of valuable natural resources; (iii) high morbidity and mortality from environmentally-related diseases that disproportionately affect poor and disadvantaged communities; and (iv) ineffective review process of EIA documents. The latter causes long delays in the issuance of environmental permits, adding unnecessary costs to projects.

In addition to the above-mentioned problems, environmental management has also suffered because of the absence of leadership by Pakistan's Environmental Protection Council (PEPC), a high-level body with members at the ministerial level. The Council not only failed to meet at least twice yearly as required under PEPA, 1997, but also failed to meet at all between 2004 and 2010 (Annex 5 contains further details on environmental management institutions in Pakistan).

4.2. Constraints on Meeting NEQS Requirements

There have been major shortfalls in compliance with NEQS requirements, and one of the reasons is that the standards are not attainable by many firms under the challenging economic and public safety conditions that now exist within Pakistan. The weak enforcement of and compliance with NEQS is demonstrated by data gathered in the previously mentioned survey of firms conducted as part of this analytic work. Results below concern two major industrial subsectors: leather tanning and textile processing.

The survey responses for the question on awareness of the NEQS were usable for 57 firms.¹⁷ Results indicate that NEQS awareness varied significantly by firm size: larger firms were more aware of NEQS than SMEs (Figure 4.1). All but one of the 15 large firms were aware of the existence of the standards, but only one-third of the 42 SMEs (14 out of 42) knew anything about NEQS. For the 42 SMEs, the firms that had the least awareness of NEQS were those that sold only in domestic markets; 14 of the 15 large firms knew about the existence of NEQS regardless of whether they exported. NEQS awareness on the part of SMEs was greater for firms active in international markets. As Figure 5 shows, firm size and engagement in exports are correlated, with a far higher share of large firms (typically in the textiles processing sector) selling either all or part of their output overseas. Whether a firm was aware of NEQS was significantly correlated with *each* of the following variables: firm size, industrial sector, and whether a firm exports all or part of its output. It is difficult to separate the individual influences of firm size, industrial sector and engagement in exports because (except for industrial sector and engagement with exports) the three variables are themselves correlated with each other (see Annex 4 for correlation details).

¹⁷ Some firms did not answer the question and other firms provided answers that were inconsistent with answers to other questions.

Figure 4.1. Variations in Awareness of NEQS with Firm Size and Engagement in Exports (Numbers within bars correspond to total firms aware out of total firms responding; n=57)

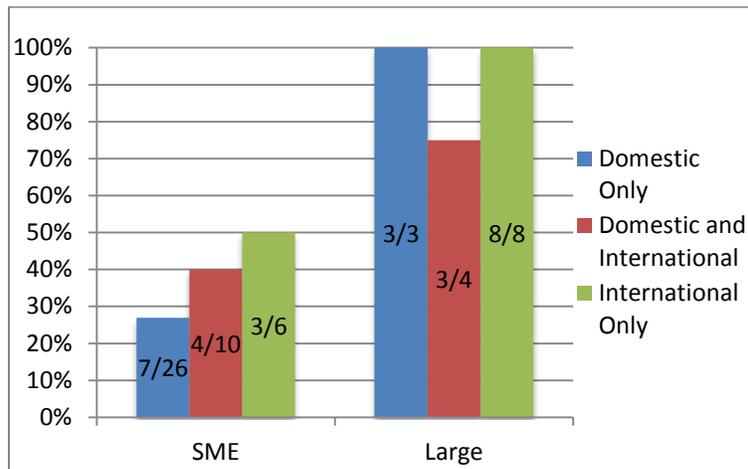
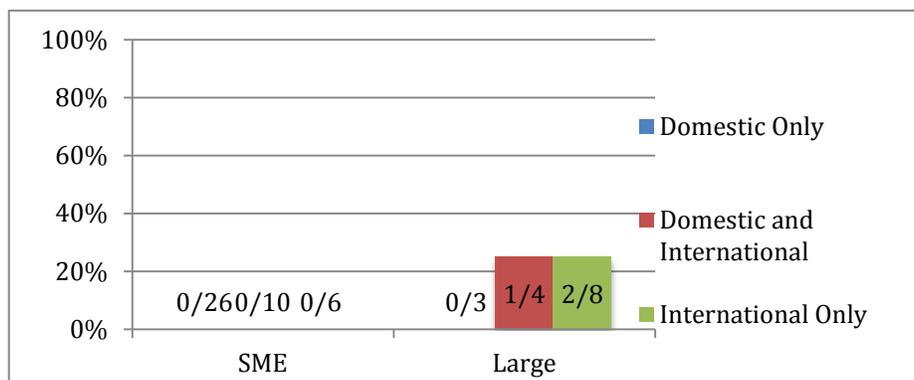


Figure 4.2 shows results for NEQS compliance for the aforementioned 57 firms, and the results reveal that the extent of noncompliance is striking: 54 of 57 firms failed to satisfy the NEQS. None of the 42 SMEs met the standards. While the compliance results for large firms were better in relative terms, they were nonetheless poor. Only 20% (3 out of 15) large firms were in compliance. All three of these firms were engaged in exports and the one firm that elaborated on the subject indicated that the motivations to comply with NEQS were “international customer demands” and “increased competitiveness.”

Figure 4.2. Variations in NEQS Compliance with Firm Size and Engagement in Exports (Numbers within bars correspond to total firms in compliance out of total firms responding; n=57)



A number of reasons were given for the lack of compliance with NEQS by firms that were aware of the standards but out of compliance. By far the most common explanation was the inability to afford construction of a secondary wastewater treatment plant needed to meet the standards. A number of survey respondents indicated that common effluent treatment plants, which would treat industrial wastewater from multiple sources, should be built and operated by others (e.g.,

the government, managers of an industrial cluster, or an industrial association). They also felt that fees should be paid by users, presumably based on the volume and strength of their wastes. A number of survey respondents mentioned that they would be able to meet the NEQS if CETPs were constructed for their clusters. The CETP for the leather tannery cluster at the Korangi Industrial Area (Karachi) provides treatment of the wastewater from 130 tanneries that is adequate for meeting the NEQS, but the Korangi industrial estate is huge, housing more than 2000 firms from different sectors. Wastewater from most firms in the industrial estate is discharged without treatment.¹⁸ Moreover, while the Korangi CETP was built for tanneries, not all of the tanneries are using the facility. More generally, a challenge in using CETPs is not only getting the plants built and operated, but also getting all firms in a cluster to connect to the plant and to pay fees needed for plant operation and maintenance.

Another reason cited as the basis for non-compliance was the unrealistic nature of the NEQS. Some responders said the standards were excessively stringent, especially given conditions in Pakistan. For example, some firms said the standards for biochemical oxygen demand and chemical oxygen demand were too rigorous. They had constructed primary treatment plants but could not meet the standards for these parameters and they could not afford to build the required secondary treatment plants. Many respondents referred to the construction of wastewater treatment plants as a "dead investment," by which they meant an investment that would yield no financial returns to the firm.

¹⁸ Personal communication in 2008 between Skip Luken, consultant, and the general manager, environmental engineering division, NEC Consultants (Southern zone) concerning the CETP at Korangi.

CHAPTER 5. EVALUATION OF CLEANER PRODUCTION INITIATIVES

During the 1990s, funding from Pakistan's government together with international donor funding and assistance from industrial associations within Pakistan was used to create three cleaner production centers. These centers have played a leading role in encouraging firms to adopt CP practices. For the most part, the centers have focused largely on providing technical assistance and, in some cases, the sale of environmental services. Donor funding played a role in founding all three centers, and only one of the three now operates without either government or donor financial support.

The cleaner production initiatives undertaken by the centers have focused on conducting environmental and energy audits to identify appropriate CP measures, providing technical assistance to industry in implementing CP measures, and raising awareness of CP. However, the technical assistance programs have operated without an overall national strategy or plan. While the technical assistance initiatives represent a good start, the challenge faced in Pakistan (and many other countries) is to change the long-term behavior of not just a few demonstration firms or a few hundred firms served by CP centers, but of the much larger number of company owners and managers in the many industrial firms that have significant waste discharges.

Each of Pakistan's three CP centers (described below and in Table 5.1) has the capacity to educate and incentivize the firms they serve to adopt CP practices.

- The Cleaner Production Centre (CPC), which is based in Sialkot, has only worked with leather tanneries in the Sialkot area, and much of its work has been with SMEs. It was started using funds provided by GoP and bilateral aid from Norway and its continuing operation depends on securing funding from donors and/or the government.
- The Cleaner Production Institute (CPI), with offices in Lahore, Faisalabad and Karachi, serves several industrial sub-sectors: leather tanning, textile processing, sugar, and pulp and paper. The CP projects it recommends are often executed by consultants, particularly the National Environmental Consulting Pvt., a private for-profit firm that is legally independent of CPI. The center was started using funds provided by the Embassy of the Kingdom of the Netherlands and has had a long term relationship with the Embassy. As in the case of CPC, the Cleaner Production Institute continues to rely on donor funding.
- The National Cleaner Production Centre-Foundation (NCPC-F), which is located at the Attock refinery in Rawalpindi, focuses on providing CP support to the oil and gas sub-sector and, to a lesser extent, to other sectors. It has the broadest geographical coverage of the three centers and operates primarily in Punjab and Sindh. Unlike the other two CP centers, NCPC-F is not dependent on donor or government funding. Although it was initially started with money from UNEP and the United Nations Industrial Development Organization (UNIDO), since 2005, it has been financially self-sufficient. It obtains its revenues by selling environmental services; e.g., monitoring of industrial waste discharges, and the preparation of environmental impact assessments and energy audits.

Table 5.1. Institutional Arrangements for the Three CP Centers

Center/Arrangement	CPC	CPI	NCPC-F
Date Established	1999	2004	1998
Degree of independence	Subsidiary of Pakistan Gloves Manufacturers and Exporters Association	Fully independent, private	Fully independent
Legal status	Ministry of Commerce	Registered private	Registered private company
Host institution	Pakistan Gloves Manufactures and Exporters Association	Collaborates with four industrial associations	Ministry/ public entity

Results from the aforementioned survey of firms indicate that the CP centers had a positive impact: firms adopted a notable fraction of the CP options presented by the centers. Table 2 provides a breakdown, by firm size and sector, of the 76 firms participating in the survey that responded to questions on numbers of CP measures adopted. The average adoption rate in Table 5.2 for firms served by CPC was about 47%, whereas the average adoption rates were over 60% for surveyed firms served by CPI.¹⁹ Firm size may explain some of the variation in adoption rates because larger firms have greater capacity for conducting technical analyses and obtaining investment funds, and thus they may be able to take advantage of a greater number of CP options. The initial search for CP options was practically costless to the firms because the CPC and CPI staffs conducted audits and presented the measures to the firms. The firms were in the position of then deciding which options they found attractive enough to implement.

Table 5.2. Number of CP Options Implemented by Surveyed Firms (n=76)

	CPC- Leather	CPI- Leather	CPI- Textiles
Number of firms responding	41	7	28
Total number of CP options presented	19	37	40
Average number of options adopted	8.9	22.3	26.6
Average % of options adopted	46.9%	60.2%	66.4%

Regardless of firm size and sector, the survey results clearly indicate that the CP centers served as the primary source of information on CP for the vast majority of surveyed firms. Of the 77 surveyed firms that responded to relevant questions, 77.5% indicated that a CP center was instrumental in providing information on CP measures that firms could adapt to cut pollution and save money. That is not to say that other organizations did not play a role. Indeed, some survey respondents mentioned the importance of industry associations in assisting with the identification and implementation of CP measures. On a few occasions, there was also mention of a firm's in-

¹⁹ These figures likely represent an underestimate of actual adoption rates because not every option presented by the centers was applicable in every case; the centers used standardized protocols in delineating CP measures.

house expertise. That said, there is little question that the CP centers have played a critical role in providing firms with the information they needed to identify and implement CP measures.

Studies conducted in the course of this NLTA found that there were significant reductions in both pollution discharges and production costs as a result of implementing CP measures. For example, in textile processing mills, BOD levels decreased substantially (i.e., in some cases from more than 1700 mg/l down to 80 mg/l) after CP measures were implemented. Moreover, as the figures below for the textiles processing sector illustrate, cost savings were often significant.

- Lahore: In one firm, the cost of installing a caustic recovery plant was PKR 3.8 million, and it resulted in savings of up to PKR 1.5 million per month.
- Faisalabad: The cost for implementing CP measures at a firm was PKR 9 million and resulted in energy savings of PKR 27 million per year.
- Karachi: In one firm, the cost of installing three OGDEN pumps for condensate recovery was PKR 6.5 million for each pump. The pumps recovered condensate at a rate of 6500 kg/hr, which yielded large savings compared to investment.

As another example, Attock Refinery Limited (ARL) achieved significant savings as a result of implementing CP measures during 2007-08. By optimizing steam production, it reduced furnace oil consumption by nearly 10 million lb/year. In addition, CO₂ emissions were reduced by 23.1 metric tons after the installation of solar water heaters. ARL was able to recycle and reuse roughly 10 million gallons of its effluent water (3-4 percent) after implementing energy conservation and efficiency improvement measures. The key factors that influenced ARL to implement CP included: improving the environment, achieving cost savings, and increasing competitiveness.

Although exceptions exist, the interviews of survey respondents made it clear that owners and managers of SMEs were often not knowledgeable of environmental issues in general. Many were not aware of the relationships between CP and product quality or improved competitiveness, and they typically faced virtually no pressure to meet environmental regulations; many of the SMEs were unaware that NEQS even existed and a number of SMEs had never had any contact with an EPA staff member. In contrast, the large firms (i.e., greater than 250 employees) had more highly educated owners, managers and staffs. Interviewees at large firms often had an understanding of the explicit links between CP, EMS, ISO 14001, potential cost savings, possible reduced costs in meeting NEQS, and how all of these factors affected competitiveness. In addition, large firms typically had had some contact with EPAs and they knew about NEQS, even though most failed to comply.

The work of CP centers was found to be generally well-respected and valued by firms. Surveyed firms were asked to characterize the support offered by the CP centers, and 75 firms provided usable responses. Those responses were sorted into three categories based on terminology used in the survey. Across both industries and both CP centers, at least 80% of the responses consisted of the highest ratings (excellent or very good) and no responses characterized the CP center support negatively. In addition, for CPI's work with textile processing firms, 96% of respondents gave the highest ratings.

Notwithstanding the high levels of satisfaction that firms have with the services received, the centers are apparently not being effective in instructing firms about underlying concepts linked to CP. Indeed, the vast majority of the surveyed firms were unable to respond well to the question: “How do you define cleaner production?” About 13.8% of the 80 firms that responded to this question indicated either that they had no idea of what cleaner production meant or they provided a response that was far from correct, such as equating CP with end-of-pipe waste treatment. Another 73.8% responded in very general ways, with the following responses being representative: CP means “to care and save the environment and use less water,” and “to preserve the environment and promote energy conservation.” A much smaller fraction of the firms participating (12.5%) indicated the respondent had a good conceptual understanding of CP; e.g., “CP is the application of different practices in the production process by which we can minimize or eliminate risk factors on humans and environment.” It is only these relatively few respondents that conceptualized cleaner production as an ongoing process of discovering ways to improve efficiency, minimize waste generation or reduce risks.

Many of the firms receiving CP services from the centers appear to simply have adopted a number of the recommendations provided by the CP centers based on energy and environmental audits without having an understanding of CP as (using key words from the UNEP definition of CP introduced earlier in this report) “the continuous application of a ... strategy ... to increase efficiency and reduce risks to humans and the environment.” The words “*continuous*” and “*strategy*” are missing from most of the conceptualizations offered by survey respondents in their definitions of CP, but these words are essential if CP is to be considered part of a firm’s ongoing way of doing business. More generally, because firms and production technologies continually change, the options for CP also change. A firm that embraces CP as a strategy is one that conducts energy and environmental audits periodically and provides employees with CP training and ongoing incentives to discover new ways of cutting costs by conserving water and energy and generating less waste.

These results point to a missed opportunity for the CP centers. Instead of concentrating their main efforts on presenting CP measures for the firms to adopt, the centers could provide on-site instruction on how to conduct audits and help firms structure employee training, incentives and responsibilities so that the implementation of adopted CP measures is effective and the discovery of new CP measures is rewarded. Moreover, survey results revealed that many of the firms, especially SMEs, are unaware of the advantages of establishing environmental management systems and becoming certified to ISO 14,001. As mentioned, a large number of the surveyed SMEs had not heard of ISO 14,001.

The firms participating in the survey also provided recommendations for improving services provided by CP centers. As indicated in Table 5.3, areas that respondents felt needed the most strengthening varied by sector and center. The most common suggestions for improvement for CPC included increasing the amount of staff knowledge and expertise regarding the details of the leather tanning industry and increasing capacity overall (e.g., by increasing the frequency and consistency of CPC staff member visits and improving laboratory services). For the 8 leather tanneries served by CPI, the only suggestions offered was for CPI staff to keep up-to-date on latest CP technologies that the firms could implement and for CP centers to provide more training to the firms’ staffs. One of the most frequently made suggestions by textile processing firms served by CPI was to have CPI staff members keep pace with technological advances.

Another commonly mentioned suggestion concerned the need for overall capacity building. While these results point to shortfalls in performance of the CP centers, it is notable that the suggestions all reflect the desire by firms to have more and better CP services.

Table 5.3. Suggestions from Firms for Improvements to CP Centers

Suggested Improvements	Leather – CPC: n= 42	Leather- CPI: n=8	Textile Processing – CPI: n=30
Increased industry expertise	22.0%	0%	18.5%
Need more staff	17.1%	0%	0.0%
More frequent visits	19.5%	0%	7.4%
Improved laboratory services (e.g. for tests on offered in Pakistan)	19.5%	0%	3.7%
Increased awareness building	7.3%	0%	3.7%
Increased capacity	34.1%	0%	33.3%
Better solid waste management guidance	4.9%	0%	0.0%
Keeping pace with latest technologies	9.8%	28.6%	37.0%
More training for firm staff	7.3%	28.6%	29.6%
Avoid slowing down of services provided	7.3%	0%	0.0%

CHAPTER 6. RECOMMENDATIONS AND CONCLUSIONS

Pakistan has paid extraordinarily high costs for the environmental degradation that has taken place. Air pollution, poor water quality, and inadequate water supply and sanitation result in tens of thousands of deaths annually. Estimates of the damages from air pollution and water and sanitation shortfalls total at least 6% of the country's GDP. By itself, this would be enough reason to encourage improved industrial environmental management. But there is another compelling reason for doing so: Pakistani exporters will not be competitive if they are unable to satisfy environmental regulations of governments that receive exports and of international business customers that demand high environmental performance from their suppliers.

The discussion below uses the analyses in previous chapters as a basis for identifying steps that the GoP can take to significantly improve the competitiveness of Pakistani firms by enhancing industrial environmental performance. The rationale for the recommended strategy can be summarized as follows: the limited capacity of the provincial EPAs combined with the time it will take to devolve environmental regulations to the provincial level means that regulatory enforcement is not likely to motivate improved industrial environmental management in the near term. An effective short-term strategy for enhancing competitiveness via improved industrial environmental performance builds on the self-interest of firms in cutting costs and increasing their market shares in export markets. Competitive pressures will only increase in the future because governments in target export countries and multinationals will be demanding higher levels of environmental performance of suppliers. Furthermore, as a result of the increased emphasis by multinationals on green supply chain management, the pressures currently faced by firms engaged in exports for improved environmental management will eventually shift to firms upstream in supply chains. These supply chain linkages will eventually affect Pakistani firms that sell exclusively in domestic markets but have business customers that sell to multinationals and other firms in the EU, the US and elsewhere.

Certification to ISO 14,001 can play a key role in enhancing competitiveness, but firms will face difficulties in becoming certified without making some changes. Even after adopting CP measures, firms may face problems because they have no prospects for meeting the current NEQS; certification requires either meeting applicable standards or making continual progress in doing so. Therefore, in addition to emphasizing expansion of CP programs, the recommended strategy emphasizes making the NEQS less stringent on an interim basis and constructing CETPs in industrial clusters to make environmental compliance (and therefore ISO 14,001 certification) more feasible. Collectively, the recommendations below are intended to make it possible for Pakistani firms (export-oriented and domestic alike) to compete more effectively.

The recommendations are organized as follows. The initial recommendations concern ways in which government agencies can be strengthened so that environmental regulations can be effectively enforced. This is followed by recommendations to revise the NEQS downward on an interim basis so that they can be attained under current economic conditions in Pakistan. It is also recommended that CETPs be created in existing and new industrial clusters so that regulatory compliance is feasible for many more firms. The combination of realistic plans to attain the NEQS along with the creation of environmental management systems will allow many more

Pakistani firms to become ISO 14,001 certified.²⁰ The recommendations also concern steps that can be taken to extend the work of the cleaner production centers and industry associations to advance the diffusion of CP concepts and further promote integration of CP and EMS into the business strategies of firms. The final set of recommendations presented below center on what can be done to improve Pakistan's quality infrastructure (i.e., infrastructure for metrology, standardization, testing, quality management and conformity assessment) and steps that can be taken to make it easier for Pakistani firms to comply with ISO 14,001 and other international environmental standards.

6.1. Augmenting the Capacity of Governments to Meet Environment-related Responsibilities

6.1.1. Provincial-level Units

The work of following up on the environment-related requirements of the 18th Amendment of the Pakistan Constitution will fall heavily on the provincial EPAs, and they will require considerable strengthening to carry out their expanded duties. The 18th Amendment requires that much of what is now national environmental policy be translated down and recast as provincial environmental policy, and the provincial EPAs are likely to be tasked with carrying out the staff work needed to facilitate these changes. However, provincial EPAs are not currently well-staffed and lack the capacity to effectively enforce environmental regulations. Evidence for this is that the majority of SMEs participating in the survey of firms carried out as part of this NLTA were not aware of the existence of NEQS and many firms had no contact at all with an EPA. In addition, provincial EPAs have limited funding for designing and implementing programs to address high priority environmental problems. They also lack the ability to effectively implement existing environmental impact assessment requirements, especially for large infrastructure projects. The capacity of the provincial EPAs should therefore be expanded by significantly increasing the staffing of the provincial EPAs as well as their levels of professional education and experience. Funding will also be needed to augment the EPAs' capacity to conduct environmental monitoring and enforce compliance with environmental requirements. Augmented funding and staffing for provincial EPAs should be a near term priority.

In order to respond effectively to the environment-related implications of the 18th Amendment, environmental units should be created within the Planning and Development departments of provincial governments. These departments have a wide range of responsibilities linked to economic development, including preparation of the provincial "annual development programs" and five-year plans, and monitoring the use of annual development program funds. By having environmental units within the provincial planning and development departments, these departments would become more sensitive to the linkages between industrial environmental performance, industrial competitiveness, and economic growth. In the near term, the Planning and Development departments should create environmental units that are tasked with integrating environmental considerations into the work of the departments. The new environmental units could also conduct analyses for department officials and department staffs in other units on how

²⁰ Currently there are no CETPs that are completely effective in treating the industrial discharges from Pakistan's 80 major industrial estates (Luken, 2009).

the environmental performance of firms in the province is affecting their competitiveness as well as human and environmental health within the province.

6.1.2. *Ministry of Climate Change*

The new MCC contains staffs that were part of the former Ministry of the Environment. The capacity of this apex unit should be strengthened significantly in the short term by the addition of funding and experienced environmental professionals. This environmental apex unit should carry out the following functions:

- *International environmental negotiations* — Staff members of the apex unit should travel with Pakistan’s delegations to conferences at which international environmental agreements are negotiated to assist the delegations by providing information related to the state-of-the environment and the accessibility of state-of-the-art technologies in Pakistan as well as the feasibility of meeting proposed agreement conditions.
- *National environmental policies* — Notwithstanding the devolution process linked to the 18th Amendment, there is value in having a single set of baseline environmental norms so that all Pakistani’s can enjoy a level of environmental quality consistent with protecting human health. These baseline norms could be embodied in national environmental policies developed by the apex unit; individual provinces can develop different norms, but they should be at least on par with standards developed by the apex unit for all of Pakistan.
- *Trans-boundary environmental issues*—the apex environmental unit should mediate issues involving two or more provinces because provinces lack the resources to manage such matters effectively. The unit should also assist in dealing with cross-boundary issues involving other countries.

The MCC should also be given responsibility for *coordinating* the institutional strengthening and capacity building of provincial EPAs and environmental units to be created within the planning and development departments of provincial governments. The coordination function can involve such activities as the following for each province.

- Acquiring baseline data (e.g., ambient air quality concentrations), and assessing the impact on the environment of proposed policy changes and reforms.
- Disseminating information on good environmental management practices and facilitating coordination among provincial EPAs.
- Strengthening provincial environmental impact assessment systems to increase technical capacity of reviewers, improve administrative frameworks, increase supervisory strength, and handle increased caseloads resulting from new responsibilities falling on provinces as a result of the 18th Amendment.

The new apex environmental unit should also have responsibilities for: creating incentives for enhanced coordination among sub-national environmental units, providing measures to reduce

vulnerability to natural disasters, enhancing public disclosure and strengthening accountability. Each of these responsibilities is clarified below.

- *Co-financing as an incentive for sub-national coordination* – One way for the apex environmental unit to incentivize coordination among sub-national environmental units involves having the ability to co-finance investment projects at the sub-national level; subsequent financing could be made contingent on attaining results. The Global Change Impact Studies Centre (GCISC) has initiated actions in this direction..
- *Reduced vulnerability to natural disasters*—Floods, mudslides, and earthquakes have the potential to cut vital transport links and otherwise wreak havoc, including massive disruption of industrial activity; the devastation caused by the 2010 floods provides an example. Given the significance of natural disasters in Pakistan, the GoP should task the apex environmental unit to work with others in MCC with developing measures to reduce vulnerability to such disasters.
- *Promoting transparency via public disclosure* – The apex environmental unit should take a leadership role in providing guidance to Pak-EPA and the provincial EPAs on how to introduce more systematic efforts to raise citizens’ awareness of environmental issues (e.g., health impacts of pollution) and thereby promote transparency and accountability. Examples of methods for accomplishing this include: more extensive publication of data on key environmental indicators (including health statistics or data on pollution loads); wider use of public forums to discuss environmental impacts of development initiatives; and broader and more detailed review and discussion of environmental management tools. Guidance should also be provided on measures to disseminate information in a manner that is easily interpreted and can allow individual citizens, communities, the media and NGOs to play a role as informal regulators; this level of citizen engagement would also promote accountability on the part of those being regulated.²¹
- *Strengthening accountability*—Pakistan has active civil society organizations which play an important role in implementing projects, delivering services to the poor, and participating in policy debates. However, civil society organizations have limited capacity to participate in monitoring environmental policy implementation and to hold environmental institutions accountable. The apex environmental agency could provide guidance to the Pak-EPA and the provincial EPAs on ways to support development of technical capacity within civil society organizations concerned with environmental issues.

A timetable, including specific actions for improving Pakistan’s Environmental Framework using a national level apex environmental agency, is given in Table 6.

²¹ For examples of how this has been done in China using the China Water Pollution Map, see Jun, M. et al. (2010).

Table 6.1. Recommended Actions for Improving Pakistan’s Environmental Framework by Strengthening the MCC

<i>Recommended Action</i>	<i>Timeframe</i>
Setting coordination incentives, possibly with a coordination fund to co-finance regional projects	Medium term
Assigning responsibility for reducing vulnerability to natural disasters	Short term
Provide guidance to EPAs on transparency and public disclosure issues	Medium term
Provide guidance to EPAs on establishing accountability mechanisms	Medium term

6.1.3. Other National-level Units

It is recommended that the Ministry of Industries (MoI) seize the opportunity to take a leadership role in developing a national strategy for the diffusion of CP and EMS and the certification of firms to ISO 14,001 and other international standards. This can be done by creating an environmental unit within the MoI to take on the aforementioned leadership and coordination functions.

New environmental units should also be created within the Finance Ministry and the Ministry of Industries in order to augment their ability to advocate for improved industrial environmental management. As mentioned in the Finance Ministry’s *2010-11 Economic Outlook*, “a comprehensive growth strategy is being evolved, to increase productivity, efficiency, and competitiveness of the economy, and to ensure high growth rates that are both sustainable as well as more equitable” (Pakistan Finance Ministry, 2010-11, p. 2). Given the impacts of environmental performance on firms’ competitiveness, it will be important for the Ministry of Finance to have a unit with staff capable of highlighting to top officials in the Ministry the links between industrial environmental performance and competitiveness. This will facilitate inclusion in annual budgets of adequate funding and programming for CETP construction and CP dissemination. As in the case of the Finance Ministry, an internal unit should be created within the Ministry of Industries so that the links between industrial environmental performance and competitiveness can be integrated into the Commission's work. This would enable the Commission’s plan formulation activities to reflect the importance of industrial environmental performance on firms’ productivity and competitiveness.

6.2. The Need for Regulatory Reform

A central element of the strategy recommended herein builds upon the self-interest of firms to improve their competitive positions and decrease their costs by adopting economically efficient CP approaches and becoming certified to ISO 14,001. As mentioned, certification requires progress toward meeting the NEQS, something that represents a major obstacle for many firms, particularly SMEs. Pakistani firms engaged in exports are likely to feel continuing pressure to improve their environmental performance from foreign business customs and government

regulations in countries targeted for exports; failure to enhance environmental performance will cause these firms to risk losing export business.

As a way to improve the performance of all firms, not just exporters, it is recommended that the NEQS be revised on an interim basis to reflect ground-level realities and that CETPs be constructed and operated in industrial clusters. These actions will make it possible for more firms to satisfy NEQS and certify to ISO 14,001. While construction of CETPs would make it possible for many firms in clusters to comply with fairly rigorous standards, it will take time to organize the financing, design and construction of CETPs. In the meantime, a relaxed set of NEQS should be promulgated and applied on an interim basis. These interim NEQS standards, which can better reflect on-the-ground conditions in Pakistan and the financial, technical and human resource constraints facing SMEs, should maintain stringent levels for pollution parameters affecting human health. Indeed, top priority should be given to requirements that protect human health. Examples would be strict requirements on releases of pathogenic organisms, heavy metals and hazardous organic compounds. In addition to focusing on protection of human health, the interim standards should also set pollution limits that avoid notable nuisance conditions and prevent damage to important ecosystems. The permanent NEQS can be more rigorous and protect both human and environmental health in the broadest sense. Large firms that are far from industrial clusters should be in a position to construct their own wastewater treatment works, but SMEs will need to rely on CETPs.

Revision of the NEQS can be accomplished by creating the equivalent of the Shamslakha Committee of the late 1990s.²² This committee included experts and stakeholders, and did its work by consulting extensively with representatives of enterprises, industry associations, NGOs and the public sector. The new standard setting committee should be charged with determining interim NEQS that are realistic for firms to meet while the process of building new CETPs is underway. In addition, the committee should also determine the number of years for which interim standards are to apply, and it should delineate the permanent NEQS that will hold after this interim period. By proceeding in this way, firms will be able to comply with the interim NEQS and therefore enhance their chances of having their environmental management systems become certified to ISO 14,001. By having the committee also determine permanent standards, designers of CETPs will have the information they need to ensure that the CETPs meet the permanent standards.

Provincial EPAs will not be well positioned to enforce the interim NEQS in the short term, but firms eager to enhance their competitiveness should be motivated to meet the interim standards, thereby satisfying the green supply chain management requirements of multinationals for acceptable environmental performance and certification to ISO 14,001.

6.3. Building Common Effluent Treatment Plants and Reviving the Pollution Charge Scheme

Cleaner production methods and CETPs complement each other in the following sense: CP methods can be used to minimize the generation of wastes at the firm level, thereby making it less costly to treat wastes in CETPs. This is especially the case for pollutants like heavy metals that disrupt the functioning of widely used wastewater treatment processes. By definition, a

²² The NEQS created by the Shamslakha Committee of the late 1990s were not effectively implemented because of the political upheavals in the early 2000's, the period immediately following the Committee's work.

CETP can accommodate wastewaters originating from multiple sources. CETPs can be owned and operated by a public body, an industrial association, a commercial venture, or a public-private partnership. CETPs should be designed to treat only those pollutants that are common to all or most of the enterprises discharging to the system. The treatment of less common pollutants, or pollutants that could be expected to disrupt the functioning of CETPs (e.g., cadmium, lead and cyanide) should be left to individual firms to remove at the source (by using CP or a pre-treatment system) for the following reasons:

- In many situations, there will be a relatively small fraction of firms discharging particular pollutants to a CETP and fairness and effective CETP operations require that those firms pre-treat or use CP; in this way, enterprises not generating those specific pollutants will not be charged for the additional capital and/or operating costs required to treat them.
- Removal of many of the less common pollutants like (e.g., toxic metals and hazardous organic compounds) are typically costly to manage using a CETP, and they can often be dealt with more effectively by eliminating or at least minimizing them at the source using a pre-treatment scheme and/or CP methods, such as production process changes and changes in inputs.

Once CETPs are constructed and cost and operating details are sorted out, firms served by those facilities will be in better position to meet rigorous NEQS. Moreover, by the time the interim period has elapsed, the capacity of the provincial EPAs should be such that an effective enforcement program can be mounted, which will further motivate NEQS compliance.

Numerous coordination and logistical problems hamper the building of CETPs, but they remain the only cost-effective way for SMEs to manage their effluents. Problems are demonstrated by cases in which plans for new CETPs were shelved because firms could not agree on cost sharing arrangements. These problems will need to be sorted out to make progress on building and operating CETPs. Although accurate data is scarce, it has been estimated that Pakistan has only 50 to 100 effluent treatment plants but there are over 8,000 firms with significant pollution loads. Additionally, industrial discharges from the 10 to 20 existing major industrial estates are not effectively treated, even in the few places where CETPs exist. (Many other estates have been planned and are in various stages of implementation.) The only two CETPs (located in Kasur and Korangi) that treat tannery discharge suffer from major operational issues because of uncertainties and disagreements regarding who should pay for pollution abatement costs (Luken, 2009).

As a way to generate revenues to support construction of CETPs, help fund EPA monitoring and enforcement operations, and further motivate NEQS compliance, the long-dormant pollution charge system should be revived and revised. The work of revision can be included in the mandate to the committee formed to revise the NEQS. Pollution charge systems are used throughout the EU and in many countries around the world. If the charges are set high enough, as they are in the Netherlands, they provide a significant incentive for firms to cut pollution. Even when countries set charges much below the incremental cost of wastewater treatment, the charge schemes still advance the cause of pollution control because some of the revenues from the charge schemes are used to support EPA monitoring and enforcement efforts and some are returned to firms as subsidies to construct wastewater treatment plants.

Pakistan's moribund pollution charge system can be restructured such that firms pay charges based on both the concentrations and mass flow rates of their discharges.²³ Based on experience in other countries, EPAs will have an incentive to monitor and enforce the pollution charge scheme because they will receive part of the revenues generated. In addition, revenues from charges can be used to help fund CETPs for industrial clusters and provide budgetary resources for provincial EPAs.

Based on experience in other countries using pollution charges, charge-based revenues will not be enough to construct CETPs. Consequently, the GoP should give attention to other funding sources, including both domestic sources (e.g., provincial governments and industry associations) and international ones (e.g., multilateral and bilateral aid institutions). Several industrial estates have plans for CETPs, but they have been stymied by problems in financing plant construction. The Korangi plant also provides an example of how financing other aspects of construction and operation can be arranged. The total cost of the CETP, the first plant of its kind in Pakistan in terms of its nature, ownership, capacity and technology, cost an about Rs 492 million, which was contributed by the federal, Sindh and Karachi governments, the Pakistan Tanners Association and the Dutch government (Alam, 2009). Pakistan has a rich history of cluster development and thus short-term progress can be made by moving forward with construction and operation of CETPs for existing clusters. Details on industrial water pollution in Pakistan and potential for improvement are given in Annex 3.

6.4. Considering a Tax to Deal with Chromium Wastes from Tanneries

A significant water pollution control challenge in Pakistan is linked to the discharge of chromium wastes from leather tanneries. There are two common oxidation states for chromium: Cr (VI), hexavalent chromium, which is a soluble and highly toxic aqueous contaminant; and Cr (III), trivalent chromium, which is more stable in ambient environmental conditions, insoluble, and considered nontoxic. The chromium used and discharged by tanneries is predominantly the relatively innocuous Cr (III), although in some tannery practices Cr (VI) is also involved. While Cr (III) is the predominant type, several studies support the view that in the context of tanneries, there is a risk of oxidation of Cr (III) to Cr (VI) and potential dispersion into the aqueous environment. The highest risks of oxidation occur if tannery sludge is exposed to very high temperatures or if the sludge or sediments in the discharge environment contain manganese oxides, particularly in the absence of strong reducing agents such as organic matter, FE (II) or sulfides.²⁴ The reason pollution from tanneries is so challenging is because most of the several hundred tanneries are SMEs that release untreated wastewater. Because they are small and

²³ The previously mentioned Shamslakha Committee developed rules for the pollution charge system in the late 1990s, however the Pak-EPA did not enforce the rules, due to a shift in government priorities.

²⁴ Given that Cr (VI) is a strong oxidant, it is likely to be reduced to the more stable Cr (III) species, particularly in circumstances where organic matter is present (Fendorf, 1995), as is the case for tannery sludge. However, documentation of appreciable Cr (VI) concentrations in surface and groundwater despite presumed Cr (VI) reduction have led to investigations on the potential for the oxidation of Cr (III) to Cr (VI) (Avudainayagam, 2003). Results of such studies indicate that, in context of tanneries, it is possible for Cr (III) to be oxidized to Cr (VI) by oxygen at high temperatures in a solid phase, or by manganese oxides in the discharge environment or sludge when in an aqueous phase, (Apte, et al., 2005). Although this conversion is largely transient in the presence of reducing agents that will convert Cr (VI) back to Cr (III), depending on discharge conditions (e.g. into environments high in manganese oxides and low in organic material), it may be possible for some Cr (VI) to enter the aqueous phase before reduction back to Cr (III), thereby contaminating local water sources. (Apte, et al., 2006).

numerous, it is difficult for EPA's to conduct monitoring and control water pollution from this sector using traditional environmental regulations.

A possible response to this challenge that is worth considering involves imposition of a tax on chromium sulfate, which is a basic input to the leather tanning process. The underlying notion is that a tax on a chromium sulfate would result in higher prices to tanneries, and would provide them with incentives to reuse and recycle chromium. OECD countries have imposed hundreds of environment-related taxes on inputs such as pesticides, but a search of the literature on green taxes suggest that a product tax on chromium sulfate as a pollution control measure has not been used elsewhere, and therefore Pakistan would be in the position of having to learn by doing if such a tax were imposed.

In addition to the risks associated with innovation in this area, a number of issues would need to be explored in depth before a tax on chromium could be considered seriously. One such issue is the potential negative impact of a chromium tax on the competitive position of Pakistan's leather exports. In addition, studies would need to be done of ways to offset these adverse effects by subsidizing chromium recycling and reuse at tanneries. In this way, the tax on chromium sulfate would provide the incentive to consider recycling seriously and a subsidy program would make it financially feasible to do so.

6.5. Expanding the Role of the Cleaner Production Centers

Existing CP centers have demonstrated their ability to create effective and mutually supporting relationships with managers and staffs at firms they have served. Additional funding should be obtained to support expansion of existing CP centers and the creation of new centers to reach firms and industrial sectors not currently served.

In the short term, the CP centers (in cooperation with industry associations) should increase their scope of activities to include instructing firms on: (i) CP measures that are most appropriate and relevant, (ii) ongoing integration of environmental and energy audits and related CP approaches into firms' daily operations to make continual improvements, (iii) creating a formal EMS and getting certified to ISO 14,001, and (iv) remaining up-to-date on sector-specific requirements imposed by countries importing Pakistani products. The following CP measures may represent feasible and relatively low-cost measures for firms to adopt and use as part of ongoing operations: good housekeeping practices (i.e. avoiding spillages and reusing materials); improved chemical storage practices; improved worker safety practices; and monitoring the use of chemicals, electricity and water. In the short term, CP centers and industry associations should also encourage and promote investment in local manufacturing of CP-related equipment useful in major Pakistani industries and help firms to identify funding sources and suppliers for CP equipment.

One of the challenges facing two of the three existing centers—CPC and CPI – is that they depend heavily on external funding. Only NCPC-F operates with a business model that does not rely on donor or government funding. Existing and new CP centers would benefit from creating advisory boards. These boards could help centers in: creating sound financial plans and business models to sustain and expand operations; and guiding centers on how best to further assist firms in integrating CP, EMS, and ISO 14,001 certification into routine business operations and long-

term plans. Advisory board members could include key stakeholders, such as: the provincial EPAs for the provinces in which the center operates, the industry associations for the sectors served by the center, and representatives from private consulting firms that may be impacted by the CP centers activities.

In the short term, a national CP center should be created to meet three main objectives: (i) provide technical advice to and promote information sharing among sub-national CP centers; (ii) engage in international exchanges of information with other national CP centers; and (iii) participate, under the leadership of MoI, in expanding efforts to diffuse CP-related concepts and technologies as well as information on EMS and ISO 14,001 to firms in Pakistan. The following are among other the additional functions that can be carried out by a national center:

- Forming links with universities to have CP and EMS integrated into curricula, particularly at business schools and environmental engineering programs in Pakistan;
- Organizing CP roundtables and conferences for staffs of industry associations and sub-national CP centers to encourage networking and information sharing across centers and industry associations from different sectors; and
- Creating and providing access to databases with new CP solutions and case studies that can serve as models of best practices.

The national CP center should have an advisory board consisting of representatives from MoI, MCC, Pak-EPA, the sub-national CP centers, key industry associations, and consulting companies heavily engaged in CP-related work. The advisory board should meet regularly to advise the national center leadership on the types of activities and programs the national center should prioritize.

6.6. Improving Public Disclosure and Information Dissemination

In the final analysis, an informed citizenry, an active press and energized environmental NGOs can move Pakistan in the direction of providing the kinds of support that EPAs will need to gain compliance with environmental regulations. The Pak-EPA and provincial EPAs can foster the creation of an informed citizenry by distributing information regarding firms violating environmental regulations as well as data on the health impacts of environmental degradation. There are models of how information about firms violating environmental regulations can galvanize citizens to pressure polluters to clean up. A widely emulated example is Indonesia's Program for Pollution Control, Evaluation, and Rating, commonly referred to as "PROPER" (Blackman, et al., 2004). The program uses a color-coded rating scheme, ranging from gold for excellent performance to black for poor performance, as well as "reputational incentives."

The provision of information to the general public on health impacts of pollution also empowers citizens to place pressure on industries. In the short term, the Pak-EPA and provincial governments should lend support to environmental NGOs (e.g., WWF-Pakistan) and news outlets interested in environmental issues by providing them with information on firms releasing pollutants affecting human health and, more generally on the costs to Pakistan of continued

environmental degradation. At the provincial level, EPAs can consider whether and how the PROPER program can be employed.

A notable approach for disseminating information involves the work of the Institute for Public and Environmental Affairs, an NGO in China that manages the China Water Pollution Map. This online national pollution monitoring tool links publicly available data on pollution regulatory violations to specific company names and locations. As of September 2010, the online map and database, which is accessed by a search engine, contained over 70,000 specific citations of companies violating emission standards and other environmental rules since 2004. Using the map's search engine, Chinese citizens can check whether firms have been cited for poor environmental performance. An analogous China Air Pollution Map has also been created (Jun et. al, 2010).

6.7. Augmenting Pakistan's Quality Infrastructure

National infrastructure linked to quality management (widely referred to as “quality infrastructure”) consists of institutions engaged in standardization, metrology, testing, inspection, certification and accreditation. It is often expensive, time consuming and complicated for firms to gain access to this infrastructure. Providing these services is an important element in maintaining Pakistan's export competitiveness. Pakistani firms can go abroad to access the needed quality infrastructure, but this poses special challenges for SMEs; they seldom use overseas service providers if there is no domestic capability. Also, sending equipment for calibration overseas is excessively burdensome. Moreover, having to use overseas auditors for ISO 9,001 and ISO 14,001 certifications is an impediment for Pakistani firms that are interested in obtaining those certifications, and it is also challenging for firms to use overseas auditors in trying to meet restrictions imposed under WTO Agreements on Technical Barriers to Trade. For these reasons, Pakistan should view the development of quality-related infrastructure needed by firms as a priority element in the country's export strategy.²⁵

Pakistan has made a good start on development of quality infrastructure by creating Pakistan Standards and Quality Control Authority (PSQCA), Pakistan National Accreditation Council, and the National Physical and Standards Laboratory (NPSL). However, these organizations do not yet have the capacity needed to serve Pakistani firms engaged in exports effectively. The capacity of PSQCA, which is Pakistan's National Enquiry Point under WTO's Technical Barriers to Trade and Sanitary & Phytosanitary (SPS) agreements, should be strengthened significantly in the short term.

PSQCA should be allocated with the resources and staff needed to serve as a communications bridge between standard-setting organizations affecting exports and Pakistani exporters. This bridging activity would involve enhancing the vertical linkages needed to supply information to and receive information from export-oriented firms. The bridging function has two main elements. PSQCA should: (i) make Pakistani exporters aware of trade and environmental issues so that they can make necessary adjustments in a timely way; and, (ii) provide information representing the perspectives of Pakistani exporters to organizations engaged in setting standards. To carry out this bridging function, PSQCA should design and implement a system to

²⁵ Material in this paragraph and the ones that follow is based on Gujadhur (2010).

collect, track and release information concerning foreign environmental standards and requirements for products. In the case of government-set standards, PSQCA should educate exporters about standards that are currently under development. The bridging function also requires PSQCA to solicit, collate and relay the views of Pakistani exporters as inputs to the standard-setting process during the comment periods mandated by the WTO's Agreement on Technical Barriers to Trade.

Table 6.2. Recommended Actions for Cleaner Production in Pakistan

<i>Recommended Action</i>	<i>Responsible Party</i>	<i>Timeframe</i>
Revision of Environmental Regulations		
Develop both interim and revised permanent National Environmental Quality Standards	New Standard Setting Committee (includes representatives of enterprises, industry associations, NGOs and public sector)	Short-term
Revise and implement pollution charge system	Government of Pakistan	Short-term
Implement permanent National Environmental Quality Standards	New Standard Setting Committee /Government of Pakistan	Long-term
Strengthening of Environmental Agencies		
Increase funding and staff of experienced environmental professionals in the Ministry of Climate Change	Government of Pakistan	Short-term
Enhance the functions and responsibilities of the Ministry of Disaster Management, to include, among others: developing national environmental policies and coordinating the institutional strengthening and capacity building of provincial EPAs	Government of Pakistan	Short, Medium, and Long-term
Strengthen provincial EPAs so that they have the budgets and staffs needed to help provincial governments design new environmental regulations pursuant to the 18 th Amendment and the capacity to monitor environmental pollution and enforce the new regulations	Provincial environmental protection agencies	Short, Medium, and Long-term
Create environmental units within Finance Ministry and Ministry of Industries	Finance Ministry and the Ministry of Industries	Short-term
Construction of Common Effluent Treatment Plants		
Create plans for funding and construction of CETPs in industrial clusters	Public body, industrial association, commercial venture, or public-private partnership.	Short-term

Strengthening Cleaner Production Centers		
Extend the work and scope of Cleaner Production centers to promote long-term integration of CP and environmental management systems in firms' daily operations and management strategies, and establish additional CP centers	CP centers, industry associations, CP working group	Short-term
Create advisory board in CP centers to identify funding sources and develop business plans to ensure financial sustainability	CP centers	Short-term
Create "CP working group" within the Ministry of Industries tasked with developing a national plan for CP and EMS and a strategy for financing construction of CETPs	Ministry of Industries	Short-term
Create a national cleaner production center to promote information sharing among sub-national CP centers and engage in international exchanges of information with other national CP centers	CP working group	Short-term
Reducing Water Pollution		
Imposition of a tax on chromium sulfate for tanneries	Government of Pakistan	Short-term
Public Disclosure and Information Dissemination		
Foster creation of informed citizenry through distribution of information regarding firms' violating environmental regulations and data on health impacts of environmental degradation	Pakistan Environmental Protection Agency and Provincial Environmental Protection Agencies	Short-term
Collect, assemble and release information to firms on foreign environmental standards, voluntary standards established by consortia and retailers, and requirements related to Pakistani products in potential export markets	Pakistan Standards and Quality Control Authority and industry associations	Short-term
Allow Pakistan's specific needs to be accounted for during the processes for formulating international standards in standard setting bodies such as ISO	Pakistan Standards and Quality Control Authority	Short-term

CHAPTER 7. REFERENCES

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ANNEX 1. METHODOLOGY²⁶

1.1. Introduction

This document presents the methodology used by the Non-Lending Technical Assistance (NLTA) provided by the World Bank to the Government of Pakistan (GoP) with the objective of identifying interventions that the GoP might adopt to mainstream environmental sustainability considerations in Pakistan's industrial sector and strengthen Pakistan's competitiveness in domestic and global markets. The NLTA was initiated after the GoP requested the Bank's assistance to inform the development of the country's new industrial policy.

The NLTA's objectives were to support the GoP to: (i) strive for macroeconomic stability and sectoral policies that support industrial competitiveness; (ii) upgrade trade facilitation and transport infrastructure in order to address some of the spatial aspects of industrialization; (iii) green Pakistan's Industrial Sector to enhance international competitiveness; and (iv) develop strong institutions for effective industrialization initiatives including those for small and medium enterprises.

In order to meet its objectives, the NLTA adopted a two-pronged approach consisting of the preparation of innovative analytical work and the facilitation of stakeholder engagement to discuss alternative policy options and build consensus on how Pakistan might adopt policies and programs that improve environmental conditions while simultaneously contributing to the country's increased industrial competitiveness.

1.2. Deliverables

Under the NLTA, six studies were undertaken, including the following: (i) Industrial Policy, its Spatial Aspects, and Cluster Development in Pakistan; (ii) Evaluation of Cleaner Production (CP) Initiatives in Pakistan; (iii) Evaluation of Industrial Environmental Management in Pakistan; and (iv) Evaluation of Industrial Environmental Management in Developing Countries. In addition, Dr. Salman Shah evaluated the Small and Medium Enterprise Development Authority (SMEDA), GoP's apex body for Small and Medium Enterprise (SME) promotion in Pakistan. This independent evaluation was explicitly requested by the GoP, taking into account that SMEs constitute major drivers of growth in Pakistan, while also recognizing that they face multiple significant challenges which SMEDA's improved support could help to overcome.

The methodology of these studies was based mainly on primary data collected under the NLTA. The methodology also included the identification of relevant stakeholders and the development of structured and semi-structured interviews. Primary data collection helped to integrate the perspectives and opinions of a wide variety of sectors, while also providing information that was previously unavailable in Pakistan.

A list of the studies, along with their objectives and methodologies used, is presented in Table A1.1 below:

²⁶ This annex was prepared by Ernesto Sanchez-Triana, Javaid Afzal, and Santiago Enriquez. The findings, interpretations, and conclusions expressed in this annex do not necessarily reflect the views of the staff or Executive Directors of The World Bank or the governments represented by the Executive Directors.

Table A1.1. Studies Completed under the NLTA

Sectoral Study	Objective	Methodology
<p>Lahore University of Management Sciences (LUMS), 2011, Industrial Policy, its Spatial Aspects and Cluster Development in Pakistan, commissioned by the World Bank.</p>	<p>The evaluation examined Pakistan’s industrial performance, its spatial aspects and cluster development in Pakistan with the aim of deriving policy recommendations for industrial growth and development.</p>	<p>The methodology consisted of a three tiered analysis of the industrial sector.</p> <p>The first tier was a macro level investigation of industrial performance, which included a detailed description and analysis of the structure and performance of Pakistan’s industrial sector and investment trends in the country. It also highlighted major impediments to both investments and increased productivity and product diversity within the manufacturing sector. These constraints ranged from macroeconomic instability, energy shortage, infrastructure bottlenecks, factor market imperfections to governance and security issues. The analysis in this section is based on the repository of existing evidence on the above mentioned constraints such as the cost of doing business data collated by World Bank and other similar studies.</p> <p>The second tier was a firm-level analysis of competitiveness. The analysis covered both large and small manufacturing sectors. In both cases, the competitiveness of each sector was assessed and policy options proposed to enhance it. This was done by conducting in depth consultative sessions with sector representatives, analyzing all existing literature on each sector in Pakistan and, for some sectors, through a simple value-chain analysis supplemented by a broader industry assessment that contextualized value-addition achieved in a particular chain.</p> <p>The third tier was a detailed study on the spatial aspects of industrialization or industrial cluster formation. Mapping measures were used to reveal the main determinants of cluster formation and identify the determinants of existing clusters. This analysis helped in identifying the degree to which cluster formation is dependent on ‘historical accidents’, government policy or regional economic characteristics or comparative advantages. This tier also looked at the impact of disparate infrastructural provision on regional poverty and income inequality.</p>
<p>Shah, Salman, 2011, Independent Organizational Evaluation of Pakistan’s Small and</p>	<p>Examine the degree to which SMEDA’s interventions have contributed to mainstream sustainability considerations in the development of Small and Medium</p>	<p>The evaluation was based on the feedback provided by key stakeholders, particularly SME clients of SMEDA key staff/managers of SMEDA and the GoP. Collected information focused on analyzing:</p>

<p>Medium Enterprise Development Authority (SMEDA), commissioned by the World Bank.</p>	<p>Enterprises (SMEs) and enhance SMEs' competitiveness.</p>	<ul style="list-style-type: none"> • The range of services offered including support in acquiring manufacturing technology, marketing support, training, financial support and accessing information technology, etc. • The depth of services provided ranging from provision of information to in-depth planning and implementation of proposed solutions • Cost of services obtained by SMEs • Main shortcomings of the bodies, including material and human resources • Qualifications of the staff • Extent of success of the body and its credibility in delivering results <p>The feedback was received through two different survey questionnaires developed for entrepreneurs and for SMEDA's staff.</p> <p>In addition, 12 in-depth detailed case studies were prepared on firms that received the different types of services provided by SMEDA. The following criteria were used to select participating firms:</p> <ul style="list-style-type: none"> • The firm's sector is significant to Pakistan's economy. • Firms had interacted with SMEDA, obtained assistance from it and implemented its suggestions. • Firms were willing to share their experiences and provide documents and relevant data. • Case studies had the potential to provide insights to other firms in the sector and across sectors. <p>The study also looked at international best practice to benchmark the services provided by SME development agencies in other countries, particularly India, Korea, Malaysia, Thailand, Japan, Turkey, Armenia, South Africa, Brazil and Chile.</p>
<ul style="list-style-type: none"> • Luken, R., 2009, Cleaner Production in Pakistan, commissioned by the World Bank. • Laiq, A., 2011, Implementable Recommendations for Cleaner Production Programs in Pakistan, commissioned by 	<p>The evaluation focused mainly on:</p> <ol style="list-style-type: none"> (1) The scope of CP efforts in Pakistan, including industrial gains from CP in terms of increased efficiency in the use of water, energy, raw material or other inputs, as well as reductions in emissions and discharges of pollutants; (2) The private monetary benefits and costs for the firms that have adopted CP, both based on actual benefits and costs accrued by 	<p>The methodology was based on interviews with:</p> <ul style="list-style-type: none"> • Staffs of the three CP centers; • Managers of firms that use the services of CP centers; • Officials of environmental agencies in charge of determining compliance with environmental requirements of the firms; • Staffs of relevant, business chambers or other types of associations, civil society organizations, government agencies and departments, and other relevant stakeholders.

<p>the World Bank.</p>	<p>firms, and based on a hypothetical scenario of strict enforcement of the applicable environmental laws and regulations;</p> <p>(3) Recommended interventions that could be carried out to strengthen CP efforts that enhance the firms' competitiveness and contribute to address the country's environmental priorities; and</p> <p>(4) Insights that explain the limited expansion of CP in Pakistan, particularly as compared to the expectations of the donors that financed the creation of the existing CP centers.</p>	<p>In addition, the methodology included in-depth case study assessments of the CP activities of relevant firms.</p>
<p>Khan, A.U., 2011, Evaluation of Industrial Environmental Management in Pakistan, commissioned by the World Bank.</p>	<p>The study's overall objective was to evaluate Pakistan's experience with industrial environmental management, particularly since 1997, the year in which the Pakistan Environmental Protection Act was adopted.</p> <p>The study also had four specific objectives:</p> <p>(1) Analyze existing environmental laws, policies, standards and regulations in Pakistan with the aim of determining their internal consistency, the extent to which they are consistent with practices in countries within the region at a similar stage of economic development, and their suitability for and relevance to conditions in Pakistan.</p> <p>(2) Determine the extent to which: Environmental authorities have implemented existing environmental laws, policies, regulations, and standards; industries have complied with environmental requirements; and the human resources and technical capacities available to environmental authorities allow them to implement Pakistan's environmental laws, policies, regulations, and standards.</p> <p>(3) Ascertain the perspectives of firms regarding: implementation approaches taken by environmental authorities; challenges firms face in meeting</p>	<p>The study's methodology consisted of an analysis of primary data and various sources of information, including interviews with:</p> <ul style="list-style-type: none"> • Staffs at Pak-EPA and provincial EPAs. • Staffs of NGOs focused on environmental management. • Officials and environmental staffs at firms, industry associations, and chambers of commerce

	<p>environmental requirements; and the degree to which firms have sufficient incentives to meet environmental requirements and to adopt voluntary environmental management measures, such as those associated with ISO 14,001.</p> <p>(4) Make specific recommendations regarding steps GoP might take to address the main challenges identified.</p>	
<p>Ortolano, L., 2011, Evaluation of Industrial Environmental Management (IEM) in Developing Countries with Extensive Experience with IEM, commissioned by the World Bank.</p>	<p>The evaluation was carried out to extract lessons learned about IEM activities in developing countries. China was singled out for particular attention because the government has embraced the concept of a “circular economy,” in which waste reduction, recycling and reuse is fostered in product production, distribution and consumption.</p>	<p>Analysis based on research findings carried out in China.</p>

1.3. Workshops and Knowledge Exchanges

The NLTA’s consultative process included numerous discussions with government representatives, particularly with the Ministry of Industries (MoI) and the Planning Commission of Pakistan. Each of the terms of reference for the completed studies was discussed with the counterpart agency. Later, the findings of the analytical work were presented to elicit their comments, and received feedback was incorporated into the final reports. In addition, frequent dissemination of the analytical work was carried out with various ministries to obtain their opinions, keep them informed about the NLTA’s progress and increase buy-in.

Pakistan’s MoI established a High Level Committee (HLC) to discuss the analyses carried out under the NLTA. The objective of this forum was to bring together representatives of federal and provincial governmental entities, the private sector, academic institutions, and other stakeholders to discuss policy alternatives and build consensus for the adoption, implementation, monitoring and evaluation of Pakistan’s competitiveness strategy, including specific recommendations to mainstream environmental sustainability in the industrial sector. The GoP notified the HLC on October 06, 2008, which was integrated by 28 members (representatives from federal and provincial governments, academia, NGOs, industry chambers, experts, and the World Bank) and was chaired by the Secretary, MoI. Specifically, the HLC facilitated the finalization of the terms of reference of the studies carried out as part of the NLTA, and provided feedback and recommendations to the consultants that were responsible for carrying out each of the studies.

The HLC met over the course of the NLTA to review/finalize work on the studies on: (i) Industrial Policy, its Spatial Aspects and Cluster Development in Pakistan, (ii) Organizational Evaluation of SMEDA, (iii) Evaluation of Industrial Environmental Management (IEM) in Pakistan, and (iv) Evaluation of Cleaner Production (CP) Initiatives in Pakistan. Each of these reports was presented twice to the forum, first to present preliminary findings and obtain feedback on the best way to complete the studies, and then, when the draft final reports were presented to the forum for finalization. During these meetings, HLC members shared their knowledge, suggestions and comments on the analyses presented.

The GoP also created a task force to use the recommendations emerging from the NLTA, as well as consultation mechanisms created under it, to develop its new Industrial Policy. The analytical work was fully mainstreamed in the Ministry of Industry and Planning Commission, as shown by the draft national industrial policy and the medium term growth strategy. Furthermore, the NLTA provides the analytical underpinnings of programmatic investments.

The NLTA findings indicate that improvements in infrastructure and industrial environmental management are needed if Pakistan is to realize gains in economic efficiency and competitiveness, especially in export markets. Competing in global markets increasingly requires addressing the strong linkages between environmental protection, sustainable use of natural resources, technological innovation and diffusion, and business competitiveness. Increasingly, firms and countries that provide potentially lucrative export markets for Pakistan are demanding that environment be considered in all aspects of a product's life cycle. This is not a matter only of gaining markets but also maintaining market shares.

The NLTA findings also demonstrate that a number of the large international business customers of Pakistani exporters are increasingly requiring their suppliers to create environmental management systems and have them approved by independent auditors so they can be certified to various standards (e.g., ISO 9,001 and ISO 14,001). Pakistan's industry has been largely stagnant for years, but manufacturing and services are the future of the country as indicated by the medium term growth strategy. A structural change in manufacturing is therefore needed for Pakistan to occupy niches that countries like China are leaving open, and take full advantage of its comparative advantage in manufacturing. This can only be attained by applying a cross-sectoral approach, and both the Planning Commission and MOI are cognizant of this need.

Based on the NLTA findings, it is clear that firms in Pakistan will have to take far more proactive positions just to keep up with their export competitors from other countries. The GoP is taking an active role in creating incentives to make this happen. The MoI expects that the draft national industrial policy be approved during the first semester of 2012.

A list of meetings of the HLC is presented in Table A1.2 below:

Table A1.2. HLC meetings Held under the NLTA

Venue	Date Held	Agenda
Islamabad	26 March 2009	Review of Draft Inception Report on study "Implementable Recommendations for Cleaner Production Programs in Pakistan" and to provide inputs to the consultant to carry out further work.
Islamabad	10 August 2009	Review of Draft Inception Report on study "Evaluation of Industrial Environmental Management" and provide inputs to the consultant to carry out the further work.
Islamabad	31 March 2010	Review of the preliminary report on the "Institutional Analysis of the Industrial Sector (SMEDA)" and to provide inputs to the consultant to carry out further work.
Islamabad	07 October 2010	Review of Draft Final Report on study "Evaluation of Industrial Environmental Management" and provide inputs to the consultant to finalize the study.
Islamabad	04 November 2010	Review of Draft Final Report on study "Institutional Analysis of the Industrial Sector (SMEDA)" and provide inputs to the consultant to finalize the study.
Islamabad	06 June 2011	Review of Draft Final Report on study "Implementable Recommendations for Cleaner Production Programs in Pakistan" and to provide inputs to the consultant to finalize the study.

Key inputs received from the members of the HLC included recommendations to: (i) incorporate best practices from developing countries across the world in the analytical work conducted under the NLTA; (ii) develop a direct dialogue with the private sector and industrial chambers to discuss the analytical work's findings and recommendations; (iii) assess the importance of measures such as the development of Common Effluent Treatment Plants (CETP) and exchange rate-related policies; and (iv) conduct an assessment of the gaps in national policies related to industry and the environment. All of these recommendations were included in the analytical work. In addition, the dialogue with the private sector was strengthened.²⁷ These studies were placed on the MoI's website and to obtain comments and feedback from a broader audience.

As indicated before, the MoI (on their own) created a Task Force on Industrial Policy to steer the process of preparing the policy. The rationale of this forum was to bring together key stakeholders to discuss policy alternatives and build consensus and have wider ownership of a new industrial policy for its adoption and implementation in the future. The Task Force was notified on November 21, 2009 and had 26 members (representatives from government. (federal & provinces), academia, experts, and representatives of chambers and industrial associations) and was chaired by Federal Minister MoI. The Task Force was supported by a "Nucleus Group" consisting of 8 members who worked out the recommendations for the new industrial policy.

A list of workshops of the TF for preparation of NIP is presented in Table A1.3 below:

Table A1.3. MoI's Task Force workshops for preparation of the new industrial policy

No.	Venue	Date Held	Agenda
1	Islamabad	25 May 2010	Review of MoI's Inception Report on "National Industrial Policy".
2	Islamabad	12 August 2010	Review of MoI's Draft Report on "National Industrial Policy" and to provide inputs to the 'Core Group' to carry out further work and finalize the National Industrial Policy.

A list of consultations by Core Group and MoI for preparation of NIP is presented in Table A1.4 below:

Table A1.4. Consultations held by MoI for preparation of the new industrial policy

No.	Venue	Date Held	Agenda
1	Sukkur	28 July 2010	Consultation for preparation of National Industrial Policy at Sukkur

²⁷ HLC participants included: Mr. Shahab Khawaja, Secretary, MoI&P; Mr. Abdul Hafeez Chaudhary, Additional Secretary – I; Mr. Javed A. Malik, Additional Secretary – II; Mr. Muhammad Niaz Butt, Joint Secretary (I&F), MoI&P, Islamabad; Dr. Aqdas Ali Kazmi, Chief (WTO), Mr. Ahmed Raza, Secretary Industries Department, Government of Balochistan, Quetta; Mr. Ishrat Siddiqui, Director Industries Department, Government of Sindh, Karachi; Mr. Javed Iqbal Malik, Economic Advisor, Industries Department, Government of Punjab, Lahore; Mr. Khalid Durrani, Director Industries Department, Government of NWFP, Peshawar; Mt. Ali Touqeer Sheikh, LEAD Pakistan, Islamabad; Ch. Laiq Ali, Consultant, World Bank, Islamabad; Mr. Javed Afzal, Co-TTL, Environment Specialist, World Bank, Islamabad; Dr. M. Bashir Khan, Director General Environment Department, Government of NWFP, Peshawar; Mr. Ateeq-ur-Rehman, Economic Consultant, Ministry of Commerce, Islamabad; Mr. Gulzar Firoz, Chairman FPCCI, Standing Committee on Environment, Karachi; Mr. Abdul Hamid, Director (Planning and Implementation), Sarhad Development Authority (SDA), Peshawar, Dr. Mehmood A. Khawaja, Representative of Sustainable Development Policy Institute (SPDI), Islamabad; Mr. Zafar Rehman, Dy. Chief, ENERCON, Islamabad; Mr. Aslam Nadeem, Deputy Chief (Facilitation), MoI&P, Islamabad; Mr. Muhammad Javaid, Technical Advisor, Environment Protection Department (EPD) Punjab, Lahore; Mr. Muhammad Javed Afzal, Manager Training, SMEDA, Lahore; Mr. Nauman Wazir, CEO, Frontier Foundary-Steel, Peshawar; Mr. Attaullah Khattak,

			Chambers of Commerce & Industry.
2	Hyderabad	29 July 2010	Consultation for preparation of National Industrial Policy at Hyderabad Chambers of Commerce & Industry.
3	Multan	30 July 2010	Consultation for preparation of National Industrial Policy at Multan Chambers of Commerce & Industry.
4	Karachi	02 August 2010	Consultation for preparation of National Industrial Policy at Karachi Chambers of Commerce & Industry.
5	Karachi	02 August 2010	Consultation for preparation of National Industrial Policy at The Federation of Pakistan Chambers of Commerce & Industry (FPCCI).
6	Peshawar	03 August 2010	Consultation for preparation of National Industrial Policy at Khyber Pakhtunkhwa Chambers of Commerce & Industry.
7	Faisalabad	08 August 2010	Consultation for preparation of National Industrial Policy at Faisalabad Chambers of Commerce & Industry.
8	Gujranwala	10 August 2010	Consultation for preparation of National Industrial Policy at Gujranwala Chambers of Commerce & Industry.
9	Lahore	13 August 2010	Consultation for preparation of National Industrial Policy at Lahore Chambers of Commerce & Industry.

1.4. Conclusions

The methodology adopted was highly effective to meet the NLTA's objectives. The preparation of analytical work, based on intensive data collection efforts, helped to inform discussion about the alternatives that the GoP might adopt to promote its industrialization, competitiveness and sustainability agendas simultaneously. In addition, stakeholder engagement efforts helped integrate a wide variety of stakeholder opinions into policy discussion and strengthened the analytical work completed under the NLTA.

The NLTA's interactive process helped to ensure that its recommendations were aligned with other policy developments in Pakistan, particularly the adoption of the 2011 "Framework for Economic Growth". The primary data collected, as well as the theoretical frameworks that were used to analyze it, provided robust, evidence-based recommendations that can help to operationalize the main policy directions provided by the Framework.

The GoP has used the recommendations emerging from the NLTA, as well as consultation mechanisms created under it, to develop its new Industrial Policy. Moreover, the GoP submitted in January 2012 a formal request for a Bank operation that would finance the implementation of the new policy, particularly the recommendations that emerged from the NLTA. This request is an acknowledgement of the relevance, quality, and timeliness of the NLTA, and also demonstrates the value that such instrument can have in enhancing the Bank's dialogue with its country clients.

ANNEX 2. CONTRIBUTIONS TO THE DEBATE ON PAKISTAN’S SUSTAINABLE INDUSTRIALIZATION GROWTH²⁸

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²⁸ This annex was prepared by Ernesto Sánchez-Triana, Ijaz Nabi, and Ghazal Dezfuli based on consultant reports prepared by Leonard Ortolano, Lahore University of Management Sciences (LUMS), Innovative Development Strategies, Santiago Enriquez, and Rahul Kanakia. This annex is based primarily on background papers prepared as part of the Mainstreaming Sustainability into Pakistan’s Sustainable Industrial Growth, Non-Lending Technical Assistance. The findings, interpretations, and conclusions expressed in this appendix do not necessarily reflect the views of the staff or Executive Directors of The World Bank or the governments represented by the Executive Directors

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ACRONYMS

CETP	Common Effluent Treatment Plant
CMI	Census of Manufacturing Industries
CO ₂	Carbon Dioxide
CP	Cleaner Production
CPI	Cleaner Production Institute
CPC	Cleaner Production Center
BOD	Biochemical oxygen demand
EIA	Environmental Impact Assessment
EMS	Environmental Management System
EPA	Environmental Protection Agency
ET	Environmental Tribunal
EU	European Union
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GoP	Government of Pakistan
ISO	International Organization for Standardization
MoE	Ministry of Environment
MoI	Ministry of Industries
NCPC-F	National Cleaner Production Centre-Foundation
NEP	National Environmental Policy
NEQS	National Environmental Quality Standards
NGO	Non Governmental Organization
NLTA	Non-Lending Technical Assistance
NPSL	National Physical and Standards Laboratory
Pak-EPA	Pakistan Environmental Protection Agency
PSQCA	Pakistan Standards and Quality Control Authority
PEPA	Pakistan Environmental Protection Act of 1997
PEPC	Pakistan Environmental Protection Council
PKR	Pakistani Rupee
PNAC	Pakistan National Accreditation Council
REACH	Regulation, Evaluation, Authorization, and Restriction of Chemicals
SEPA	State Environmental Protection Administration
SME	Small and Medium Enterprise
SMEDA	Small and Medium Enterprise Development Authority
SPS	Sanitary and Phytosanitary
TBT	Technical Barriers to Trade
TDAP	Trade Development Authority of Pakistan
TFP	Total Factor Productivity
TRTA	Trade Related Technical Assistance
UNEP	United Nations Environment Programme
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
USD	United States Dollars
WHO	World Health Organization
WRAP	Worldwide Responsible Accredited Production
WTO	World Trade Organization

EXECUTIVE SUMMARY

Pakistan's development efforts are guided by the 2011 "Framework for Economic Growth."²⁹ The 2011 Framework lays out the growth strategy drafted by Pakistan's Planning Commission and identifies the strategic actions needed to create a prosperous, industrialized Pakistan through rapid and sustainable development. According to the Framework, industrialization has the potential to become a dynamic engine of economic growth and make significant contributions to meeting Pakistan's economic and human development goals.

One of the several items that the Government of Pakistan (GoP) considers critical for sustained economic growth is the "liberalization of Pakistan's trade and investment regime."³⁰ Indeed, the 2011 Framework emphasizes the centrality of industry in achieving economic and human development goals. The Framework recognizes that accelerating industrialization will require reducing the cost of doing business and creating an incentive structure designed to achieve a competitive, dynamic, and export-driven industrial sector capable of providing employment to the growing labor force. The GoP also recognizes that competing in global markets requires a socially and environmentally sustainable industrialization strategy and to that end requested inputs from the World Bank. The four main inputs for a sustainable industrial growth in Pakistan discussed in this annex are:

- Macroeconomic stability and sectoral policies that support industrial competitiveness;
- Upgraded trade facilitation and infrastructure (particularly transport and energy infrastructure) in order to address some of the spatial aspects of industrialization;
- Greening of Pakistan's Industrial Sector to enhance international competitiveness; and
- Strong institutions for effective industrialization initiatives, including those for small and medium enterprises

These mutually complementary areas were selected because they operate on the nexus of feedback between sustainability and competitiveness. Macroeconomic stability allows firms and governments to make long-term plans, including investments in cleaner production and in infrastructure, such as transport and energy infrastructure. Improved transport infrastructure will encourage more economically efficient transport modalities that will open access to Chinese and Iranian markets and will lower the environmental costs of production, thus making Pakistan a more attractive export partner for nations and firms that have made a commitment to green production. Improved transport infrastructure will also provide new opportunities to strengthen existing areas of high activity—industrial clusters—and, thus, foster economies of scale. In these industrial clusters, clean production initiatives will result in lower production costs and increased international competitiveness. Finally, these growing industrial clusters will create growing need for a strong set of institutions to implement industrialization initiatives, such as environmental management agencies to control pollution and cleaner production centers to increase domestic awareness of international environmental standards.

In 2008, a High Level Committee (HLC) was established by the Ministry of Industries (MoI) representing the federal government, the four provincial governments, academia, NGO's, and industry. The HLC developed the Terms of Reference for NLTA-supported analytical work, reviewed the recommendations and held discussions with key chambers of Commerce and Industry in the major cities. The second part

²⁹ Planning Commission. 2011. Pakistan: Framework for Economic Growth. Planning Commission, Government of Pakistan, Islamabad. Available at <http://www.cprspd.org/Final%20Version%20-%20Pakistan%20Framework%20for%20Economic%20Growth%202011%20%28May%202.pdf> Accessed August 3, 2011.

³⁰ Planning Commission. 2011. Pakistan: Framework for Economic Growth, op.cit. .p. 12

was to commission a series of reports by leading local and international experts on the four principal elements of the sustainable industrialization strategy. This annex summarizes the analytical work of the NLTA-supported reports.

A review of recent industrial performance (Chapter 1) shows that despite a promising start in the 1960s, Pakistan's industry has not been the engine of economic growth and high productivity employment expected in government development visions. Industrial outcomes have been affected by the boom-bust cycles of GDP growth. Fueled by remittances and a consumption boom, GDP grew at above 7 percent in 2002 – 2006 and then fell to 4 percent in 2008 and 2 percent in 2009, in part as a result of the global economic crisis. In keeping with this trend, large scale manufacturing surged to a growth rate of 20 percent in 2005 followed by a sharp contraction reflecting weakening aggregate demand but also severe power shortages and deteriorating security.

Various measures of productivity underscore industry's weak international competitiveness. Total factor productivity growth in manufacturing was 1.64 percent during the 1990s and increased by only 0.9 percent in 1998-2007. Labor productivity growth in 1990-2006 was also sluggish at 1.29 percent compared to 9 percent in China and 3.4 percent in India. Globally, rapid growth in manufacturing exports in 1990-2008 allowed developing countries to gain sizeable share of the world market. India, Malaysia and Thailand more than doubled their share in world exports (increasing it by 185 percent on average). Pakistan's share, on the other hand, declined from 0.18 percent of world exports to 0.15 percent over this period. Nor have Pakistan's exports moved up the value chain even in textiles where the country has a comparative advantage. Furthermore, Pakistan's exports are concentrated in products (textiles and clothing) whose share in world exports is declining, thus reflecting poor positioning for the future.

One consequence of the weak international competitiveness of Pakistan's industry is that its share in GDP has stagnated at about 25 percent. Accounting for over 50 percent of GDP, services now dominate the economy. A large part of the labor force (more than 40 percent) is still employed in agriculture and industry, which has the highest value added, has the lowest share of total employment (20 percent). This is a matter of concern, since the movement of labor from low productivity (agriculture) to relatively high productivity sectors (such as manufacturing) contributes to the surplus that spurs growth and improved living standards for workers.

Implement macroeconomic and sectoral policies for strengthening industrial competitiveness

Industry's weaknesses have been accentuated by an economic management stance that favors consumption over both savings and investment in manufacturing as exhibited in a host of macro and sectoral pricing and public expenditure policies. Rapid growth of remittances and concessionary development assistance has allowed Pakistan to build up reserves while maintaining a large trade deficit. The exchange rate management stance has fueled consumption-led growth, appreciated the equilibrium exchange rate, and may well be contributing to the "Dutch disease" problem of declining international competitiveness of manufactured exports³¹. Consistent with the consumption-led growth policy stance, personal loans in 2001-2007 expanded most rapidly in the lending portfolios of financial institutions compared with loans to manufacturing establishments. The acute energy shortage also hits manufacturing firms the hardest. Residential households receive preference in terms of both energy rationing and pricing.

³¹ Acosta, Pablo A., Emmanuel K.K.Lartey, and Frederico Mandelman, 2007, "Remittances, Exchange rate Regimes and the Dutch Disease," Federal Reserve Bank of Atlanta Working Paper No. 2008-08 (Atlanta: Federal Reserve Bank); Acosta, Pablo A., Emmanuel K.K.Lartey, and Frederico Mandelman, 2007, "Remittances, Exchange rate Regimes and the Dutch Disease: A panel data Analysis," Federal Reserve Bank of Atlanta Working Paper No. 2008-12 (Atlanta: Federal Reserve Bank); and Montiel, Peter J., 2006, "Workers' Remittances and the Long Run Equilibrium Exchange Rate: Analytical Issues", Williams College, mimeo.

The manufacturing sector also bears a disproportionate burden of taxation, diverting investment to the more lightly taxed (or non-taxed) agriculture, service and construction sectors. Poor education standards result in the high cost of training workers needed by firms. Security incidents that disrupt commuting by workers and freight also affect manufacturing firms more than other sectors.

Recent modifications in trade policy have reversed the liberalization program that had virtually eliminated traditional quantitative restrictions and reduced and simplified import tariffs. Starting in 2006/7, there has also been an increase in the maximum level, dispersion and complexity of customs duties. In 2008, regulatory duties were imposed on top of customs duties. Anti-dumping, which started in a small way in 2002, has expanded rapidly since 2008/9. Statutory Regulatory Order's (SRO's), providing exemptions or partial exemptions, have made a strong comeback with half the tariff lines subjected to SRO's benefiting specific firms and inputs. Preferential trade agreements with China, Sri Lanka and with other eight countries (Bangladesh, Bhutan, Sri Lanka, Maldives, India, Nepal, and Afghanistan) under the South Asia Free Trade Agreement (SAFTA) have also added complexity to Pakistan's trade policy. Substantial distortions have thus crept back into trade policy benefiting a few chosen enterprises while eroding international competitiveness of the vast majority of firms.

Geography endows Pakistan with the potential to reap significant economic gains if it can become a hub for regional trade, which will have spillovers for industrialization and economic growth. To the northeast is China, the world's fastest growing economy with a population of over a billion increasingly engaged in the development of its western frontier that lies close to Pakistan. To the northwest and west are the resource rich economies of Central Asia and Iran, which are eager to combine their mineral wealth with skills to generate higher income for their citizens. To the east is India growing at 8 percent per annum (a far cry from the so-called Hindu rate of growth of 3 percent) with large pools of skilled labor and savings seeking gainful employment and investment avenues. In order to reap economic benefits in this context of growing opportunities, Pakistan needs to again play its historical role of a connector of markets that lie to the north (China) and west (Central Asia, Iran) to those in the east (India). This requires liberalizing the highly restricted trade with India that has stunted cross-border legal commerce, encouraged smuggling and prevented investment and technology exchange between the two countries. Rigorous analytical work, including a seminal report by Pakistan's Ministry of Commerce, supports such a move.³²

In this context, the recent announcement granting Most Favored Nation status (MFN) to India is a welcome development. But it needs to be followed up with practical steps for an efficient payment system, a sensible policy that promotes trade but also avoids excessive (and unfair) injury to Pakistan's industry, trade-facilitating government services (customs, quality focused non-tariff barriers -- NTBs), transport networks and, most important of all, a sensible visa regime so that the benefits can be shared by all and not just the largest enterprises. Also, India will be looking to transit trade facilities and Pakistan should seek to attract Indian investment and technology. Given current business practices, NTBs can creep in through any of these trade facilitating measures and potentially nullify or reduce the benefits of the MFN announcement.

The upshot is that the broad policy stance has further accentuated the exchange rate-driven Dutch disease problem for manufacturing firms instead of correcting it. Accordingly, the first step towards a strategy for sustainable industrialization is to remove the bias against manufacturing in the broad policy stance. The

³² Nabi, I., & Nasim, A. (2001). Trading with the enemy: A case for liberalizing Pakistan-India trade in S. Lahiri (Eds.), *Regionalism and Globalization: Theory and Practice* (170-197). London: Routledge; Naqvi Z. and Nabi I. (2008) "Pakistan-India Trade: the Way Forward", in M. Kugelman and R. Hathaway edited, Hard Sell: Attaining Pakistan's Competitiveness in Global Trade, Woodrow Wilson Center, Washington DC 2008; and Naqvi Z. and Nabi I. (2008) "Pakistan-India Trade: the Way Forward", in M. Kugelman and R. Hathaway edited, Hard Sell: Attaining Pakistan's Competitiveness in Global Trade, Woodrow Wilson Center, Washington DC 2008

other steps are modernizing trade facilitation and transportation, managing the environmental damage associated with industrial waste and strengthening institutions for policy design and enforcement.

Upgrade trade facilitation and infrastructure

Investment climate surveys and competitiveness indices consistently point to poor trade logistics and lack of adequate infrastructure, especially that for transport and energy, as a key bottleneck to greater international competitiveness of Pakistani firms. A proactive trade and infrastructure policy, therefore, is an appropriate intervention to aid the efforts of Pakistan's industrial sector to move up the value chain and become a large-scale export-driven manufacturing economy that seeks to take on some of the mass-production niches which are currently being freed up by increasing wages in China.

Key recommendations for improving trade and infrastructure and the reform program proposed for modernizing transport and logistics to strengthen competitiveness of the national economy include the following:

- Carry out a comprehensive package of reforms to unleash the potential of Pakistan's freight transport sector, which compares poorly with those of competing economies and whose inefficiencies represent 4 – 6 percent of GDP. Reforms to modernize the sector should prioritize: (i) promoting the integration of different modes of transportation, giving preference to railways over long distances, where they are more efficient and sustainable than road transport; (ii) redefining the government's role to focus on regulating and attracting private sector investments in the sector and gradually eliminate current biases that distort the market; and (iii) foster the adoption of new technologies and procedures that add value to the services provided by the trade and transport sectors, including those that help to move from the current focus on bulk cargo to containerized cargo.
- Adopting a multimodal transport system and modernizing the trucking fleet will help reduce negative environmental and social externalities. Above all, enhancing the economy-wide benefits of trade and transport reforms and reducing the adverse impact require strong environmental and social protection institutions that safeguard the well-being of groups that may be adversely affected by new investments and policy reforms.
- Ensuring access, by breaking down trade barriers and improving suboptimal infrastructure, to the major transport corridors and cross border markets, especially in Khyber Pakhtunkhwa (KP) and Balochistan, and upper Sindh in anticipation of greater trans-regional trade flows (with India, China, Afghanistan, Central Asia and Iran) through these regions following liberalization of trade with India.
- Strengthening the institutional capacity of infrastructure and environmental agencies for environmental management. Organizations in Pakistan's infrastructure sectors have limited capacity to address the environmental and social issues that arise during the construction and operation of transport infrastructure. Strengthening their capacity to incorporate environmental and social considerations at the earliest planning stages and address issues as they arise will generate significant benefits for Pakistan's population. Strengthening the capacity of environmental agencies (particularly after the devolution of environmental responsibilities to the provincial governments as a result of the Eighteenth Constitutional Amendment) should be the utmost priority, particularly as negative environmental externalities of the freight transport sector are already significant.
- Identify potential energy sources (both domestic and regional) that can be used to supply consistent power to the industrial sector. Indeed, the shortages in energy have hit the industrial sector the hardest. The GoP should urgently develop new sources of energy supply to cater to industry, particularly developing cleaner sources of energy as an alternative to its limited gas

sources, upgrading existing distribution networks, investing in thermal and hydel plants, utilizing coal as an alternative source of energy (as is done in India), and importing gas from neighboring countries.

The economic impact of modernizing the trade and transport sectors will generate a high pay-off in terms of strengthening Pakistan's industry thereby making it more internationally competitive. However, a sustainable industrialization strategy also requires that the potential negative effects of the program be evaluated and mitigation strategies adopted to minimize the impact. To that end, this annex draws on the findings of the parallel Strategic Environmental, Poverty and Social Assessment of Trade and Transport Sector Reforms (SEPSA).

Greening Pakistan's Industrial Sector to Enhance International Competitiveness

The cost of environmental damage from air pollution, toxic waste and other forms of water pollution can be substantial. Recent studies³³ estimate the cost of such environmental degradation, including those associated with environment-related mortality and morbidity, to be as high as 9 percent of GDP. Industry is a major contributor to these costs. Thus, industrial growth that does not recognize costs to the environment and public health overestimates the real industrial contribution to GDP growth and, depending on the severity of the associated pollution, cannot be sustained.

Sustainable industrialization requires measures that promote cleaner production processes to reduce industry's contribution to air and water pollution, and the dumping of toxic solid waste. Furthermore, setting realistic and enforceable environment standards facilitates ISO14001 certification and, thus, contributes directly to improved international competitiveness. Chapter 4 of this annex, based on the Appendix, "The Greening of Pakistan's Industrial Sector," reviews the evidence on industry's contribution to various types of environmental risks and proposes measures for adopting cleaner production processes together with realistic and enforceable environment standards. The Greening of Pakistan's Industrial Sector is based on studies completed under the NLTA on "Evaluation of Industrial Environment Management (IEM) in Pakistan", "Evaluation of IEM in Developing Countries with Extensive IEM Experience" and "Evaluation of Cleaner Production Initiatives in Pakistan."

Industry contributes significantly to water pollution in the country. Thus Pakistan cannot make significant improvements in ambient water quality without reducing waste from industry. This will require major changes for enterprises, since current treatment facilities are limited to a relatively few Combined Effluent Treatment Plants (CETPs) that accept wastewater from firms in industrial clusters (e.g., the Korangi and Kasur CETPs that treat discharges from tanneries).

Urban air pollution due to fine particulates (PM2.5) is likewise a serious problem in Pakistan as both stationary and mobile sources (many of which are part of the industrial supply chain) contribute to emissions of fine and ultrafine particulate matter. Indoor industrial air pollution is also quite common in tanneries, textile processing and pulp & paper and sugar mills.

In spite of federal environmental regulation since 1983, a significant expansion of regulatory powers in 1997, and further clarification of regulatory powers in 2005, significant implementation gaps still remain in the industrial environmental management system, particularly related to implementation of the

³³ World Bank, 2006b. "Pakistan Strategic Country Environment Assessment". Washington DC.

World Bank, 2008, Environmental Health and Child Survival. Washington DC.

Larsen B. and Strukova E. (2011) Cost of Environmental Degradation. Consulting Report for the World Bank. Washington D.C.

National Environmental Quality Standards (NEQS). It is essential that these standards are revised to make them more realistic and attainable under present conditions in Pakistan. For water pollution, the top priority should be given to imposing stringent concentration restrictions on releases of coliform bacteria, heavy metals, and other hazardous substances. A mechanism for enforcing pollution charges (such as the ShamsLakha committee's recommendation in the mid-1990's) needs to be put in place. Clustering of SMEs to facilitate waste collection and treatment would also be an important measure. Regarding air pollution, the primary emphasis should be on reducing levels of PM2.5. Rules governing hazardous waste have been developed, but need to be enforced. Regulations regarding Environment Impact Assessments (EIAs) also need to be restructured and enforced.

Cleaner Production Centers (CPCs) facilitate the application of an integrated environmental strategy to processes, products, and services to increase efficiency in resource use and reduce risk to humans and the environment. Three CPCs have already been established (Sialkot, Lahore and at the national level) and are operating with varying degrees of success. Currently, funded by donor assistance, these centers need to be made commercially viable by charging fees for services and expanding their service to a broader range of firms.

Given the presently inadequate capacity of government environmental agencies with respect to enforcement, voluntary instruments, such as ISO 14001 certification, can play an essential role in improving environmental performance of manufacturing companies.³⁴ This is important because many multinational corporations explicitly require their suppliers to be ISO 14001 certified; access to international markets is harder for firms that do not adhere to this standard. To be certified under ISO 14001, a firm must have an environment management system (EMS) in place that conforms to the ISO 14001 standards and the EMS must be implemented consistently. The experience with EMS and ISO 14001 certification in Pakistan to date, however, is mixed. In a recent survey, most tanneries, many textiles units, and nearly all sugar mills are not ISO 14001 certified although many have put in place EMS. Pulp and paper mills and pharmaceutical and fertilizer companies have EMS and are either ISO 14001 certified or rapidly progressing towards it. By extending clean production standards to the laggards, especially the highly polluting SMEs, progress towards ISO 14001 can be hastened for enhanced international competitiveness.

An NLTA-funded survey to assess firms' attitudes towards cleaner production revealed the unrealistic stringency of Pakistan's current NEQS, as well as the lack of skilled professional staff to be hired by both firms and enforcing authorities, and the absence of common treatment facilities as major reasons for non-compliance and slow progress towards ISO 14001 certification.

³⁴ ISO (International Organization for Standardization), the world's largest developer of International Standards, is a network of the national standards institutes of 160 countries, one member per country; it has a Central Secretariat in Geneva, Switzerland, that coordinates the system. ISO 14001 is an international environmental standard created under the auspices of ISO and based on the work of committees composed of representatives of both public and private organizations.

Develop strong institutions for effective industrialization initiatives including those for small and medium enterprises

The implementation of a strategy for sustainable industrialization requires well functioning institutions. Recent literature³⁵ argues that there are significant market failures in the early stages of development due to, “information externalities entailed in discovering the cost structure of an economy, and coordination externalities in the presence of scale economies.” These result in disincentives for entrepreneurs to search for profitable opportunities³⁶ and retard industrial development. A possible solution is to follow the East Asian, specifically Korean, model³⁷ which requires a committed modern civil service and well-functioning institutions for policy formulation and implementation. An assessment of the quality of civil services is beyond the scope of this annex, but Chapter 5 focuses on institutions that would aid the formulation and implementation of a strategy for sustainable industrialization in Pakistan.

Pakistan’s Ministry of Industries, in its seminal 2005 report, “Towards a Prosperous Pakistan: A Strategy for Rapid Industrial Growth” makes the best case for effective policy coordination at the level of the federal government. MoI recognizes, as does this annex, that many of the policies being recommended for rapid industrial development do not fall directly under the purview of the Ministry of Industries. MoI needs to enhance capacity (or augment it as needed by collaborating with local/international universities/research centers) to play its vital role as an advocate for industry at both the federal and the provincial levels. This role has to be sanctioned by the Cabinet and, given the 18th Amendment of the Constitution that empowers the provinces, by the National Economic Council (NEC). A critical capacity is the ability to engage with the private sector to identify crucial policy reforms (e.g. exchange rate policy, credit allocation, energy pricing, tax rates and tariff structure) needed to establish a level playing field for industry and lower the costs of doing business. Improved capacity to dialogue with the private sector is also needed in order to prioritize public investment, especially in times of fiscal austerity, and leverage public/private partnership in infrastructure provision.

Recent developments have likewise made it imperative for MoI to interact with provincial governments for successful implementation of the strategy for sustainable industrialization. Starting in 2004, provincial governments, in partnership with multilateral donors, especially the World Bank, have started to develop provincial “visions” for economic development. Industrial growth for high productivity employment is an important objective in all provincial visions. The other important recent development is the 18th Amendment of the Constitution. Abolishing the concurrent list and increasing the provincial share in the aggregate resource has empowered the provinces, which are now expected to take on the primary responsibility for delivering on the development objectives.

These developments will further strengthen the demand for regional balance in infrastructure provision for industry. While this is a welcome development, provincial industrialization has to be weighed against the economies of scale that come from the agglomeration of industrial activity in a few clusters. Striking the right balance to prioritize infrastructure investment in times of fiscal tightening is a major challenge and one that the MoI will need to take up at the NEC, chaired by the Prime Minister, with provincial Chief Ministers as members, along with their respective economic teams. MoI will have to set the agenda on spatial dimensions of sustainable industrialization at the NEC, in close coordination with provincial industries departments. MoI will need to develop capacity to do this effectively.

³⁵ Rodrik, D. (2004). Industrial Policy in the 21st Century. UNIDO

³⁶ Philip E. Auerswald and Ammar Malik, 2011, “Review of (LUMS) Industrial Policy: Its spatial Aspects and Cluster Development” Consultant report commissioned by the World Bank. Washington DC.

³⁷ Dani Rodrik, Gene Grossman, Victor Norman Source (1995), “Getting Intervention Right: How Korea and Taiwan Grew Rich”, Economic Policy, Vol.10, No.20 (April, 1995), pp 53-107.

Small and Medium Enterprises (SMEs) are viewed by GoP as major drivers of growth in Pakistan.³⁸ They employ 80 percent of the non-agricultural labor force, and account for 40 percent of GDP and 25 percent of manufactured exports³⁹. However their small size—87 percent of manufacturing SMEs have five or fewer employees—poses problems of access to input and output markets. In addition, there is a lack of proper infrastructure for SMEs to operate with, and there is a lack of supply of skilled workers in Pakistan for them to employ. SMEs face market constraints in the form of lack of vendors and limited access to foreign and many local markets. The Small and Medium Enterprises Development Authority (SMEDA) does not seem to have played its role in helping remove these constraints. Overall, its ratings in these areas have been low.

An assessment was conducted of SMEDA as part of the analytical work undertaken for this NLTA and a number of recommendations have been made to improve its functioning, for example, setting comprehensive goals and targets for SMEDA's Board of Directors to be achieved over the next five years, authorizing and funding SMEDA to develop a new organizational development plan in line with its goals and targets, restructuring SMEDA to enable it to develop a favorable policy environment for SMEs, and providing a budget that allows SMEDA to meet its goals and targets.

The 18th Amendment to Pakistan's Constitution requires devolution of major responsibilities for environmental management to sub-national governments, which will have significant implications for environmental quality management. In Pakistan, delegation of environmental functions from the federal to provincial governments is comprehensive and has empowered provincial EPAs to address most environmental issues in the provinces. As a result of the decentralization, the sphere of operation of each of the provincial EPAs increased considerably. However, many environmental issues cut across geographical boundaries, and systematized mechanisms for inter-sectoral coordination to address cross-cutting issues and harmonize common interventions are needed for effective decentralization. Without adequate coordination, decentralization can lead to substantial differences in environmental quality across regions.

On October 26, 2011, the Prime Minister announced creation of the Ministry of Disaster Management (MDA) at the Federal level, which became the Ministry of Climate Change (MCC) in early 2012. All the environmental management related functions, which were under the purview of Ministry of Environment before the 18th Amendment to the Constitution were recombined and assigned to this new Ministry (except for those under the Pakistan Forest Institute (PFI) and The National Energy Conservation Center (Enercon)). By mid 2012, it is expected that the new Ministry will start performing its obligations, particularly coordination of international protocols and environmental protection/management across the country. The National Disaster Management Authority (NDMA) has also been placed under the new Ministry.

Pakistan might take advantage of international best practices to strengthen the new Ministry. Most countries in the world currently have an apex central environmental ministry or agency with a number of technical and action-oriented agencies designating and implementing public policies, and enforcing regulations. Specifically, the responsibilities that usually are maintained by the central government, regardless of the level of decentralization, include: design and enactment of national environmental policies and standards; transboundary issues; coordination of regional agencies, and research related to climate change, biodiversity or water issues, such as glacial melting. Other possible responsibilities that could be strengthened in Pakistan at the national level can include the following: setting coordination incentives with sub-national environmental units; establishing accountability mechanisms; promoting

³⁸ GoP, 2007, p.8.

³⁹ Available from www.sbp.org.pk/bpd/Conference/Day_One/SME_in_Pakistan.ppt. Accessed May 6, 2011

public disclosure, strengthening the demand side of accountability; and reducing vulnerability to natural disasters:

The NLTA’s overall assessment of environment related-institutions is that, while Pakistan has in place an elaborate institutional framework for addressing environment issues, its impact on the ground is limited. This is because of insufficient capacity in terms of skilled personnel at both the federal and provincial levels, unrealistically elevated environmental standards and inconsistencies in legislation that put provincial governments at odds with the federal government. All of these factors contribute to poor enforcement and very limited progress towards environmental management systems certification, which is critical for environmentally sound and internationally competitive industrialization.

The following tables summarize this annex’s main recommendations regarding the actions that the GoP could adopt to mainstream sustainability considerations into its industrial sector by: i) improving the macroeconomic climate for long-term investment in green production and transport infrastructure; ii) reforming Pakistan’s cargo freight sector in order to provide better access to trading partners, lower the environmental costs of production and aid in the development of existing industrial estates; iii) invest in green production in these burgeoning industrial estates; and iv) improve the institutional environment for sustainable industrial policy.

Table E.1. Key Potential Macroeconomic Policy Reforms to Encourage Industrial Growth

Policy Reform	Time Frame
Access to credit can be broadened by allowing manufacturing firms to leverage their real estate assets as collateral for loans.	Short Term
Trade can be liberalized by ending tariffs, allowing a greater variety of imports from India, and the elimination of protectionist policies that favor a few firms at the expense of the general economy.	Medium Term
The tax code can be reformed so that it apportions the tax burden in non-distortionary manner that does not discriminate against manufacturing activities.	Medium Term

Table E.2. Recommended Actions to Foster Sustainable Trade and Infrastructure in Pakistan

Action	Time Frame
Foster the adoption of new technologies and procedures that add value to the services provided by the trade and transport sector	Short Term
Modernize trucking fleet	Short Term
Strengthening the institutional capacity of infrastructure sector agencies and environmental agencies for environmental management	Short Term
Develop a new energy policy that identifies both short-term and long-term energy sources to cater to the industrial sector	Short-term
Redefine government role, move away from direct operation and towards an impartial apparatus that fosters and regulates transport infrastructure	Medium Term
Improve transport infrastructure along trade corridors with India, China and Central Asia	Long term

Table E.3. Recommended Actions for Greening Pakistan’s Industrial Sector

<i>Recommended Action</i>	<i>Responsible Party</i>	<i>Timeframe</i>
Revision of Environmental Regulations		
Develop both interim and revised permanent National	New Standard Setting	Short-term

Environmental Quality Standards	Committee (includes representatives of enterprises, industry associations, NGOs and public sector)	
Revise and implement pollution charge system	Government of Pakistan	Short-term
Implement permanent National Environmental Quality Standards	New Standard Setting Committee /Government of Pakistan	Long-term
Construction of Common Effluent Treatment Plants		
Create plans for funding and construction of common CETPs in industrial clusters	Public body, industrial association, commercial venture, or public-private partnership.	Short-term
Strengthening Cleaner Production Centers		
Extend the work and scope of Cleaner Production (CP) centers to promote long-term integration of CP and environmental management systems (EMS) in firm's daily operations and management strategies, and establish additional CP centers	CP centers, industry associations, CP working group	Short-term
Create advisory board in CP centers to identify funding sources and develop business plans to ensure financial sustainability	CP centers	Short-term
Create "CP working group" within the Ministry of Industries tasked with developing a national plan for CP and EMS and a strategy for financing construction of CETPs	Ministry of Industries	Short-term
Create a national cleaner production center to promote information sharing among sub-national CP centers and engage in international exchanges of information with other national CP centers	CP working group	Short-term
Public Disclosure and Information Dissemination		
Foster creation of informed citizenry through distribution of information regarding firms' violating environmental regulations and data on health impacts of environmental degradation	Pakistan Environmental Protection Agency and Provincial Environmental Protection Agencies	Short-term
Collect, assemble and release information to firms on foreign environmental standards, voluntary standards established by consortia and retailers, and requirements related to Pakistani products in potential export markets	Pakistan Standards and Quality Control Authority and industry associations	Short-term
Allow Pakistan's specific needs to be accounted for during the processes for formulating international standards in standard setting bodies such as ISO	Pakistan Standards and Quality Control Authority	Short-term

Table E.4. Strengthening MoI’s Capacity for Sustainable Industrialization

Industrial Strategy component	Ministry/Line Agency Directly In charge	Needed MoI capacity to fulfill the role
Reducing macroeconomic and financial risk (including inflation, interest rates and crowding out issues)	Ministry of Finance, State Bank of Pakistan	-Technical capacity to present industry perspectives on macroeconomic stability/competitive exchange rate/access to credit issues -Regular dialogue with the private sector
Energy prices and energy availability	Ministry of Water and Power, PEPCO, OGRA	Technical capacity to represent industry energy needs and pricing issues
Non-discriminatory tax policy	Federal Board of Revenue	Capacity to ensure that the burden of taxation (via corporate, income and sales tax) does not fall only on industry, as other sectors escape the tax net.
Trade policy (including regional trade) and trade facilitation	Ministry of Commerce, Federal Board of Revenue, Ministry of Foreign Affairs	Capacity to maintain a liberalized trade regime (especially vis-à-vis the emerging large economies in the neighborhood) that is not injurious to local industry (appropriate anti-dumping stance); promotion of modern customs procedures that strengthen internationally competitive supply chains.
Efficient transportation and port handling	Ministry of Communications, Shipping and Ports, Provincial governments, Ministry of Railways	Technical capacity to recommend cost reducing public/private investment and management practices in roads, railways, ports and shipping
Spatial location and regionally balanced industrialization	National Economic Council, Planning Division, provincial governments	Developing capacity to strike the right balance between the objectives of agglomeration for scale economies and helping strengthen investment climate to promote local industry
Managing industrial waste and environment pollution	Ministry of Environment and provincial environment departments	Promotion of realistic environment standards and facilitation of adoption of EMS to eventual ISO14001 certification

Table E.5. Recommended Actions for Improving Pakistan’s Institutional Framework for Sustainable Industrialization

<i>Recommended Action</i>	<i>Responsible Party</i>	<i>Timeframe</i>
Strengthen provincial EPAs so that they have the budgets and staffs needed to help provincial governments design new environmental regulations pursuant to the 18 th Amendment and the capacity to monitor environmental pollution and enforce the new regulations	Provincial environmental protection agencies	Short-term
Create “Cleaner Production working group” within the Ministry of Industries tasked with developing a national plan for CP and EMS and a strategy for financing construction of CETPs	Ministry of Industries	Short-term

<p>Strengthen the Minister of Climate Change with the following key responsibilities: coordinating environmental policy and priority-setting; designing and enacting national environmental policies; handling transboundary issues; conducting research related to climate change, biodiversity and water issues; establishing accountability mechanism; promoting public disclosure; and strengthening the demand side of accountability</p>	<p>Government of Pakistan</p>	<p>Short term</p>
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CHAPTER 1. PAKISTAN'S INDUSTRIAL VISION

1.1. Industrialization in the Context of Pakistan's Development Framework

Pakistan's development efforts are guided by the 2011 "Framework for Economic Growth."⁴⁰ The *2011 Framework* lays out the growth strategy drafted by Pakistan's Planning Commission and identifies the strategic actions needed to create a prosperous, industrialized Pakistan through rapid and sustainable development. According to the 2011 Framework, industrialization has the potential to become a dynamic engine of economic growth and make significant contributions to meeting Pakistan's economic and human development goals.

Indeed, the 2011 Framework emphasizes the centrality of industry in achieving economic and human development goals. The Framework recognizes that accelerating industrialization will require reducing the cost of doing business and creating an incentive structure designed to achieve a competitive, dynamic, and export-driven industrial sector capable of providing employment to the growing labor force. GoP also recognizes that competing in global markets requires a socially and environmentally sustainable industrialization strategy and to that end requested Non-Lending Technical Assistance (NLTA) from the Bank

While working towards a broad reform agenda that targets multiple pillars of competitiveness, the GoP recognizes that competing in global markets requires addressing infrastructure bottlenecks and the linkage between environmental protection and international business competitiveness.⁴¹ One of the several items that the GoP considers as critical for sustained economic growth is the "liberalization of Pakistan's trade and investment regime."⁴² GoP also recognizes the importance of spatial dimension of development and its implications for sustainable industrialization.

1.2. The Bank's Non-Lending Technical Assistance (NLTA)

The GoP requested support from the World Bank to identify interventions that the GoP can implement effectively to strengthen Pakistan's competitiveness in domestic and global markets. The objectives of the World Bank's non-lending technical assistance are to support the GoP to:

- Strive for macroeconomic stability and sectoral policies that support industrial competitiveness;
- Upgrade trade facilitation and transport infrastructure in order to address some of the spatial aspects of industrialization;
- Green Pakistan's Industrial Sector to enhance international competitiveness; and
- Develop strong institutions for effective industrialization initiatives including those for small and medium enterprises

⁴⁰ Planning Commission. 2011. Pakistan: Framework for Economic Growth. Planning Commission, Government of Pakistan, Islamabad. Available at <http://www.cprspd.org/Final%20Version%20-%20Pakistan%20Framework%20for%20Economic%20Growth%202011%20%28May%202.pdf> Accessed August 3, 2011.

⁴¹ World Bank, 2007

⁴² Planning Commission. 2011. Pakistan: Framework for Economic Growth, op.cit. .p. 12

These mutually complementary policy areas were selected because they operate along the nexus of feedback between sustainability and competitiveness. Macroeconomic stability allows firms and governments to make long-term plans, including investments in cleaner production and in infrastructure, such as trade and transport infrastructure. Improved trade and infrastructure will encourage more economically efficient transport modalities that will open access to Chinese and Iranian markets and will lower the environmental costs of production, thus making Pakistan a more attractive export partner for nations and firms that have made a commitment to green production. Improved infrastructure will also provide new opportunities to strengthen existing areas of high activity—industrial clusters—and, thus, foster economies of scale. In these industrial clusters, clean production initiatives, particularly the construction of common effluent treatment plants, will result in lower production costs and increased international competitiveness. Finally, these growing industrial clusters will create growing need for a strong set of institutions to implement industrialization initiatives, such as environmental management agencies to control pollution and cleaner production centers to increase domestic awareness of international environmental standards.

The NLTA adopted a two-part strategy to address the above mentioned issues. One involved the use of a process to ensure meaningful discussions among key stakeholders involved in aligning Pakistan's industrial policy with the goals in the *2011 Framework*. The other involved engaging a number of studies to assist with analytic work that would provide a foundation for meeting the NLTA's objectives.

Discussions among key stakeholders

In order to ensure meaningful discussions among key stakeholders in the identification of specific sustainability criteria that would be incorporated into GoP's industrialization strategy, the government created in 2009 a forum, formally named as a High Level Committee (HLC), integrated by 28 members representing a wide range of stakeholders: the federal government, the governments of all four provinces, industry, academia, NGOs, and in general civil society organizations. The HLC is chaired by the Minister of Industries.

The HLC directly assisted the analytic work of the NLTA by discussing and finalizing the Terms of References (ToRs) of the analytic studies carried out as part of the NLTA; and sharing its knowledge with consultants carrying out the individual studies. The HLC met seven times over the life of the NLTA and its work included:

- Actively participating in discussions on policy options;
- Debating how a new industrial policy for Pakistan might be adopted, implemented, monitored and evaluated;
- Building consensus on a way forward towards meeting the GoP goals of industrial structural change;
- Supporting development of mechanisms for a long-term, ongoing competitiveness dialogue

In parallel, and on its own, the Ministry of Industries initiated a process for building consensus leading to the formulation of a new industrial policy for Pakistan. To this end, the MoI established a Task Force supported by a nucleus group consisting of eight members. This core technical group was made responsible for developing a policy proposal. The full task force met twice in Islamabad. Some of the members participated in nine meetings across the country, where draft proposals were presented and discussed. The sessions were held at the Federation of Pakistan Chamber of Commerce & Industry (FPCCI) in Karachi, and the Chambers of Commerce and Industry in Karachi, Sukkur, Hyderabad, Multan, Peshawar, Faisalabad, Gujranwala, Lahore and Islamabad. The sessions served as forums for

bringing together key stakeholders to discuss policy alternatives and build consensus. The aim was to have a broad ownership of the proposed policy and thereby facilitate its eventual adoption and implementation.

Analytic Work as a Foundation for Meeting NLTA Objectives

The second approach involved engaging teams of specialists to conduct analytic studies to provide a foundation for meeting the NLTA's objectives. One of the studies, conducted by researchers at the Lahore University of Management Sciences (LUMS), focused on Pakistan's spatial disparities and effective industrial cluster development. The formulation of the industrial policy was in accordance with the overall growth and development priorities of the GoP as broadly identified by the "9-point" Plan put forward by the Planning Commission (PC) and the Prime Minister's Economic Advisory Council (EAC). The study assessed the value added of industrial estates and clusters and recommends interventions that could be carried out to strengthen the development of industrial estates and clusters in ways that would help address the country's environmental priorities. The analytic work also addressed the following issues: disparities in infrastructural provision, regional inequalities, factors influencing spatial distribution and concentration of industries, and prospects for effective industrial cluster development.

A parallel analytical work was conducted by the Bank on "Pakistan Strategic Environmental, Poverty and Social Assessment of Trade and Transport Sector Reforms (SEPSA)." The relevant findings of the analysis completed under SEPSA and their linkages with industrialization are also discussed in this annex.

Given the importance of small and medium enterprises (SMEs) in industrial output and employment, a separate study was commissioned to evaluate interventions carried out by the Small and Medium Enterprise Development Authority (SMEDA), the apex body for SME promotion in Pakistan. Emphasis was placed on interventions that result in sustainable development. This study provided policy advice to strengthen the institutional framework for SMEs and give them incentives for adopting socially and environmentally sound practices.

In addition, three analytical studies conducted as part of this NLTA focused on various aspects of industrial environmental management:

- Evaluation of Industrial Environmental Management (IEM) in Pakistan – An evaluation of Pakistan's IEM activities was conducted for the period from 1997 – 2010 to identify specific interventions that the GoP could adopt to ensure that IEM is aligned with Pakistan's environmental priorities and is providing incentives for firms to enhance their competitiveness in the course of attaining environmental goals.
- Evaluation of IEM in Developing Countries with Extensive IEM Experience – A set of interviews with IEM experts and a detailed review of relevant literature were used to extract lessons learned about IEM activities in countries with IEM experiences potentially valuable to Pakistan; such as the experience of China.
- Evaluation of Cleaner Production (CP) initiatives in Pakistan – An assessment was conducted of the several CP initiatives underway in Pakistan. In addition to assessing the scope of CP efforts in Pakistan, the study recommended interventions that could strengthen CP efforts that enhance the firms' competitiveness while addressing Pakistan's environmental priorities.

1.3. Outline of the Report

This annex draws on the analytical work described above to summarize the principal findings and recommendations and contribute to the debate on sustainable industrial growth in Pakistan.

Chapter 2 presents the profile of industry in Pakistan and reviews performance in recent years. The weak international competitiveness of industry is assessed and its causes identified. The strategy for sustainable industrialization would strengthen international competitiveness of firms by addressing the key constraints that adversely affect industrial performance. Of critical importance is the Dutch disease problem associated with remittances and other capital inflows that has appreciated the equilibrium exchange rate. Direct intervention in the exchange rate market by lowering the nominal exchange rate may not affect the equilibrium exchange rate if remittances and official inflows are expected to remain high. This makes it all the more important to remove distortions in the credit market, trade policy and the tax regime that discourage investment in manufacturing. Given the high equilibrium exchange rate, a more proactive (but prudent) fiscal policy would be central for a sustainable industrialization strategy.

The GoP has embarked on an ambitious program of trade and transport facilitation to lower the cost of doing business for firms and improve the overall investment climate. While improvements in trade and infrastructure are needed to help Pakistan's lagging industrial sector, these reforms are necessary to help keep pace with the on-going spatial transformation occurring in the country. Pakistan's population living in cities is expected to increase from 36 percent in 2010 to nearly 50 percent in the decade starting in 2030. The envisaged reforms, which contribute to agglomeration economies in urban areas, are reviewed in Chapter 3. In view of the concern for sustainability, the economic and social impact of the program is assessed by identifying the winners and losers affected by the major reforms and suggesting remedial strategies to minimize the social and environmental costs of trade and transport reforms.

While suggesting the remedial measures to counter the biases in policy and public expenditure that adversely affect industrial performance, a strategy for sustainable industrialization has to also address the negative externalities of industrialization. The profiles of industrial waste water, hazardous solid waste and air pollution point to the importance of policy intervention to lower the cost of pollution associated with industry, including the adoption of cleaner production systems, environment management systems and obtaining ISO 14001 certification. These issues are discussed in Chapter 4 drawing on the appendix "Greening of Pakistan's Industrial Sector", as well as on the studies "Evaluation of Industrial Environmental Management (IEM) in Pakistan", "Evaluation of IEM in Developing Countries with Extensive IEM Experience", and "Evaluation of Cleaner Production (CP) initiatives in Pakistan.

Strong institutions are needed to implement cost-effective interventions to promote industrialization and this is taken up in Chapter 5. Effective policy coordination is needed to ensure that industry interests are well represented at key policy forums to avoid systemic bias against industry in key pricing and public investment decisions. GoP in its 2005 report, "Towards a Prosperous Pakistan: A Strategy for Rapid Industrial Growth" outlines institutional arrangements for achieving this. Another area of institutional strengthening is the promotion of small and medium enterprises. SMEs are viewed by GoP as a major driver of economic growth.⁴³ In Pakistan, SMEs are very small: 87 percent of SMEs employ five or fewer people, and 98 percent have ten or less employees. Yet, they employ 80 percent of the non-agricultural labor force, and account for 40 percent of GDP and produce 25 percent of exported goods. Given SMEs importance and their structure, they have received some policy attention. A specialized institution, the Small and Medium Enterprise Development Authority (SMEDA), has been set up to support the SMEs via an array of interventions. Ensuring cost effective institutional support to SMEs would be an important pillar of a strategy for industrialization. This discussion is based on the NLTA study, "Independent Evaluation of SMEDA"⁴⁴.

⁴³ GoP, 2007, p.8

⁴⁴ Shah, Salman 2011, "Independent Evaluation of SMEDA" Consulting Report commissioned by the World Bank for the Pakistan, Mainstreaming Sustainability in Pakistan's Industrial Competitiveness NLTA. Lahore. Pakistan

CHAPTER 2. INDUSTRIAL PERFORMANCE AND THE POLICY REGIME

A review of recent industrial performance shows that despite the promising start in the 1960's, industry has not been the engine of economic growth and high productivity employment expected in the Government of Pakistan's (GoP's) development visions. Industrial outcome has been affected by the boom-bust cycles of Pakistan's overall economic performance. Characterized by low labor productivity and weak international competitiveness, industry's share in GDP and total employment is declining. These weaknesses have been accentuated by an economic management stance that favors consumption over savings and investment in manufacturing as exhibited in a host of macro and sectoral pricing and public expenditure policies.

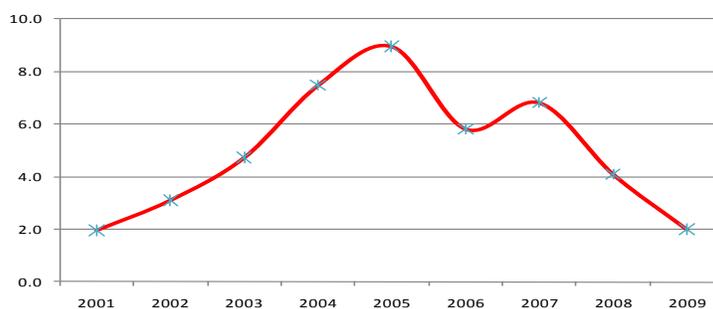
This chapter discusses the profile of Pakistan's industrial sector, including the policy regime faced by industrial investors. It is based on the analytical work supported by the NLTA, but also by the private sector and by local and international researchers. It is argued that a stable macroeconomic environment and a sectoral policy stance that levels the playing field for industry vis-à-vis other sectors of the economy is critical for strengthening international competitiveness of manufacturing firms.

2.1. Recent Economic Developments and the Industrial Sector

High Volatility of GDP Growth

The stated economic policy for most of the last decade has emphasized trade-led growth and macroeconomic stability (Ministry of Finance, PRSP II: 5). Recent performance of the economy, however, repeats the growth volatility that has characterized economic growth for several decades. Between 2001 and 2006, the growth rate rose dramatically following a surge in remittances and foreign aid that led to a consumption-fueled boom (Figure A2.2.1). Growth exceeded all expectations averaging over 7 percent per annum for almost four years; the capital market expanded rapidly, foreign exchange reserves increased to six months of imports, and there was a significant increase in per capita income. In 2007, however, the economy went into a sharp downturn. In 2008, growth fell to 4 percent and was further down to 2 percent in 2009.

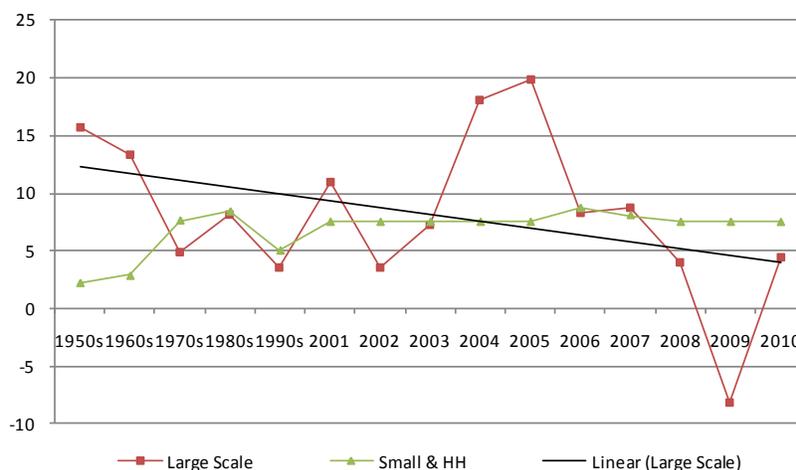
Figure A2.2.1. GDP Growth Rate in Pakistan, 2001-2009 (in percent)



Source: Federal Bureau of Statistics

The global recession was only partly responsible for the collapse of the growth rate⁴⁵. The principal factor was the underlying structural weaknesses of the economy. Industrial vulnerability is signified by the fact that manufacturing growth had declined even during the consumption-led boom falling eventually to -3.3 percent in 2009. This was mainly due to a slump in large-scale manufacturing; the growth rate of small firms has been steady since 2000 (Figure A2.2.2). Large-scale manufacturing registered a sharp increase in its growth rate between 2002 (4 percent) and 2005 (20 percent), followed by a sharp contraction reflecting weakening aggregate demand, deteriorating security and power shortages.

Figure A2.2.2. Performance of the Large Scale and Small Scale Manufacturing Sector in Pakistan, 1950-2010, in percent



Source: Pakistan Economic Survey 2007-08

Evolving Structure of the Economy

Structural change in the national economy has been a fundamental feature in the growth and development of both Western Economies and Newly Industrialized Countries of the East.⁴⁶ As an economy develops, the share of agriculture in GDP inevitably declines while that of manufactures and services increases. This form of structural change represents a gradual shift from low productivity to high productivity activities. Along with this observable structural transformation, there is wide agreement in the empirical economics literature about the following stages in development.⁴⁷ At low income levels, specialization is high and is primarily determined by resource based comparative advantage. As a country becomes richer, the manufacturing base diversifies with firms producing and exporting a wider range of relatively more sophisticated products. However, at higher levels of income, the process reverses; specialization again increases but in high value added and technologically advanced products. Increased product diversification therefore represents an intermediate stage in the process of structural transformation during a country's economic development.⁴⁸

⁴⁵ The growth rates of other South Asian countries also dropped, but not to the same low levels as Pakistan's (ADB, 2009). For example, India's GDP growth rate fell to 6.8 percent in 2008 but has risen since then to 7.2 percent in 2009. Similarly, Bangladesh has maintained its growth rates at an average of 6.2 percent.

⁴⁶ See Timmer CP, Akkus S. 2008. The structural transformation as a pathway out of poverty: analytics, empirics and politics. Working paper 150. Washington, DC: Center for Global Development. Available from: <http://www.cgdev.org/content/publications/detail/16421>.

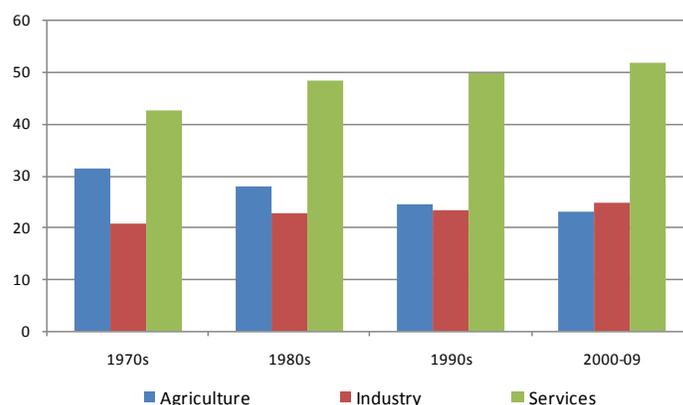
⁴⁷ Klinger and Lederman (2004)

⁴⁸ See Timmer CP, Akkus S. 2008.

Industrialization offers a range of potential benefits, including, more job creation, higher economic growth, and tax revenues. However, in the context of Pakistan’s economy, policies have been skewed in favor of the primary and tertiary sectors, depriving to a large extent the manufacturing sector. Services continue to increase their share in GDP while agriculture’s share is declining slowly and the manufacturing share is stagnant.

Figure A2.2.3 shows that the economy is now dominated by services, accounting for more than 50 percent of GDP. The manufacturing share, on the other hand, has remained constant at about 25 percent of GDP, whereas the contribution of agricultural has declined from more than 30 percent in the 1970s to about 25 percent today. Meanwhile, a large part of the labor force (more than 40 percent) is still employed in agriculture and industry, with the former having the highest value addition, but the lowest share in employment (20 percent). This is a matter of concern, since movement of labor from low productivity (agriculture) to relatively high productivity sectors (such as manufacturing) generates the surplus that spurs growth and results in improved living standards for workers.

Figure A2.2.3. Sectoral Shares in GDP of Pakistan, 1970-2009 (in percent)



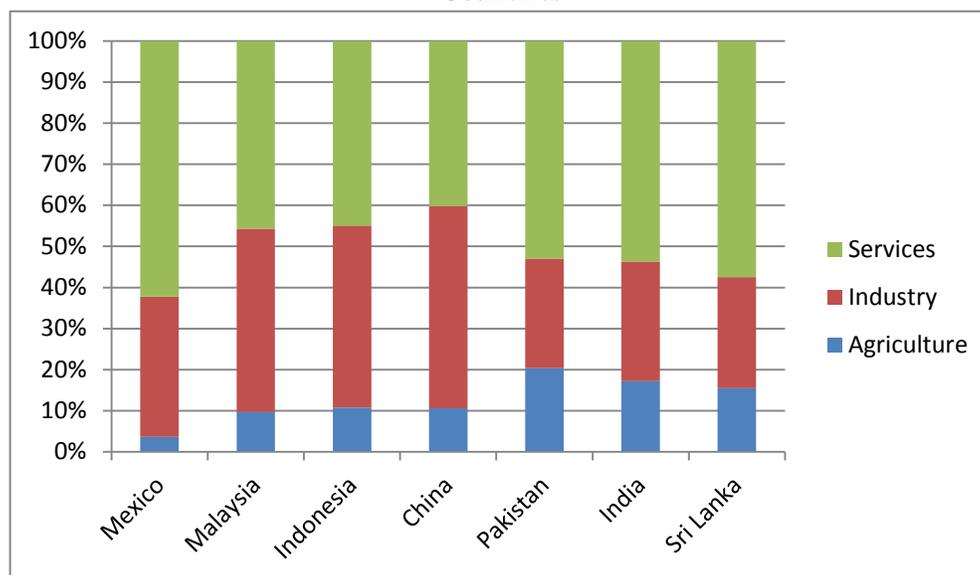
Source: Pakistan Economic Survey 2002-03, 2008-09 and Bureau of Statistics data on GDP up to 2009.

The evolving structure of the economy is indicative of the manufacturing sector’s unsatisfactory performance. Manufacturing grew at an average rate of 10.6 percent in 1998-2007, but on a yearly basis the growth rate has fallen from 14 percent in 2004 to 5.4 percent in 2008.⁴⁹

A prominent feature of the economic structure of Pakistan’s economy is the way in which it differs from that of developing countries with strong emerging economies. In comparison to China, Malaysia, and Indonesia, Pakistan has the largest agricultural share of GDP and the smallest industrial share of GDP. Relative to India, Sri Lanka and Mexico, it also has a larger share of GDP from agriculture. Given Pakistan’s increasing urbanization rate, these findings are unusual (Figure A2.2.4).

⁴⁹ ADB, 2008.

Figure A2.2.4. Industry, Agriculture, and Services' Contribution to GDP in Select Countries



Source: The 2008 CIA World Factbook.

A main reason for the poor performance of the industrial sector continues to be heavily concentrated in low value added consumer products, e.g. food, beverages, and textiles (Table A2.2.1). Textiles, which account for more than 70% of Pakistan's total exports, are considered to be non-dynamic in nature, offer little possibility for technological improvements, and attract very little foreign direct investment. In general, the industrial sector has failed to move into more sophisticated capital goods and to develop upstream ancillary manufacturing, such as chemicals and engineering. Importantly, manufacturing is concentrated in items that are losing their share in the world market. In 2008, the share of textiles, garments and footwear in Pakistan's exports was more than 60 percent, whereas these items constituted 5.8 percent of world exports.

Table A2.2.1. Average Product Shares in the Manufacturing Sector of Pakistan, 1970-90 (in percent)

Product	1970s	1980s	1990s
Food & Beverage	30.45	30.94	22.89
Textiles	27.78	18.14	25.06
Apparel, leather & textile	2.04	2.37	2.80
Industrial Chemicals	11.20	14.29	15.50
Petroleum & Coal	5.27	6.01	3.26
Rubber & Plastic	1.80	1.80	1.42
Metals & Non-metals	9.10	14.20	13.20
Nonelectrical Machinery	1.84	2.14	2.09
Electrical Machinery	3.31	3.26	5.43
Transport Equipment	2.99	2.89	3.05

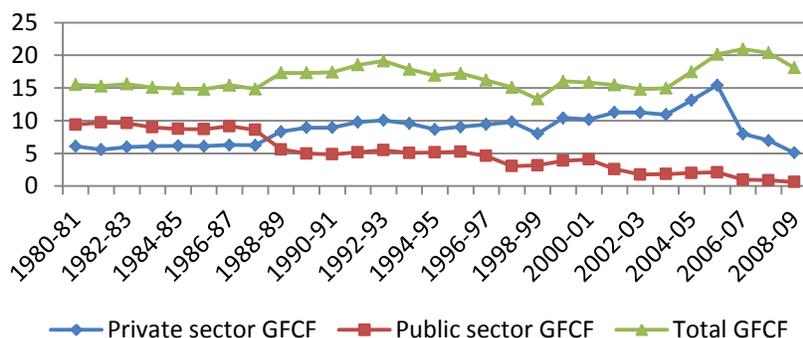
Source: Pakistan Economic Survey (various issues)

Investment and Savings Trends

Although GDP growth in Pakistan over the last three decades is comparable with other developing countries, investment has been sluggish. Total fixed investment as a percentage of GDP has remained in

the range of 15 to 20 percent in the last three decades (Figure A2.2.5). Due to improvements in the external environment, the share briefly rose from 15 to more than 20 percent between 2003 and 2006. However, in the last three years, worsening internal security and increased macroeconomic instability have brought about a sharp fall in private investment pulling down the share of total investment in GDP by up to five percentage points.

Figure A2.2.5. Total, Private and Public Gross Fixed Capital Formulation (GFCF) in Pakistan, 1980-2009 (in percent of GDP)



Notes: Total GFCF includes private sector, public sector and general government.
Sources: Economic Surveys 1987-88, 1992-93, 1999-00, 2003-04 and 2006-

Public investment has fallen sharply over the last three decades, from 9.2 percent of GDP in the 1980s to below 5 percent the mid-1990s. This was a result of fiscal consolidation in the 1980's.⁵⁰ The role of the government in the economy was further reduced through privatization of large public sector entities and the share of the private sector increased to 84 percent of GDP.⁵¹ The decline in public investment was offset by the private sector invigorated by financial sector reforms and later by major governance, and economic reforms⁵². Private investment thus increased from 7.8 percent of GDP in the 1980s to 12.7 percent of GDP in the 2000s. Foreign Direct Investment (FDI) increased even more dramatically in the 2000s, from USD0.4 billion in 2001 to USD2.4 billion in 2008. This has changed since 2007 with both domestic private investment and FDI contracting sharply due to uncertain economic environment and international liquidity constraints.

At the same time, Pakistan has had persistently low levels of savings and investment compared to other countries with similar income levels (Table A2.2.2 A2.2.2). Savings in the economy have been constrained by both high fiscal deficits (reduced public savings) and an inflationary environment (increased consumption expenditures), which has in turn widened the resource gap from 3.6 percent of GDP over the 1994-2001 period to 5.4 percent in 2009. Low investments in the economy slow down economic growth, whereas low savings exert pressure on

⁵⁰ As a result of fiscal and external deficits, Pakistan sought help in the late 1980s from the World Bank and IMF on an emergency basis for the revival of economy. The Structural Adjustment Program (SAP) was introduced to address the twin deficits through reductions in expenditures and increases in tax revenue along with conditions pertaining to the restructuring of the economy through liberalization, privatization and deregulation.

⁵¹ ADB, 2008.

⁵² Implementation of the Privatization Act 2000, creation of the Ministry of Privatization and investment, Board of Investments (BOI), and Insurance Act 2001 were important steps in this direction. A new legal structure was introduced to strengthen the financial system which includes introduction of recovery laws, legal structure for non-bank financial institutions, monetary and fiscal board for better coordination between monetary and fiscal policies, and the Fiscal Responsibility and Debt Limitation Act 2005 primarily aimed at reducing fiscal deficits.

external accounts to finance domestic investments. The large and widening resource gap also increases the external debt and debt-servicing burden, which has resulted in macroeconomic instability in the past.

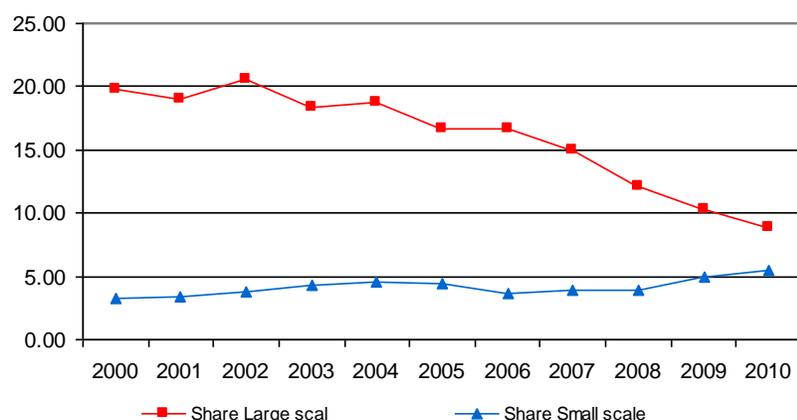
Table A2.2.2. Comparisons of Savings and Investments, 1994-2009 (as percent of GDP)

		1994-2001 Average	2007	2008	2009
World	Saving	22.1	23.7	23.8	21.4
	Investment	22.4	23.3	23.4	21.5
	Resource Gap	-0.3	0.4	0.4	-0.1
Developing Economies	Saving	24.1	33.0	33.5	31.1
	Investment	24.8	28.8	29.3	29.2
	Resource Gap	-0.7	4.2	4.2	1.9
Developing Asia	Saving	32.7	44.7	44.7	43.6
	Investment	32.4	37.9	39.1	39.5
	Resource Gap	0.3	6.8	5.6	4.1
Pakistan	Saving	15.4	17.8	13.3	14.3
	Investment	19.0	22.9	21.6	19.7
	Resource Gap	-3.6	-5.1	-8.3	-5.4

Source: State Bank of Pakistan 2008, World Economic Outlook 201

The resource gap is particularly problematic for the manufacturing sector, since Pakistan has recently experienced a sectoral shift of investment from the industrial sector (large scale manufacturing, mining and quarrying, construction and electricity) to services (finance, transport and communications). In fact, the share of transport and communication investment in total investment rose from 12 to 24 percent between 2000 and 2010, while the share of industrial investment declined from 38 percent to 20 percent. A similar pattern can be observed in the share of total manufacturing, driven largely by a significant decline in investment in the large firms (Figure A2.2.6).

Figure A2.2.6. Share of Manufacturing Investment in Total Fixed Investment, 2000-10 (percent)



Source: Economic Survey (various issues)

Similarly, the sectoral composition of FDI has shifted away from manufacturing. FDI in the last two decades has come in the oil and gas sector, power, financial, and telecommunication sectors. Less than one fifth of total FDI in 2008 went to manufacturing reflecting a declining trend that started in 2004. Economic research reveals strong linkages between FDI in recipient countries and economic growth. For example, Wang 2009 finds that FDI in the manufacturing sector brings more benefits than in non-

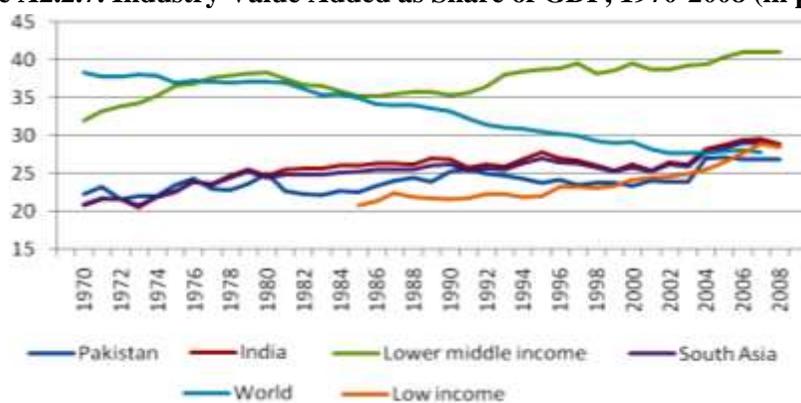
manufacturing sectors of the economy.⁵³ This is of concern for Pakistan as FDI, particularly in the manufacturing sector is important in terms of realizing technological spillover effects and economies of scale.

2.2. Industrial Competitiveness

Low Productivity

Value-added in industry (as a share of GDP) has ranged between 21 and 27 percent throughout the 1970s and 1980s (Figure A2.2.7.) From 1994 to 2003 it was constant at about 23 percent, after which it rose to 27 percent; a level at which it has remained since. Relative to other comparable countries, this is very low. For instance, India has had a higher value added share since the early 1980s and even low-income countries have recently overtaken Pakistan.

Figure A2.2.7. Industry Value Added as Share of GDP, 1970-2008 (in percent)



Source: World Development Indicators (WDI), 2009

This poor performance is also reflected in Pakistan's deteriorating ranking of competitiveness as measured by the Global Competitiveness Index (GCI). Pakistan ranked 73rd out of 101 countries in 2003, and 101 out of 134 countries in 2010. In comparison with its regional competitors, Pakistan has ranked higher than Bangladesh, but far below India, which has outperformed Pakistan across all twelve pillars⁵⁴ on which the GCI is based.

The contribution of total factor productivity (TFP) to the growth process has been low. In 1960-2005, 80 percent of GDP growth was explained by capital accumulation and labor expansion with TFP growth making up the remainder (Table A2.2.3). TFP growth accounted for 38 percent of GDP growth in the 1980s, but fell to merely 18 percent in the 1990s before recovering slightly to 23 percent. More worryingly still, TFP growth in the manufacturing sector was only 1.64 percent during the 1990s, which increased by a mere 0.9 percent in 1998-2007.⁵⁵

Table A2.2.3. Growth Accounting in Pakistan by Decades, 1961-2005 (in percent)

Decomposition of GDP Growth Rate

⁵³ Wang, Miao (2009), Manufacturing FDI and economic growth: evidence from Asian economies, Applied Economics, 41(8), 991 — 1002

⁵⁴ Competitiveness is defined by 12 pillars (institutions, infrastructure, macroeconomic stability, health and primary education, higher education and training, goods market efficiency, labor market efficiency, financial market sophistication, technological readiness, market size, business sophistication, and innovation) and divided into three categories (basic requirement, efficiency enhancers & innovation and sophistication)

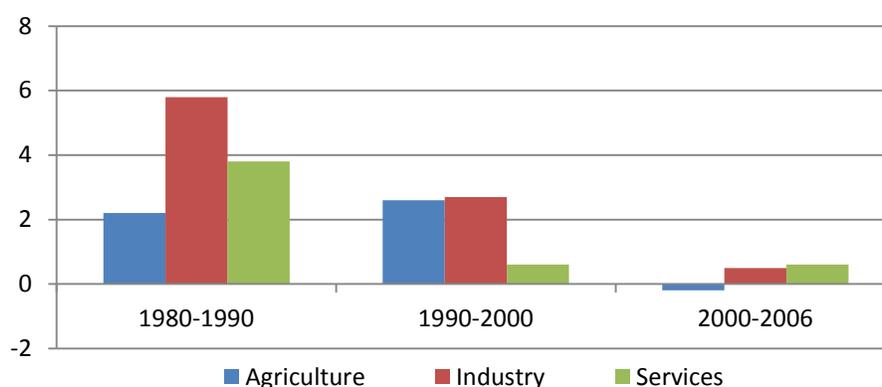
⁵⁵ Chaudhry, 2009

	GDP Growth	Capital	Labor	TFP
1961-1970	6.97	64%	23%	12%
1971-1980	4.58	39%	50%	10%
1981-1990	6.09	31%	31%	38%
1991-2000	3.86	38%	44%	18%
2001-2005	4.55	35%	42%	23%

Source: World Bank (2006a)

Labor productivity growth has been sluggish at 1.29 percent in 1990-2006, whereas it rose by 9.07 percent in China, 3.38 percent in India and 2.69 percent in Bangladesh.⁵⁶ In addition, labor productivity has varied greatly across sectors. Output per worker grew fastest in industry during the 1980s, but the growth rate fell steadily and dropped to less than 1 percent in 2000-2006.

Figure A2.2.8. Output per Worker Growth in Pakistan, 1980-2006 (in percent)



Source: Nabi (2010)

Poor Export Performance

Globally, rapid growth in manufacturing exports has allowed developing countries to gain a sizeable share of the world market. Pakistan, however, has not been part of this trend. For example, the global share of exports from India, Malaysia and Thailand has on average increased by 185 percent in 1990-2008, whereas Pakistan's share declined by 17 percent (Table A2.2.4).

Table A2.2.4. Country Export Shares Relative to Total World Exports, 1970-2008 (in percent)

	1974	1980	1990	2000	2008
India	0.56	0.43	0.57	0.70	1.32
Malaysia	0.55	0.74	0.94	1.61	1.43
Pakistan	0.14	0.15	0.18	0.15	0.15
Thailand	0.32	0.37	0.74	1.13	1.25

Source: United Nations Commodity Trade Statistics Database

Moreover, Pakistan exports a narrow range of manufactured products to which it has added little value. This can be captured by the PRODY index⁵⁷, which associates a certain income level to each product, and

⁵⁶ Asian Productivity Organization (2009)

⁵⁷ The PRODY index is constructed as the weighted average of the per capita GDPs of the countries exporting a specific product, and thus represents the income (and productivity) level associated with that product. The weights

the revealed comparative advantage (RCA)⁵⁸; a measure that is greater than one if the country has a comparative advantage in producing a given good. The results in Table A2.2.5 suggest that despite being a major producer of raw cotton, Pakistan does not have a comparative advantage in those textile products that fetch the highest prices. Its exports are instead concentrated in those goods (raw cotton, cotton yarn, and cotton fabrics) that are produced by low-income countries. Pakistan's high RCA in these products is mainly due to government policies that have so far favored low value-added items over more sophisticated products, such as felt articles or bonded fiber.

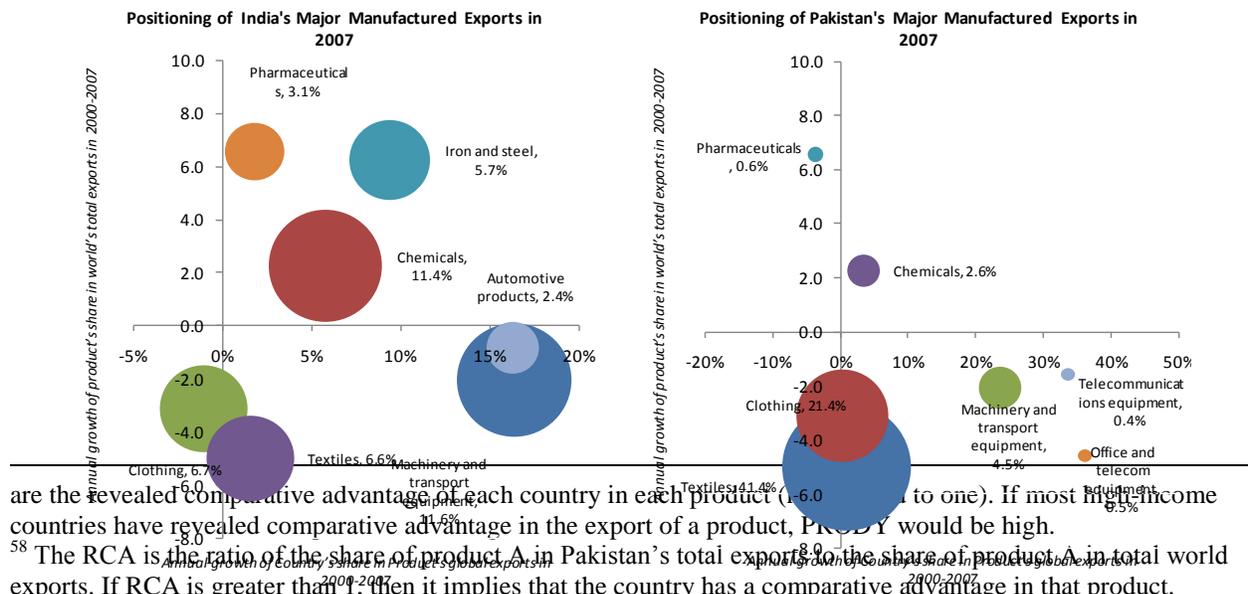
Table A2.2.5. PRODY and RCA in Textiles, 2008-09

Product	PRODY (in USD)	RCA
Raw cotton	2,036	5.9
Cotton yarn	5,631	86.5
Cotton fabrics	4,541	115.0
Men & boys' readymade garments	6,777	13.2
Women & girls' readymade garments	5,160	5.2
Clothing accessories (knit wear)	9,419	22.5
Articles of felt (technical textile)	22,486	0.1
Bonded fiber fabric	31,250	0.2

Source: UN Commodity Trade Statistics and Asian Development Bank

As a consequence, Pakistan's export positioning in the world markets is not very encouraging. This can be illustrated graphically by comparing the growth rate of a given good in world exports with the corresponding growth rate in Pakistan's exports. If the product is in the upper right hand quadrant (the 'competitive quadrant'), it means that the product is internationally competitive. As is evident from Figure A2.2.9 below, Pakistan has a minute proportion of its exports (only 2.6 percent) in the 'competitive quadrant'. Manufacturing exports are dominated by textiles (41.4 percent), whose world demand is falling. In comparison, India exports a great variety of manufactured products with several of its exports, namely pharmaceuticals, chemicals, iron and steel, and automotive parts, in the 'competitive quadrant'.⁵⁹

Figure A2.2.9. Competitiveness and Performance of India's and Pakistan's Exports, 2000-07 (in %)



are the revealed comparative advantage of each country in each product (1 to one). If most high-income countries have revealed comparative advantage in the export of a product, PRODY would be high.

⁵⁸ The RCA is the ratio of the share of product A in Pakistan's total exports to the share of product A in total world exports. If RCA is greater than 1, then it implies that the country has a comparative advantage in that product.

⁵⁹ Nabi, 2010.

Source: Nabi (2010)

The underlying reason for Pakistan's inability to achieve a dynamic competitive advantage is the persistent failure to diversify its production⁶⁰ and climb up the technology ladder.⁶¹ In fact, in 2008 medium- and high-technology products merely accounted for 9.5 percent of Pakistan's exports, while they made up 57.6 percent in world exports (Table A2.2.6). Moreover, the performance of medium-technology exports has not been encouraging; their growth rate was below both the corresponding world growth rate and Pakistan's total exports growth rate. The growth of high-technology exports, on the contrary, has been remarkable at 17.5 percent per year; however, their share in total exports is negligible and exceptionally low in comparison to other countries.

Table A2.2.6. Technological Level of Pakistani and World Exports, 1998-2008 (in percent)

Sector	Pakistan Exports			World Exports*	
	Growth 1998-2008	Share 1998-2000	Share 2006-2008	Growth 1998-2008	Share 2008
Total	9.6			10.1	
Primary	10.1	12.3	12.7	11.2	11.4
Resource-based	23.9	3.5	10.9	10.5	14.8
Low-technology	8.2	74.7	66.7	9.2	16.2
Medium-technology	8.7	8.6	8.1	10.1	35.5
High-technology	17.5	0.8	1.4	9.3	22.1

Notes: * Exclusive of oil exports

Source: United Nations Commodity Trade Statistics Database

Box A2.2.1. Access to Foreign Markets

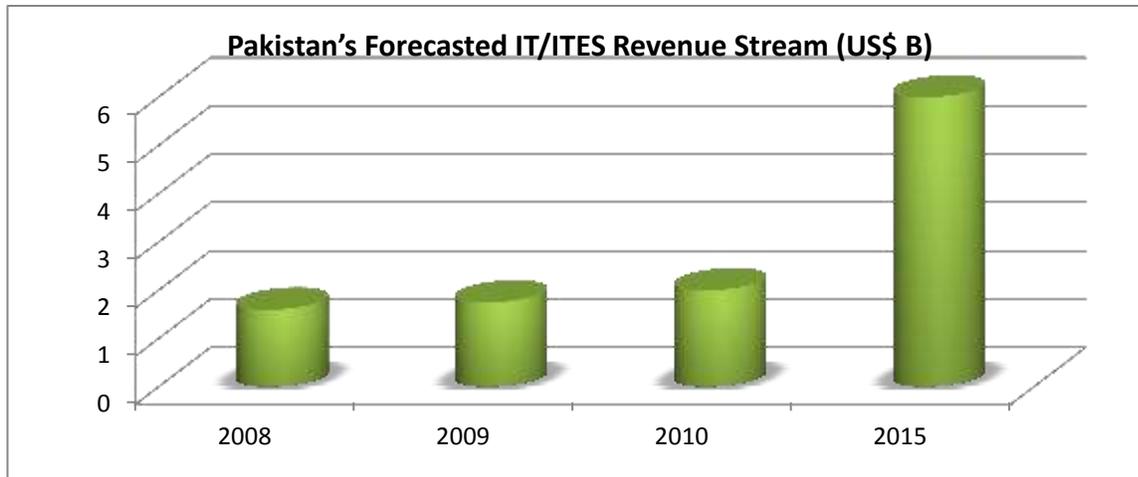
In Pakistan, foreign market access is not reaching its potential. Pakistan foreign market potential is at least 4.5 times greater than that of the United States and its real market access is between 4-9% of US levels in 2003.¹ In effect, Pakistan ranks low on real market access because of low competitiveness, and it ranks high on foreign market potential because it is right next to India. Pakistan overall has moderate market access potential. Its distance from major markets holds down its overall score, but the presence of large developing country neighbours, such as India in Pakistan's case, serves to offset its disadvantage to some degree.¹

Moreover, Pakistan's reliance on textiles—though contributing the largest share of their export market—fails to perform satisfactory in international markets. As an example, the largest textile suppliers to China from January 2009 to May 2012 are Taiwan, South Korea, and Japan according to the China Custom Statistics¹. However, the textile industry is a far larger component of Pakistan's total exports than in these countries. Not only does the textile industry in Pakistan suffer from low competitiveness, but the textile sectors fails to exploit the benefits of localization economics. Pakistan stands to gain a large part of the textile and apparel market share as the East Asian economies move up the export value-chain. However, diversification of exports is also needed: Pakistan is overly dependent on the textile and clothing industry. Simultaneously exploiting localization and agglomeration economies to increase competitiveness not only in textiles but also in other potentially higher value-added industries is needed.

⁶⁰ The product concentration level is measured using the index, $G_i = (\sum_k W_{ik}^2)^{1/2}$, where k is the number of products that account for more than 90 percent of Pakistan's exports and W_i is the share of commodity i in total export earnings. The index can take a value between 0 and 1; the closer it is to 1, the greater the degree of concentration. Pakistan's value is 0.40.

⁶¹ Lall, 2000.

Box A2.2.2. Revitalizing Pakistan's IT/ITES Sector



The Information Technology/Information Technology Enabled Services (IT/ITES) sector is growing at such a pace that Pakistan can gain huge revenue streams with only a small portion of the international market. The overall off-shore market is expected to increase to about \$250B by 2015. Even a growth to \$6B will capture just 2.5% of the market in 2015. To participate in this market, Pakistan needs to make trade-offs in terms of investments and capabilities. Key among these are skill development and reducing security concerns. The five areas that will need addressing are: infrastructure development; skills development; targeted investment promotion for selected segments; and, mitigating security issues, including both personal safety and data confidentiality. *Source:* World Bank. 2009. Actionable Program to Grow the Information Technology (IT) and IT Enabled Service (ITES) Industry in Pakistan.”

2.3. The Policy Regime and Industrial Performance

2.3.1. Macroeconomic Developments

Remittances and International Competitiveness of Industry

Even though remittances and migration have been an important part of Pakistan's economy for a long time, their scale, and therefore their development impact, has taken on a new significance in the last three decades because of migration to much richer markets overseas. In 1995, total annual remittances were 1.7 percent of GDP. In 2007, they jumped to nearly 6 percent of GDP. Remittances spurred consumption led growth in 2003-07, helped in reducing poverty, and allowed the large trade deficit to be financed without putting pressure on the exchange.

A review of economic literature on the relationship between remittances and competitiveness suggests that there is considerable evidence that remittances result in appreciation of the equilibrium exchange rate^{62,63,64}. Also known as the Dutch Disease Problem, this impact of remittances on the recipient economy can be deleterious to the manufacturing sector that has the potential for generating employment and beneficial technological externalities. Considering that an appreciated equilibrium exchange rate erodes manufacturing firms' international competitiveness, compensatory elements may be built into other policies that affect the cost of doing business for firms. A quick review of salient policies shows that such elements have been absent in Pakistan.

The Financial Market

The financial market in Pakistan is shallow. Firms largely rely on retained earnings to finance their working capital and investment needs, ranging from 78 percent in Sindh to 88 percent in the KP.⁶⁵ If firms draw on external finance, they mainly resort to banks and trust funds (67 percent), followed by the Central Directorate of National Savings (22 percent), non-bank financial institutions, such as development funds and venture capital (7 percent), and insurance (4 percent). A detailed breakdown of these lending categories clearly shows that personal loans have experienced the fastest growth in Pakistan over the 2001-2007 period (Figure A2.2.10).

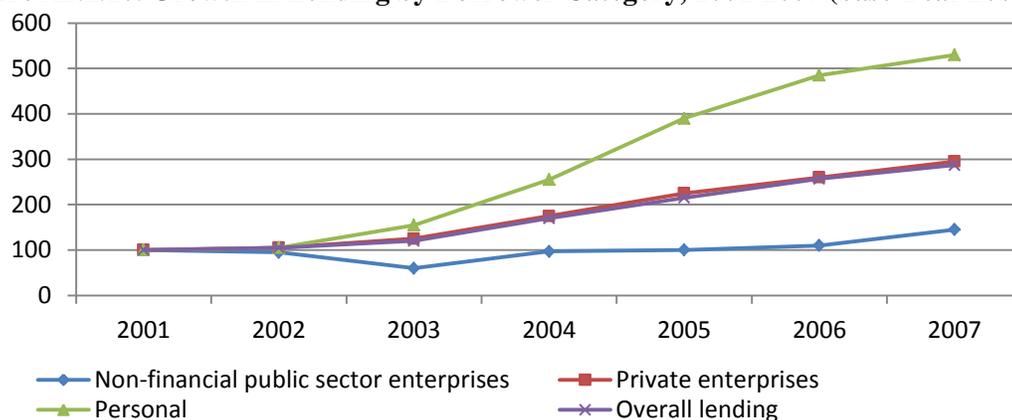
⁶² Acosta, Pablo A., Emmanuel K.K.Lartey, and Frederico Mandelman, 2007, "Remittances, Exchange rate Regimes and the Dutch Disease," Federal Reserve Bank of Atlanta Working Paper No. 2008-08 (Atlanta: Federal Reserve Bank).

⁶³ Acosta, Pablo A., Emmanuel K.K.Lartey, and Frederico Mandelman, 2007, "Remittances, Exchange rate Regimes and the Dutch Disease: A panel data Analysis," Federal Reserve Bank of Atlanta Working Paper No. 2008-12 (Atlanta: Federal Reserve Bank).

⁶⁴ Montiel, Peter J., 2006, "Workers' Remittances and the Long Run Equilibrium Exchange Rate: Analytical Issues", Williams College, mimeo.

⁶⁵ World Bank, 2009d

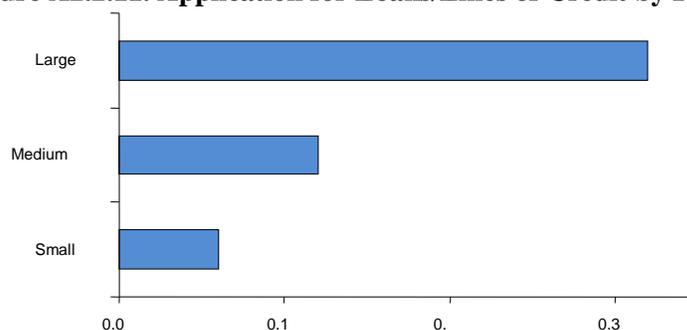
Figure A2.2.10. Growth in Lending by Borrower Category, 2001-2007 (base Year 2001)



Source: Nabi (2010)

Furthermore, access to finance is highly uneven across firms. Credit rationing largely affects small- and medium-sized enterprises (SMEs) that constitute a significant portion of the industry (Figure A2.2.11). As a consequence, it is difficult for them to grow in size and scale, and improve productivity. This is due to constraints on both the demand and supply side. On the supply side, these comprise weak and poorly enforced creditor rights, as well as high unit costs of SME lending. In addition, SMEs are often perceived as risky borrowers. Firstly, they face a more uncertain competitive environment than large firms, and experience more variable rates of return and thus higher rates of failure. Secondly, they have lower human and capital resources to withstand economic adversity. Thirdly, their inadequate accounting systems and lack of financial controls undermine the accessibility and reliability of information on both profitability and repayment capacity. Finally, they operate in a somewhat ambiguous governance environment, which reduces the security of transactions.

Figure A2.2.11. Application for Loans/Lines of Credit by Firm Size



Source: Investment Climate Survey (2007)

On the demand side, the constraints consist of loan disbursement procedures, high interest rates and significant collateral requirements.⁶⁶ The latter is particularly problematic, as banks often require collateral exceeding 100 percent of the loan in order to mitigate asymmetric information and adverse selection problems. However, the principal asset of manufacturing firms is land, which is effectively removed from the pool of acceptable collateral due to a highly inefficient land market. The main problem is that the land acquisition is a cumbersome process. It involves multiple agencies, complex record keeping, and sale transactions without valid conveyance documents. According to the World Bank, it

⁶⁶ Bari et al., 2005.

takes 49 days to register a property and costs about 4.2 percent of its value. As a consequence, formal titles often remain in place, preventing firms from accessing credit and land from being put to its most efficient use.

Business Climate and Regulatory Performance

The business climate has implications on firm productivity, domestic and foreign direct investment, and overall competitiveness. Firms' experiences of the business climate tend to reveal that it has significant impacts on firm productivity and daily operations. In 2012 Pakistan ranked 105/183 countries for overall ease of doing business, a decrease in rank of 9 points since 2011⁶⁷. According to the 2011-2012 Global Competitiveness Report, the biggest obstacles reported for doing business in Pakistan include: government instability/coups; corruption; policy instability; inadequate supply of infrastructure; inefficient government bureaucracy; and poor access to funding.

Roads and power generations are the number one infrastructure concern for businesses worldwide. However, Pakistan provides relatively low access to services that impeded foreign investment. As examples, Pakistan has only two fixed telephone lines per 100 people against 70 in China, 2.9 in India, 17.2 in Sri Lanka, 15.8 in Indonesia and 16.1 in Malaysia.⁶⁸ Road density stands at just 33 percent, compared to 113 percent in India, and 150 percent in Sri Lanka. Only 54 percent of the population received electrical access, compared to 99 percent in China and 66 percent in Sri Lanka.⁶⁹

Efficient trade and transport networks are critical determinants of competitiveness. Inadequate supply of infrastructure is one of the top problematic factors for doing business in Pakistan. The inefficient performance of the transport sector costs Pakistan's economy 4-6 percent of GDP every year.⁷⁰ According to the 2011-2012 Global Competitiveness Report, the quality of Pakistan's overall infrastructure is ranked 115th out of 142 countries. Although the sector is functional, its inefficiencies with high transport costs, long traveling and waiting times, and poor reliability are hampering the country's economic growth. These factors also reduce the competitiveness of the country's exports, limit Pakistan's ability to integrate into global supply chains, and increase the cost of doing business in Pakistan.

⁶⁷ A World Bank report sheds light on how easy or difficult it is for a local entrepreneur to open and run a small to medium-size business when complying with relevant regulations. It measures and tracks changes in regulations affecting 10 areas in the life cycle of a business: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts and resolving insolvency. Source: World Bank, *Doing Business 2012*.

⁶⁸ World Economic Forum's Global Competitiveness Report, 2011-2012

⁶⁹ World Development Report, 2009

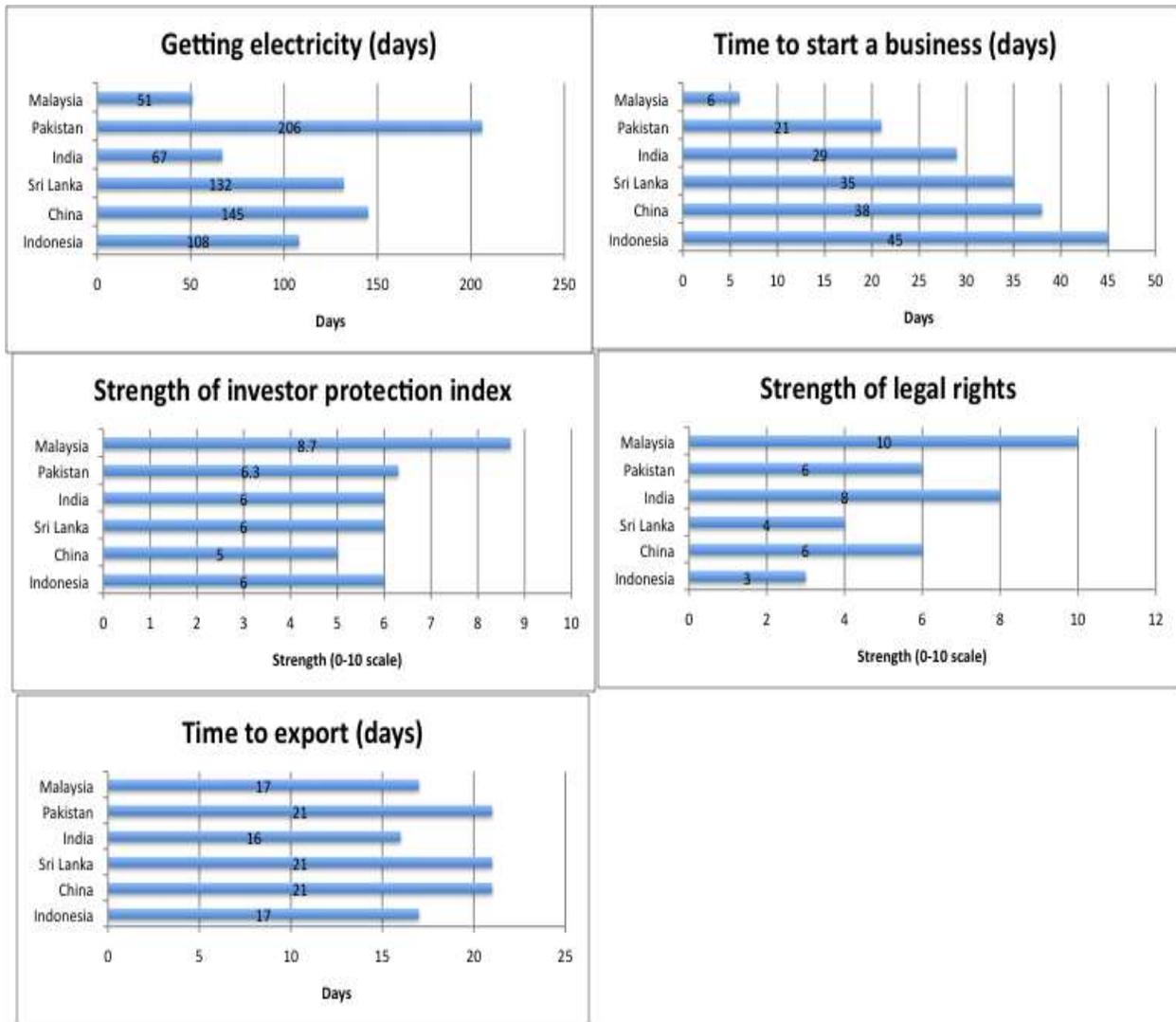
⁷⁰ Pakistan Economic Survey 2010-11, p. 13. Available at http://www.finance.gov.pk/survey_1011.html. Accessed on November 15, 2011. In many developed countries, transport contributes between 6 and 12 percent of national GDP. See Jean Paul Rodrigue, Claude Comtois, and Brian Slack, 2009, *The Geography of Transport Systems*, In India, the transport sector contributed between 5.7 – 6.4 percent of GDP between 1999 and 2005. See Asian Development Bank, 2007, "Profile of the Indian Transport Sector".

Table A2.2.7. Access to Services

Country	Avg GDP Growth (2005-2007)	Urbanization Rate (2007)	Forecasted Urbanization Rate (2030)	Telecom Access (per 100 people) (2007)	Electricity Access (% of pop.) (2005)	% Access to Improved Sanitation (2006)	% Access to Improved Water (2006)	% Paved Roads	Road Density (2000 - 06)
China	11.67	42	60.3	27.7	99.4	65	88	70.7	20.7
India	9.36	29	40.6	3.5	55.5	28	89	..	113.8
Sri Lanka	6.9	15.1	21.4	53.8	66	86	82	81.0	150.5
Pakistan	6.62	36	49.8	3.0	54	58	90	65.4	33.5
Indonesia	5.84	50	68.9	44.2	54	52	80	55.4	20.3
Malaysia	5.82	69	82.2	16.4	97.8	94	99	79.8	30
Mexico	3.74	77	83.3	18.8	..	81	95	50.0	17.7

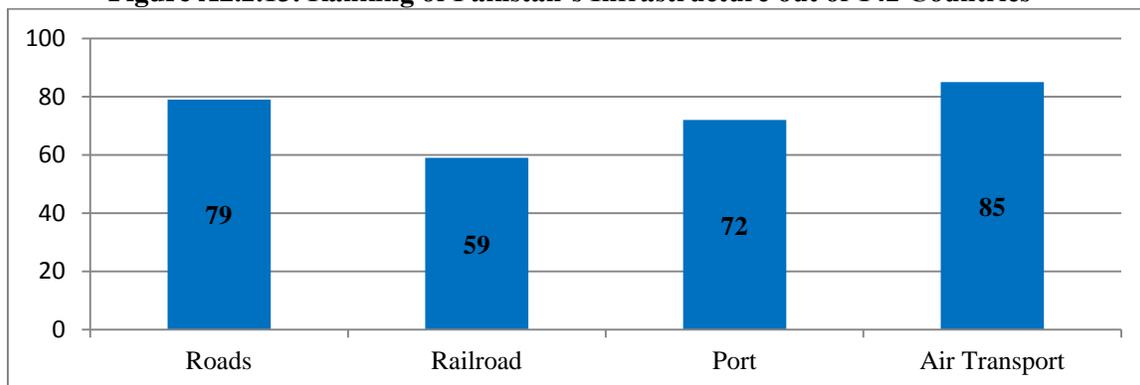
Source: World Development Report, 2009

Figure A2.2.12. Regulatory Performance in Pakistan and other Countries



Source: Doing Business, 2012

Figure A2.2.13. Ranking of Pakistan's Infrastructure out of 142 Countries⁷¹



⁷¹ World Economic Forum 2011-12.

Source: World Economic Forum (2011-2012)

Other Salient Factors Eroding Manufacturing Competitiveness⁷²

Scarcity of skilled workers: Low overall education attainment implies that firms employ less trainable workers, and government programs for skill upgrading are not well regarded by firms; this raises unit labor cost (wage divided by output per worker) and erodes competitiveness. The SME sector currently suffers from a lack of access to skilled labor. Pakistan today has the highest population growth rate in the South Asian region with hordes of unskilled entrants into the labor force every year. These adverse demographics pose a serious challenge to effective policy making. If the industrial base of the country does not expand to absorb this surplus labor, the burgeoning unemployment in both urban and rural areas is likely to have serious socio-economic and political ramifications. On the other hand, a growing population has the potential to become a significant economic asset, if adequate policies are in place to facilitate the development of a large, healthy and skilled labor force. By 2007, only 6.7 percent of firms offered formal training.⁷³

Lack of Innovation and Technology: Companies lag in conducting formal research and developing high-technology products and advanced production processes. Most SME sectors face issues with innovation and developing original products and designs.⁷⁴ In general, companies do not spend much on R&D activity, and business collaboration with local universities and product development centers is minimal at best. Local suppliers have little technological capabilities, and hence are not able to assist in developing new products and processes.⁷⁵ Only 9 percent firms have an internationally-recognized quality certification and only 2.7 percent firms use technology licensed from foreign companies.⁷⁶ Suppliers operating in clusters stand to benefit from collaboration with their international counterparts that are knowledgeable of new product and process developments.

Discriminatory tax regime: Pakistan's tax system is one of the major obstacles towards economic growth in the manufacturing sector. According to The Investment Climate Report by the World Bank, in 2009, 40 percent firms in Pakistan stated taxes as being a barrier in doing business even though this figure decreased from 47 percent in 2002. The bulk of the country's total tax revenue is collected from manufacturing firms (corporate income tax) and their output (sales tax and various excises) while agriculture and most services are out of the tax net; this makes it more attractive to invest in non-manufacturing activity. Over all, taxes increase the cost of doing business, reduce incentives to invest in the manufacturing sector, and create barriers for local producers to face competitive international markets, all of which are barriers towards growth of the industrial sector.⁷⁷

Deteriorating security: Industrial activity with long supply chains and concentrated in vulnerable urban centers is relatively more adversely affected than agriculture and traditional services which, in turn, affects industrial investment climate. Furthermore, both remittances and official assistance increased

⁷² This summary of is based on NLTA policy note, "Increasing Pakistan's Competitiveness: Spatial Transformation, Industrial Development & Income Growth" and "Economic Growth and Structural Change in South Asia: Miracle and Mirage" Ijaz Nabi, Development Policy Research Center Monograph, LUMS, 2011.

⁷³ World Bank. 2007. Pakistan Enterprise Surveys, Pakistan 2007.

⁷⁴ LUMS, 2011 for the World Bank Mainstreaming Environmental Sustainability in Pakistan's Industrial Growth.

⁷⁵ The Global Competitiveness Report 2005-2006, p. 525

⁷⁶ World Bank. 2007. Pakistan Enterprise Surveys, Pakistan 2007. Retrieved July 13, 2012 from <http://www.enterprisesurveys.org/Data/ExploreEconomies/2007/pakistan#infrastructure>

⁷⁷ World Bank (2009). Pakistan's Investment Climate Laying the Foundations for Growth. Volume 1: The Main Report. Poverty Reduction and Economic Management Department Finance and Private Sector Unit, South Asia Department.

sharply as security deteriorated, which may have exacerbated the Dutch Disease Problem. The poor law and security situation impacts industrial production at two levels. First, lack of security creates a poor perception of Pakistan in international markets; buyers in these markets have become strongly skeptical about doing business with suppliers in Pakistan. Secondly, a lack of security perception has implications on business's property and assets since it results in the private sector reducing their economic activity in the country. Based on a World Bank Survey, the percentage of firms considering law and order to be a major constraint to their business increased from 22% in 2002 to 35% in 2007.

2.4. Elements for a Sustainable Industrialization Strategy

The main findings of this chapter are that:

- One of the primary and most intractable macroeconomic issues facing Pakistan is the Dutch Disease Problem associated with remittances and other capital inflows, which has caused an appreciation in the equilibrium exchange rate, which has, in turn, disadvantaged manufacturing.
- Direct intervention in the exchange rate market by lowering the nominal exchange rate may not affect the equilibrium exchange rate if remittances and official inflows are expected to remain high. This makes it all the more important to remove distortions in the credit market, trade policy and the tax regime that discourage investment in manufacturing and retard its growth. Further, given the high equilibrium exchange rate, a more proactive fiscal policy (but prudent, given current fiscal difficulties) and competitiveness enhancing government regulation would be central to a strategy for sustainable industrialization, as presented in the below matrix
- The other critical macroeconomic issues constraining industrial growth are: i) poor access to credit; ii) inadequate electricity infrastructure; iii) illiberal trade policy; iv) constraints on trade with India; v) a scarcity of skilled workers; vi) a discriminatory tax regime; and vii) lack of security. Many of these problems are fairly intractable and will require substantial political will and resources to address. However, some of them can be handled with less effort (Table A2.2.8).

Table A2.2.8. Macroeconomic Policy Reforms to Encourage Industrial Growth

Policy Reform	Time Frame
Access to credit can be broadened by reforming land titling laws to better enable manufacturing firms to leverage their real estate assets as collateral for loans.	Short Term
Trade can be liberalized by ending tariffs, allowing a greater variety of imports from India, and the elimination of protectionist policies that favor a few firms at the expense of the general economy.	Medium Term
The tax code can be reformed so that it apportions the tax burden in non-distortionary manner, so it does not discriminate against manufacturing activities.	Medium Term

Finally, by creating a more stable macroeconomic climate—and one that does not discriminate against manufacturing—these reforms would increase the possible return on infrastructure investments, including those for the trade and infrastructure reforms discussed in chapter 3 and those for cleaner production, as discussed in Chapter 4.

CHAPTER 3. TRADE AND INFRASTRUCTURE FOR INDUSTRIAL COMPETITIVENESS

Investment climate surveys and competitiveness indices consistently point to inadequate infrastructure and poor trade logistics as key bottlenecks to international competitiveness of Pakistani firms. Indeed, the empirical literature has identified both trade and infrastructure as being correlated with economic growth performance. The ease with which exporters can access both domestic and international markets depends considerably on a variety of country-specific factors, including macroeconomic conditions, protective policies, corruption, reliable supply of hard infrastructure, and trade logistics performance, among others. Reaching the optimal environment for the exchange of goods mandates minimum barriers to business operations and activities.

The inadequacy of infrastructure is one of the constraints in Pakistan's trade competitiveness in foreign and domestic markets. Evidence indicates that transport bottlenecks are encountered in all modes of transport infrastructure and services. Some of the major challenges in transport include poor quality of roads, underinvestment in railways, poor intraregional connectivity between national road networks, lack of cross-border transport infrastructure linking cities with one another; and inadequate road and rail connectivity of ports with the rest of the economy, among others. Moreover, a lack of access to reliable energy also has severe implications for industrial production and growth potential.

A proactive trade and infrastructure policy, therefore, is an appropriate intervention to aid the efforts of Pakistan's lagging industrial sector to move up the value chain and become a large-scale export-driven manufacturing economy that seeks to take up some of the mass-production niches which are currently being freed up by increasing wages in China. Trade and infrastructure reform also has the potential to allow Pakistan to switch to more environmentally efficient transport modalities, thus making it a more attractive export-partner for firms that have committed to greening their supply chains. It will also allow for the growth of existing centers of high activity, which has the potential to create economies of scale that could lead to enhanced clean production opportunities.

This chapter summarizes the key trade and infrastructure challenges and the reform program proposed for modernizing transport and logistics to strengthen the economy's competitiveness. The economic impact of modernizing trade and infrastructure is presented to show the high pay-off in terms of making industry more internationally competitive and hence promoting the spatial transformation currently taking place in Pakistan. However, a sustainable industrialization strategy also requires that the negative social fall out of the program also be evaluated and mitigated through tailored strategies.

3.1. Principle Challenges in Trade

Logistics

A competitive network of logistics is the backbone of international trade⁷⁸. Logistics encompasses a variety of essential activities—from transport, storage, customs clearance to payment systems—and involves both public and private agents. Unfortunately, Pakistan has yet to realize the productivity gains from developing a modernized logistics system, such as those implemented in industrialized countries. The significance of an efficient logistics for trade and economic growth is widely acknowledged. Analysis based on the 2007 Logistics Performance Index (LPI) has shown that improved logistics

⁷⁸ World Bank, Logistics Performance Index, 2010

performance is strongly correlated with trade growth, export diversification, foreign direct investment, and overall economic growth.⁷⁹ High quality and reliable logistics are particularly important for higher value products and perishable goods, but are also becoming critical to minimize inventories and reduce the risk of overstocking for low and medium value goods.⁸⁰ Evidence from around the world indicates that the reliability of the supply chain is the most important aspect of logistics performance.

Indeed, when transport services are unreliable, exporters and importers incur in extra costs, for example, by increasing inventories to hedge against failed deliveries. These induced costs can be higher than direct costs of freight, affect firm competitiveness and can even affect countries' potential to diversity from time-intensive commodities. Quality is a crucial dimension of reliability, both in terms of delivery within the promised time window and the share of shipments that have no errors in cargo composition or documentation.⁸¹

Efficient supply chains are key to international competitiveness especially as Pakistan strives to move to higher value added exports. International comparisons, however, show that Pakistan ranks poorly in trade facilitation that are central to efficient supply chains. According to the World Bank Logistic Performance Index (LPI) 2012, which identifies the challenges and opportunities countries face in the performance of trade logistics. Pakistan ranked at 71 out of 155 countries, which is poorer than the ranking for India (46). Pakistan's LPI score is 2.83 (ranked 1 to 5, with 1 being worst) which is lower than India's score of 3.08.

Table A2.3.1. Logistics Performance Index, 2012 (out of 155 countries)

Country	Year	LPI Rank	LPI Score	Customs	Infrastructure	International shipments	Logistics competence	Tracking & tracing	Timeliness
Singapore	2012	1	4.13	4.1	4.15	3.99	4.07	4.07	4.39
Hong Kong, China	2012	2	4.12	3.97	4.12	4.18	4.08	4.09	4.28
China	2012	26	3.52	3.25	3.61	3.46	3.47	3.52	3.8
Malaysia	2012	29	3.49	3.28	3.43	3.4	3.45	3.54	3.86
India	2012	46	3.08	2.77	2.87	2.98	3.14	3.09	3.58
Pakistan	2012	71	2.83	2.85	2.69	2.86	2.77	2.61	3.14

Source: GCI International, 2012

The transport supply chain system is not providing the value-added services that have become the hallmark of modern logistics, e.g. multi-modal systems that combine the strengths of different transport modes into one integrated system. In general, logistic services provided by freight forwarders are simple because of the simple structure of the supply chain, which does not always utilize the most efficient mode of transport for the movement of goods. For example, rail freight generally has a competitive advantage over road freight for longer distances and for the transport of bulk commodities. Integrated logistics services are mainly offered by local offices or representatives of large international companies, with the

⁷⁹ Ibid.

⁸⁰ World Bank (2006a). "Transport Competitiveness in Pakistan: Analytical Underpinnings for National Trade Corridor Improvement Program". Report No. 36523 – PK.

⁸¹ Arvis, Jean-François, et al (2010). "Connecting to Compete 2010: Trade Logistics in the Global Economy", (The World Bank: Washington, D.C.). Available at: <http://go.worldbank.org/88X6PU5GV0>. Accessed on April 13, 2010.

latter making up half of the logistics market.⁸² The following describes specific logistical concerns in Pakistan's port, rail, airport, and road sector.

Ports and Shipping

Many of the logistical inefficiencies of ports have to do with high charges, delays at the port, labor problems, and on-shore cargo handling restrictive practices⁸³. Cargo handling at Pakistan's two main ports, Karachi and Port Qasim, reached 63.8 million tons in 2008-9 compared to under 20 million tons in 1989-90. However, to keep things in perspective, container port traffic in Pakistan at 1.93 million Twenty-foot equivalent unit (TEU) is half that of Sri Lanka. Service provided by private container terminals is preferred over those run by the government port authority. Total container handling charges of \$113 per TEU at Karachi and \$105 per TEU at Port Qasim are higher than the average of \$80 per TEU for India.

With the implementation of Pakistan Customs Computerized System (PACCS), the customs clearance time has been reduced from 4-5 days to less than 24 hours in Karachi International Container Terminal (KICT). PACCS was rolled out and implemented in three other container terminals at the end of 2006. The free storage period also was reduced to 4-5 days from 7 days. However, container dwell times (5-6 days on average) are still above the international standard of 3-5 days, which decreases the capacity of container terminals to less than their potential. Tariffs for bulk and general cargo were found to be relatively low (4 to 6 dollars per ton) compared to other rates in the region, but tariffs on containerized cargo were relatively on the high side.

Highways and trucking

The trucking fleet is predominantly out-dated by several decades and runs on under-powered engines, which has implications on logistical performance.⁸⁴ High import tariffs on high capacity multi-axle truck protects local manufacturers producing low capacity and low-powered trucks and hence prevents the trucking sector from improving the trucking fleet. Over the past 20 years, revenues per kilometers have decreased, in real terms, by 1.4 % on average per year.⁸⁵ Many trucks operate long hours and carry excessive loads while traveling at low speeds, ranging between 20-25 kilometers per hour compared to 80-90 kilometers per hour in Europe. Journeys in Pakistan take three times longer than in Europe. Road freight takes an average of 3-4 days between ports and the north of the country (a distance of 1400-1800 km) which is twice the equivalent time in Asia and Europe.⁸⁶

To maintain high revenues, trucks are overloaded and lack of enforcement of regulations on safe operation, crew hours, truck modification, and trailer manufacture increase the risk of accidents.⁸⁷ Transport time is lost by trucks needing repairs due to overloading.⁸⁸ The average time lost for non-agricultural freight trips is 4.7 hours compared to 3 hours for passenger trips. Even though trucking

⁸² World Bank (2009). "Pakistan: Second Trade & Transport Facilitation Project." Project Appraisal Document, Report No: 48094 - PK p. 4, Available at: <http://go.worldbank.org/7B8WWXJ6H0>. Accessed on March 15, 2010.

⁸³ LUMS, 2011.

⁸⁴ World Bank (2006). "Transport Competitiveness in Pakistan: Analytical Underpinnings for the National Trade Corridor Improvement Program." Report No. 36523- PK, p.71..

⁸⁵ Ibid, p. 67.

⁸⁶ Ibid, p. 69.

⁸⁷ World Bank, 2006a.

⁸⁸ Japan International Cooperation Agency (JICA). (2006). "Pakistan Transport Plan Study in the Islamic Republic of Pakistan." Final Report, pp. 2-29.

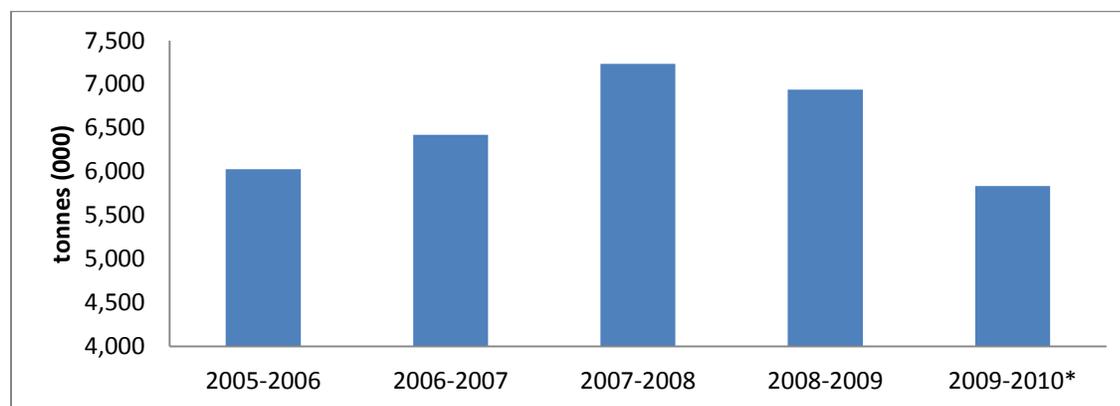
freight cost per ton Km is \$0.015-0.021,⁸⁹ the quality of service is poor especially seen from the perspective of exporters. Express service at higher rates is available but the fleet providing the services is small compared to demand. The recent reduction in tariffs on imported vehicles will improve things but this will take time. More recently, security concerns have mounted especially in Baluchistan and interior Sindh.

Railways

Pakistan Railways (PR) is one of the largest organizations in Pakistan, employing 86,669 workers in 2007-2008.⁹⁰ It has a network of 7,791 route-km -7,346 kms of which are of broad gauge while the remaining 445 kms are of meter gauge⁹¹. There are 625 stations with 1,043 kms of total double-track sections and 285 kms of electrified sections. Since 1982, no new routes have been constructed. The main line connects the five major stations of Karachi, Multan, Lahore, Rawalpindi, and Peshawar. The core railway, comprising the main north-south route and the strategic link to Quetta, comprises one third of the total network. However, it supports 75 percent of the total trains and over 85 percent of freight traffic⁹².

Long delays and low speed are the main causes of road being preferred to railways for both passenger and freight service. The productivity of PR's freight services is about 1/8 of Chinese Railways, 1/3 of Indian Railways, and half of Thai Railways, a network of comparable size. In addition, freight rates are not competitive compared to road transport. In contrast, Chinese rail is 2-3 times cheaper than road. As a result, PR has a very low and stagnant market share, carrying less than 10 percent of passenger traffic and 4 percent of freight⁹³. In 2008-09, railway freight traffic was 5,896 million ton km.⁹⁴ However, in 2007-08, railways carried 7,234 tons of freight, which was estimated at less than 5 percent of the total freight carried in the country.

Figure A2.3.1. Freight Carried by Pakistan Railways



Source: Pakistan Railways Yearbook (2009-2010)

Aviation

⁸⁹ WB, 2006.

⁹⁰ Pakistan Railways 2008.

⁹¹ Ministry of Railways, 2005.

⁹² World Bank, 2006 : 49

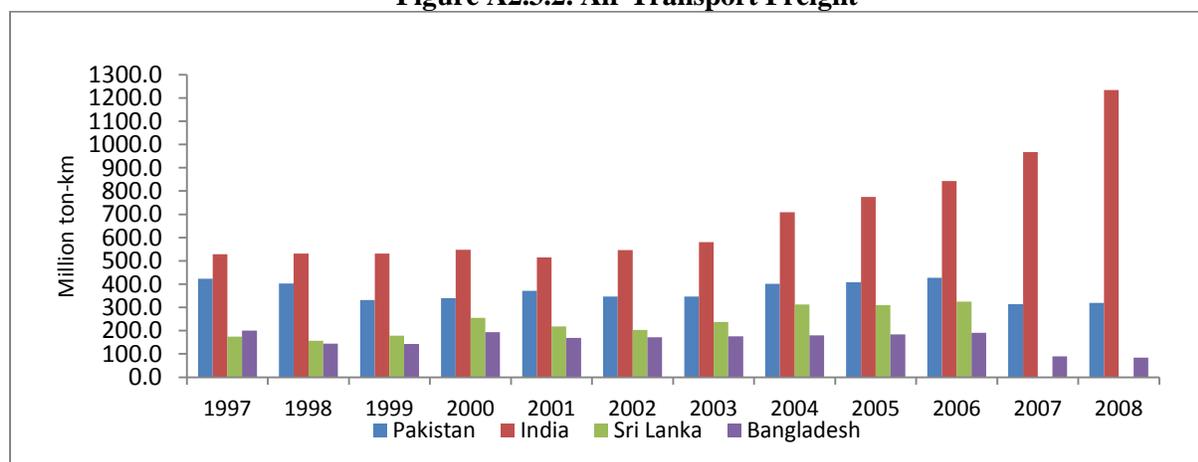
⁹³ World Bank, "Pakistan Transport Sector: Overview", <http://go.worldbank.org/7CYYM39VG0> (accessed on 23rd January, 2011).

⁹⁴ EAW 2010: 205.

Pakistan International Airline Corporation (PIA) was established in 1955 and was for a long time the only airline in the country. Pakistan has 42 functional airports out of which 10 serve international flights. Karachi is Pakistan's main airport but significant levels of both domestic and international cargo are also handled at Islamabad and Lahore. Two more international airports are coming up in Islamabad and Gwadar with the involvement of the private sector under the policy of liberalization of the aviation industry in Pakistan. The Sialkot International Airport has already been completed and has generated \$600 million of annual revenues from transport of cargo and passengers. The new Islamabad International Airport is expected to handle annual traffic of 6.5 million passengers and 100,000 metric tons of cargo on completion⁹⁵.

PIA, the major public sector airline, though facing the competition from a few private airlines, carries approximately 70 percent of domestic passengers and almost all domestic freight traffic⁹⁶. The share of air freight to total freight transported is quite small. A total of 319.8 million ton-kms were transported in 2008⁹⁷ (Figure A2.3.2).

Figure A2.3.2. Air Transport Freight



Source: World Development Indicators 2009

Pakistan adopted an Open Skies Aviation Policy in the early 1990s. Private airlines joined the civil aviation industry in Pakistan as a consequence of the policy. Most of these airlines operated on a small scale with limited professional management and inefficient and old equipment. Stiff competition from PIA led to heavy losses for most of them, and most of the private operators could not continue services.

CAA (Civil Aviation Authority, established in 1982 to regulate aviation in Pakistan) initially made efforts to regulate the aviation industry but met with stiff resistance from the various professional cadres of PIA. The ongoing tussle between the PIA and CAA has, over the years, deepened the mistrust between the two key players in the industry. PIA has major grievances over the unilateral Open Skies Policy as it faces more competition from other airlines without getting an opportunity to penetrate foreign markets.

A 2006 Pakistan logistical cost study found that airfreight dwelling times at airports are two to three times longer than the actual transport time because of an inadequate supply of airfreight capacity on planes.

⁹⁵ The construction of the new Islamabad International Airport is expected to be completed by 2013.

⁹⁶ World Bank, "Pakistan Transport Sector: Overview", <http://go.worldbank.org/7CYYM39VG0> (accessed on 23rd January, 2011).

⁹⁷ World Development Indicators 2009.

There was a general delay of 4-7 days. Additionally, the study found that Indian exporters have access to bigger airfreight capacity than Pakistani exporters.⁹⁸ For example, the frequency of freight air transport out of all of Pakistan's international airports, which include Karachi, Islamabad, Lahore and Peshawar) to Frankfurt is 10 flights per week, whereas flights from Mumbai, India to Frankfurt, including a MD-11 full freighter that flies 3 times per week, can accommodate 300% more freight export by air.⁹⁹

Trade Policy

Starting in 1996/97, Pakistan embarked on a radical trade liberalization program which by 2003 had eliminated nearly all its remaining traditional quantitative restrictions while drastically reducing the level and simplifying the structure of import tariffs. This liberalization episode was supported by real exchange rate devaluation over the period of about 20 percent. The reforms enabled exports and the economy to take advantage of the boom in world trade between 2003 and late 2007. During this period (2007/08 compared with 2001/02) exports in nominal US dollars increased by 110 percent. Although this was an encouraging performance, over the same period the exports of other developing countries grew much faster: for example, India's increased by a factor of three in nominal US dollars. It can be plausibly argued that Pakistan's economic system was still not sufficiently efficient and flexible to take better advantage of this extraordinary opportunity because of continuing failures and rigidities in its economic policies, especially in its trade policies.

From the beginning there were a number of important exceptions to the 1997-2003 trade policy reforms, and some backtracking on others occurred later on, especially during 2006 and after the GFC crisis of 2008. These include the following: reversal of a number of the more important liberalizing reforms in agriculture, notably of wheat, sugar and fertilizer policies; continuation of the long standing ban on imports from India of products not on Pakistan's limited "positive list"; local content policies in the auto industry;¹⁰⁰ the use of ostensibly WTO-compatible (TBT and SPS) technical regulations and regulations based on health and safety to restrict imports;¹⁰¹ and; the introduction of anti-dumping;¹⁰²

Starting in 2006/07, there were increases in the maximum level, dispersion and complexity of Customs Duties, and in August 2008 the introduction of a number of "Regulatory Duties" on top of Customs Duties. Including the regulatory duties (but omitting outliers such as the very high tariffs in the auto sector) there are now at least nine standard "normal" tariffs, ranging from zero to 50 percent. This compares with just four standard normal rates ranging from 5 to 25 percent in 2002/03. The new structure has greatly increased the potential for high effective protection rates and bigger distortions across import substitution activities, and has increased the general anti-export bias in the system. Additionally, since 2006 there has been an expanded use of SROs. Most of these provide exemptions or partial exemptions from normal tariffs, but others provide for increased tariffs. In 2010/11 more than half (54 percent) of the total number of tariff lines were subject to at least one special condition announced in an SRO¹⁰³. Most of these are exemptions for inputs and are confined to specified firms or groups of firms.

⁹⁸ Logistics Consulting Group (2006), op. cit., pp. 78- 81.

⁹⁹ Ibid., p. 81.

¹⁰⁰ These were replaced in July 2006 by very high and steeply escalated tariffs which effectively kept almost the same system in place, and enabled the detailed interventions of the Engineering Development Board (EDB) to continue;

¹⁰¹ These include bans and restrictions on imports of second hand products (e.g. consumer durables such as passenger cars, motor cycles, air conditioners and various types of industrial machinery and equipment) where protection of local industries is clearly the dominant motive

¹⁰² This started in a small way in 2002, but subsequently expanded rapidly during and after 2008/09.

¹⁰³ 57 percent of agricultural tariff lines and 53 percent of non-agricultural tariff lines.

They are not available to other importers, in particular commercial importers. Their administration is a *de facto* import licensing system run by EDB and other ministries in conjunction with the Customs Service.

Additionally, the tariff system became more complex as a result of preferential trade agreements, especially the agreement with China effectively implemented in January 2006, and to a lesser extent from the agreements with Sri Lanka (operational from June 12, 2005) and with the other South Asian countries under SAFTA (operational from January 1, 2006). Pakistan also continued its usage of administratively complex and constantly changing export subsidy programs and policies. Given positive protection for import substitution production, there is a general case for both input tariff rebate/exemption programs and export subsidies. But according to some knowledgeable people, as actually administered in Pakistan, these programs disproportionately benefit established exporters, discriminate against small and new exporters, and discourage export diversification.

Substantial distortion has thus crept back into the trade policy that is benefitting a few chosen firms while eroding international competitiveness of the vast majority of firms.

Regional Trade

In today's globalized world, increasing cross-border trade between economies is increasingly important for business. Burdensome and complex customs procedures, unnecessary and excessive document requirements, and inefficient and poor infrastructure all lead to delays for exporters and importers, increase the cost of doing business, and hamper trade potential. Research reveals that exporters in developing countries benefit more from a 10% reduction in their trading costs than from an analogous reduction in the tariffs applied to their products in global markets.¹⁰⁴

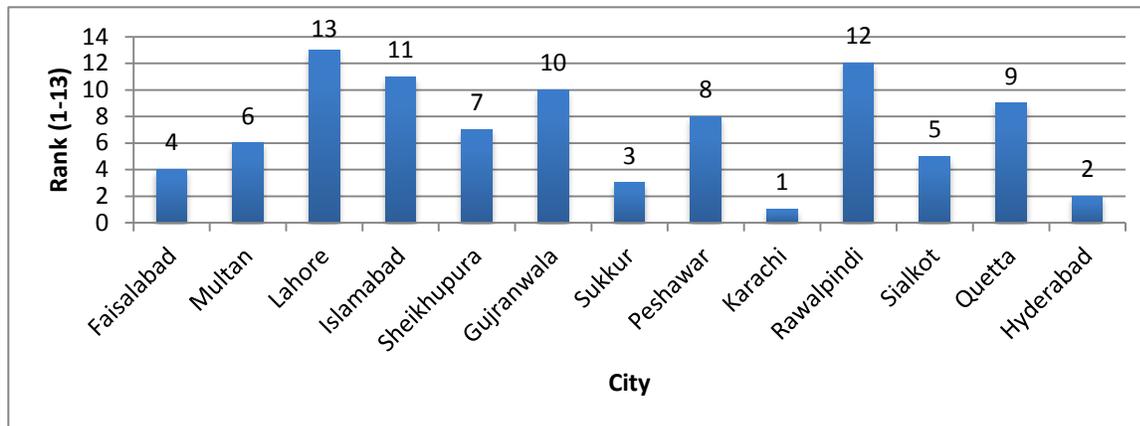
In order to analyze the extent of trade activity in Pakistan, the World Bank's Doing Business of 2010 ranked 13 of the main industrial cities of Pakistan based on their cross-border trading as shown in Figure A2.3.3. Karachi, which is the largest city in Pakistan, houses the largest sea port, and is the capital of the province of Sindh, not surprisingly has the top ranking, followed by Hyderabad and Sukkur in second and third place, respectively. Both these smaller cities are located near to Karachi, which may explain some of their advantage influencing their ranks, as proximity allows for greater information spillovers, access to specialized labor, and local transfers of knowledge.

Indeed, an interesting finding as highlighted in Doing Business 2010 is that size of the city may not matter in trade: Lahore fared poorly compared to the relatively smaller cities of Multan and Sheikhpura City (an industrial city), which were found to be more efficient in cross-border trading.¹⁰⁵

Figure A2.3.3. Ranking of Pakistani Cities in Terms of Trading Across Borders

¹⁰⁴ World Bank's Doing Business, 2012 Pakistan

¹⁰⁵ Ibid.



Source: *Doing Business, 2010*

Geography endows Pakistan with the potential to reap huge economic gains from becoming a hub for regional trade that will have spillovers for economic growth. China, India, Central Asia and Iran are among the dynamic economies that Pakistan could connect. To the Northeast is China, the world's fastest growing economy with a population of over a billion increasingly engaged in the development of its Western frontier that lies close to Pakistan. To the Northwest and the West lie the resource rich economies of Central Asia and Iran, eager to combine their mineral wealth with skills to generate higher income for their citizens. To the East is India, growing at 8 percent per annum (a far cry from the so-called Hindu rate of growth of 3 percent) with large pools of skilled labor and savings looking for gainful employment and investment avenues. In order to reap economic benefits in this neighborhood of growing opportunities, Pakistan needs to play its historical role of a connector of markets that lie in the North (China) and the West (Central Asia, Iran) to markets in the East (India). This requires liberalizing the highly restricted trade with India that has stunted cross-border legal trade, encouraged smuggling and prevented investment and technology exchange between the two countries.

Rigorous analytical work has already been done that demonstrates the location benefits of liberalizing trade with India¹⁰⁶¹⁰⁷¹⁰⁸. In a region such as South Asia, political considerations can preclude economic integration of neighboring countries. Conflict in South Asia after the end of British colonial rule in 1947 prevented the neighborhood countries from taking advantage of their market sizes, a region which includes more than a fifth of the world's population. It took forty years before trade volumes between Pakistan and India surpassed those of the early 1950s.¹⁰⁹ A recent study found that trade between the two countries would increase by 405 percent if political and territorial conflicts were resolved.¹¹⁰ The seminal

¹⁰⁶ Nabi, I., & Nasim, A. (2001). Trading with the enemy: A case for liberalizing Pakistan-India trade in S. Lahiri (Eds.), *Regionalism and Globalization: Theory and Practice* (170-197). London: Routledge.

¹⁰⁷ Naqvi Z. and Nabi I. (2008) "Pakistan-India Trade: the Way Forward", in M. Kugelman and R. Hathaway edited, *Hard Sell: Attaining Pakistan's Competitiveness in Global Trade*, Woodrow Wilson Center, Washington DC 2008

¹⁰⁸ Nabi, I. (2010), *India-Pakistan Relations: An Economist's Peek into the Future*, South Asia Free Media Association (SAFMA), Lahore.

¹⁰⁹ Nabi, Ijaz, and Anjum Nasim. 2001. "Trading with the Enemy: A Case for Liberalizing Pakistan-India Trade." In *Regionalism and Globalization: Theory and Practice*, ed. Sajal Lahiri. New York: Routledge.

¹¹⁰ Source: Naqvi, Zareen F., and Philip Schuler. 2007. *The Challenges and Potential of Pakistan-India Trade*. Washington, DC: World Bank as cited in WDR, 2009. According to the WDR, 2009: "Important strides have been made in the past decade. In 2004, the two countries engaged in the "Composite Dialogue" on peace and security issues, including terrorism and drug trafficking, confidence-building, economic and commercial cooperation, and

report by the Ministry of Commerce¹¹¹ provided a careful assessment of gainers and losers at the sectoral level from liberalizing trade with India and strongly recommending that Pakistan-India trade be liberalized. The influential recent study by Pakistan Business Council¹¹², takes the argument further by elaborating the broader economic gains of liberalizing trade with India. This analytical work, combined with recent geo-political developments, has resulted in Pakistan granting Most Favored Nation Status (MFN) to India thus removing a major hurdle in normalizing Pakistan-India trade relations.

The announcement granting Most Favored Nation status to India needs to be followed up with practical steps to put in place an efficient payment system, a sensible trade policy that promotes trade but also avoids excessive (and unfair) injury to Pakistan's industry, trade facilitating government services (customs, quality focused NTBs), transport networks and most important of all a sensible visa regime so that the benefits can be shared by all and not just the big fish. Also, India would be looking to transit trade facilities and Pakistan should seek to attract Indian investment and technology. Given current business practices, non-tariff barriers can creep in via any of these trade facilitating measures and can nullify or reduce the benefits of the MFN announcement.

3.2 Principle Challenges in Infrastructure

Energy

Access to consistent and affordable electricity is imperative for the success of industry. Pakistan is experiencing a severe energy crisis: only 54 percent of the population received electrical access, compared to 99 percent in China and 66 percent in Sri Lanka¹¹³ and unreliable energy has significantly stifled industrial growth. Lack of energy has implications on firm productivity, domestic and foreign direct investment, and export performance. According to the 2011-2012 Global Competitiveness Report, the biggest obstacles reported for doing business in Pakistan include: government instability/coups; corruption; policy instability; inadequate supply of infrastructure; and inefficient government bureaucracy; followed by poor access to funding.

Roughly 75 percent of Pakistani firms identified lack of electricity as a major constraint that affects their performance¹¹⁴. Managers of energy failed to anticipate the sharp increase in consumer demand, which increased from 12,500 megawatts in 2003 to 20,500 megawatts in 2007-08. With declining public expenditure on energy,¹¹⁵ electricity demand has outstripped supply by a significant margin for the past few years (Figure A2.3.4); a gap, which was estimated at 5,500MW for 2010.

Figure A2.3.4. Electricity Demand and Supply, 2003-2010 (MW)

friendly exchanges in various fields. On a broader regional basis, the South Asian Association for Regional Cooperation is a forum to discuss development challenges, such as cooperation in energy production and water basin management.”

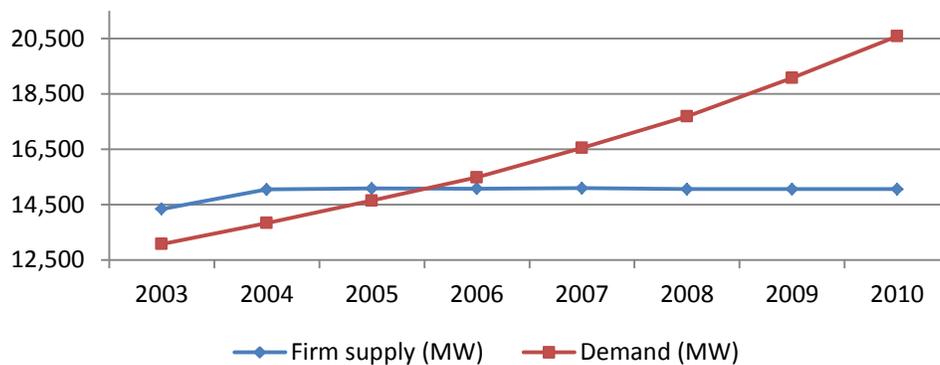
¹¹¹ Government of Pakistan, Ministry of Commerce, Ministry of Commerce (1996), *Pakistan-India Trade: Transition to the GATT Regime*, Government of Pakistan, Islamabad.

¹¹² Pakistan Business Council (2011), “Regional Trade: A Growth Driver”, a PBC position paper by the Regional Trade Panel.

¹¹³ World Development Report, 2009

¹¹⁴ World Bank. 2007. Pakistan Enterprise Surveys, Pakistan 2007. Retrieved July 13, 2012 from <http://www.enterprisesurveys.org/Data/ExploreEconomies/2007/pakistan#infrastructure>

¹¹⁵ Hussain, 2009.



Source: Private Power Infrastructure Board: <http://www.ppib.gov.pk>

Acute energy shortages have resulted in an unreliable power supply and frequent load-shedding, which have in turn placed a huge burden on the manufacturing sector. Particularly badly affected are electricity-intensive sectors such as textiles, basic metals, leather products, rubber and plastic goods, as well as pulp and paper products. The total cost of outages to the industrial sector is substantial and was estimated at about PKR157 billion.¹¹⁶ This is equivalent to 9 percent of the total industrial value added, and constitutes a 7 percent decline in production and an employment loss of 300,000 jobs. In addition, the slowdown in manufacturing activity has affected other related economic activities such as wholesale and retail trade, transport, communications, banking and insurance. Taking this short-run multiplier effect into account, the total cost of industrial load-shedding was estimated at PKR210 billion, which is about 2 percent of GDP.

The supply gap could have been filled by Independent Power Producers (IPPs).¹¹⁷ However, delays in tariff adjustment and the failure to prevent theft and technical line losses did not improve the incentive regime for the needed IPP investment to add to capacity and upgrade technology. Circular debt, i.e. failure of PEPCO to make timely payments to power producers, who were then unable to pay the oil and gas companies, has become endemic. These deferred payments led to a reduction in production and an accumulation of PKR370 billion in debts.¹¹⁸

Energy pricing policy has systematically discriminated against manufacturing firms that pay the highest tariffs, while commercial, agricultural and household consumers are subsidized. Fertilizer producers, an exception among manufacturers (the aim is to subsidize farmers) and household consumers received subsidies of PKR14 billion and PKR9 billion respectively in 2003 and continue to enjoy high subsidies.

Due to the lack of both private and public investment in the power sector, the condition of the transmission and distribution system is poor. In 2006, it cost Pakistan an estimated PKR4.3 billion for each percentage point line loss. According to the World Development Indicators, the situation has slightly improved during the last decade, with transmission and distribution losses declining from 26.1 percent in 2001 to 20.9 percent in 2008. However, Pakistan's losses are still the second largest in South Asia—India's are highest at 23.3 percent. Another indicator of the system's inefficiency is the delay in getting an electricity connection. The procedure can take 206 days, compared to 145 days for South Asia, 67 days in

¹¹⁶ Institute of Public Policy, 2008.

¹¹⁷ It is important to note that it is not a feasible alternative to install generators to supply electricity when there is an outage. The cost per unit of electricity is significantly higher when using generators, which is why only around 6 percent of domestic energy production is provided by generators.

¹¹⁸ Hussain, 2009.

India and 51 days in Malaysia.¹¹⁹ Moreover, the waiting time has deteriorated drastically from 2002, when it was 32 days. On a national level, the situation has actually worsened in 3 out of 4 provinces, with delays in KP now almost 3 times those of 2002. At the firm level, medium-sized firms suffer most with delays of up to 140 days.

Transport Infrastructure

Facilitating trade and spatial connectivity is effective only with the support of adequate transport infrastructure, which helps to *facilitate* the production and distribution of products and services. As previously discussed, transport is an essential component to the success of trade logistics and growth. Indeed, roads are one of the top infrastructure concerns for businesses worldwide. In the absence of institutional barriers, transportation infrastructure is a critical element to improving industrial competitiveness as it expands the markets of individual industrial producers.

As explained in Chapter 2 of this document, inadequate supply of infrastructure is one of the top problematic factors for doing business in Pakistan. The inefficient performance of the transport sector costs Pakistan's economy 4-6 percent of GDP every year.¹²⁰ According to the 2011-2012 Global Competitiveness Report, the quality of Pakistan's overall infrastructure is ranked 115/142 countries. Although the transport sector is functional, its inefficiencies with long waiting and traveling times, high costs, and low reliability are hampering the country's economic growth. These factors also reduce the competitiveness of the country's exports, increase the cost of doing business in Pakistan, and constrain Pakistan's ability to integrate into global supply chains which mandates just-in-time delivery.

Roads and Highways

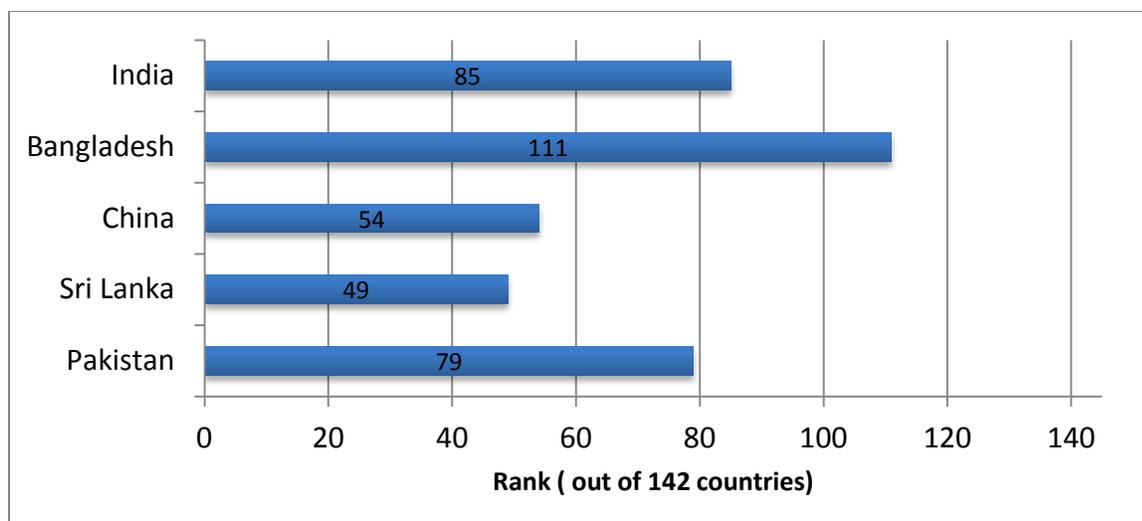
The total road network in Pakistan is approximately 259,618 km, of which 12,000 km consists of national highways and 2,207 km of motorways under the responsibility of the federal government. As of March 2010, there were an estimated 216,043 trucks in Pakistan plying on 180,000 km of high quality roads. Pakistan ranks 79 out of 142 countries on quality of roads, which is ranked less than India, China, and Sri Lanka. Road density in Pakistan is among the lowest in the region. Road density stands at just 33 percent, compared to 113 percent in India, and 150 percent in Sri Lanka.¹²¹

Figure A3.3.5. Quality of Roads

¹¹⁹ World Bank, *Doing Business 2012*, Pakistan.

¹²⁰ Pakistan Economic Survey 2010-11, p. 13. Available at http://www.finance.gov.pk/survey_1011.html. Accessed on November 15, 2011. In many developed countries, transport contributes between 6 and 12 percent of national GDP. See Jean Paul Rodrigue, Claude Comtois, and Brian Slack, 2009, *The Geography of Transport Systems*, In India, the transport sector contributed between 5.7 – 6.4 percent of GDP between 1999 and 2005. See Asian Development Bank, 2007, "Profile of the Indian Transport Sector".

¹²¹ World Development Report, 2009.



Source: World Economic Forum, 2011-2012

Pakistan's reliance on obsolete and inefficient fleets has implications for road quality. A major challenge is the trucking fleet that consists mainly of 2-axle (70 percent) and 3-axle (20 percent) vehicles and on some main sections of the major highway (N5) account for 70-80 percent of the total flow. Trucking companies are primarily small (less than five vehicles) and unregistered (informal, non taxpaying), and depend on freight brokers and subcontracting to large companies to secure business. To maintain high revenues, trucks are overloaded which damages road quality and increases the demand for higher road investment. Poor quality and overloaded fleet, in turn, implies high cost of road maintenance. Recent fiscal problems have reduced funding for road maintenance, and at the current allocation of Rs 25 billion per year, it will take 8 years to clear the backlog of road maintenance.

Railways

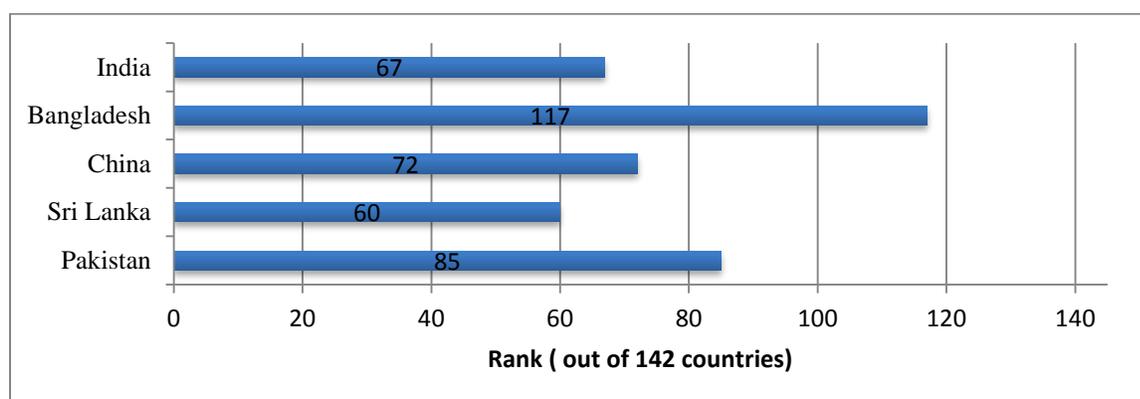
The poor condition of the railways infrastructure is one reason for its poor performance – while the public sector has made significant investments in road infrastructure, the same has not been true for rail. PR is unable to service its debt, and to cover its full operating costs plus pension payments, and thus is in no position to invest in renewal and maintenance of its rolling stock. Signaling and telecommunications equipment are in need of repair. Freight wagons are old, and in poor condition with a small capacity designed for general cargo, while much of freight transport is now moving towards containerization. Other PR shortcomings include: (i) running numerous unnecessary lines; (ii) cross-subsidizing passengers from freight and the non-core network from the core network; and (iii) offering supply-driven services. Railway business began to slow down in 2008, as the economy slowed down and internal security issues intensified. Growth was also stalled by issues with infrastructure – freight traffic was affected, for example, by the non-availability of locomotives and non-procurement of spare parts. In 2009-10, freight traffic decreased by 13.1 percent.

Air Transport

Pakistan ranks 85 out of 142 countries on Air Transport Infrastructure Quality (Figure A2.3.6). Aviation infrastructure is not at par with international competitors. Cargo handling facilities need major up-gradation, and parking and landing facilities are inadequate and limited. Moreover, there is no airline in Pakistan dedicated solely to the transport of cargo for both exports and imports. Private airlines are not able to respond to the high demand in freight or passenger transport due to government's close

collaboration and protection of Pakistan International Airlines (PIA), which carries almost all domestic freight traffic.¹²² The major beneficiaries are the international airlines that fill the demand gap for transportation of cargo. The patronage given to PIA by the government is a major disincentive for other private airlines to enter the industry and also de-motivation for PIA to improve its efficiency and the quality of services that it provides.¹²³ PIA also operates as a monopoly on certain routes, for example, for Haj traffic. For these reasons, Pakistan ranks 108 out of 125 countries on ETI (2010) for Airport Density.

Figure A3.3.6. Air Transport Infrastructure Quality



Source: World Economic Forum, 2011-2012

3.3. The Trade and Infrastructure Reform Program

The trade and infrastructure reform program takes an all-inclusive approach, encompassing the public and private sector, services and infrastructure, reforms and investment. With a strong reform agenda supplemented by a comprehensive investment program, trade and infrastructure reform has become essentially the medium term freight transport development framework for Pakistan. The key challenges that are being addressed by trade and infrastructure reforms include:¹²⁴

- a. Modernize and streamline trade and transport logistics, practices and customs;
- b. Improve port efficiency, reduce the costs for port users and enhance port management accountability;
- c. Create a commercial and accountable environment in Pakistan Railways (PR) and increase private sector participation in the operation of rail services;
- d. Modernize the trucking industry and reduce the cost of transport and other externalities;
- e. Sustain delivery of an efficient, safe and reliable National Highways system;
- f. Promote and ensure safe, secure, economical and efficient civil aviation operations;
- g. Increase export of perishable commodities (fruits, vegetables, livestock etc.) through establishment of an efficient and viable cool chain supply system;

¹²²

<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/EXTSARREGTOPTRANSPOR T/0,,contentMDK:20699058~menuPK:869060~pagePK:34004173~piPK:34003707~theSitePK:579598,00.html>

¹²³ PIA has the highest employee-to-aircraft ratio in the world, at 434 per aircraft. Indian airlines have 276 per aircraft and the highest employee to aircraft ratio in the US is at United Airlines, with fewer than 120 per aircraft. <http://www.historyofpia.com/forums/viewtopic.php?f=1&t=13287>

¹²⁴ As listed on the website of the NTC Management Unit (NTCMU):

<http://115.186.133.3/pcportal/NTCIP/index.html>

- h. Develop an energy corridor linking China and Afghanistan with the Central Asian Republics (CARs); and
- i. Develop inland water transport through link canals and the Indus River as alternative and economical modes of transportation.

To implement the Program, the GoP has set up a National Trade Corridor Task Force (NTCTF) headed by the Deputy Chairman of the Planning Commission. The Federal Secretaries of the Ministries of Communications, Railways, Ports and Shipping, Defense, Petroleum, and Industries; as well as representatives of the Federal Board of Revenue (FBR), the National Highway Authority (NHA) and the Civil Aviation Authority (CAA) are members of the Task Force. In addition, the three development partners (the World Bank, the Asian Development Bank or ADB and the Japan Bank for International Cooperation or JBIC) supporting the Program are also represented in the NTCTF. Ten committees have been formulated under the Task Force to oversee implementation of specific activities.¹²⁵ The government has also set up the NTC Management Unit (NTCMU) in the Planning Commission to act as the supervisory agency for the initiatives being carried out under the Program. The following describes the initiatives carried out for promoting trade facilitation and infrastructure modernization.

Trade Facilitation

Simplification of Trade Documents

These initiatives include measures to ensure that all trade related documents in Pakistan conform to the UN Layout Key (UNLK), an international standard for simplified documents, as well as checking commercial and official familiarity with Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT). Other activities planned include assessing the efficiency of documentary credit systems, and identifying the extent to which payment delays are caused by trade and transport delays.

¹²⁵ These committees cover Railways; Highways; Trucking; Aviation and Air-Transport; Ports & Shipping; Trade Facilitation; Cool Chain; Energy; Public Private Partnership; and Project interventions.

Facilitation of Trade Operations

Activities planned include improvements in official regulations covering movement of goods across borders, i.e. facilitation and tracking of cargo in transit trade operations; support for clearance procedures at dry ports; capacity building of freight forwarders and development of cold chain logistics amongst other things. The two pilot projects to be initiated, i.e. the development of an electronic trading platform and transit/cargo tracking systems, can be included in this broad set of measures.

The freight forwarding and logistics sector has traditionally had little access to sources of financing – banks in Pakistan are more geared towards working with production houses that can offer collateral in recognized forms. In the longer run, governmental officers, entrepreneurs and other stakeholders in the trade and freight transport sector need to start a dialogue with financial institutions to explore the possibility of extending business development credit to logistics professionals in keeping with their expanding role in an economy increasingly dependent on strong domestic and international transport links.

With regard to the ATTA, some of the key concerns are security-related, and will require strong implementation of security protocols. However, the loss of business for Pakistani truckers is also a key concern, particularly in an atmosphere of heightened insecurity. An important mitigation strategy here will be to ensure that Afghan drivers operate under the same regulatory regime that applies to Pakistani businesses, therefore providing them with less of an opportunity to engage in a price war with local concerns.

Reform of Ports and Shipping

In 2008-09, the last year for which published data is available, the Karachi Port had 291 officers and 4,893 workers¹²⁶ whereas Port Qasim had 1,666 employees in 2007 down from 2,213 in 2000¹²⁷. As mentioned earlier, these represent significantly lower levels from previous years as rationalization of staffing has been a feature of administrative changes at both ports in recent years. Further reduction in staff numbers has not been mentioned in the business plans of either port, or in interviews conducted by NLTA consultants with port authorities, but further private sector involvement in port operations may necessitate further cuts – a fact that has been alluded to in the Project Appraisal Document.¹²⁸

Limiting the scope of, and ultimately wrapping up the Karachi Dock Labor Board (KDLB) has been on the agenda of the Ministry of Ports and Shipping for some time.¹²⁹ Initially the Government had planned to fund severance packages for KDLB registered workers, as well as labor redeployment services. The plan could not, however, go very far as workers registered with KDLB are not public sector employees. As of July 2010, the KDLB is very much functional, although its future remains uncertain.

Port Qasim has always operated as a landlord port, and the Karachi Port is moving closer to that status through the implementation of a Landlord Strategy developed by the Ministry of Ports and Shipping. The Karachi Port Trust (KPT) is in the process of developing a deep draught container terminal at Keamari, which will be operated on build-operate-transfer (BOT) basis. The reconstruction of berths 10 to 17 is proceeding, and handling of bulk cargo at least two of these berths is likely to be tendered when the

¹²⁶ KPT, 2009.

¹²⁷ PQA 2007 Port Qasim Business Plan 2006-07 to 2011-12. Ministry of Ports and Shipping.

¹²⁸ More specifically, the PAD says that KPT “expects to reduce its staff numbers by 30 percent.” see World Bank (2009: 29)

¹²⁹ World Bank 2006a.

reconstruction is complete. Other plans include setting up an independent dredging company, which will be a wholly owned subsidiary of KPT, but with a CEO hired from the market, and may later be privatized; and outsourcing of tugs and pilot services as approved by KPT's board in 2006.

Rationalization of Port Tariffs and Improved Marketing

Port charges are regulated by the Ministry of Ports and Shipping, but with the proposed corporatization of port authorities, this function will be transferred to the respective boards managing the two ports. Both the Karachi Port and Port Qasim are committed to further reductions in port charges. In August 2009, a 10 percent reduction in wet charges was announced for Karachi Port while recommendations were made to the Board of Trustees of KPT to freeze the annual increase of handling, marshaling and storage charges of containers.¹³⁰ The Karachi Port has set up a Costing Cell to examine further reductions in charges, which will be sent to the Ministry for approval.

Depending on the charges reduced, the impact of tariff rationalization on end users and service providers at ports would be positive. If the tariff reduction has the effect of increasing port usage in the long-term, the positive effects will be multiplied, and could extend to employment creation not only at the ports themselves but amongst ancillary service providers and in the wider economy. Rationalization of port charges and an improvement in port services may also result from the proposed corporatization of ports and the transfer of greater autonomy to port authorities – a process that should result in ports competing for business. Once again, a spirit of competition amongst the ports should be good for business and for end-users.

Reform of Highways and Trucking

Overloading is endemic in the industry and truckers claim that it is critical for profitability given that the fleet consists mostly of two axle vehicles. This causes both accidents and road damage. NHA has prepared a Truck Weight Control action plan, which envisages setting up of weigh stations at goods loading points and at entry points of highways, as well as using data from a proposed Central Data Repository (CDR) with details of motor vehicle registration to be able to identify owners of offending vehicles.

The 2007 Trucking Policy recognized that the 2 and 3 axle, which dominate the sector in Pakistan and are often assembled in back-street operations with no regard for minimum quality standards, are harmful for the environment, consume more fuel, and damage road infrastructure. As such, the Policy sought to effect a modernization of the fleet, encouraging use of multi-axle vehicles that meet minimal European emission standards. Subsequent to the finalization of the Trucking Policy, this reform has become imperative as the Pakistan Environment Protection Agency (Pak EPA) notified new National Environmental Quality Standards (NEQS) for motor vehicles in 2008, which specify that all local diesel vehicle manufacturers must meet Euro II emission standards by end June 2012. In addition to the notification of fuel emission standards, the government has also prepared national standards for manufacture of trailers and semi-trailers that have been sent to the Pakistan Standards and Quality Control Authority (PSQCA) for finalization.

The key policy incentive for modernization of the fleet was the rationalization of tariffs on vehicle assembly kits in the budget of 2006-07, which brought tariffs down from levels of up to 60 percent (on Completely Built Units or CBU and Completely Knocked Down or CKD for rigid trucks) to 10 percent,

¹³⁰ Wet charges include berth fee, pilotage, tug charges and storage charges. Dry or land charges on the other hand include costs of wharfage, use of dock labor and dues paid to terminal operators.

with duty on CKD kits for some categories of prime movers removed altogether.¹³¹ In order to make the policy regime predictable, a five-year timetable for additional reduction of duties was also given. In addition, in the Trade Policy of 2007-08, the government allowed import of used heavy-duty vehicles as long as they met certain specifications. Even with these incentives, however, the average price of a truck meeting Euro II specifications is about Rs. 7 to 8 million, well above the Rs. 1 to 1.5 million charged for a truck assembled by a manufacturer in the informal sector using second-hand materials.

The government also wants to move towards instituting industrial estates for truck assembly in an effort to check truck body making in the informal sector, where bodies are built onto Hino or Bedford chassis with little regard for the need to safety regulations or adhere to minimal quality standards. Trucking was recognized as an industry in January 2008, in a bid to better regulate the sector, and open up opportunities for sector stakeholders to access credit.

Vehicle registration and certification systems are housed in provincial governments, but the 2007 Trucking Policy highlights the need to create a CDR to facilitate data transfers and exchange across provinces, a vital function in an environment when vehicles cross provincial boundaries regularly. The proposed CDR would house data on the origin of the vehicle, its registration and identification particulars, as well as details of taxes paid, fitness certifications, axle load control and a host of other variables. The proposed design would ensure that the roles and functions of the federal and provincial governments are delineated clearly, and that the federal government acts as a database manager, but does not take on operational responsibilities for vehicle regulation.

The creation of a database on vehicles in general and trucks in particular would also facilitate motor vehicle examination and fitness certification systems, which are for all practical purposes non-existent at the moment, in spite of the legal requirements of the Motor Vehicles Ordinance of 1965.¹³² Motor vehicle examiners (MVEs) are not trained or equipped to test vehicle fitness according to the requirements of international or even newly instituted domestic standards. The Trucking Policy proposes the establishment of Vehicle Fitness Testing Stations (VFTS), possibly with public-private partnership, as part of a revamped system of vehicle testing and certification.

In addition to vehicle fitness, a revamped regulatory system would also institute systems for driver's training and licensing which would ensure that drivers are tested for knowledge of traffic rules and are physically fit as per the requirements of a job that entails long hours spent in navigation, often in difficult conditions. Instituting such a system will require setting up training schools for drivers of heavy vehicles, instituting tests for licensing and maintaining a database of infractions that are recorded against license numbers. The system would also help in checking against substance abuse amongst drivers – a common problem which potentially extremely dangerous implications.

Absence of a Reform Program for Energy

A lack of power has drastically affected the industrial sector, with some figures pointing to drastic reductions in industrial production and increases in unemployment levels. Indeed, a recent report by the Asian Development Bank cites that ““Losses arising from power and gas shortages held down GDP growth by 3–4 percentage points in FY2011 and FY2012.” The increase in power tariffs has also hurt industry by increasing costs. Moreover, the services sector has been hurt by lack of fuel, particularly Pakistan Railways and Pakistan International Airways.

¹³¹ See. MIPSI (2007 :36) for details

¹³² Under the associated Motor Vehicles Rules, 1969 (specifically Rule 35), motor vehicle examiners are required to assess the fitness of commercial vehicles annually.

Pakistan currently has no formal and comprehensive plan or long-term vision to resolve the on-going chronic energy crisis that is hindering the growth of its economy. The energy crisis is a multifaceted problem plagued with political, technical, security, and financing challenges that have made seeking both short and long term solutions difficult. The GoP has engaged in a variety of high-level discussions centering on finding solutions for the energy crisis, including addressing: power generation from alternative sources (e.g., coal, renewable, and hydro electric from domestic sources) and international sources of energy (e.g., gas imports from neighboring countries, including Iran) for meeting short-term and long-term energy demands; the circular debt problem; upgrading and rehabilitating transmission and distributing systems; and, electricity theft. However, to date, no formal national energy plan has been formulated that addresses solutions for the energy crisis.

3.4. Sectoral Reforms for Sustainable Trade and Infrastructure

An inefficient logistics system, an inadequate supply of infrastructure, and the on-going energy crisis have decreased the competitiveness of industry, resulting in substantial losses of productivity, profit, employment, and hence exports growth. Given that the growth and development of a country is positively linked to industrialization and investment, Pakistan's systematic poor performance in industrial growth is a major cause of concern. Therefore it is vital to develop and implement policies that promote trade and provide the appropriate infrastructure to reduce the cost of doing business. Given that industrial sectors are primarily located in urban centers, a key objective is to efficiently link these clusters with domestic and international markets to enhance trade growth. The following recommendations are not part of the GoP's reform program and can be adopted in the GoP's industrial strategy for reducing and mitigating industrial losses due to trade and infrastructure inefficiencies:

Trade

Regional and international trade can be facilitated by exploiting the strategic locations of cities and by efficiently connecting cities with one another. Gwadar, for instance, serves great potential for both cross border trade and domestic trade. Currently, Gwadar is not linked by road or rail to the northern parts of the country, which house key industrial sectors. The city of Gwadar is also strategically located east of Iran, south of Afghanistan, and has a sea port that is located at the entrance of the Persian Gulf. For Pakistan, the economic returns from Gwadar Port stems from its location near the Strait of Hormuz, a major conduit for global oil supplies in the region. Gwadar is of strategic importance to Afghanistan, China, and Central Asia, providing these landlocked countries with access to the sea.¹³³ However, Gwadar's strategic location for facilitating regional trade and alleviating poverty has yet to be fully exploited to its greatest potential. The development and usage of the port has stalled as a consequence of a variety of issues ranging from a lack of infrastructural investment by the government, prohibitively high costs of transport, and absence of any significant industry in Baluchistan.¹³⁴ Moreover, Gwadar serves an important node for any Iran-Pakistan-India gas pipeline that could be developed, which could cross from Iran's Balochistan's province to Pakistan's. Importation of natural gas from Iran would address to some extent Pakistan's energy concern, given that currently, natural gas demand in Pakistan has far exceed the

¹³³ World Bank. 2008. Afghanistan and Pakistan-Trade Facilitation and Transit Trade: Challenges and Opportunities." Available from <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/0,,contentMDK:21706596~pagePK:146736~piPK:146830~theSitePK:223547,00.html>

¹³⁴ LUMS, 2011.

available supply; there would still be a supply gap post 2015 even if indigenous gas reserves and planned projects in pipelines in Pakistan materialize.¹³⁵

Breaking down trade barriers and improving suboptimal infrastructure to the major transport corridors and cross border markets (especially in KP and Baluchistan, and upper Sindh) can help produce greater trans-regional trade flows (with India, China, Afghanistan, Central Asia and Iran) through these regions following liberalization of trade with India. There is a rich empirical evidence revealing that trade openness is positively correlated with economic growth. The best possible environment for the exchange of goods demands less barriers to business activity. For example, government intervention, in the form of restrictive and discriminatory rules has implications on a country's international trade potential. The recent economic crisis has highlighted the degree to which economic growth depends on open markets. Protectionist measures are counterproductive as they reduce aggregate economic activity¹³⁶. Pakistan and India, the two most populous countries in South Asia, have a great potential for intra-regional trade. However, the magnitude of official trade between Pakistan and India remains small compared to their respective global trade volume, with neither country in the category of top ten trading partners of each other.¹³⁷ A recent study found that trade between the two countries would increase by 405 percent if political and territorial conflicts were resolved.¹³⁸ Pakistan and India will have to reduce barriers to foreign trade in order to realize increases in growth.¹³⁹

Transport

The GoP should focus on upgrading and rehabilitating the national road network and railway links that connect to cities—particularly industrial clusters-- to each other. It is critical to maintain existing transport infrastructure and services while simultaneously investing in improved physical infrastructure to reduce transport costs for industrial clusters. A 2004-2005 survey of pavement condition on the federal network revealed that 47 percent of the road network was in poor to very poor condition.¹⁴⁰ The NHA had 52 road development projects in 2006; however, the budget allocation of these projects was not sufficient for the timely and necessary expansion of road capacity while accounting for the deteriorating quality of current roads.¹⁴¹ Efforts should focus on improving regional connectivity between industrial clusters, including the movement of containers and the cross border movement of goods in order to reduce transport bottlenecks. The upgrading of infrastructure (e.g., at Gwadar Port) is also crucial for promoting regional trade flows and will allow Pakistan to act as a transfer channel for goods moving between the Middle East and China.

Pakistan's transport supply chain system might provide the value-added services that have become the hallmark of modern logistics: multimodal systems that combine the strengths of different transport modes into one integrated system. Pakistan's freight transport system needs to shift towards one based on the

¹³⁵ LUMS, 2011.

¹³⁶ World Economic Forum, Global Competitiveness Report 2011-2012.

¹³⁷ State Bank of Pakistan. Chapter 2: Trade Integration between Pakistan and India. Retrieved July 25, 2012 from http://www.sbp.org.pk/publications/pak-india-trade/Chap_2.pdf

¹³⁸ Source: Naqvi, Zareen F., and Philip Schuler. 2007. The Challenges and Potential of Pakistan-India Trade. Washington, DC: World Bank. According to the WDR, 2009: "Important strides have been made in the past decade. In 2004, the two countries engaged in the "Composite Dialogue" on peace and security issues, including terrorism and drug trafficking, confidence-building, economic and commercial cooperation, and friendly exchanges in various fields. On a broader regional basis, the South Asian Association for Regional Cooperation is a forum to discuss development challenges, such as cooperation in energy production and water basin management."

¹³⁹ World Economic Forum, Global Competitiveness Report 2011-2012.

¹⁴⁰ Project Appraisal Document (2009). "Second Trade and Transport Facilitation Project," The World Bank.

¹⁴¹ Project Appraisal Document (2009). "Second Trade and Transport Facilitation Project," The World Bank.

integration and complementarities of rail and trucking to improve efficiency and decrease environmental impacts. Rail freight generally has a competitive advantage and lower costs over road freight transport via trucks for longer distances. The adoption of a multimodal freight transport system, in which rail is used for long hauls and road freight is used for shorter distances, is a strategy for enhancing the sustainability of freight transport. Given that rail is more environmentally sustainable than road, the case for integrating rail more significantly into freight logistic itineraries for goods is critical.

Adopting a multimodal transport system and modernization of the trucking sector will help reduce negative *environmental* externalities generated by the trucking sector. Under the multimodal system, a reduction in the number of long-distance truck drivers, substitution of existing obsolete, poorly maintained trucks for newer models, and modal shift to railways are anticipated, which would help decrease road congestion, improve air quality, reduce greenhouse gas emissions, improve road safety and decrease the probability of road accidents and fatalities, and reduce noise pollution and hazardous material spills.

Also, adopting a multimodal transport system and modernization of the trucking sector will help mitigate a number of negative social impacts. The shift to a multimodal system, particularly a modernized trucking system and increases in rail freight transport, would help reduce HIV transmission risks. Long-distance truck drivers (who spend a lot of time away from home) and sex workers who work along major transport routes are identified as highly vulnerable groups at the greatest risk for HIV. The modernization of the transport sector, including modal shift to railways, could lead to the reduction in the long-distance trips carried out by truck drivers, and thus, to a decrease in the risk of HIV transmission.

To allow for rail to operate on a commercial basis, Pakistan Railways might be split into two different organizations: one responsible for freight and the other for passenger services, without any sort of subsidization.¹⁴² This would allow PR to be relieved of costs of operating the large non-commercial network of lines and services. PR should, over time, separate core and non-core activities with a view of having the company focus on its core function of providing rail transport rather than on management of its non-operational land assets, such as factories and workshops.

The government is keen to reduce rail-related costs to the economy, at a time when it is paying between US \$65 million to US \$130 million in subsidies to keep PR afloat¹⁴³. The key strategy in this regard is to encourage private sector participation by implementing a track access policy that allows private operators to run both passenger and freight services on selected routes. Investment in new rail lines for freight transport should be made based on public-private partnerships (PPPs) sharing risks and using the highest economic, financial, social, and environmental standards. Planned activities that fall broadly into this head include institution of systems to mechanize track maintenance; a human resource management system that would enhance capacity of existing staff; design for rehabilitation of main bridges and plans to enhance the productivity of workshops. Overall, such measures can help revitalize the rail freight sector, and enhance its reliability and performance, as well as its business reputation. The capacity building of employees is crucial not only to ensure efficient service in a revamped PR, but also to improve the long-term employment prospects of railway workers to prepare them for a future where private service operators may play a more prominent role. By allowing private entry into the railways sector, the GoP can correct some of the inefficiencies that have led to rail transport being seen as a transport modality that cannot compete, on a cost or convenience basis, with respect to highway transport.

¹⁴² The analyses of passenger transport in general and train passenger services in particular are beyond the scope of the SEPSA.

¹⁴³ World Bank. 2006a. Project Information Document: Karachi Dock Labor Board Restructuring Project. Report No. AB2616. September page 3.

To remedy inefficiencies in the trucking sector (which arguably generates the lion's share of environmental and social problems in freight transport), the GoP might accelerate implementing its 2007 National Trucking Policy. The overall objective of modernizing the trucking sector is to encourage the use of large and modern fleet trucks that meet minimum European emission standards and can meet Pakistan's freight transport demand at a lower cost. This reform is particularly important for the transport of heavier and bulk commodities. The 2 and 3 axle obsolete trucks which dominate the trucking sector are often assembled in back-street operations, with no consideration of environmental quality standards.

Proposed policy interventions in the air transport sector are at a planning stage and will depend on the findings of sector and infrastructure assessments and assessments of regulatory safety oversight. Overall, trade and transport reforms will lend support to further sector restructuring and modernization, including implementation of Global Navigation Satellite System approaches and further sector restructuring, including encouraging private sector involvement in airport and services management as per the Civil Aviation Policy of 2008; and restructuring of PIA. PIA's restructuring has been on the cards for some time, but the issue may have assumed greater urgency since June 2010, when the Prime Minister emphasized the need to restructure eight organizations that were characterized as white elephants, which could no longer be supported through the public exchequer. Job losses in the aviation industry, particularly for flight crew and maintenance staff, will have a strong negative impact, given the lack of viable alternatives in the sector. Again, as in the case of railway workers, these losses are unlikely to be effected without payment of compensation, which should somewhat mitigate the effects.

Increasing freight transport productivity requires private sector participation. Due to federal budget constraints, bringing in private participation (particularly in rail and aviation) is required. Private sector participation in the rail industry could serve to correct some of the deficiencies that are the result of the current management, including subsidization that leads to artificially high freight transport rates and poor track maintenance. Even though, the major share of trucking in Pakistan is private, by far the largest trucking company in Pakistan is owned by the National Logistic Cell (NLC). The NLC, established in 1978 to transport public imports of wheat and fertilizer, operates some 1,400 trucks and employs more than 7,000 workers. To provide a level playing field, the government might consider developing a regulatory framework for ensuring market competition in the rail and air transport sectors, including provisions for entry and exit of private operators. This regulatory framework could facilitate inter-modal connectivity and private sector participation. The regulatory structure should include responsibilities on cross-cutting issues such as: environment and social management, project and concession contract development, and monitoring and evaluation. An apex regulatory organization could take over responsibilities such as regulatory policies and promotion of private sector participation.

Energy

Given the acute energy crisis, the GoP must develop a comprehensive energy framework that addresses potential sources for energy over the long term and resolves key issues, particularly pertaining to circular debt. Pakistan may likely need to depend on both alternative domestic sources of energy and international sources to meet its growing energy demands. Indeed, the energy crisis is hitting the industry at multiple levels. Energy tariff increases are forcing businesses with low margins and those who are unable to generate their own power (particularly SMEs) to close down; unannounced load-shedding and voltage fluctuations damage machinery worth millions of dollars; and the unavailability of electricity harms productivity of workforce. Given the energy crisis, it is necessary for the GoP to explore new sources of energy supply to cater to industry, particularly developing cleaner sources of energy as an alternative to its limited gas sources, resolving current transmission and distribution losses, investing in thermal and

hydel plants, utilizing coal as an alternative source of energy (as is done in India), and importing energy sources from neighboring countries, including gas from Iran.

Areas with a heavy presence of industry, both large-scale and SMEs, should be given the status of industrial corridors and these corridors should only experience load shedding when absolutely necessary. The government should make it a priority to supply reliable power to the industrial clusters, especially in industrial cities like Karachi and Faisalabad. The approach to energy-related problems recommended by LUMS, 2010¹⁴⁴ in its proposed new industrial policy includes the following elements to be advocated by the MoI. Sector-wide energy audits should be carried out, beginning with heavy load industries. Based on audit recommendations, the industry should be given incentives to shift toward more energy efficient production methods and technology. In the industrial corridors, peak-load pricing schedules should be announced. A comprehensive program that focuses on reducing technical losses and improves the reliability of the distribution system is required. In the medium to long-run, there should be a shift in energy mix. This may be helped by developing localized, cheaper machinery for hydroelectric, thermal and coal-based power plants. In special economic zones, science parks and industrial estates, captive power generation should be allowed. At the same time, steps should be taken to facilitate the local development of wind turbines and solar energy technology in industrial estates. For this purpose, pilot research projects should be initiated bringing together universities, industry, foreign and local experts and relevant government departments.

Cross-border energy corridors can help promote both regional economic cooperation and access to energy resources. Developing a cross-border energy corridor with Iran for the construction of the Iran-Pakistan gas pipeline will help address the energy crisis in the medium and long run. In addition, the development and implementation of the proposed Iran-Pakistan Gas Pipeline and the Turkmenistan-Afghanistan-Pakistan (TAP) Natural Gas Pipeline project have important implications for helping Pakistan meet its energy demands. The Iran-Pakistan project, signed in 2009, is expected to deliver gas from Iran's South Pars gas field through Pakistan's Baluchistan and Sindh provinces.¹⁴⁵ The TAP project consists of a gas pipeline of roughly 1,700 kilometers that can transport up to roughly 20 billion cubic meters of natural gas per year from southeast Turkmenistan to Afghanistan, Pakistan, and India.¹⁴⁶ The projects will not only link energy-deficit economies such as Pakistan to the relatively richer hydrocarbon Central Asian economies, but will also provide Pakistan with cheaper and cleaner energy sources and to help meet current and future energy demands, and help overcome shortages in electricity.¹⁴⁷ However, problems pertaining to political, security, technical, and funding challenges have stalled the TAP project from being implemented and solutions for dealing with these issues have yet to be resolved. To date, construction work on the Iran-Pakistan gas pipeline is currently in progress.

3.5. Spatial Transformation and Urbanization

While improvements in trade and infrastructure are needed to help reenergize Pakistan's lagging industrial sector, trade and infrastructure reforms are also necessary to help keep pace with the on-going

¹⁴⁴ See LUMS, 2010, op cit., pp. ii-iv.

¹⁴⁵ The roughly 2,775-kilometer gas pipeline will be supplied from the South Pars field in Iran. The main line will start from Asalouyeh, Iran and is expected to stretch over 1,100 kilometers through Iran to reach Pakistan. In Pakistan, it will pass through Baluchistan and Sindh. In Khuzdar, a branch would connect to Karachi, with the main pipeline continuing towards Multan. See <http://ipripak.org/factfiles/ff124.pdf> for more details.

¹⁴⁶ Asian Development Bank. 2006. Technical Assistance for the Feasibility Studies of the Turkmenistan-Afghanistan-Pakistan Natural Gas Pipeline Project. Available from http://www.adb.org/Documents/TARs/REG/tar_stu36488.pdf Accessed on October 26, 2011

¹⁴⁷ Ibid

spatial transformation occurring in the country. Pakistan, which has the highest population growth rate¹⁴⁸ in the South Asian region, is currently undergoing two transformations: (i) a structural change in its economy, where the contribution of the agricultural sector to the country's economy is declining as that of industrial manufacturing increases; and (ii) a spatial transformation, with an increasing share of its population living in more densely populated urban centers. Pakistan's population living in cities is expected to increase from 36 percent in 2010 to nearly 50 percent in the decade starting in 2030. By 2020, Pakistan will have two mega cities (over 10 million population), Karachi and Lahore, and several others with population of one million or more (one each in Sindh, KP and Baluchistan, Islamabad Federal Territory and three in Punjab).

The growing number of rural people displaced by agricultural modernization and mechanization has contributed to the increase in the rate of urbanization, particularly in key provinces such as Sindh. Drought and poor agricultural productivity force rural residents to migrate to urban areas, where incomes and standards of living are comparably better than those in the rural areas. Given Pakistan's ongoing agrarian transformation, agricultural workers displaced by the increased capital intensity of farm practices are already migrating to cities in large numbers and will continue to do so.¹⁴⁹

However, the demographic dynamics that favor urban areas pose a challenge if industry remains stagnant. Despite the spatial transformation taking place, Pakistan's industrial structure has not experienced any significant change in the course of the past thirty years. The key problem is as follows: if Pakistan's industrial base does not expand to absorb this surplus labor, the burgeoning unemployment in urban areas is likely to have serious socio-economic and political ramifications.¹⁵⁰ A growing urban population has the potential to become a significant economic asset, assuming adequate policies are in place to facilitate the development of the industrial sector and provide employment to huge numbers of labor seekers.

Therefore a central aim of GoP's industrial policy should be to generate widespread employment in industry through policies that promote agglomeration economies in urban areas. Currently, infrastructural inefficiencies have severe impacts on industrialization, which has implications for the structural transformation of the country and the success of migrants to integrate into urban areas and secure employment. A *structural transformation* of the economy, with increased emphasis on manufacturing, is required and the recommendations provided herein can provide the blueprint for this transformation. The following sections provide an overview of migration trends in Pakistan, followed by a discussion on the spatial advantage of urban centers, particularly their role in promoting industrial development, to provide the justification for the trade and infrastructure reforms aiming to promote industrial growth.

¹⁴⁸ 1.8 percent in 2007-08; source: Government of Pakistan, 2009.

¹⁴⁹ Details on the agrarian transformation taking place within Pakistan are given by Mahmood Hasan Khan, who has done extensive research on agriculture in Pakistan. See his "Lectures on agrarian transformation in Pakistan," available at <http://www.freepatentsonline.com/article/Lectures-in-Development-Economics/201617590.html> Accessed May 6, 2011. Kahn observes:

The historical role of agriculture in the process of development is well known. It provides surplus of output and manpower to initiate industrialization. Development is initially fuelled by increased agricultural productivity and the transfer of surplus for profits and capital accumulation. This is something that is well distilled from the history of almost all societies which have economically developed. It is equally valid today.

In analyzing the current situation in Pakistan, Kahn details the capital intensification that has led to be eviction or displacement by landlords of family farmers and sharecroppers. As he observes, "increasing numbers of these unattached workers are migrating from villages to towns or cities or even to the Middle East..."

¹⁵⁰ The manufacturing sector in 2007 -08 absorbed only 13 percent of the country's labor force compared to 11.5 percent in 1999, a meager 1.5 percent point increase over the course of almost a decade; source: GoP, 2009.

Overview of Migration in Pakistan

Migration is ingrained in Pakistan's history, notably with the massive 'partition migration' following the emergence of independent States in South Asia. It remains a defining feature of the country's socio-economic dynamics, both internally and internationally. For one, Pakistan hosts the largest number of refugees in the world, with 1.8 million refugees at the end of 2008, almost all of whom are Afghans.¹⁵¹ Furthermore, at the end of 2010, there were around two million internally displaced people (IDPs), 1.4 million of them registered by the government.¹⁵² Second, migration is a key factor defining Pakistan's society and labor markets. Migration operates at three different levels: internationally, regionally and internally, all of which have strong socio-economic implication for Pakistan. These migrations are both vectors and outcomes of Pakistan's present and future spatial transformation.

At the national level, internal migration is particularly strong; in Pakistan the share of rural to urban migration increased over time (1996-2006), while urban to urban migration declined, yet remaining highest in internal migration.¹⁵³ Such migrations are also likely to be facilitated by reforms in the freight transport sector and have strong socio-political implication for Pakistan. Indeed, the regional distribution of population also has key significance for provinces due to its repercussions on their political representation and rights in the federation, distribution of resources, and employment quotas as provisioned in the constitution. About 30 percent of total migration as of 2008-09 (or up to 3 million people), has been from rural to urban areas.

Any analysis on urbanization trends that does not consider the inter and intra provincial differences in migration trends in Pakistan would be incomplete¹⁵⁴. According to the Labor Force Survey 2008-09,¹⁵⁵ Punjab accounted for the bulk of migrant labor, both inter and intra-provincial, while the proportion of migrant labor in other provinces tapered down roughly in consonance with their total population.¹⁵⁶ Intra-provincial migration has been particularly strong in Punjab with 71.7 percent of all those who reported intra-provincial migration being based in Punjab (Table A2.3.2). The direction of inter-provincial migration seemed more towards Sindh, particularly Karachi, Pakistan's largest city and commercial center, where 41.5 percent of all workers who had migrated across provinces were found to be working. About 15 percent of the total workforce consists of internal migrants and the proportion goes up to almost 20 percent for wage employment. Given that the total civilian labor force in the country consists of 53.72 million people,¹⁵⁷ this would mean that from 7 to 10 million people had migrated to join the labor force outside their place of origin as of 2008-09. These migrants generally moved towards wage employment (in larger cities) or self-employment in services (in smaller towns).¹⁵⁸ This trend is accentuated by the

¹⁵¹ At the end of 2008, Pakistan also hosted the largest number of refugees in relation to its economic capacity. The country hosted 733 refugees per US\$ 1 GDP (purchasing power parity) (UNHCR, 2009).

¹⁵² OCHA, 2010.

¹⁵³ Hamid, 2010.

¹⁵⁴ Arif, S.M., and Hamid, S. 2009.

¹⁵⁵ Federal Bureau of Statistics (FBS), 2009. Labor Force Survey 2008-09.

¹⁵⁶ Federal Bureau of Statistics (FBS), 2009. Labor Force Survey 2008-09.

¹⁵⁷ FBS, 2009.

¹⁵⁸ Although about 40 percent of Pakistan's population is now thought to reside in urban areas, these estimated 65 million persons are concentrated in a few centers. The census of 1998 showed about 200 towns and cities with more than 25,000 people, but also revealed that 8 cities with populations of over 1 million accounted for almost 60 percent of the total urban population in Pakistan, while almost a quarter of the urban population was housed in cities ranging in size from 100,000 to 1 million. This distribution is unlikely to have changed.

structure of labor markets in Pakistan where almost a third of firms in Pakistan tend to rely on seasonal or temporary labor, thus being able to add to or shed from the labor force as per trends in market demand.¹⁵⁹

Table A2.3.2. Inter and Intra Migration in Pakistan (2009)¹⁶⁰

Provinces	Total			Inter-provincial			Intra-provincial		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
<i>Pakistan</i>	100	100	100	100	100	100	100	100	100
<i>Punjab</i>	63.7	56.4	69.0	34.6	31.1	39.3	71.7	66.7	74.8
<i>Sindh</i>	25.1	28.3	22.7	41.5	37.9	46.0	20.6	24.4	18.2
<i>Khyber Pakhtunkhwa</i>	10.7	14.7	7.8	23.2	30.4	13.8	7.2	8.3	6.6
<i>Balochistan</i>	0.5	0.6	0.5	0.7	0.6	0.9	0.5	0.6	0.4

Internationally, migrants from Pakistan represent 2.3 percent of the country's population. Pakistani migrants are estimated to send back about US\$ 8.6 billion in remittances.¹⁶¹ At the regional level, Pakistan hosts 2.8 million intra-regional migrants. In facilitating connectivity, freight transport sector reforms could also contribute to the international migration of workers from Pakistan, an option that may particularly appeal to younger migrants. It will also likely increase the attractiveness of Pakistan's major cities, and notably Karachi, to migrants from the region.

Table A2.3.3. International Migration¹⁶²

Year	Estimated number of international migrants at mid-year	International migrants as a percentage of the population
<i>1990</i>	6,555,782	5.7
<i>1995</i>	4,076,599	3.1
<i>2000</i>	4,242,689	2.9
<i>2005</i>	3,554,009	2.1
<i>2010</i>	4,233,592	2.3

Spatial Comparative Advantage of Urban Centers: Provision of Infrastructure and Social Services

There is considerable variation in the provision of services in urban areas relative to rural areas that is a major "pull factor" for spatial transformation. The evaluation conducted LUMS (2011) under the NLTA clearly shows this. Highly agglomerated areas have both more hospitals and more post primary education (Figures A2.3.7, A2.3.8, A2.3.9).

¹⁵⁹ FBS, 2009.

¹⁶⁰ Ibid.

¹⁶¹ Ratha et al., 2009.

¹⁶² Source: United Nations, Department of Economic and Social Affairs, Population Division (2009). *Trends in International Migrant Stock: The 2008 Revision* (United Nations database, POP/DB/MIG/Stock/Rev.2008).

Figure A2.3.7.¹⁶³ Location of Districts by Hospital and Education Index

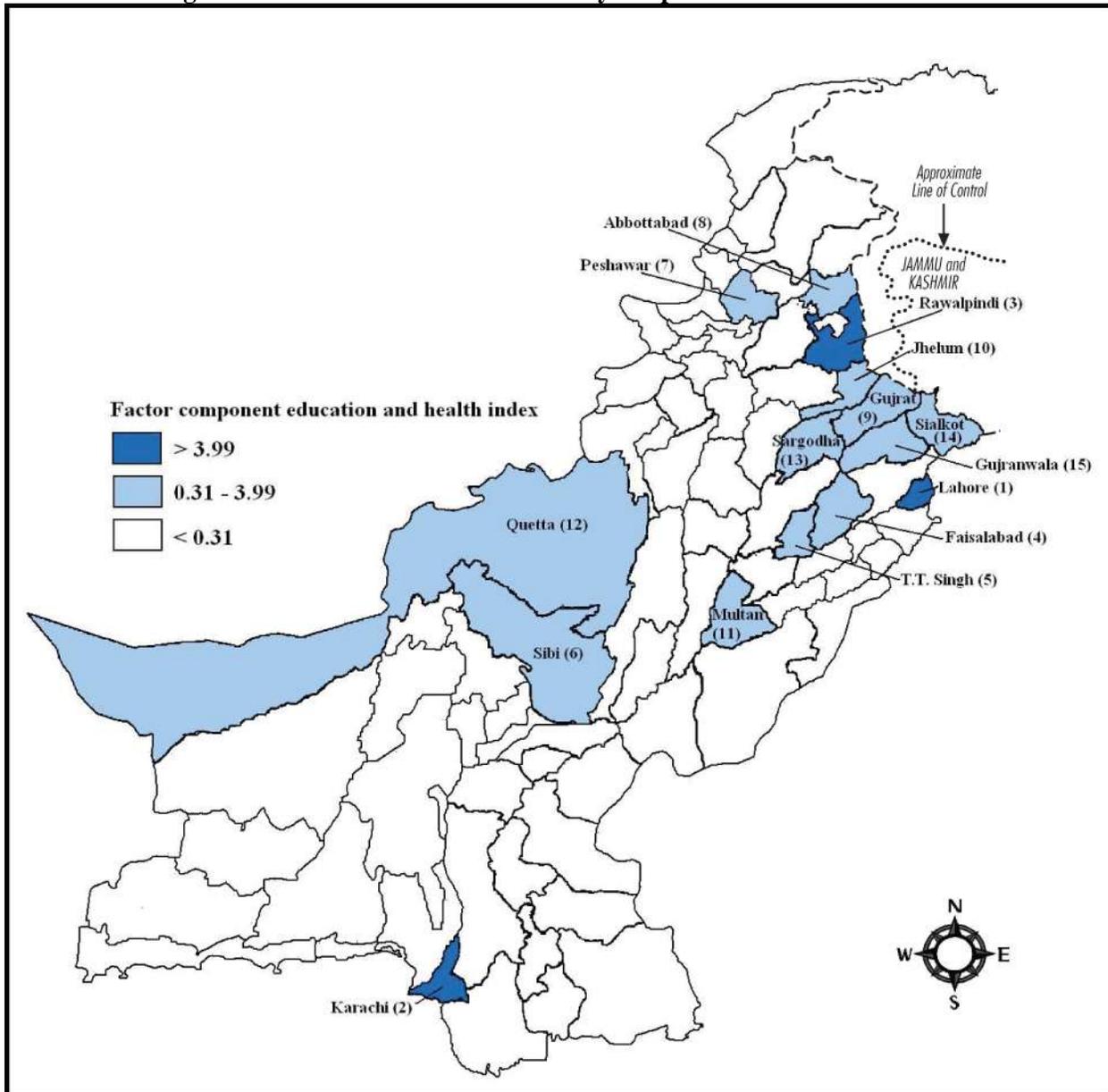


Figure A2.3.7 shows the mapping of districts on the basis of their development index¹⁶⁴ for the 2005-06. The figure confirms the above findings that investment in social infrastructure is highly concentrated in cities and their surrounding districts, whereas districts located away from these urban demand centers (e.g., southern Punjab, interior of Sindh and remotely located districts in Khyber Pakhtunkhwa and Baluchistan) are lagging behind. As new economic geography literature predicts, better-ranked districts with pools of skilled workers have higher concentration of large-scale manufacturing clusters than lower-ranked districts (Figure A2.3.10).

¹⁶³ LUMS, 2011

¹⁶⁴ The three categories include the most-developed districts, i.e., where the index is 1 standard deviation (SD) above the mean; least-developed districts, i.e., where the index is 1 SD below the mean; and the medium-developed districts that consist of all other districts. Source: LUMS, 2011.

Figure A2.3.8.¹⁶⁵ Post-primary school system and current population, 2005-06

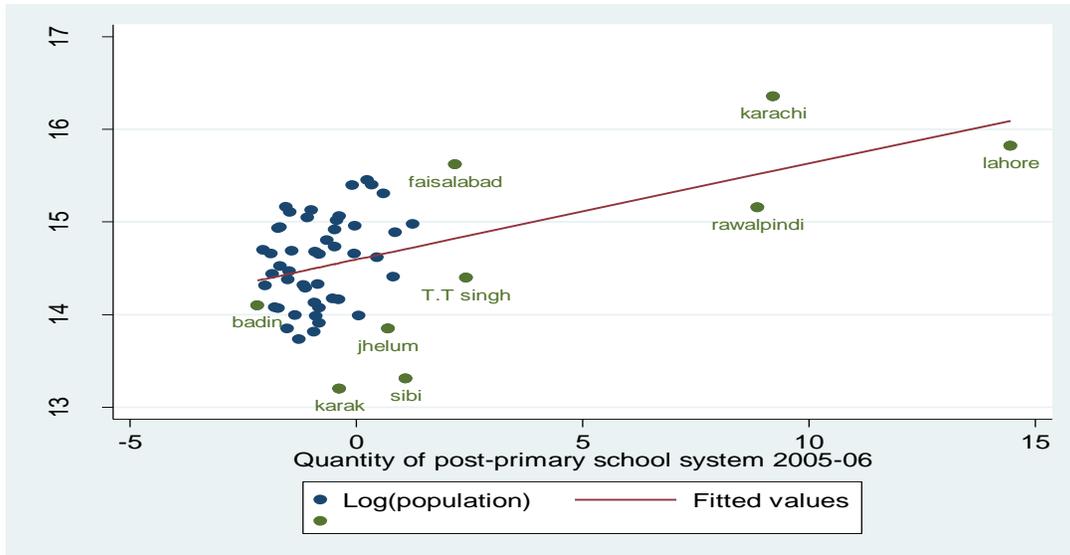
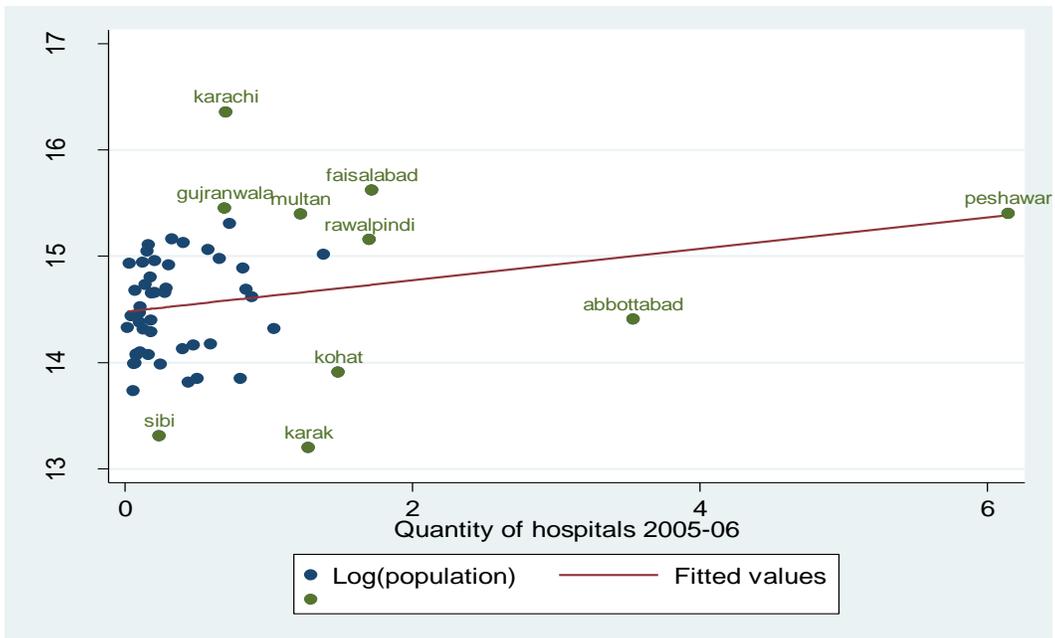


Figure A2.3.9.¹⁶⁶ Hospital size and current population, 2005-06

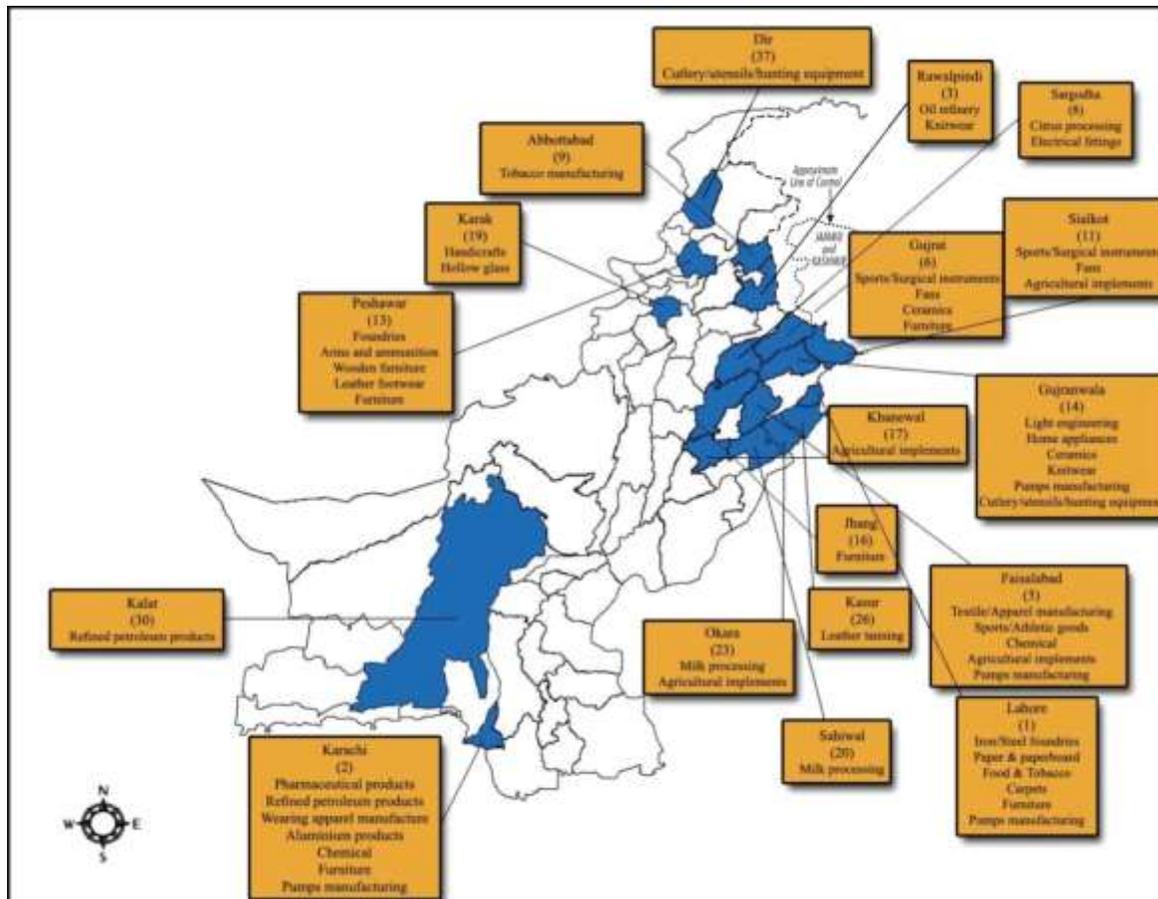


¹⁶⁵ LUMS 2011

¹⁶⁶ LUMS, 2011

Districts with higher levels of agglomeration also have a greater proportion of large scale manufacturing production (Figure A2.3.10). Figure A2.3.11 shows that the value of manufacturing production is positively correlated with district level population growth from 1981 to 2005. Overall, districts with population density of more than 600 persons per km² in Pakistan are characterized by industrial development, better education and health infrastructure, and better sanitation facilities than those in rural areas.¹⁶⁷ These districts include Karachi, Lahore, Peshawar, Faisalabad, Sialkot, Islamabad, Multan, Swabi, Gujrat, Rawalpindi, Charsadda, and Gujranwala.¹⁶⁸

Figure A2.3.10.¹⁶⁹ Industry Clusters and Development Ranking of Districts, 2005-06



In addition, districts with medium-level population densities; i.e. between 300-600 persons per km², have some industrial development and are endowed with agricultural resources. In contrast, districts with low population densities, i.e. below 30 persons per km², are characterized by limited job opportunities, little to no industrial presence, and poor agricultural endowments.¹⁷⁰

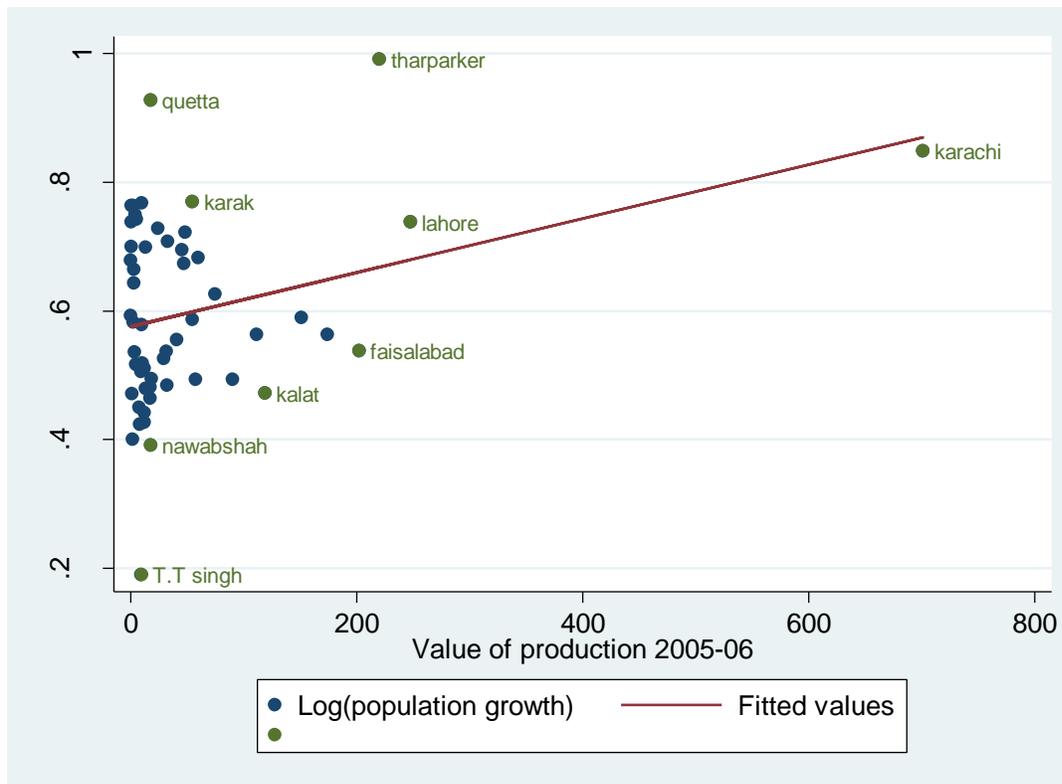
¹⁶⁷ Ibid.

¹⁶⁸ Ibid

¹⁶⁹ Source: CMI 2005-06 plant level data

¹⁷⁰ Ibid.

Figure A2.3.11.¹⁷¹ Value of Large-Scale Manufacturing Production and Population Growth



Urban Centers as Agglomeration Economies

Recent work in economic geography and urban economics highlights the significance of agglomeration economies as the defining factor for both industrial firms and people's location decisions. A pronounced feature of industrial economic activity in Pakistan is the highly geographic concentration (clustering) of firms around the metropolitan cities of Lahore and Karachi (Figure A2.3.10). Even medium-concentrated districts are clustered in proximity to these two big cities. Statistical results based on the Ellison and Glaeser¹⁷² Index find that 35 percent of the industries in Pakistan are highly agglomerated, 38 percent are

¹⁷¹ LUMS 2011

¹⁷² According to the 2011 LUMS Report: The Ellison and Glaeser index is "based on a rigorous statistical model that takes random distribution of plants across spatial units as a threshold to compare observed geographic distribution of plants. Ellison and Glaeser (1997) assume that plants make location decisions to gain from internal and external economies peculiar to a particular location. In practice, the value of the EG index indicates the strength of agglomeration externalities in an industry. Usually a γ score of more than 0.05 indicates highly agglomerated industry; a score between 0.05 and 0.02 suggests moderate agglomeration and a score of less than 0.02 shows randomly dispersed industry. The geographic concentration of 3-digit industries performed at the district level by the Ellison-Glaeser index. As suggested by Ellison and Glaeser (1997), values higher than 0.05 are considered as high concentration, values in the range of 0.02 to 0.05 show intermediate concentration and values lower than 0.02

moderately agglomerated, and 27 percent are not agglomerated. This finding is further supported in Figure A2.3.13 which plots the frequency distribution of the EG index across industries and Figure A2.3.14 which shows the overall level of agglomeration in the country. In Pakistan, the most highly concentrated industries are ship-breaking, followed by sports and athletic goods. The other highly concentrated industries are those sectors for which it is critical to be in proximity to consumers and suppliers, furniture and fixtures, scientific instruments, pharmaceutical industry, wearing apparel, handicrafts and office supplies, printing and publishing, pottery and china products, paper and paper products, etc.¹⁷³

Evidence in Pakistan suggests that firms tend to locate in areas where there are “location economies”: areas that minimize procurement costs (transport costs associated with the transportation of raw materials to the firm) and distribution costs (transport costs associated with distributing the products to customers). These are areas which have available specialized labor, inter-industry spillovers, local transfers of knowledge, and access to export markets. However, from 2000-01 to 2005-06, industry concentration decreased dramatically by about 33 percent.¹⁷⁴

The benefits of agglomeration of industries are often associated with reduction of three types of transport costs, e.g., “moving goods”, “moving people” and “moving ideas” (knowledge spillovers and sharing). Agglomeration is fundamental to industrial competitiveness because it promotes: (i) knowledge and information spillovers and innovative ideas among firms; (ii) labor-market pooling; and, (iii) input-output linkages. Spatial proximity of firms attracts suppliers and consumers to the region. Proximity also promotes the exchange of ideas between firms in clusters.¹⁷⁵ A high concentration of firms can also attract and sustain a large labor force with the skills demanded by that industry. Hence, location economies help create competitive advantage by improving firm’s access to resources.

The LUMS 2011 study finds that the size of district level population and road density help promote the agglomerating of industrial firms. Moreover, there are positive correlations between industrial locations and employment (Figure A2.3.12). Indeed, as stated in the 2009 World Development Report, Reshaping Economic Geography, “The pull of agglomeration forces in prosperous places is simply too strong for any opposing measure to be sustained.”¹⁷⁶ According to the Labor Force Survey 2008-09,¹⁷⁷ 41.5 percent of all workers who had migrated across provinces were found to be working in Sindh, particularly Karachi, Pakistan’s largest city and commercial center.

A recent study found that the majority of males (61 percent) cited economic reasons as main factors for migration¹⁷⁸. For females, marriage and reuniting with family are the most important reasons for migration between different regions. Average income of working men and women improves considerably

represent low concentration. Results of the EG index are also compared with raw geographic concentrations known as Gini index and Herfindahl index.” Source: LUMS, 2010.

¹⁷³ LUMS, 2011.

¹⁷⁴ Ibid.

¹⁷⁵ Breschi, S. and F. Lissoni (2003) Mobility and Social Networks: Localized Knowledge Spillovers Revisited. CESPRI Working Papers 142. Milano: CESPRI as cited in <http://www.tinbergen.nl/discussionpapers/08033.pdf>

¹⁷⁶ See World Bank, 2009 World Development Report, Reshaping Economic Geography, op. cit, p.159. The report observes: “Preoccupied with urban unemployment and squalor in the fast-growing cities of the South, early research on labor migration advocated restrictions. Governments often acted on these prescriptions, instituting migration abatement policies, but to little effect: flows from the countryside to cities and from wagging two leading provinces continued unabated.” (p.158)

¹⁷⁷ Federal Bureau of Statistics (FBS), 2009. Labor Force Survey 2008-09.

¹⁷⁸ Arif and Hamid 2009.

after migration to cities. In a separate study¹⁷⁹, males reported an average difference of 1192 rupees in their monthly income after migration, which is 1.84 times higher than their pre-migration average income. Women were also able to augment their incomes after migration; their income was 2.4 times more than their earning in rural areas. However, women's average income remained lower than men's before and after migration, even though the income gap decreased. Before migration, women's monthly income was 62 percent of men's income, and after migration, this ratio increased to 85 percent. Income data reveals two important findings; (i) migration contributes to improved earnings of both sexes; and (ii) gender differentials in incomes for urban areas are lower than in rural areas.

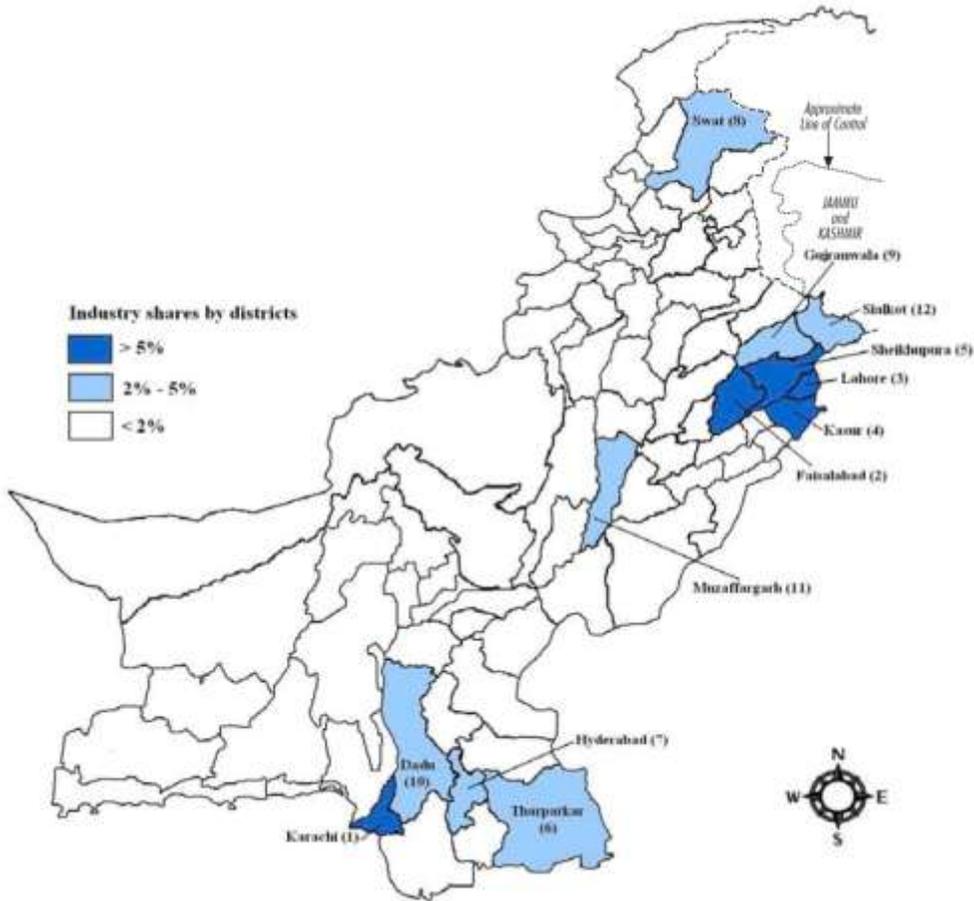
Table A2.3.4. City Population's and Urban Agglomerations (1990-2025)

<i>City</i>	<i>1990</i>	<i>1995</i>	<i>2000</i>	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2020</i>	<i>2025</i>
<i>Faisalabad</i>	1,520	1,804	2,140	2,482	2,833	3,260	3,755	4,283
<i>Gujranwala</i>	1,019	1,224	1,433	1,643	1,898	2,195	2,513	2,922
<i>Hyderabad</i>	950	1,077	1,221	1,386	1,581	1,827	2,112	2,420
<i>Islamabad</i>	343	452	594	732	851	988	1,148	1,320
<i>Karachi</i>	7,147	8,467	10,019	11,553	13,052	14,855	16,922	19,095
<i>Lahore</i>	3,970	4,653	5,448	6,259	7,092	8,107	9,275	10,512
<i>Multan</i>	953	1,097	1,263	1,445	1,650	1,906	2,203	2,523
<i>Peshawar</i>	769	905	1,066	1,235	1,415	1,636	1,893	2,170
<i>Quetta</i>	414	504	614	725	836	971	1,128	1,298
<i>Rawalpindi</i>	1,087	1,286	1,519	1,762	2,015	2,324	2,683	3,067

Source: LUMS, 2011

Figure A2.3.12. District Level Employment Shares in Pakistan's Manufacturing Sector, 2005-06

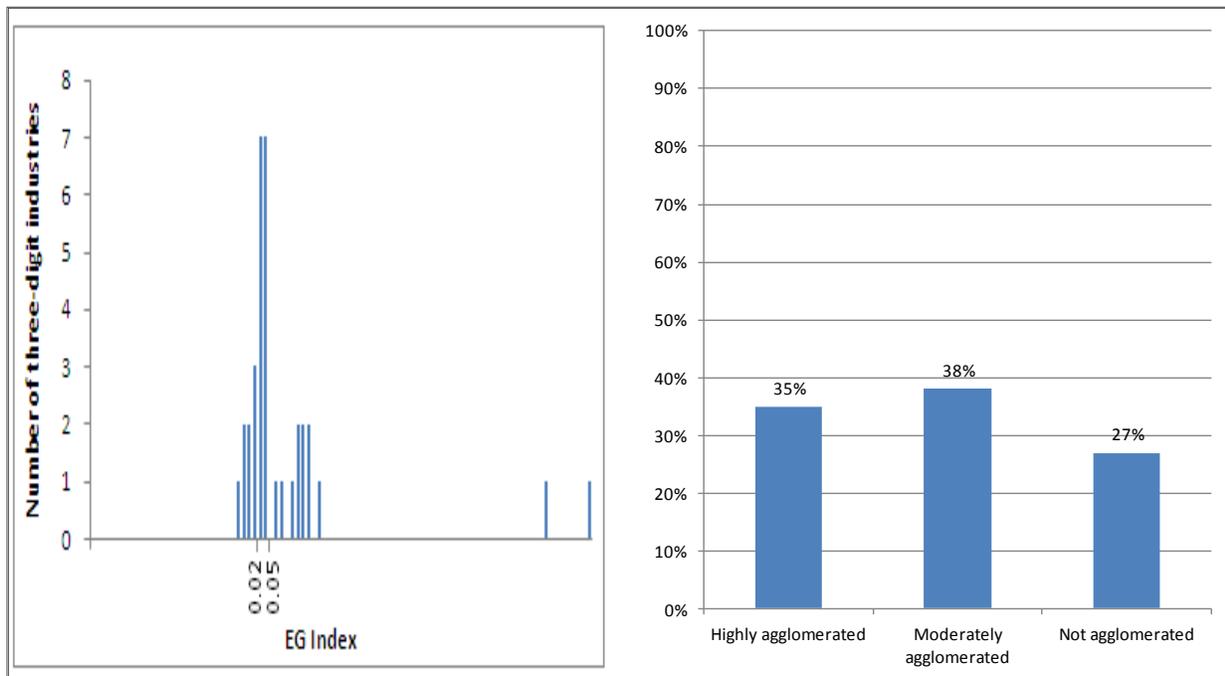
¹⁷⁹ Arif and Hasan 2009; data based on PRHS 2001.



Source: LUMS, 2011

Figure A2.3.13 Distribution of 3-digit Ellison-Glaeser Index

Figure A2.3.14: Agglomeration Level in Pakistani Manufacturing Industries



Source: LUMS 2011

Given the importance of urban centers and its linkages with employment, urbanization, and industrial development, the proposed reforms herein would contribute to agglomeration economies in urban areas, thereby increasing job opportunities in those places, while also increasing mobility. The structural and spatial transformations can be facilitated by investments to improve Pakistan’s spatial connectivity between industrial clusters and investments to provide clusters with key infrastructure and services, including energy, to allow them to conduct their operations efficiently.

3.6. Mitigating Negative Urban Externalities and Reforms for Sustainable Infrastructure

In the case of Pakistan, the two transformations that are currently taking place (a structural change in the economy and a spatial transformation) are anticipated to take place within a short timeframe, thereby increasing already severe urban problems. The process of urbanization on the one hand, provides opportunities for employment and better standards of living; on the other hand, rapid urbanization, without proper planning, may exacerbate problems associated with: air pollution, urban sprawl, housing shortages, excessive strains to water and electricity services, sanitation issues, and social conflict. Thus, policies in investment upgrading and improvements of public service delivery in urban settings should be a priority.

Henderson (2003)¹⁸⁰ examines the implications of excessive urbanization, particularly the impact of “urban primacy” (the share of a country’s urban population that is in its largest city) on congestion, housing, and the environment. He argues that cities that have excessive urban primacy are those that have

¹⁸⁰ Henderson, J.V. (2003). “The urbanization process and economic growth: The so-what question”. *Journal of Economic Growth*, (8:1), pp. 47-71.

expanded to a point in which additional agglomeration creates more congestion costs than benefits. However, Henderson also finds several examples with cities that have “suboptimal primacy” in the 1990s, primarily European countries such as Switzerland, Belgium, and the Netherlands. His research finds that deviations from optimal urban primacy in either direction (suboptimal or excessive urban primacy) considerably reduce economic growth. In the case of excessive urbanization in a city, very large commuting and housing costs strains the entire urban system by diverting scarce resources from other cities to reduce the congestion and environmental costs in congested cities. Henderson (2002) documents an additional cost: excessive primacy not only implies very large commuting and housing costs in the largest city but strains the whole urban system by diverting resources from other cities to the largest city in order to reduce congestion and environmental costs.¹⁸¹

The 2003 World Development¹⁸² further addresses the implications and solutions of urbanization levels that are not optimal:

“Disproportionate urban concentration often results from an imbalance in national institutions for signaling and balancing interests, especially across regions and levels of government. Democratization, fiscal decentralization, and investments in intercity roads, waterways, and communication can significantly reduce such concentration, permitting wider access to urban assets across the country.”

To better develop and implement urban development strategies that respond to Pakistan’s spatial transformations and that take into consideration the development of transport infrastructure to better develop cities, capacity building is required at least in two tiers of government (provincial and district). Pakistani cities have inadequate infrastructure to meet current needs, let alone an ability to respond to growing demand. In addition, cities are characterized by inefficient spatial structures (low density ribbon development), restrictive land use regulations, rent control, and limited supplies of land for commercial, industrial and residential development. As a result, land is relatively expensive and people and businesses tend to locate in further locations and/or informal areas. Within large cities, responsibilities for service delivery are fragmented, both spatially and institutionally, and fiscal capacity is limited. Addressing these challenges will be crucial to respond to the current urban population’s needs, as well as to prepare for continued urbanization. Energy infrastructure will also need to be studied and enhanced as, in some areas, it forms a bottleneck to growth that is similar to the role played by suboptimal transport infrastructure.

3.6.1. Social Challenges

While the benefits to be expected from the reforms are undeniable, some groups may nevertheless find themselves adversely impacted by some of the direct and indirect consequences of the reforms discussed above. Increases in transport productivity might affect rural non-farm and urban poor households and might be correlated with negative social impacts such as social conflict, urban sprawl, reduced business opportunities in small trucking businesses, transmission of HIV/AIDs, and involuntary resettlement. In addition to identifying the possible social and environmental impacts of specific policy actions, a discussion on the impact of the trade and infrastructure reforms is incomplete without a broader assessment of what trade and transport facilitation can mean for communities living along the existing trade corridor as well as its proposed extensions. Focus groups were conducted in a small number of selected locations across the country, with an emphasis on finding communities where the transport sector

¹⁸¹ Henderson, J.V. (2002). “Urban primacy, external costs, and quality of life”. *Resource and Energy Economics*, (24:1-2), pp. 95-106.

¹⁸² <http://www.dynamicsustainabledevelopment.org/showsection.php?file=chapter7c3.htm>

was a major employer, and where the impacts of up-gradation or extension of the trade corridor would be immediately apparent.¹⁸³ As explained below, provincial and federal laws and regulations will have to be streamlined to ensure social and environmental sustainability and a smooth rolling out of the investment plans for roads and railways.

Social conflicts are heightened by Pakistan's demographic growth and manifest themselves as sectarian or ethnic strife. Reforms in the freight transportation sector, for example, can be expected to disproportionately affect one specific ethnic group. Such a situation presents a potential for social unrest. In the case of the trucking sector, a mitigation strategy for specific ethnic groups of small and obsolete trucks likely to be negatively affected by the enforcement of the trucking policy needs to be concerned with two aspects: how to provide a business climate that keeps such businesses profitable or finds alternative means of employment and how to promote social inclusion. Access to vocational training and/or micro-loans to those workers should be considered as measures to facilitate the adjustment and limit the risk of social tensions. In addition, better access to information about employment opportunities can facilitate the match between workers and new or growing private firms operating in the sector.

Small operators in the trucking sector have a low probability of losing business to new and larger enterprises due to trade and transport reforms. Ensuring that they have access to credit and insurance, and are allowed to operate under a level playing field that allows their services throughout the country (including major routes) would help reduce the risks faced by small operators. Business linked to the current trucking sector, particularly that of rural non-farm and urban poor households as well as women and youth, might be benefitted by the implementation of the trucking policy and the modernization of the railways and ports sectors. Modernization will create new opportunities for smaller trucking firms provided they have access to credit and are not forced to quit operating on major inter-city routes.

In the case of reforms in the port, shipping, and trucking sectors, there is a risk that youth (especially from non-farm households and urban poor households) could be directly affected either through direct retrenchment or indirect loss of jobs, as well as through the loss of job prospects they had envisioned and invested in through the 'Ustad Shagird' arrangement (Master-Apprenticeship). The importance of starting off right is important for young people since it is the initial transition to the labor force that is an important determinant for their future economic (and social) well-being and, if taken collectively, a determinant of the overall level of economic development in Pakistan. Without the proper foothold to start out in the labor market, young people will have less choices that will improve their own job prospects and those of their future dependants, thus perpetuating the cycle of insufficient education, low-productivity employment, and poverty, from one generation to the next. Finding a new job will be more hard for youth who entered the labor market young and have limited education and skills, making the attainment of a stable and secure job all the more difficult. Furthermore, youth who are 'Not in Education, Employment or Training' (NEET), roughly 36 percent of the total youth population in 2005-06, could also be affected by other members of their family and community losing sources of income, which increases their chances of being discouraged and locked-in poverty,¹⁸⁴ which may result in increased social conflict.

¹⁸³ An important omission here was Balochistan – field teams were to visit selected locations across the province, close to the proposed new road and rail links to be built under the investment component of the National Trade Corridor Improvement Program. However, the law and order situation in the province did not allow the fieldwork to proceed.

¹⁸⁴ Although on a declining trend since 1999-2000, the NEET rate in Pakistan is very high in comparison with other regions, both at the low-end of the income per capita range, such as sub-Saharan Africa (27 percent), and at higher levels of income per capita such as Central and South America (21 percent). It should be noted that the female NEET rate in Pakistan would be reduced, because more women would be counted as employed, if the list of probing questions aiming 'to net-in marginal economic activities' in the labor force survey were taken into account. It is

To attain poverty reduction goals, increases in transport productivity need to be accompanied by reforms aimed at ensuring that vulnerable groups, particularly women and youth from non-farm households and urban poor households, take advantage of employment opportunities. Reforms in the trade and transport sector represent an opportunity to include a pro-active gender focus in a major sector, as well as in manufacturing activities.

The modernization of the trucking sector and adaptation of a multimodal transport system will help curb the spread of HIV originating from the trucking sector. In addition, public health initiatives to control the spread of HIV by changing behavioral risks of truck drivers are recommended. Important components would include the provision of services in geographically defined areas at greatest risk for HIV transmission (such as major trucking stopover locations). The services include information campaigns and behavior change communication aimed at improving truck drivers' knowledge, attitudes and behaviors regarding HIV; voluntary counseling and HIV testing; and proper management of sexually transmitted diseases. Such a component has been found cost-effective in Pakistan.

Ensuring Social Safeguards will be crucial to mitigate the negative impacts of reforms in the trade and transport sector. The creation and implementation of a uniform national resettlement policy that is enforced across Pakistan might ensure that the rights of persons directly affected by any transport program are safeguarded. In addition to the mitigation measures included in the design of the reforms, effective grievance redress mechanisms are needed to ensure that no further harm is done. Decisions should be based on considered, consultative, and inclusive planning. Regional and international policies and law precedents are available. In addition to measures for prompt compensation and support for livelihood development along with appropriate and effective grievance redress mechanisms at the local level, transparent mechanisms for determining compensation, supported by effective and extensive public information campaigns, are critical.

Reforming the Land Registration Act to ensure security of land titles and mandate the complete computerization of all land records in the provinces with mechanisms for transparency and third party validation built in is crucial. The establishment of secure land and property rights and preventing malpractice in the real estate markets is not only vital for protection of existing land holders, but will provide incentives for new businesses and asset owners to invest in new lands. Such investment is an element of the increasing amount and geographical spread of market activity that trade and transport reforms are expected to stimulate.

Upgrading slums and improving service delivery in urban settings should be considered a priority to manage and take advantage of Pakistan's spatial transformation. As mentioned before, the envisioned reforms are likely to increase existing incentives for rural to urban migration. Under current circumstances, migrants will add to the urban population that already faces problems finding adequate housing and meeting their needs for municipal services, including water supply, sanitation, and waste management. Clearly designed programs to improve slums and service delivery, with adequate resources and political support, would not only improve the quality of life of most urban residents, but would also reduce the social risks identified in this report, including those related to social tensions and conflict.

Road conditions and human behavior are the most relevant variables affecting road safety in Pakistan. Available information indicates that risk factors include poor road quality and lack of appropriate signage. The trucking sector is likely to be involved in a high number of accidents because of practices such as

important to keep in mind that this measure contains both unemployed non-student youth and youth who are inactive for reasons other than educational enrollment, including discouragement (i.e. inactive non-students).

overloading, modification and poor conditions of trucks, inadequate driving skills, and driver exhaustion caused by long hours behind the wheel. Until recently, obtaining a driver's license in Pakistan was relatively easy, as it did not require formal training and the process involved a few formalities with provincial authorities. The 2007 Trucking Policy should be implemented, as it contemplates measures to provide training to drivers and establish a new system enabling penalty points to be cumulatively counted, resulting in suspension or cancellation of driver's licenses. Additional measures that the GoP might consider include allocating a dedicated budget for road safety and building the capacity of police officers to enforce existing laws.

3.6.2. Environmental Challenges

Freight transportation reforms might consider a number of environmental policy options to enhance the positive effects and mitigate the negative consequences of trade and freight transport reforms. Accelerating the implementation of the 2007 Trucking Policy would lead to the substitution of the obsolete, poorly maintained, and highly polluting trucks for larger and modern trucks. These newer trucks, besides being technologically more efficient, cost effective, and less polluting, would reduce the number of trips required to move a given amount of cargo.

The maximum allowed content of sulfur for all fuels used in Pakistan originally was scheduled to drop from 10,000 to 500 ppm by 2008, but the stricter standard was postponed until 2010, and then again until July 1, 2012. The main reason for the postponements was that companies needed more time to retrofit refineries. However, Pakistan can take advantage of ultralow sulfur fuels as they become increasingly available in international markets. Pakistan currently imports about 3.5 Mt. of diesel a year from Kuwait, whose content in sulfur is 2,000 ppm. Importing diesel from Oman, Qatar, Bahrain or United Arab Emirates could reduce sulfur contents of diesel used in urban centers to 500 ppm.

Systematic air quality monitoring in urban centers (especially of $PM_{2.5}$ and $PM_{1.0}$) helps track progress of the enforcement of vehicle emission standards. Air quality monitoring is essential to identify the changes in air quality over time, and to determine if vehicle standards are being properly enforced. Ambient air pollution in medium and large urban centers in Pakistan is very serious, and very little has been done to address the problem. The high levels of dangerous pollutants, such as fine particulate matter and sulfur dioxide, cause significant health risks to urban populations. The GoP needs to revise its strategy regarding ambient air quality management by regularly monitoring the most important pollutants, including $PM_{2.5}$, which according to available evidence plays the largest role in damaging human health.

Pakistan needs comprehensive legislation to control environmental noise pollution. The National Environmental Quality Standards for Motor Vehicle Exhaust and Noise only apply to noise generated from motor vehicles. There are no national standards for regulating noise limits for residential, industrial, and commercial areas. Road traffic noise is another major source of noise pollution in urban areas. Aircraft noise is a significant source of pollution primarily in the major airports that are located inside or very close to densely populated urban areas. Given that excessive noise is a health risk, there is a need to design, implement and enforce a comprehensive regulation on noise pollution control that includes standards for controlling noise generated from sources such as, airplanes and locomotives, as well as noise standards for residential, industrial, and commercial areas.

Pakistan needs a national framework to manage the transport of hazardous materials. The goal is to create and implement a regulatory framework that covers all aspects of hazardous material transport. Key measures that the GoP could adopt include: (i) designing standards for the construction of vehicles used to transport hazardous materials; (ii) updating information on new chemicals/substances that are transported

on Pakistan's roads and railways; (iii) enhancing institutional capacity and clarifying legal responsibilities for relevant agencies; (iv) mapping of transportation routes and vulnerable points; and (v) providing resources to help the police and local fire departments to properly enforce regulations pertaining to the transport of hazardous materials. The GoP should consider international best practices in developing its national framework for hazardous materials management. Key examples include the technical guidelines for sound environmental management of various types of waste developed by the Basel Convention (to which Pakistan acceded in 1994),¹⁸⁵ the International Maritime Dangerous Goods (IMDG) Code,¹⁸⁶ and the Model Regulations on the Transport of Dangerous Goods prepared by the United Nations,¹⁸⁷

To avoid or mitigate biodiversity loss and natural habitat fragmentation due to construction of new freight transportation infrastructure, Pakistan's Environmental Impact Assessment (EIA) system could be reformed. While Pakistan's legal framework for EIA and the Guidelines for Preparation and Review of Environmental Reports have been in place for a number of years, a number of actions are needed to ensure its effective and efficient use as a planning tool. An important first step would be requiring all public and private projects that require an EIA to comply with the existing guidelines.

A modernized trucking sector and the use of railways for long hauling would help reduce GHG emissions. If the modal split is changed for inland freight transportation to 30 percent rail and 70 percent road (currently it is 4% rail and 96% road), the annual GHG emissions would be reduced to 36.8 TgCO₂eq (23.3 percent reduction or a reduction of about 11.2 million tons of GHG discharged into the atmosphere). Emphasis on the rail freight sector would result in an annual reduction in the consumption of diesel fuels by the inland freight transportation sector in Pakistan, of about 1.06 million metric tons by the year 2025/26. These savings in diesel consumption would imply a yearly reduction of about 6,116 metric tons of sulfur burned in internal combustion engines in the country.

The lack of environmental and social planning capacity at transport agencies should be rectified with a program of institutional strengthening and capacity building. Environmental and social units should be established in all those organizations that still lack them. These units should be integrated into the planning and decision-making process of their organization, so they possess the ability to influence construction and operation in such a way as to take into account environmental and social considerations (particularly early on in the planning process when such considerations can be dealt with more efficiently).

3.7. Conclusions and Recommendations

The long-term benefits of trade and transport reforms are well recognized. They will make logistics more predictable and reliable, increase efficiency and thus support industrial growth. The economy-wide impact, i.e. impact beyond the specific benefits to industrialization, of implementing trade and transport reforms is assessed in the Bank ESW on Strategic Environmental, Poverty and Social Assessment of Trade and Transport Reforms.

¹⁸⁵ See Basel Convention Technical Guidelines at: <http://www.basel.int/TheConvention/Publications/TechnicalGuidelines/tabid/2362/Default.aspx>. Accessed on December 9, 2011.

¹⁸⁶ International Maritime Dangerous Goods (IMDG) Code. See. http://www.imo.org/blast/mainframe.asp?topic_id=158#1. Accessed on December 9, 2011.

¹⁸⁷ See UN Recommendations on the Transport of Dangerous Goods - Model Regulations http://www.unece.org/trans/danger/publi/unrec/rev14/14files_e.html. Accessed on December 9, 2011.

Given Pakistan's ongoing agrarian transformation, agricultural workers displaced by the increased capital intensity of farm practices are already migrating to cities in large numbers and will continue to do so.¹⁸⁸ Increasingly, the lure of jobs in cities together with displacement of farmers due to the capital intensification of agriculture is causing many rural residents to migrate to cities in search of a better life. Given the research indicating the power of cities as engines for economic growth due to agglomeration economies, increased urbanization may prove to be a trend that helps Pakistan improve its GDP, and, at the same time, lift many out of poverty. And the cities themselves can be even more attractive in creating employment opportunities if intra-industry economies are hastened by public (or public-private) investments creating and promoting industrial clusters and providing job training and education to enhance human capital.

Improvement in transportation and trade logistics are needed to efficiently move goods from industrial clusters to domestic and international markets. Moreover, the GoP must develop a comprehensive policy to address the acute energy crises in order to provide industry with the power necessary to run their productions in order to enhance the quality of individual firms' operations and production processes. The GoP should complement industrial policy measures with systematic management of externalities by providing remedial strategies to minimize the social and environmental costs of trade and infrastructure reforms to maximize the positive effects of industrialization and urbanization. Key recommendations include the following measures:

Carry out a comprehensive package of reforms to unleash the potential of Pakistan's freight transport sector. Pakistan's freight transport sector compares poorly with those of other competing economies and its inefficiencies represent 4 – 6 percent of GDP. Reforms to modernize the sector should prioritize: (i) promoting the integration of different modes of transportation, giving preference to railways over long distances, where it is more efficient and sustainable than road transport (adopting a multimodal transport system); (ii) modernize the trucking fleet to reduce environmental and social externalities generated; (iii) redefining the government's role to focus on regulating and attracting private sector investments in the sector and gradually eliminate current biases that distort the market; and, (iv) foster the adoption of new technologies and procedures that add value to the services provided by the trade and transport sector, including those that would help to move from the current focus of bulk cargo to containerized cargo.

Strengthen the institutional capacity of infrastructure sector agencies and environmental agencies for environmental management. Organizations in Pakistan's infrastructure sector have limited capacity to address the environmental and social issues that arise during the construction and operation of transport infrastructure. Strengthening their institutional capacity to incorporate environmental and social consideration at the earliest planning stages and address issues as they arise would generate significant benefits to Pakistan's population. In addition, given that reforms in the spatial transformation and industrial sector will have country-wide effects, they will put a burden on Pakistan's environmental

¹⁸⁸ Details on the agrarian transformation taking place within Pakistan are given by Mahmood Hasan Khan, who has done extensive research on agriculture in Pakistan. See his "Lectures on agrarian transformation in Pakistan," available at <http://www.freepatentsonline.com/article/Lectures-in-Development-Economics/201617590.html> Accessed May 6, 2011. Kahn observes:

The historical role of agriculture in the process of development is well known. It provides surplus of output and manpower to initiate industrialization. Development is initially fuelled by increased agricultural productivity and the transfer of surplus for profits and capital accumulation. This is something that is well distilled from the history of almost all societies which have economically developed. It is equally valid today.

In analyzing the current situation in Pakistan, Kahn details the capital intensification that has led to be eviction or displacement by landlords of family farmers and sharecroppers. As he observes, "increasing numbers of these unattached workers are migrating from villages to towns or cities or even to the Middle East...."

management framework. Strengthening the institutional capacity of environmental agencies (particularly after the devolution of environmental responsibilities to the provincial governments as a result of the Eighteenth Constitutional Amendment) should be an utmost priority, particularly as evidence indicates that the environmental externalities of the freight transport sector are already significant.

The GoP should identify potential energy sources (both domestic and regional) that can be used to supply consistent power to the industrial sector. Indeed, the shortages in energy have hit the industrial sector the hardest. The GoP should urgently develop new sources of energy supply to cater to industry, particularly developing cleaner sources of energy as an alternative to its limited supply of gas sources, upgrading existing distribution networks, investing in thermal and hydel plants, utilizing coal as an alternative source of energy (as is done in India), and exploiting regional sources of energy, particularly gas from neighboring Iran.

Efficiently connect the cities and industrial clusters with one another via upgradation, extension, and rehabilitation of transport infrastructure. In regions such as Punjab, Sindh, and KP, spatially connective infrastructure, particularly inter-regional transport infrastructure, information, and communication services can help facilitate linkages between cities and important trade corridors. The planned rail and road infrastructure connecting Gwadar Port with northern Sindh is one example. Reforms and investments in the freight transport sector should therefore be developed in coordination with efforts to establish or strengthen industrial clusters in Pakistan. The synergies between the freight transport sector and an industrial policy that support the development of clusters would facilitate the structural and spatial transformations that Pakistan is undergoing and which could contribute significantly to the country's economic growth and poverty reduction goals.

Break down trade barriers and improve cross-border infrastructure to the major transport corridors and markets. A recent study found that trade between India and Pakistan would increase by 405 percent if political and territorial conflicts were resolved.¹⁸⁹ The strategic location of Gwadar should be exploited: Gwadar serves an important node for any Iran-Pakistan-India gas pipeline that could be developed, which could cross from Iran's Balochistan's province to Pakistan's. Importation of natural gas from Iran would address to some extent the energy concern, given that currently, natural gas demand in Pakistan has far exceed the available supply; there would still be a supply gap post 2015 even if indigenous gas reserves and planned projects in pipelines in Pakistan materialize.¹⁹⁰

In conjunction with efforts to improve cluster development, the GoP should improve skill- training and education levels of current and prospective workers to secure employment in the industrial sector in urban areas. This is particularly critical given that the SME sector currently suffers from a lack of access to skilled labor. Pakistan is rapidly urbanizing, and, reforms in trade and infrastructure are anticipated to contribute to this trend, particularly as investments and new employment opportunities will most likely materialize in urban areas. Evidence from around the world indicates that urbanization offers a number of benefits, but that low skills and education levels can offset these gains.

¹⁸⁹ Source: Naqvi, Zareen F., and Philip Schuler. 2007. *The Challenges and Potential of Pakistan-India Trade*. Washington, DC: World Bank. According to the WDR, 2009: "Important strides have been made in the past decade. In 2004, the two countries engaged in the "Composite Dialogue" on peace and security issues, including terrorism and drug trafficking, confidence-building, economic and commercial cooperation, and friendly exchanges in various fields. On a broader regional basis, the South Asian Association for Regional Cooperation is a forum to discuss development challenges, such as cooperation in energy production and water basin management."

¹⁹⁰ LUMS, 2011.

Table A2.3.5. Recommended Actions to Foster Sustainable Trade and Infrastructure in Pakistan

Action	Time Frame
Foster the adoption of new technologies and procedures that add value to the services provided by the trade and transport sector	Short Term
Modernize trucking fleet	Short Term
Strengthening the institutional capacity of infrastructure sector agencies and environmental agencies for environmental management	Short Term
Develop a comprehensive energy plan for the short, medium and long term	Short term
Redefine government role, move away from direct operation and towards an impartial apparatus that fosters and regulates private investments in trade infrastructure	Medium Term
Break down trade barriers with India	Medium Term
Improve transport infrastructure along trade corridors with China and Central Asia	Long term
Promote the integration of different modes of transportation, giving preference to railways over long distances	Long Term
Efficiently connect cities and industrial clusters with the rest of the economy and potential cross-border economies through road/rail rehabilitation and construction	Long term

CHAPTER 4. GREENING PAKISTAN'S INDUSTRIAL SECTOR: A NECESSARY CONDITION FOR MEETING PAKISTAN'S DEVELOPMENT GOALS

Pakistan's growth strategy for the economy, as outlined in the 2011 Framework for Economic Growth, calls for reinvigorating the industrial sector and increasing exports. Improved industrial environmental performance is essential if Pakistani firms are to be competitive in export markets like the EU in which business customers demand high environmental performance from their suppliers and often require certification to international standards, such as ISO 14,001. Pakistan is behind its competitors in export markets in terms of environmental management: compliance with international standards is low; moreover, a significant number of Pakistani firms are not even aware that Pakistan has environmental regulations that they are supposed to meet. It will be impossible for Pakistani firms to remain competitive and for Pakistan to meet its goals for expanding exports unless the firms and the GoP become much more proactive about enhancing industrial environmental performance.

The first two sections of this chapter provide analysis of the need for cleaner production: Section 1 of this chapter discusses the linkages between competitiveness in international markets and cleaner production; and Section 2 gives a brief overview of the current status of industrial environmental management in Pakistan. The remaining sections discuss policy options. Section 3 makes the case for regulatory reform, particularly revision of the NEQS; Section 4 outlines recommendations for the construction of common effluent treatment plants; Section 5 deals with the expansion of cleaner production centers; Section 6 is on institutional reforms, including the strengthening of federal and provincial environment departments; and Section 7 is on public disclosure, strengthening civil society and creating a demand for good environmental management. Section 8 summarizes the findings and recommendations.

4.1. The Linkages between Cleaner Production and Export Competitiveness

Improvements in industrial environmental management are needed if Pakistan is to realize gains in economic efficiency and competitiveness, especially in export markets. Competing in global markets increasingly requires addressing the strong linkages between environmental protection, sustainable use of natural resources, technological innovation and diffusion, and business competitiveness. Increasingly, firms and countries that provide potentially lucrative export markets for Pakistan are demanding that environment be considered in all aspects of a product's life cycle. In a number of cases, consumer demands have been reflected in both national policies and policies of major firms purchasing exports. Countries in the EU and elsewhere are placing restrictions on environmental dimensions¹⁹¹ of both domestically manufactured items and imports. In addition, a number of the large international business customers of Pakistani exporters are increasingly requiring their suppliers to create environmental management systems and have them approved by independent auditors so they can be certified to various standards (e.g., ISO 9,001 and ISO 14,001).

Although recent decades have seen an easing of most trade barriers, the gradual reduction of tariff barriers to facilitate trade has been accompanied by an increase in non-tariff barriers, which include a group of "technical barriers to trade (TBT)"; i.e., requirements imposed by governments to protect the health and safety of their citizens and the environment. As an example, one of many EU TBTs is the Directive on General Product Safety, which went into effect in the European Union on June 29, 1994. Article 2 of the directive defines producers as the manufacturer, the manufacturer's representatives or *any party in the*

¹⁹¹ Examples include Cosmetics Directives 2004; Waste Electrical and Electronic Equipment (WEEE) Directive 2005; Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) 2006; and Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) 2007.

supply chain whose activities affect the product's "safety properties." Therefore, a Pakistani firm exporting products posing potential consumer safety hazards to a business in the EU would be required to meet various requirements under the directive. An example is Article 4, which expressly requires manufacturers of products to warn of "significant" risks. The warning must identify the risk in a manner that will make the potential user or consumer aware of it. Individual EU countries may also require that manufacturers include certain on-product warnings.

As an example of some of the difficulties faced by exporters, during the period between August 2000 and July 2001, 896 Pakistani food products were prohibited from entering the US because they failed the US Food and Drug Administration's (FDA) sanitary and phytosanitary inspections. Broadly speaking, the reasons for rejections concerned filth and microbiological contamination; a number of products were rejected because of the presence of unsafe food additives and heavy metals. There were also challenges with meeting labeling requirements.¹⁹² In a more recent example, based on a 2011 analysis of the US FDA's Important Refusal Reports (IRRs, which are published monthly on the agency's website), surgical equipment from Pakistan has been refused entry into the United States because production did not conform with applicable requirements. As another example, for the month of March 2009, Pakistani products received 17 IRRs, with 16 of them being issued to surgical instruments that were banned for non-compliance to appropriate manufacturing processes.¹⁹³

In addition to these government-regulatory barriers, Pakistan also faces the challenge of complying with the increasing proliferation of voluntary industry standards imposed on input suppliers: failure to comply with standards may exclude exporters from trading with business customers that require compliance by suppliers.

Many multinational corporations, including those that have subsidiaries in Pakistan as well as those that purchase from Pakistani suppliers, are tackling the challenge of greening their supply chains. Several firms have issued sustainability focused supply chain related announcements during the past few years. Of particular relevance to Pakistan, green supply chain commitments have also been made by H&M, Adidas, Nike and other multinationals supplied by Pakistani exporters. These sustainable sourcing and green supply chain policies will likely include supplier monitoring and verification. A number of multinationals have made commitments to greening even the lower levels of the supply chain, which has led them to require that "first-tier suppliers" monitor the environmental compliance of their suppliers "in order to maintain their own green status."¹⁹⁴

Under green supply chain initiatives, firms require their suppliers to meet certain environmental performance standards and, in many cases, require monitoring and verification by means of either the supplier's internal audits or independent external audits conducted by the purchaser or designated third party auditors. These green supply chain requirements are particularly significant for Pakistan, given the country's ambitions to increase exports significantly. As these green supply chain initiatives mature, Pakistani suppliers will have to meet them or risk losing their international customers. As the

¹⁹² Chaturvedi, S. and Nagpal, G. 2003. WTO and Product Related Environmental Standards: Emerging Issues and Policy Options. EPW special article. Available at <http://www.ppl.nl/bibliographies/wto/files/5627.pdf>. Accessed November 13, 2011.

¹⁹³ Food and Drug Administration. 2009. Refusal Actions by FDA as Recorded by OASIS for Pakistan, March 2009, Available from http://www.accessdata.fda.gov/scripts/importrefusals/ir_selection.cfm?DYear=2009&DMonth=3&CountryCode=PK Accessed November 9, 2011

¹⁹⁴ Jun, M. et al., 2010. Greening Supply Chains in China: Practical Lessons from China-based Suppliers in Achieving Environmental Performance," WRI Working Paper, World Resources Institute, Washington, DC. P. 19.

multinational business customers move down the supply chain to second-tier suppliers, the reach of these requirements will extend further to Pakistani firms that do not export themselves, but sell their products to exporters.

Box A2.4.1. Cleaner Production and Improved Productivity¹⁹⁵

Pakistan must pursue cleaner production in order to meet the demands of its export partners, but empirical evidence demonstrates that cleaner production is also likely to increase Pakistan's export competitiveness by lowering costs and improving productivity. One reason that many multinationals are pursuing green supply chain management is because of a growing body of evidence that green production improves efficiency and synergy among business partners and their lead corporations, and helps to enhance environmental performance, minimize waste and achieve cost savings and marketing exposure. Also, a growing body of empirical literature concludes that improved environmental performance enhances financial performance (e.g. Porter and van der Linde, 1995; Hart, 1995). Cohen et al. (1995), for example, demonstrate a strong correlation between environmental performance and firm profitability. Russo and Fouts (1997) in their study of 243 firms, find that environmental performance and return on assets are positively linked, and that returns to environmental performance are higher for high-growth industries. Nehrt (1996) analyzes the relationship between the intensity of investment in pollution prevention and timing on firm profit growth in a sample of 50 pulp and paper firms. His findings confirm a positive relationship between early movers in pollution prevention and profit growth.

A study by Rao and Holt (2005) conducted in South East Asia empirically confirmed that there is a significant correlation between greening the supply chain and the competitiveness and economic performance of the firms involved. This research provides a theoretical basis and an empirical analysis to investigate the link between green supply chain management and economic performance. For this study, a conceptual model was developed from literature sources and data from a sample of ISO 14001 certified firms in South East Asia was collected using a structured questionnaire. A linear structural equation modeling approach was used to determine if there was any causal relationship between greening different phases of the supply chain, competitiveness, and economic performance. The findings reveal that greening production significantly leads to greening operations, which enhances competitiveness and economic performance of firms, as a result of savings in raw material and energy and water usage.

Many of these firms require that their suppliers abide by international standards such as those issued by ISO. Of all the ISO standards, the two of greatest relevance are ISO 9,001 (from the ISO 9,000 series of *quality* management system standards) and ISO 14,001 (from the ISO 14,000 series of *environmental* management system standards). ISO 9,001 and ISO 14,001 contain specific requirements for a management system, against which an organization's system can be "certified." When an organization's quality (or environmental) management system is said to be certified, it means the requirements of the standard have been met by the organization's system, as verified by external audits conducted by an accredited "certification" (or "registration") body. Of the two standards, ISO 9,001 is older and has been adopted by many more organizations. ISO 9,001 and ISO 14,001 are different from the vast majority of ISO standards, which are specific to a particular product, material, or process. In contrast, ISO 9,001 and ISO 14,001 are generic standards; i.e., they can be applied to any organization, regardless of organizational size and whatever its product or service, in any sector of activity.¹⁹⁶

¹⁹⁵ Rao, P. and Holt, D. 2005. Do Green Supply Chains Lead to Competitiveness and Economic performance? *International Journal of Operations & Production Management*, Vol. 25, No., 9 pp. 898-916. Porter, M. and van der Linde, C. 1995. Green and competitive: Ending the stalemate. *Harvard Business Review*, 73: 120-134. Hart, S. 1995. A natural-resource-based view of the firm. *Academy of Management Review*, 20: 986-1014. Cohen, M., Fenn, S., and Naimon, J. 1995. *Environmental and financial performance*. Washington: IRRC as cited in Rao, P. and Holt, D. 2005.

¹⁹⁶ This sentence is based on material on the ISO website, http://www.iso.org/iso/about/discover-iso_what-different-about-iso-9001-and-iso-14001.htm Accessed August 23, 2011.

Using data from the ISO 2006 Survey, Clougherty and Grajek¹⁹⁷ showed that Pakistan ranked 73rd out of 91 countries in terms of number of ISO 9,001 certifications per million inhabitants. The total number of certifications was only 2013.¹⁹⁸ Throughout the world, the number of certifications for ISO 14,001 is lower than those for ISO 9,001, but in Pakistan the numbers are *much* lower (Table A2.4.1). In December 2008, there were about 189,000 firms certified to ISO 14,001 worldwide compared to about 983,000 certified to ISO 9,001. The ratio of ISO 14,001 certifications to ISO 9,001 certifications worldwide is about 0.19. The ratio of ISO 14,001 certifications to ISO 9,001 certifications in Pakistan was 200/2268, which is about 0.09, less than half the ratio based on global statistics.

Table A2.4.1. ISO 9,001 and 14,001 Certified Organizations in Pakistan

ISO Standard	2005	2006	2007	2008
ISO-9,001	2013	2291	2580	2268
ISO-14,001	59	77	115	200

Source: ISO Surveys of Certification

In summary, as increasing numbers of firms take steps to green their supply chains. Pakistani firms engaged in exports will need to improve their environmental performance in ways called for by their business customers and governments of countries receiving their exports or run the risk of losing key buyers. If the response of Pakistani firms to ISO-14001 is an indicator of performance, it is clear that firms in Pakistan will have to take far more proactive positions just to keep up with their export competitors from other countries.

4.2. Current Status of Industrial Environmental Management in Pakistan

A key element of the development challenge facing Pakistan concerns the need to capture all of the advantages of economic expansion without sacrificing notable shares of GDP to environmental externalities. A number of World Bank analyses have found that environmental degradation in Pakistan amounts to *at least* 6% of GDP.¹⁹⁹ If the economy grows at the expense of the environment, GDP figures will be artificially inflated by a host of adverse side effects, such as morbidity and mortality effects of air and water pollution. A 2008 World Bank study estimated that the total cost of the effects of environmental risk factors on Pakistan’s economy and populace is about 9% of GDP. A 2011 World Bank study estimated that in the province of Sindh, environmental degradation, including both natural resource degradation and the effects of pollution on human health, had a cost equivalent to 15% of the province’s GDP. These figures reflect direct and indirect costs linked to different aspects of environmental

¹⁹⁷ Clougherty, J.A. and Grajek, M. 2007. International Standards and International Trade: Empirical Evidence from ISO 9000 Diffusion, unpublished.

¹⁹⁸ Malik and Zhuang report a somewhat higher number. “Information gathered from 4 major ISO certification bodies in Pakistan shows figures of ISO 9000 clients around 2293 in December 2005. Malik, S. A. and Zhuang, T. 2006. ISO Certification: The Trend and Scope from Pakistani Industry’s Perspective, IEEE International Conference on [Management of Innovation and Technology, 21-23 June 2006, Singapore.](#)

¹⁹⁹ World Bank, 2006a, Pakistan Strategic Country Environmental Assessment, Volume I: Main Report Report No. 36946-PK, World Bank, Washington, DC, p. i.

World Bank. 2008. Environmental Health and Child survival, Epidemiology, Economics, Experiences. Washington, DC

Larsen, and Strukova. Sindh Cost of Environmental Degradation. Consulting report commissioned by the World Bank. Washington DC.

degradation, such as water pollution, forest degradation, agricultural soil salinity and erosion, and lead exposure, among others. Industrial activities figure prominently in this estimate.

Industrial activities, particularly those using fossil fuels, are a significant source of air pollution. Outdoor air pollution is most severe in urban areas, where the concentrations of industrial activity, vehicles, and other sources of air pollution are the highest in Pakistan, and contribute with pollutant concentrations significantly exceeding World Health Organization (WHO) guidelines²⁰⁰. In Pakistan, more than 35 percent of the population lives in urban areas, most of them in cities of more than 1 million inhabitants. The industrial sector in Pakistan generates significant environmental pollution that is reducing the quality of life including a significant percentage of fine and ultrafine percent of particulate matter (PM)_{2.5}. Given that air pollution, particularly from PM_{2.5}, has been linked with negative health effects, there is a need to implement interventions aimed at improving urban air quality as part of Pakistan's development agenda.²⁰¹

As examples of industries' contributions to air pollution, tanneries, textiles, pharmaceutical, paper, cement, fertilizer, and sugar mill industries use furnace oil that is high in sulfur content and generates significant amounts of air pollutants, including fine and ultrafine particle emissions. For leather production, concentrations of particulate matter emissions are high due to dust emissions from shaving and buffing machines. Particulate matter containing fly ash and unburned bagasse particles found in the boilers' flue gases are the major issues in most of the sugar mills. Inefficient boilers and generators generate particulate matter and sulfur and nitrogen oxides. Pulp and paper mills are major sources of air pollutants. The main sources of the air pollutants in paper processing factories included boilers and continuous digester blow tanks.²⁰² A wide range of small to medium scale industries (including brick kilns, steel re-rolling, steel recycling, and plastic molding) cause a disproportionate share of pollution through their use of dirty "waste" fuels, such as old tires, paper, wood, and textile waste. Although data are limited, sporadic monitoring of air pollutants in industrial areas in Pakistan suggests that international standards for fine and ultrafine particulate matter and sulfur and nitrogen oxides are frequently exceeded.

Industrial activity also generates surface and groundwater contamination. The industrial activity present in Sialkot serves as an example. The surface and groundwater of Sialkot has been degraded due to rapid industrialization along with urbanization and agricultural activities in its surroundings areas.²⁰³ Major industries in Sialkot include textiles, surgical instruments, tanneries, beverages, diesel engines, drugs and pharmaceuticals, iron and steel rolling mills. More than 264 tanneries, 244 leather and garment manufacturing units, 900 leather sports good manufacturing units, 14 flour mills, and 57 rice husking units operate in Sialkot. Most of these industries are scattered in and around the city. All the industrial units consume large amount of water which, together with dissolved toxic substances (including heavy metals), is discharged after processing into nearby ponds, agricultural lands, rivers, streams, open ditches and open land. Discharge of effluents from tanneries was found to be roughly 1.1 million liters per day.²⁰⁴ Toxic effluents have implications for water supply safety as they seep into the soil and contaminate aquifers and pollute potable water supplies. Contamination of groundwater due to heavy metals is one of the most serious concerns that have received attention at regional, local and global levels because of their impacts on public health and ecosystems. Industrial pollution in Sialkot affects the quality of

²⁰⁰ World Bank, 2008, p. 168.

²⁰¹ Colbeck, 2010; Ghauri, 2010; Ilyas, 2007.

²⁰² Khan, 2010.

²⁰³ Qadir A, Malik RN, Hussain SZ (2008) Spatio-temporal variations in water quality of Nullah Aik-tributary of the river Chenab, Pakistan. *Environmental Monitoring and Assessment*, 140: 43-59.

²⁰⁴ Khan A.U (2011). *Industrial Environmental Management in Pakistan*. Consulting Report commissioned by the World Bank. Lahore. Pakistan.

groundwater.²⁰⁵ Research results revealed that by 2005 and 2006, the groundwater in 57 percent of the total sites sampled had high levels of lead (Pb) and other heavy metals, which exceeded the WHO and PSQCA permissible limits. The concentration of lead was found between 0.11 -0.81 mg/L in all zones, which exceeded the WHO and PSQCA guidelines of 0.01 mg/L. Lead is a serious cumulative body poison that can cause chronic health effects such as blood disorders, including hypertension, brain and nerve damage, kidney damage, and digestive problems.²⁰⁶ The study emphasized the need to reduce heavy metals contamination caused by industrial activities in order to reduce human morbidity and mortality through adequate regulations and pollution control laws, mainstreaming of environmental considerations into industrial production processes, and proper management of waste.²⁰⁷

Industrial activities have been associated with increases in lead poisoning, one of the most significant environmental health threats affecting children in Pakistan. Even low levels of lead exposure are associated with impairment of childhood cognitive function and abnormal infant behavior.²⁰⁸ The US Center for Disease Control and Prevention states that a blood lead level (BLL) of 10 µg/dL or greater is a cause for concern for health. However, several studies have recently documented neuropsychological effects in terms of IQ losses in children under five years of age with BLL *below* 10 µg/dL.²⁰⁹ A study by Khan et al (2011) found that in areas located near industries in Punjab, 30 percent of children had BLL >10 µg/dL. The same study found that the mean BLL (µg/dL) for children between the ages 1-6 located 30 km from industries in Punjab was 10.9. A study of children living around automobile and battery repair workshops in Lahore found an average BLL of 10.9 µg/dL in children 1-4 years of age, with 52 percent of children with BLL >10 µg/dL.²¹⁰ A study in Punjab found an average BLL of 9.0 µg/dL among children 1-6 years of age living near smelters/battery recycling plant industries in Wah/Gujranwala and 6.5 µg/dL among children living 30 km from the industrial areas.²¹¹ In light of the above studies the average BLL in children under five years of age today is roughly estimated to be 7-8 µg/dL in cities. For BLLs > 10 µg/dL, Lanphear et al (2005) report an incremental IQ decrement of 1.9 (0.19 per 1 µg/dL) over the range of 10-20 µg/dL and a decrement of 1.1 (0.11 per 1 µg/dL) over the range of 20-30 µg/dL for concurrent BLLs. Total yearly losses of IQ-points in children under five years in Sindh are estimated in the range of 1.7 - 4.9 million, with a mid-point estimate of 3.1 million. Various studies find that a decline of one IQ point is associated with a 1.3-2.0 percent decline in lifetime income.²¹²

A lack of consideration to worker safety and health in industries is a factor that not only contributes to poor human health, but also limits firm's worker productivity and output levels. The textile processing sector is one of the most important sectors of the textile industry of Pakistan in regards to production, exports, and labor employment.²¹³ An analysis of health impacts of working in the weaving industry in Pakistan that sampled 100 units in Faisalabad found that in general, workers did not wear safety equipment-- such as facemasks, earplugs, or gloves. None of the facilities provided face masks to

²⁰⁵ Ullah et al (2009)

²⁰⁶ SDWF (2003). Drinking Water Quality and Health. Safe Drinking Water Foundation. Retrieved on December 9, 2011 from [http://www.safewater.org/members/teachers/water %20 and %20 health.com](http://www.safewater.org/members/teachers/water%20and%20health.com).

²⁰⁷ Ullah et al. 2009

²⁰⁸ AL Mendelsohn, BP Dreyer, AH Fierman, CM Rosen, LA Legano, HA Kruger, et al., et al. Low-level lead exposure and cognitive development in early childhood. *J Dev Behav Pediatr* 1999; 20: 425-31.

²⁰⁹ IQ losses associated with BLLs > 10 µg/dL have been established long ago.

²¹⁰ Ahmad et al, 2009.

²¹¹ Khan et al 2011; Khan et al 2010.

²¹² The high bound reflects the estimated loss in income for males and females in Salkever (1995), weighted by the labor force participation rates of males and females in Sindh province reported by FBS (2010). The low and high bounds do not include the effect of IQ on labor force participation rate.

²¹³ Anjum, A., A.A. Mann and M.A. Anjum, 2009. Health concerns among workers in weaving industry: a case study of tehsil Faialabad, Pakistan. *J. Agric. Soc. Sci.*, 5: 106-108

employees, which are crucial in providing protection to workers from cotton dust (6% of the workers sampled were suffering from tuberculosis).²¹⁴²¹⁵ A less-polluted workplace is expected to decrease labor costs due to a reduction in the costs of illness, employee absenteeism, turnovers and recruitment.²¹⁶ A healthier environment will thus increase worker productivity.²¹⁷

While agglomeration economies can generate significant economic benefits, they can also result in congestion and air pollution, among other public “bads.” Industries tend to agglomerate in a few geographic locations where there is availability of specialized labor, inter-industry spillovers, higher road density, local transfer of knowledge, and access to international supplier and buyer networks. These factors enhance firm competitiveness and largely explain the clustering of large-scale manufacturing and high employment levels around the metropolitan areas of Lahore and Karachi. Unless appropriate remedies are implemented to reduce air and water pollution through pollution prevention and control efforts, pollution as a result of industrial activity will continue to disproportionately affect the health and productivity of poor people in Pakistan. Despite the strong evidence indicating an urgent need to improve urban air quality in Pakistan, the issue has received little attention and is yet to be included as a priority in the country’s policy agenda. Given the already severe damages caused by air pollution and the possibility that environmental conditions might worsen as a result of growing industrialization and urbanization, the GoP might consider adopting priority interventions in the short term and building the institutional and technical capacity to adopt additional measures over the medium and long term.

Pollution standards for Pakistan’s industries are set forth by the National Environment Quality Standards (NEQS). These standards, which set limits on a wide variety of pollutants, are enforced by the provincial environmental protection agencies (EPAs). However, these agencies are largely incapable—due to a lack of funding and staff—of meeting their regulatory responsibilities and are unable to enforce mandatory compliance with the NEQS. Hence, firms either comply on a voluntary basis or not at all. Amongst firms, NEQS compliance is low; many firms don’t understand the NEQS requirements or are completely unaware of them.

4.2.1. Environmental Management Agencies

As of early 2012, Pakistan’s apex environmental organization is the Ministry of Climate Change (MCC). This Ministry has authority over the Pakistan Environmental Protection Agency (Pak-EPA) and has policy-making and planning functions as they relate to environment. While the Ministry is a policy-setting body, the Pakistan EPA is a federal regulatory agency tasked with enforcing Pakistan’s environmental regulatory framework. The exact responsibilities and powers of the MCC and Pak-EPA have yet to be worked out, as these bodies are taking up the portfolio of the Ministry of Environment, which was abolished in May 2011 under a decentralization scheme mandated by the 18th Amendment to the Constitution of Pakistan (whose intent was to return many federal powers to the control of the provinces).

Each of the four provinces possesses a provincial EPA, which is tasked with numerous responsibilities for implementing environmental programs. Provincial EPAs have the authority to handle environmental

²¹⁴ Anjum, A., A.A. Mann and M.A. Anjum, 2009. Health concerns among workers in weaving industry: a case study of tehsil Faialabad, Pakistan. *J. Agric. Soc. Sci.*, 5: 106–108

²¹⁵ Ambec and Paul Lanoie (2007). *op. cit.*, p. 28

²¹⁶ Anjum, A., A.A. Mann and M.A. Anjum, 2009. Health concerns among workers in weaving industry: a case study of tehsil Faialabad, Pakistan. *J. Agric. Soc. Sci.*, 5: 106–108

²¹⁷ P. De Backer. (1999), “L’impact économique et l’efficacité environnementale de la certification ISO 14001/EMAS des entreprises industrielles. Consulting report at ADEME as cited in Ambec and Paul Lanoie (2007), *op. cit.*, p. 28

management tasks in their respective provinces (e.g., implementing rules and regulations of the Pakistan Environmental Protection Act--PEPA, 1997). With the possible exception of reviewing few environmental assessment documents for large projects being undertaken within the province, these agencies do not have the capacity to devote systematic attention to their regulatory responsibilities.

Pakistan has other government agencies with environmental responsibilities, including: the Planning Commission, the Ministry of Industries(MoI), and the Ministry of Finance. Pakistan's Planning Commission contains an environment section, comprised of a Chief and Deputy Chief, under the Member, Infrastructure. The primary function of the environment section is to incorporate environmental concerns into national development policies. Similarly, all four provinces have an environment section in their Planning and Development Department. The aim of these departments is to incorporate environmental concerns into the overarching development policy of the province and ensure that environmental concerns are reflected in the schemes and projects that the province is developing. MoI is responsible for regulating the types of vehicles that can be imported, potentially constraining imports of high-polluting vehicles from entry to Pakistan. The Ministry is also responsible for measures aimed at modernizing the fleet of public service vehicles and scrapping older vehicles. The Ministry of Finance is partially responsible for fuel pricing and subsidies.

Given the shifting lines of authority as a result of devolution and the abolishment of the Ministry of Environment, this weak institutional climate has the potential to harm Pakistan's performance on transboundary issues, such as the ongoing international effort to address global climate change. It is possible that uncertainty could harm efforts to mainstream sustainability into the industrial sector by creating an unstable regulatory environment where firms cannot effectively invest for the future as they are not certain where Pakistan will stand on environmental issues, treaties and regulations.

4.2.2. Cleaner Production Centers

Cleaner Production (CP) initiatives in Pakistan have involved numerous actors, as well as three cleaner production centers that are leaders in this field. In Pakistan, the approach used to encourage firms to adopt CP practices centers largely on providing high levels of technical assistance funded by international donors. Cleaner Production initiatives have been undertaken in the past fifteen years in Pakistan, primarily focusing on assessment of needs, energy audits, provision of technical assistance to industry in adopting CP measure, and raising awareness of CP. However, the technical assistance programs have operated without an overall national strategy or plan. While the technical assistance initiatives represent a good start, the challenge faced in Pakistan (and many other countries) is to change the long-term behavior of not just a few demonstration firms or a few hundred firms served by CP centers, but of the much larger number of company owners and managers in the many industrial firms that have significant waste discharges.

Information diffusion is an important strategy for successful CP implementation in the short-term. The approach with the greatest short-term potential for moving CP forward involves the diffusion of information to allow firms to learn of economically-efficient CP options and how they can save money, enhance profitability and burnish their reputations as "environmentally friendly" enterprises. Firms are more likely to be motivated to adopt CP measures when they understand the available options and their technical feasibility and when they discover that adoption can lead to reduced costs, enhanced profitability and larger opportunities for marketing and sales. As the evidence below will show, Pakistani firms are more inclined to adopt CP measures when they have the information and training needed to discover that it is in their self interest to incorporate CP practices into routine operations.

Each of Pakistan’s three CP centers has the capacity to educate and incentivize firms they serve to adopt CP practices. In particular:

- The Cleaner Production Centre (CPC) is based in Sialkot and is highly focused on leather tanneries in one geographic area (Sialkot). To date it has only worked in the leather sector in Sialkot and much of its work has been with SMEs. It was started using funds provided by GoP and bilateral aid from Norway and its continuing operation depends on securing funding from donors and/or the government.
- The Cleaner Production Institute (CPI), with offices in Lahore, Faisalabad and Karachi, serves several industrial sub-sectors, particularly leather, textile processing, sugar and pulp and paper. The CP projects it recommends are often executed by consultants, particularly the National Environmental Consulting Pvt., a private for-profit firm that is legally independent of CPI. It was started using funds provided by the Embassy of the Kingdom of the Netherlands and has had long term relationships with the Embassy. CPI continues to rely on donor funding.
- The National Cleaner Production Centre-Foundation (NCPC-F), located at the Attock refinery in Rawalapindi, focuses on providing CP support to the oil and gas sub-sector and, to a lesser extent, to other sectors. It has the broadest geographical coverage of the three centers and operates primarily in Punjab and Sindh. Unlike the other two CP centers, NCPC-F is not dependent on donor or government funding. Although it was initially started with money from two UN organizations (UNEP and UNIDO), since 2005, it has been financially self sufficient as a result of revenues generated by the sale of environmental services (e.g., monitoring of industrial waste discharges, and the preparation of environmental impact assessments and energy audits).

Table A2.4.2. Institutional Arrangements for the Three CP Centers

Center/Arrangement	CPC	CPI	NCPC-F
Date Established	1999	2004	1998
Degree of independence	Subsidiary of Pakistan Gloves Manufacturers and Exporters Association	Fully independent	Fully independent
Legal status	Ministry of Commerce	Registered private company	Registered private company
Host institution	Pakistan Gloves Manufactures and Exporters Association	Collaborates with four industrial associations	Ministry/ public entity

Studies conducted in the course of this NLTA found that there were significant reductions in both pollution discharges and production costs as a result of implementation of CP measures. For example, in textile processing mills, BOD₅ levels decreased substantially (i.e., from more than 1700 mg/l down to 80 mg/l) after CP measures were implemented. Moreover, as the figures below for the textiles processing sector illustrate, cost savings were often significant.

- Lahore: Cost for installation of Caustic Recovery Plant was PKR 3.8 million, and it resulted in savings in one firm of up to PKR 1.5 million per month.
- Faisalabad: Cost for implementing CP measures was PKR 9 million and resulting energy savings were PKR 27 million per year.
- Karachi: The cost for installation of three OGDEN pumps for condensate recovery was PKR 6.5 million for each pump. And, the capacity to recover condensate was at the rate of 6500 kg/hr by each pump, which yielded large savings compared to investment.

As another example, Attock Refinery Limited achieved significant savings as a result of implementing CP measures during 2007-08. By optimizing steam production, it reduced furnace oil consumption by nearly 10 million lb/year. In addition, CO₂ emissions were reduced by 23.1 metric tons after the installation of solar water heaters. ARL was able to recycle and reuse roughly 10 million gallons of its effluent water (3-4 percent) after implementing energy conservation and efficiency improvement measures. The key factors that influenced ARL to implement CP included: improving the environment, achieving cost savings, and increasing competitiveness.

Although exceptions certainly exist, the NLTA's analytical work, including interviews of survey respondents, made it clear that owners and managers of SMEs were often not highly knowledgeable of environmental issues. They often were not aware of relationships between CP and product quality or improved competitiveness, and they typically faced virtually no pressure to meet environmental regulations because often there was no pressure. Indeed, many of the SMEs were unaware that NEQS even existed and a number of SMEs had never had any contact with an EPA staff member. In contrast, the large firms (i.e., greater than 250 employees) had more highly educated owners, managers and staff. Many of the large firms had an understanding of the explicit links between CP, EMS and ISO 14001, potential cost savings, possible reduced costs in meeting NEQS, and potential improvements in competitiveness. In addition, large firms typically had had some contact with EPAs and they, at the least, knew about NEQS.

Regardless of firm size and sector, the survey data clearly indicate that the CP centers served as the primary source of information on CP for the vast majority of surveyed firms. Of the 77 surveyed firms that responded to relevant questions, 77.5 percent indicated that a CP center was instrumental in providing information on CP measures that firms could adapt to cut pollution and save money. That is not to say that other organizations did not play a role. Indeed, there was occasional mention in the survey responses of the importance of industry associations in assisting with the identification and implementation of CP measures. On a few occasions, there was also mention of a firm's in-house expertise. That said, there is little question that the CP centers have played a critical role in providing firms with the information they needed to implement CP measures.

4.2.3. Environmental Performance

Several studies have found that NEQS compliance is low.²¹⁸ The poor budget and staff situation of the provincial EPAs means that they lack the ability to monitor discharges, enforce regulations, and effectively force polluters to pay for the cost of mitigating their emissions.²¹⁹ As such, NEQS compliance can only be expected on a voluntary basis, but many firms feel that Pakistan's environmental standards are complicated and unduly onerous. The situation is complicated because ISO 14,001 certification requires that firms have plans for continual improvement in environmental management, including plans to eventually meet the NEQS. As such, the current NEQS form a barrier to increasing Pakistan's export competitiveness by introducing cleaner production systems.

Many enterprises have indicated an interest in meeting the NEQS but feel stymied because compliance with the standards appears to be well beyond their reach under current circumstances. One of the difficulties is that the regulated firms feel they cannot afford to construct the effluent treatment facilities, typically involving secondary treatment, required to meet the NEQS. Also, treatment plant construction is

²¹⁸ Azizullah, A. et al., 2011, Water pollution in Pakistan and its impact on public health — A Review. *Environment International*, 37 (2): 479-497.

²¹⁹ Luken, R.A. 2009. Industrial Environmental Management in Pakistan. Consulting report commissioned by the World Bank under this NLTA. Washington. D.C.

often infeasible because of constraints on available land area. These unattainable NEQS requirements discourage many firms from trying to comply even as the weak regulatory enforcement reduces the motivation to comply.

Given the large number of point sources of pollution and the limited resources devoted to environmental protection in Pakistan, it would be difficult to implement the NEQS without cooperation and support from firms. However, obtaining such support requires having discharge standards that are realistically attainable and applied uniformly to firms in similar circumstances. Gaining the support of firms also requires uniform and consistent enforcement. Firms need to know that enforcement will be evenhanded to ensure a “level playing field” in the sense that similar firms are treated by environmental authorities in the same way in terms of compliance inspections, penalties, and so forth.

When firms were polled about their compliance with NEQS, the extent of noncompliance was striking: 54 of 57 firms failed to satisfy the NEQS. None of the 42 SMEs satisfied the standards. While the compliance results for large firms were better in relative terms, they were nonetheless poor. Only 3 of the 15 large firms were in compliance. All three of these firms were engaged in exports and the one firm that elaborated on the response indicated that the motivation to comply with NEQS were “international customer demands” and “increased competitiveness.”

A number of reasons were given for the lack of compliance with NEQS by firms that were aware of the standards but out of compliance, and by far the most common was the inability to afford construction of a secondary wastewater treatment plant needed for compliance. By far, the most common rationale for the failure to comply is summarized by this representative comment from one respondent:

Installation of water treatment plant is required, it is expensive and also considered a dead investment as we also have to spend to operate it and do not get any revenues. Moreover it requires space for its installation that we do not have.

A number of firms mentioned the need for the construction of “combined effluent treatment plants” (CETPs). Respondents making this argument varied in their terminology with some using CETPs to refer to “centralized” or “common” effluent treatment plants. It was typically inferred that these facilities, which would treat industrial wastewater from multiple sources, should be built and operated by others (e.g., the government, or managers of an industrial cluster, or an industrial association), with fees paid by users, presumably based on the volume and strength of their wastes. Another reason mentioned for non-compliance was the unrealistic nature of the NEQS. Some responders said the standards were excessively stringent, especially given conditions in Pakistan. For example, some firms said the standards for biochemical oxygen demand and chemical oxygen demand were too rigorous; they had constructed primary treatment plants but could not meet the standards for these parameters and they could not afford to build secondary treatment plants.

A number of firms mentioned that they would be able to meet the NEQS if CETPs were constructed for their clusters. Some of the surveyed firms were served by the CETP at Korangi and it was cited by several respondents as an example of what is possible. The CETP for the leather tannery cluster at the Korangi Industrial Area (Karachi) provides treatment of the wastewater from 130 tanneries that is adequate for meeting the NEQS, but the Korangi industrial estate is huge, housing more than 2000 firms from different sectors. Wastewater from most firms in the industrial estate discharge untreated wastewater.²²⁰ Moreover, while the Korangi CETP was built for tanneries, not all of the tanneries are using the facility. More

²²⁰ Personal communication in 2009 between Ralph Luken, World Bank consultant, and the general manager, environmental engineering division, NEC Consultants (Southern zone) concerning the CETP at Korangi.

generally, a challenge in using CETPs is not only getting the plants built and operated, but also getting all firms in a cluster to connect.

Another constraint on the adoption of cleaner production solutions is the lack of access to finance. As discussed in Chapter 2, SMEs, in particular, suffer from an enabling environment that hampers their ability to borrow money for capital improvements. In the case of investments for cleaner production, the situation might improve as a result of IFC technical assistance to identify opportunities for integrating sustainability criteria into the assessment of credit risks and to differentiate borrowers based on their environmental liabilities and the risk of repayment default due to plant closure or other factors associated with environmental performance. These new techniques might decrease the barriers to making loans for cleaner production opportunities by allowing financial institutions to more accurately estimate the benefits—in terms of reduced risk and more efficient production—of cleaner production techniques.

4.3. The Need for Regulatory Reform

A central element of the strategy recommended herein builds upon the self-interest of firms to improve their competitive positions and decrease their costs by adopting economically efficient CP approaches and becoming certified to ISO 14,001. However, certification requires progress toward meeting the NEQS, something that represents a major obstacle for many firms, particularly SMEs. Pakistani firms engaged in exports are likely to feel continuing pressure to improve their environmental performance from foreign business customs and government regulations in countries targeted for exports; failure to enhance environmental performance will cause these firms to risk losing export business. As a way to improve the performance of all firms, not just exporters, it is recommended that the NEQS be revised to reflect ground-level realities while giving top priority to requirements that protect human health and avoid major environmental damage; this will make it possible for more firms to attain compliance and ISO 14,001 certification.

In order to make it possible for firms to satisfy NEQS requirements, two sets of actions should be undertaken: revision of the NEQS and construction and effective operation of CETPs. While construction of CETPs would make it possible for many firms in clusters to comply with fairly rigorous standards, it will take time to organize the financing and construction of CETPs. In the meantime, a relaxed set of interim NEQS should be promulgated and applied for a period of several years. These interim NEQS standards, which can better reflect on-the-ground conditions in Pakistan, should maintain stringent levels for pollution parameters affecting human health. Large firms that are far from industrial clusters should be in a position to construct their own wastewater treatment works, but SMEs will need to rely on CETPs.

Revision of the NEQS can be accomplished by creating the equivalent of the Shamslakha Committee of the late 1990s.²²¹ This committee included experts and stakeholders, and did its work by consulting extensively with representatives of enterprises, industry associations, NGOs and the public sector. The new standard setting committee should be charged with determining *interim* NEQS that are realistic for firms to meet while the process of building new CETPs is underway. In addition, the committee should also determine the number of years for which interim standards are to apply, and it should also determine the permanent NEQS that will hold after this interim period. By proceeding in this way, firms will be able to comply with the interim NEQS and therefore enhance their chances of having their environmental management systems become certified by ISO 14,001. By having the committee also determine permanent standards, designers of CETPs will have the information they need (i.e., the permanent NEQS,

²²¹ The NEQS created by the Shamslakha Committee of the late 1990s were not effectively implemented because of the political upheavals in the early 2000's, the period immediately following the Committee's work.

as opposed to the interim NEQS) to ensure that the CETPs meet the permanent standards. Although provincial EPAs will not be well positioned to enforce the interim NEQS in the short term, firms who are motivated to enhance their export competitiveness should be able to meet the interim standards, thereby satisfying the green supply chain management requirements of multinationals for acceptable environmental performance and certification by ISO 14,001. In developing interim standards, top priority should be given to setting pollution limits at levels that protect and maintain human health. Priority should also be given to maintaining standards at levels to avoid notable nuisance conditions and prevent damage to important ecosystems. The permanent NEQS can be more rigorous and protect both human and environmental health in the broadest sense.

4.4. Building Common Effluent Treatment Plants

Numerous coordination and logistical problems hamper the building of CETPs, but they remain the only cost-effective way for small and medium enterprises to control their effluent emissions. In two cases, plans for new CETPs were shelved because firms could not agree on cost sharing arrangements. These problems will need to be sorted out if there is to be progress on building and operating CETPs. There are only 50 to 100 effluent treatment plants in Pakistan and there are over 8,000 firms with significant pollution loads. Additionally, there are no CETPs that are completely effective in treating the industrial discharges from the 10 to 20 existing major industrial estates (many other estates have been planned and are in various stages of implementation). The only two CETPs (located in Kasur and Korangi that treat tannery discharge) suffer from major operational issues because of uncertainties regarding who pays for pollution abatement costs.²²²

By definition, a CETP can accommodate wastewaters originating from multiple sources. CETPs can be owned and operated by a public body, an industrial association, a commercial venture, or a public-private partnership. Cleaner production methods and CETPs complement each other in the following sense: CP methods can be used to minimize the generation of wastes at the firm level, thereby making it less costly to treat wastes in CETPs. This is especially the case for pollutants like toxic metals that disrupt the functioning of widely used wastewater treatment processes.

The long-dormant pollution charge system should be revived and revised; the work of revision can be included in the mandate to the committee formed to revise the NEQS. Pollution charge systems are used throughout the EU and in many countries around the world. If the charges are set high enough, as they are in the Netherlands, they provide a significant incentive for firms to cut pollution. Even when charges are set much below the marginal cost of wastewater treatment, they still advance the cause of pollution control because some of the revenues from the charge schemes can be used to support EPA monitoring and enforcement efforts and some can be returned to firms as subsidies to construct wastewater treatment plants. Pakistan's moribund²²³ pollution charge system can be restructured such that firms pay charges based on both the concentrations and mass flow rates of their discharges. Based on experience in other countries, EPAs will have an incentive to monitor and enforce the pollution charge scheme because they will receive part of the revenues generated. Revenues generated from charges can be used to build CETPs for industrial clusters and provide budgetary resources for EPAs.

However, based on experience in other countries using pollution charges, charge-based revenues will not be enough to construct CETPs. Consequently, the GoP should give attention to other funding sources,

²²² Luken, R.A. 2009. Consulting Report commissioned by the World Bank. Washington. D.C.

²²³ The previously mentioned Shamslakhha Committee developed rules for the pollution charge system in the late 1990s; however the Pak-EPA did not enforce the rules, due to a shift in government priorities.

including both domestic sources (e.g., provincial governments and industry associations) and international sources (e.g., multilateral and bilateral aid institutions). Several industrial estates have plans for CETPs, but they have been stymied by problems in financing plant construction. The Korangi plant also provides an example of how financing other aspects of construction and operation can be arranged. The total cost of the CETP, the first plant of its kind in Pakistan in terms of its nature, ownership, capacity and technology, cost about Rs. 492 million, which was contributed by the federal, Sindh and Karachi governments, the Pakistan Tanners Association and the Dutch government.²²⁴ From the perspective of individual firms, there are complementarities between CP and CETP: firms that rely on CP to the extent possible will pay lower fees in supporting CETP operating costs because those firms will generate less waste that needs to be treated. In the long term, a focus on revised interim and permanent NEQS, the construction and operation of CETPs for firms in industrial clusters, and widespread use of cleaner production methods, will make Pakistani firms more competitive and it will allow more firms to satisfy the de facto international environmental standards developed by ISO and other international bodies.

Pakistan has a rich history of cluster development and thus much progress can be made by moving forward with construction and operation of CETPs for existing clusters. Cluster development makes it possible to treat waste from multiple firms, particularly from SMEs, cost effectively because there are significant economies of scale in wastewater treatment plant construction.

4.5. Expanding the Cleaner Production Centers

In the short term, the CP centers (in cooperation with industry associations) should increase their scope of activities to include instruction on: (i) CP measures that are most appropriate and relevant for firms, (ii) ongoing integration of environmental and energy audits and related CP approaches into firms' daily operations to make continual improvements, (iii) guidance in creating a formal EMS and getting certified by ISO 14,001, and (iv) information on how to remain up-to-date on sector-specific requirements imposed by countries importing Pakistani products. For example, CP measures that include good housekeeping skills (i.e. avoiding spillages and reusing materials), improved chemical storage practices, improved worker safety practices, noise control measures, and monitoring may be relatively cost-effective measures for firms to adopt and use as part of ongoing operations. In the short term, CP centers and industry associations should encourage and promote investment in local manufacturing of cleaner production equipment along with other emerging environmental technologies, and help firms to identify funding sources and suppliers for CP equipment. Technology is particularly outdated in industries such as leather, sports, surgical equipment, fans and cutlery. Relatively few SMEs employ professional management, effective systems of record-keeping, and systems to remain up-to-date on requirements imposed by importers.

A key reason for making short-term investments in existing CP centers is that those centers have demonstrated their ability to create effective and mutually supporting relationships with managers and staffs at the firms they have served. To guide the centers on the use of new funding and to give them guidance on becoming financially sustainable, each CP center should create an advisory board. The centers will need guidance in their CP and EMS diffusion activities and in this regard they would each benefit from creating an advisory board consisting of members as follows: the provincial EPAs for the provinces in which the center works, the industry associations for the sectors served by the center, and representatives from private consulting firms that may be impacted by the CP centers activities. These boards can also help with financial planning. Of the existing centers, only NCPC-F operates with a

²²⁴ Alam, M. 2009. KARACHI: Effluent Plant Deaths Reveal Lack of Planning, Legal Compliance" Dawn.Com, Available from <http://archives.dawn.com/archives/162732> , Accessed October 29, 2011.

business model that does not rely on donor or government funding.²²⁵ The other centers should be proactive in developing business plans to ensure their financial sustainability.

In the short term, a national cleaner production center should be created to promote information sharing among sub-national CP centers, to engage in international exchanges of information with other national CP centers, and to participate, under the leadership of MoI and the CP working group described below, in expanded efforts to diffuse CP-related concepts and technologies as well as information on EMS to firms in Pakistan. The national CP center should have an advisory board consisting of officials from MoI, Pak-EPA, the sub-national CP centers, and leaders of key industry associations. The advisory board should meet several times per year to advise the national center leadership on the types of activities and programs the national center should prioritize. In the short term, the CP working group can take a lead role in creating the new center and the advisory board. The following are among the functions that could be served by a national CP center:

- Networking with national CP centers in other countries to share information and learn about effective international practices for CP diffusion and training;
- Providing advisory services to sub-national CP centers on specialized topics, such as information on measures that CP centers outside of Pakistan have taken to ensure their financial sustainability, and instruction on ways of combining CP training with training on EMS with the goal of showing CP and EMS as ongoing processes that are integrated into the operating procedures of firms as opposed to being a one-time effort;
- Forming links with universities to have CP and EMS integrated into curricula, particularly at business schools and environmental engineering programs in Pakistan;
- Organizing CP roundtables and conferences for staffs of industry associations and sub-national CP centers to encourage networking and information sharing across centers and industry associations from different sectors; and,
- Creating and providing access to databases with new CP solutions and case studies that can serve as models of best practices.

Given that multiple stakeholders -- EPAs, industry associations and CP centers -- will continue to work toward improved industrial environmental management, there is a need for strong leadership and coordination. In this way, duplication of efforts can be avoided and synergies can be captured as these stakeholders work to disseminate to firms information on CP, EMS and other ways to enhance competitiveness while improving environmental performance. A new environment unit within MoI can play critically important leadership and coordination roles. It is recommended that the MoI seize the opportunity to take a leadership role in developing a national strategy for the diffusion of CP and EMS and the certification of firms by ISO 14,001 and other international standards.

An early task for the MoI's newly created unit would be to organize a "CP working group" consisting of representatives from EPAs, industry associations, each of the CP centers, and international aid institutions that have provided long-term support to the CP centers to create: (i) a national plan for the dissemination of CP and EMS, and (ii) an overall strategy for seeking financing to support the construction of CETPs in industrial clusters.

4.6. Public Disclosure and Information Dissemination

²²⁵ NCPC-F, which offers a broad variety of environmental consulting services, does not face basic problems related to financial sustainability because it charges for its services and is not dependent on donor or government funding

In the final analysis, an informed citizenry, an active press and emerging environmental NGOs can move Pakistan in the direction of providing the kinds of support that EPAs will need to enforce compliance with environmental regulations. The Pak-EPA and provincial EPAs can foster the creation of an informed citizenry by distributing information regarding firms violating environmental regulations as well as data on the health impacts of environmental degradation. There are models of how information about firms violating environmental regulations can galvanize citizens to put pressure on polluters to clean up; a widely emulated example is the program referred to as “PROPER,” which was developed in Indonesia.²²⁶ The provision of information to the general public on health impacts of pollution also empowers citizens to place pressure on industries. In the short term, the Pak-EPA and provincial governments should lend support to environmental NGOs (e.g., WWF-Pakistan) and news outlets interested in environmental issues by providing them with information on firms releasing pollutants affecting human health and, more generally on the costs to Pakistan of continued environmental degradation. At the provincial level, EPAs can consider whether and how the PROPER program, which has been adapted by several developing countries, can be employed in Pakistan.²²⁷ One profitable avenue might be to map out pollution hot spots, their spatial extent, the most polluting industries within these spatial zones, and the firms/factories within the identified industries that account for the majority of the pollutant effluents/emissions. Such targeting might help identify the extent to which it would be a cost-effective strategy to focus enforcement efforts on only the most polluting firms.

Infrastructure linked to quality management at firms consists of standardization, metrology, testing, inspection, certification and accreditation. It is often expensive, time consuming and complicated for firms to gain access to this infrastructure. Providing these services is a crucial element to maintaining Pakistan’s export competitiveness. Pakistani firms can go abroad to access the needed quality management infrastructure, but this poses special challenges for SMEs; they seldom use overseas service providers if there is no domestic capability. Sending equipment for calibration overseas is excessively burdensome. Moreover, using overseas quality management auditors for ISO 9,001 certifications and overseas EMS auditors for ISO 14,001 certifications are impediments for firms interested in obtaining those certifications, and it is also challenging for firms to use overseas auditors in trying to meet restrictions imposed under WTO Agreements on Technical Barriers to Trade. For these reasons, Pakistan should view the development of quality-related infrastructure needed by firms as a high priority element in the country’s export strategy.²²⁸ Pakistan has made a good start on infrastructure development by creating the Pakistan Standards and Quality Control Authority (PSQCA), Pakistan National Accreditation Council (PNAC), and the National Physical and Standards Laboratory (NPSL); however, these organizations do not yet have the capacity needed to serve Pakistani firms engaged in exports effectively. The capacity of PSQCA, which is Pakistan’s National Enquiry Point under WTO’s TBT and SPS agreements, should be strengthened significantly in the short term.

PSQCA should serve as a communications bridge between standard-setters and exporters; this will involve enhancing the vertical linkages needed to supply information to and receive information from export-oriented firms. The bridging function has two main elements. PSQCA should: (i) make Pakistani

²²⁶ Indonesia’s Program for Pollution Control, Evaluation, and Rating (PROPER) is a national-level public environmental reporting initiative. The program uses a color-coded rating, ranging from gold for excellent performance to black for poor performance, as well as “reputational incentives.” For details, see Blackman, et al., 2004. How Do Public Disclosure Pollution Control Programs Work? Evidence from Indonesia. *Human Ecology Review*, Vol. 11, No. 3.

²²⁷ For example, China’s Greenwatch program is an adaptation of PROPER.

²²⁸ Material in this paragraph and the ones that follow is from Gujadhur, S.K. 2010. Quality - A Prerequisite for Exports: Increasing Complexity of Technical Requirements in Export Markets. *International Trade Forum* - Issue 3/2010.

exporters aware of trade and environmental issues so that they can make necessary adjustment in a timely way; and, (ii) provide information representing the perspectives of Pakistani exporters to organizations engaged in setting standards. To carry out this bridging function, PSQCA should design and implement a system to collect, track and release information concerning foreign environmental standards and requirements for products; in the case of government-set standards, PSQCA should educate exporters about standards that are currently under development. The bridging function also requires PSQCA to solicit, collate and relay the views of Pakistani exporters as inputs to the standard-setting process during the comment periods mandated by the WTO's Agreement on Technical Barriers to Trade.

4.7. Conclusions and Recommendations

The cost of environmental damage in Pakistan is tremendous. Air pollution, and inadequate water supply and sanitation result in tens of thousands of deaths, annually. Due to these illnesses, environmental damage results in annual losses to Pakistan that total at least 6% of GDP. By itself, this would be enough reason to encourage cleaner production initiatives. But there is also convincing evidence that cleaner production will also have more concrete economic benefits. With the increase in government regulations and voluntary standards that mandate environmental standards from exporters, Pakistan must take steps to convey the image that it is a green supplier, lest it risk falling behind countries that are acting more aggressively on this front.

The findings of this chapter are briefly summarized below:

- Government regulations issued by developing nations and green supplier initiatives on the part of foreign multinationals are of increasing concern to Pakistan. These initiatives often not only mandate that exporting firms meet certain environmental standards, they often also go down a second level, so that purely domestic firms (ones who sell inputs to exporting firms) might also be required to have cleaner production processes in place.
- These regulations often require ISO-9001 or ISO-14001 certification for the exporting firms. Pakistan does not have many firms with these sorts of certifications, and that number is not increasing fast enough.
- ISO-14001 certifications require progress towards meeting national emissions standards, but NEQS are seen as being unduly complicated and onerous; most firms in Pakistan do not feel that they will ever be able to meet the current standards.
- The recent shifting of Pakistan's environmental regulatory and policy-setting priorities has further disorganized Pakistan's already overburdened environmental regulatory apparatus. The Ministry of Climate Change is new and its situation is uncertain, while understaffed provincial EPAs are unable to compel mandatory compliance with the NEQS; hence, compliance can only be expected on a voluntary basis. This weak institutional climate also has the potential to harm Pakistan's performance on transboundary issues where lines of authority are not currently clear, such as the ongoing international effort to address global climate change. This uncertain climate could create instability that hampers investment in clean production.
- Common effluent treatment plants have proven cost-effective in treating wastewater in certain industrial estates, but coordination problems hamper further CETP construction. Pakistan has a pollution charge system that can be used to compel polluters to pay for the construction of CETPs, however it is currently moribund.
- Cleaner Production Centers have enabled firms in industrial estates to increase their number of environmental mitigations and, in some cases, to reduce the cost of production; in many cases, these CPCs are the only source of cleaner production mitigation that firms have access to.

- Due to the lack of national-level leadership on cleaner production, firms are often unaware of the intersections between export competitiveness, import-country government regulations, the industry standards of foreign multinationals, ISO certification, and NEQS compliance.
- Within Pakistan, there is currently only limited public support and NGO agitation for environmental governance; the sort of agitation that led importers and foreign multinationals to adopt their stringent environmental standards in the first place. However, there is nascent demand for environmental governance: a majority of Pakistanis agree that it is important for companies to have a good environmental track record.

The recommendations laid out in this annex fall into four categories: (i) revision of national environment quality standards; (ii) construction of common effluent treatment plants; (iii) strengthening and expanding cleaner production centers; and (iv) public disclosure and information dissemination. These recommendations are briefly summarized by the following matrix:

Table A2.4.3. Recommended Actions for Cleaner Production in Pakistan

<i>Recommended Action</i>	<i>Responsible Party</i>	<i>Timeframe</i>
Revision of Environmental Regulations		
Develop both interim and revised permanent National Environmental Quality Standards	New Standard Setting Committee (includes representatives of enterprises, industry associations, NGOs and public sector)	Short-term
Revise and implement pollution charge system	Government of Pakistan	Short-term
Implement permanent National Environmental Quality Standards	New Standard Setting Committee /Government of Pakistan	Long-term
Construction of Common Effluent Treatment Plants		
Create plans for funding and construction of CETPs in industrial clusters	Public body, industrial association, commercial venture, or public-private partnership.	Short-term
Strengthening Cleaner Production Centers		
Extend the work and scope of Cleaner Production (CP) centers to promote long-term integration of CP and environmental management systems (EMS) in firm's daily operations and management strategies, and establish additional CP centers	CP centers, industry associations, CP working group	Short-term
Create advisory board in CP centers to identify funding sources and develop business plans to ensure financial sustainability	CP centers	Short-term
Create "CP working group" within the Ministry of Industries tasked with developing a national plan for CP and EMS and a strategy for financing construction of CETPs	Ministry of Industries	Short-term
Create a national cleaner production center to promote information sharing among sub-national CP centers and engage in international exchanges of information with other national CP centers	CP working group	Short-term
Public Disclosure and Information Dissemination		
Foster creation of informed citizenry through distribution of information regarding firms' violating environmental regulations and data on health impacts of environmental degradation	Pakistan Environmental Protection Agency and Provincial Environmental Protection Agencies	Short-term
Collect, assemble and release information to firms on foreign environmental standards, voluntary standards established by consortia and retailers, and requirements related to Pakistani products in potential export markets	Pakistan Standards and Quality Control Authority and industry associations	Short-term

Allow Pakistan's specific needs to be accounted for during the processes for formulating international standards in standard setting bodies such as ISO	Pakistan Standards and Quality Control Authority	Short-term
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CHAPTER 5. INSTITUTIONS FOR SUSTAINABLE INDUSTRIALIZATION

The implementation of a strategy for sustainable industrialization, as proposed in this annex, requires well functioning institutions. The justification for an industrial policy whereby governments proactively promote industrial growth has been made by appealing to recent work by Rodrik (2004)²²⁹. It is argued that in early stages of development there are significant market failures due to, “information externalities entailed in discovering the cost structure of an economy, and coordination externalities in the presence of scale economies”. These result in disincentives for entrepreneurs to search for profitable opportunities²³⁰ and retard industrial development. The way out is to follow the East Asian, specifically the Korean, model. As described by Rodrik, Grossman and NormanSource (1995)²³¹:

...what is required is a competent, honest and efficient bureaucracy to administer the interventions, and a clear-sighted political leadership that consistently placed high priority on economic performance...”

Since an assessment of the quality of civil services is beyond the scope of this annex. This chapter focuses on institutions that would aid the formulation and implementation of a strategy for sustainable industrialization in Pakistan, in the hopes that institutional strengthening can lead to an enabling environment in which there are continuous processes for incorporating sustainability considerations into Pakistan’s industrial sector. The institutions are discussed focusing on the four dimensions of sustainability emphasized in this annex: policy coordination to (i) ensure that the cost of doing business for industrial firms is kept low, (ii) spatial location decisions are coordinated and are based on sound economic principles, (iii) specialized institutions such as SMEDA for small enterprise development work well, and (iv) environmental concerns are addressed in a manner that reflects local realities and promotes international competitiveness of firms²³².

5.1. MoI as a Policy Coordinator

The Ministry of Industries, in its 2005 seminal report, “Towards a Prosperous Pakistan: A Strategy for Rapid Industrial Growth” makes the best case for effective coordination at the level of the federal government. MoI recognizes, as does this annex, that many of the policies being recommended for rapid industrial development do not fall directly under its purview. To implement the strategy, the MoI would need to develop the capacity to coordinate with other line ministries/agencies. A2.5.1 lists the type of policies that would need such coordination, the ministries/agencies with prime responsibility for the sectoral policies and the role of MoI for successful coordination.

To foster sustainable industrialization, the Ministry would need to develop the capacity to carry out effective dialogue with the Federal Board of Revenue, State Bank of Pakistan, Securities and Exchange Commission and Ministries of Finance, Energy, Railways, Communications, Ports and Shipping, Climate

²²⁹ Rodrik, D. (2004). Industrial Policy in the 21st Century. UNIDO

²³⁰ Philip E. Auerswald and Ammar Malik, 2011 “ Review of (LUMS) Industrial Policy: Its spatial Aspects and Cluster Development”

²³¹ Dani Rodrik, Gene Grossman, Victor NormanSource (1995), “Getting Intervention Right: How Korea and Taiwan grew Rich”, Economic Policy, Vol.10, No.20 (Apr., 1995), pp 53-107.

²³² The importance of institutions is also underscored by the recent Turkish success in diversifying its manufacturing exports by products and destination and increasing their share in GDP, “Turkey’s recent export performance” (Draft note, September 2011)

Change and following the 18th Amendment, the National Economic Council. This will require substantial specialized human resource capacity, and the cabinet mandate, to carry out the coordination role.

Another area for strengthening MoI capacity is as service provider to the private sector for carrying out industry-specific international benchmarking exercises for competitiveness of the value chain. The MoI would also be well positioned to carry out analysis and based on it, developing a strategy for attracting investment from China, as well as from other relevant countries (e.g. India, after the liberalization of its economic relationship with Pakistan).

Building MoI capacity will also entail developing the ability to identify and induct (on retainer contracts or other appropriate arrangements) professionals at local universities/research institutions/private sector associations who can be brought in by the ministry as and when needed (the recent work by a team of LUMS economists/business professors is a good example) to do the analytical work as needed and serve on specialized task forces.

Table A2.5.1. Strengthening MoI capacity for Sustainable Industrialization

Industrial Strategy component	Ministry/Line Agency Directly In charge	Needed MoI capacity to fulfill the role
Reducing macroeconomic and financial risk (including inflation, interest rates and crowding out issues)	Ministry of Finance, State Bank of Pakistan	-Technical capacity to present industry's perspectives on macroeconomic stability/competitive exchange rate/access to credit issues -Regular dialogue with the private sector
Energy prices and energy availability	Ministry of Water and Power, PEPCO, OGRA	Technical capacity to represent industry's energy needs and pricing issues
Non-discriminatory tax policy	Federal Board of Revenue	Capacity to ensure that the burden of taxation (via corporate, income and sales tax) does not fall only on industry, as other sectors escape the tax net.
Trade policy (including regional trade) and trade facilitation	Ministry of Commerce, Federal Board of Revenue, Ministry of Foreign Affairs	Capacity to maintain a liberalized trade regime (especially vis-à-vis the emerging large economies in the neighborhood) that is not injurious to local industry (appropriate anti-dumping stance); promotion of modern customs procedures that strengthen internationally competitive supply chains.
Efficient transportation and port handling	Ministry of Communications, Shipping and Ports, Provincial governments, Ministry of Railways	Technical capacity to recommend cost reducing public/private investment and management practices in roads, railways, ports and shipping
Managing industrial waste and environment pollution	Ministry of Climate Change, Pakistan Environmental Protection Agency, and provincial environmental protection departments.	Promotion of realistic environment standards and facilitation of adoption of EMS to eventual ISO14001 certification

The MoI is well positioned to play a significant role in Pakistan's economic restructuring as well as its approach to environmental management. The MoI has the opportunity to play a significant role in

minimizing the negatives external effects of the expected increase in industrialization and urbanization by helping to move forward Pakistan's efforts in industrial environmental management. The MoI can play this leadership role by engaging in the following activities: using its position on the Pakistan Environmental Protection Council (PEPC) to urge for a reformulation of Pakistan's national level environmental strategy; promote the use of cleaner production approaches; and ensure that industries have access to international markets by promoting compliance to internationally recognized product quality and environmental standards (e.g., ISO 14001). In addition to gaining access to international markets, excellence in industrial environmental management will allow Pakistan's firms to establish comparative advantage by promoting corporate social responsibility and high quality environmental management as part of their branding efforts.

In conclusion, the MoI needs to enhance its capacity (or augment it as needed by collaborating with local/international universities/research centers) to play its vital role as an advocate for industry at both the federal and the provincial levels. This role has to be sanctioned by the cabinet and, given the 18th Amendment of the Constitution that empowers the provinces, by the National Economic Council. A critical capacity is the ability to engage with the private sector to identify the crucial policy agenda (e.g. exchange rate policy, credit allocation, energy pricing, tax rates and tariff structure) to a level playing field for industry and lower the costs of doing business. The capacity to dialogue with the private sector is also needed to prioritize public investment especially in times of fiscal austerity and to leverage public/private partnership in infrastructure provision.

5.2. National Economic Council's Role in Spatial Transformation

Recent developments have made it imperative for MoI to interact with provincial governments for successful implementation of the spatial dimension of the strategy for sustainable industrialization. Starting in 2004, provincial governments, in partnership with multilateral donors, especially the World Bank, have started to develop provincial visions for economic development. Punjab was the first to prepare its economic report, followed by KP, Sindh, Baluchistan and most recently Gilgit-Baltistan. The economic reports are comprehensive in the way national economic reports are, in terms of visions for poverty reduction, employment and income growth and sectoral targets. Industrial growth for high productivity employment is an important objective in all of the provincial reports. It is thus important for MoI to ensure that there is consistency between the provincial and the federal objectives and strategies for spatial dimension of sustainable industrialization.

Then other important recent development is the 18th Amendment of the Constitution. Responding to strong demand from the provinces for greater autonomy, the concurrent list has been abolished²³³. At the same time, the 7th National Finance Award has reduced the federal share in the national pool of resources (the reduction will continue over the next several years) thus increasing the provincial share in the aggregate (to enhance equity, the share of relatively poor provinces has been increased more). This has empowered the provinces and they are now expected to take on the primary responsibility for delivering on the development objectives. These developments will further strengthen the demand for a regional balance in infrastructure provision for industry.

The regionally balanced approach to economic development in general is a welcome development in an ethnically plural society such as Pakistan's. However, this has to be weighed against the economies of

²³³ The concurrent list allowed both the provincial and federal governments to have development programs in the provinces; the provinces have considered the concurrent list to be the main instrument for loss of provincial autonomy to the federal government.

scale that come from agglomeration of industrial activity in a few industrial clusters. Striking the right balance to prioritize infrastructure investment in times of fiscal tightening is a major challenge and one that the MoI will need to take up. The right forum for debating these issues and for taking decisions is the National Economic Council, chaired by the Prime Minister, with provincial Chief Ministers as members along with their respective economic teams. MoI will have to set the agenda on spatial dimensions of sustainable industrialization at the NEC, in close coordination with provincial industries departments. MoI will need to develop capacity to do this effectively.

5.3. Small and Medium Enterprise Development Authority (SMEDA)

Small and Medium Enterprises (SMEs) are viewed by GoP as one of the major drivers of growth in Pakistan.²³⁴ Many of the SMEs in Pakistan are very small: 87% of SMEs in the manufacturing sector employ five or fewer people, and 98% of SMEs in this sector have ten or less employees.²³⁵ SMEs employ about 80% of the non-agricultural labor force; they make a contribution to GDP of about 40%; they also contribute about Rs 140 billion to exports, and produce 25% of exported manufactured goods.²³⁶ Given their significance, SMEs were given special attention in the course of the NLTA.

Pakistan's premier institution supporting SMEs is the Small and Medium Enterprise Development Authority (SMEDA). This organization, which operates under the MoI, is responsible for: formulating and devising policies for SMEs; carrying out support and service activities for SMEs; networking with other federal, provincial and local government entities to assist SMEs; interacting with SMEs and evaluating their financial health and development; and garnering resources from public, private, and international bodies for the betterment of SMEs. In brief, SMEDA's mandate is to transform the potential of the SME sector into reality.

An assessment was conducted of SMEDA as part of the analytic work undertaken for this NLTA. That study determined that the SME sector is suffering from many constraints including lack of access to finance, limited access to markets, lack of infrastructure, hostile business environment, corruption and red tape, weak management and lack of access to skilled labor.²³⁷ Also, many of the government policies are devised from the perspective of large firms and not SMEs. The implementation of SME policies in Pakistan is fragmented and limited and needs to be more effective in light of the SME sector's importance and contribution.

The study of SMEDA also found that the entire domain of SME policy making and development of SME support system is becoming very disjointed and jumbled, with duplication of resources and effort, and a lack of coordination, focus and performance accountability. For example, the MoI had a clear leadership role in the formulation and approval of the SME policy 2007. However, after the policy was approved by the Prime Minister and his cabinet, the implementation of the policy was not delegated to SMEDA and there was no set of clear goals and a business plan for at least the next five years. Adequate fiscal, human and physical resources for policy implementation have not been set and the policy is languishing with no implementation mechanism in place.²³⁸

²³⁴ GoP, 2007, p.8.

²³⁵ Qureshi, N. I., et al., 2009, p. 64.

²³⁶ Available from www.sbp.org.pk/bpd/Conference/Day_One/SME_in_Pakistan.ppt. Accessed May 6, 2010

²³⁷ The analytic work on SMEs was carried out by Shah, S. 2011. Independent Organizational Evaluation of Small and Medium Enterprise Development Authority (SMEDA). Draft Report.

²³⁸ Shah, S. 2011.

A survey of SMEs was conducted as part of this NLTA. The survey sample covered SMEs from manufacturing (59%), services (33%), and agriculture (8%). Results highlighted the many constraints on growth of SMEs in Pakistan. SMEs do not have smooth access to finance. There is a lack of proper infrastructure for SMEs to operate with, and there is lack of supply of skilled workers in Pakistan. SMEs face market constraints in the form of lack of vendors and limited access to foreign and many local markets. SMEDA does not seem to have played its role in helping remove these constraints. Overall its ratings in these areas have been low.

The analytic work for this NLTA offered a number of recommendations that could be used to strengthen SMEs in Pakistan. In addition to restructuring SMEDA, the NLTA analytic work recommended actions that include:

- Setting comprehensive goals and targets for SMEDA's Board of Directors to be achieved over the next five years.
- Authorizing and funding SMEDA to develop its own new organizational development plan in line with its institutional goals and targets, its proposed activities and a new organizational structure as proposed by this NLTA.
- Implementing the organizational development plan of SMEDA as soon as it is ready through supplementary budgetary provisions, if necessary and by hiring sector specialists.
- The new organizational structure should also enable SMEDA to interact with the government (federal and provincial) in developing a favorable policy environment for SMEs.
- Providing the necessary budgetary support needed for SMEDA to be an effective body for the SMEs and to enable it to meet the goals and targets set for it.
- Create an adequate monitoring and evaluation framework that provides SMEDA with reliable and complete data to assess the impact of its programs, as well as a better understanding of SMEs in general and the key challenges they face.

5.4. Environmental Management

The 18th Amendment to Pakistan's Constitution devolved major responsibilities for environmental management to sub-national governments, which will have significant implications for environmental quality management. The typical rationale for decentralizing environmental management is as follows. Since environmental problems are typically felt locally, provinces and municipalities are often in a better position to address environmental problems, and thus would achieve superior outcomes if given the freedom to choose the most appropriate policies and instruments. In Pakistan, delegation of environmental functions from the federal government to provincial governments is comprehensive and has empowered provincial EPAs to take care of most of the environmental issues in the provinces. After the delegation of enforcement functions to the provincial governments, Pak-EPA's main responsibilities became limited to assisting provincial governments in the formulation of rules and regulations under PEPA, 1997.

As a result of the decentralization, the sphere of operation of each of the provincial EPAs increased considerably with the 18th Amendment, but many environmental issues cut across geographical boundaries, and systematized mechanisms for inter-sectoral coordination to tackle cross-cutting issues and harmonize common interventions are needed for effective decentralization. Without proper coordination, decentralization often leads to substantial differences in environmental quality across regions. Decentralization efforts may fail tremendously without a reasonable level of supervision and monitoring by central governments as well as a without a good level of coordination between agencies. Even when local capacity is strong, the transfer of responsibilities may make the coordination of national

policies difficult, particularly in federative systems. Coordination is required both between economic and sector ministries, as well as across tiers of government.

On October 26, 2011, the Prime Minister announced the creation of the Ministry of Disaster Management at the Federal level, which became the Ministry of Climate Change in early 2012. All the environmental management related functions, which were under the purview of Ministry of Environment before the 18th Amendment in the Constitution of the country were clubbed together and put back with this new Ministry (except Pakistan Forest Institute, PFI, and the National Energy Conservation Center, ENERCON). By mid 2012, it is expected that the new Ministry would start performing its obligations particularly coordination in international protocols and environmental protection/management across the country. The National Disaster Management Authority (NDMA) has also been placed under the new Ministry.

Pakistan might take advantage of international best practices to strengthen the new Ministry. Most countries in the world currently have an apex central environmental ministry or agency with a number of technical and action-oriented agencies designating and implementing public policies, and enforcing regulations. Even in Canada, a country with strong formal mechanisms for coordination, the underlying cause of good coordination is the existence on an apex agency at the federal level. In Mexico, Brazil, and the United States, local environmental agencies were given substantial freedom to determine the way in which environmental standards are met. But all these nations retained an apex-level body, located at the federal level, to make national environment policy and manage coordination between states and provinces. These functions are kept as central responsibilities because failure to do so has been found to be potentially harmful to the environment and inhabitants. Specifically, the responsibilities that usually are maintained by the central government, regardless of the level of decentralization, include:

- *Design and enactment of national environmental policies and standards.* This responsibility is maintained by the central government in order to provide constituents throughout the country a degree of consistency of rules and regulations and because people whose health and livelihoods are impacted by environmental policy tend to expect certain norms of environmental management, regardless of region;
- *Transboundary issues.* This function is better handled by the central government as regional entities lack the resources and credibility to manage such matters effectively. In addition, central-level agencies represent the country at international negotiations and in international conventions and initiatives, such as the Montreal Protocol and climate change conventions.
- *Coordination of regional agencies.* In the interest of efficiency, collaboration and sharing of good practices, the role of coordination of efforts among the various regional institutions is maintained at the central government level. This includes monitoring and evaluation of environmental programs that impact multiple regions, as well as granting permits for activities that impact the environment in more than one geographic area.
- *Research related to climate change, biodiversity or water issues, such as glacial melting.* These issues can impact multiple states within a country, as well as multiple counties in a region, so delegation of such research would be ineffective at best.

With the recent reorganization of Pakistan's institutional climate for environmental regulation, Pakistan's environmental management agencies will need considerable technical assistance and capacity building. The Ministry of Climate Change is newly created and just beginning to explore its responsibilities. Furthermore, provincial EPAs are not currently well-staffed and lack the capacity to effectively enforce environmental regulations; evidence for this is that the majority of SMEs participating in the survey of firms carried out as part of this NLTA were not even aware of the existence of NEQS and many firms had no contact at all with an EPA. In addition, provincial EPAs have limited funding for designing and

implementing programs to address environmental priority problems. They also lack the ability to effectively implement existing environmental impact assessment requirements, especially in the context of large infrastructure projects. Institutional strengthening for the MCC and provincial EPAs should be a near term priority.

Other possible responsibilities that could be strengthened in Pakistan at the national level can include the following:

- *Setting coordination incentives:* Possible coordination incentives with sub-national environmental units include giving MCC the ability to co-finance investment projects at the regional level, linked to results agreements. In countries with a decentralized environmental structure, co-financing is often the most important tool national authorities have to ensure national–regional coordination. Conventional control mechanisms would be used to ensure that project funds are well spent. These mechanisms would help to bolster the federal government's ability to monitor environmental performance and could be used to finance environmental work related to cleaner production, or to strengthen the technical capacities of EPAs.
- *Establishing accountability mechanisms:* MCC could put in place a simple but effective accountability mechanism that consists of identifying a simple set of standards to measure the fulfillment of basic environmental rights, such as the right to clean air and water. Using simple language, these standards could be broadly disseminated among the population with the help of civil society organizations, making use of national and local media. Every year, report cards measuring the degree of fulfillment of those standards in each region or province could be produced, and town hall meetings could be called to discuss the ability to comply with authorities and civil society, and jointly find remedies and solutions.
- *Promoting public disclosure:* It is critical that a more systematic effort be made to enhance awareness of environmental issues linked to industrial activity. The publication of data in support of key environmental indicators (including health statistics or pollution load discharge in industrial clusters) and wider use of public forums for cleaner water initiatives are ways to improve public information, and promote transparency, accountability and awareness. In China, Colombia, and Indonesia, among other countries, the publication of key environmental performance indicators has been critical in raising environmental awareness and placing environmental issues in the national agenda. Mechanisms to disseminate information in a manner that is easily interpretable can allow communities to play a role as informal regulators, and also promotes accountability on the part of industries being regulated.²³⁹
- *Strengthening the demand side of accountability:* Pakistan has active civil society organizations which play important roles in implementing projects, delivering services to poor sectors of the population, and those participating in policy debates. However the capacity of civil society to participate in monitoring policy implementation and holding environmental institutions accountable is limited. International experience indicates that civil society can play an important role when citizens' organizations demand accountability from public institutions. The proposed apex environmental agency could support the development of the technical capacity of civil society organizations to promote social accountability initiatives that could be independently implemented or in association with environmental agencies or with horizontal accountability institutions.
- *Reduction of vulnerability to natural disasters:* Natural disasters pose a substantial risk to transport infrastructure as well to industries: as an example, earthquakes, mudslides, and flooding have the potential to cut vital rail and road links. Conversely, proper transport infrastructure is

²³⁹ World Bank, 2005. World Development Indicators 2005. Washington D.C.

vital to disaster relief efforts. Due to the significant impact of natural disasters on Pakistan, the government might task the new Minister with policy design and implementation of nonstructural measures to reduce vulnerability to natural disasters. Creation of an office for reduction of vulnerability to natural disasters could be carried out in the short term.

A new environment unit within the Ministry of Industries can play critically important leadership and coordination roles. The MOI could seize the opportunity to take a leadership role in developing a national strategy for the diffusion of CP and EMS and the certification of firms by ISO 14,001 and other international standards. An early task for this unit is to organize a “CP working group” consisting of representatives from EPAs, industry associations, each of the CP centers, and international aid institutions that have provided long-term support to the CP centers to create: (i) a national plan for the dissemination to firms of information on CP, EMS, and certification to ISO 14,001; and (ii) an overall strategy for seeking financing to support the construction of CETPs in industrial clusters.

Currently, the provincial EPAs suffer from: (i) limited technical capacity and funding for conducting analytical work and priority-setting; (ii) limited funding for designing and implementing programs to address environmental priority problems; and (iii) EIA systems that are too weak to fully address potential negative environmental impacts resulting from economic growth. Pakistan’s environmental management agencies need significant strengthening. Unless careful attention is given to environmental management during industrial expansion, economic gains will be accompanied by massive environmental and social costs in the form of human morbidity and mortality and environmental damage from increased industrial pollution. Few, if any, provincial environment agencies are capable of enforcing the nation’s environmental regulations within the borders of their provinces. Technical capabilities are limited within key environmental agencies, including provincial EPAs. None of them have the capability to handle cross-boundary issues (which include air and water pollution and the handling of solid waste). With the 2011 “Framework for Economic Growth” acknowledging the role of industry in becoming a dynamic engine of economic growth and making significant contributions to meeting Pakistan’s economic and human development goals, it is imperative that institutional strengthening be undertaken to better equip agencies (at the provincial and national level alike) to handle environmental issues stemming from industrial activities in the country.

In conclusion, while Pakistan has in place an institutional framework for addressing environment issues, the impact on the ground is limited. This is because of insufficient capacity in terms of skilled personnel at both federal and provincial levels, unrealistically stiff environmental standards and inconsistencies in legislation that put provincial governments at odds with the federal government. All of these factors contribute to poor enforcement and unimpressive progress towards environmental management systems certification that is critical for environmentally sound and internationally competitive industrialization.

ANNEX 3. MANAGING INDUSTRIAL WATER POLLUTION IN PAKISTAN: CURRENT STATUS AND POTENTIAL FOR IMPROVEMENT²⁴⁰

3.1. Introduction

Pakistan is suffering economically because of its ongoing environmental challenges. A 2006 World Bank analysis estimated that the annual costs of environmental degradation are *at least* 6% of GDP (365 billion Rs. per year), and these costs fall disproportionately on the poor.²⁴¹ Recently, the Government of Pakistan (GoP) initiated an ambitious development strategy that will include the goal of increasing significantly the manufacturing sector's share of annual GDP. As part of this strategy, urbanization is expected to increase rapidly as the country shifts its emphasis away from agriculture toward manufacturing. In addition, Pakistan seeks to expand its presence in the global economy by liberalizing its trade rules and augmenting exports.²⁴²

Pakistan's ability to enjoy the economic benefits of this development strategy will require that it enhance its environmental management efforts and thereby avoid the external costs of increased urbanization and industrialization. Promoting industrial expansion and urbanization without attention to environment will lead to GDP figures that are inflated significantly by high costs of environmental externalities. Moreover, the ability to compete in international markets will require significant emphasis on enhancing industrial environmental management. Indeed, Pakistani firms exporting to the US and EU, regions that are among Pakistan's principal trading partners, have been under pressure to improve their environmental performance.

As an example of some of the difficulties faced by exporters, during the period between August 2000 and July 2001, 896 Pakistani food products were prohibited from entering the US because they failed the US Food and Drug Administration's (FDA) sanitary and phytosanitary inspections. Broadly speaking, the reasons for rejections concerned filth and microbiological contamination; a number of products were rejected because of the presence of heavy metals.²⁴³ In a more recent example, based on a 2011 analysis of the US FDA's Important Refusal Reports (IRRs, which are published monthly on the agency's website), surgical equipment from Pakistan has been refused entry into the United States because production did not conform with applicable requirements. As another example, for the month of March 2009, Pakistani products received 17 IRRs, with 16 of them being issued to surgical instruments that were banned for non-compliance to appropriate manufacturing processes.²⁴⁴ Moreover, as part of a survey of Pakistani firms conducted as part of this NLTA, a number of enterprises mentioned that their business

²⁴⁰ This annex was prepared by Leonard Ortolano, Ernesto Sanchez-Triana and Javaid Afzal. This annex is based primarily on a report prepared by Leonard Ortolano; Susan Rebellon; A. Khan.; R .Luken; and C. Laiq as part of the Mainstreaming Sustainability into Pakistan's Sustainable Industrial Growth, Non-Lending Technical Assistance. The findings, interpretations, and conclusions expressed in this appendix do not necessarily reflect the views of the staff or Executive Directors of The World Bank or the governments represented by the Executive Directors.

²⁴¹ World Bank, 2006, Pakistan Strategic Country Environmental Analysis, World Bank, Washington, DC.

²⁴² Pakistan Planning Commission, 2011, Pakistan: Framework for Economic Growth, Islamabad.

²⁴³ Chaturvedi, S. and G. Nagpal, 2003, WTO and product related environmental standards: emerging issues and policy options, EPW special article, available at <http://www.ppl.nl/bibliographies/wto/files/5627.pdf>. Accessed November 13, 2011.

²⁴⁴ Food and Drug Administration, Refusal Actions by FDA as Recorded by OASIS for Pakistan, March 2009, Available from

http://www.accessdata.fda.gov/scripts/importrefusals/ir_selection.cfm?DYear=2009&DMonth=3&CountryCode=PK Accessed November 9, 2011

customers were pressuring them to comply with ISO 14,001²⁴⁵, which requires that firms have a plan for meeting the National Environmental Quality Standards (NEQS).

Inadequate water supply, sanitation and hygiene constitute some of the most significant sources of environmental externalities identified in a 2006 World Bank study.²⁴⁶ The total external cost amounted to *at least* 6% of GDP. The cost linked to diarrheal diseases and typhoid due to inadequacies linked to water was estimated to be about 31% of the total. Accelerated industrial growth and urbanization will present additional future environmental challenges, including a rise in toxic water pollution, as well as increases in nonpoint source pollution linked to urban runoff.

In this context, the so-called “Environmental Kuznets Curve” (EKC) is sometimes raised as a basis for defending the negative environmental impacts that occur during the initial phases of industrial growth and urbanization. Proponents of this hypothesis claim that a country must first go through a stage of high environmental degradation as it moves towards increased industrialization and higher GDP per capita; after a certain income level is reached, increasing GDP will be accompanied by reductions in environmental deterioration. This reversal is typically attributed to factors such as the increased affordability of waste treatment, the phasing out of highly polluting, obsolete technologies, and the rising demand for improved environmental quality on the part of a citizenry that has satisfied more basic needs. However, it is not necessarily the case that environmental degradation will rise as GDP increases or that it will fall after a particular level of GDP is reached. Indeed, the very existence of the EKC is controversial. This is reflected in inconsistencies in results from empirical analyses examining the EKC argument. Some studies²⁴⁷ demonstrate that, for *selected countries*, the data is consistent with the trajectory of the curve, but only for a *few pollutants*, typically air pollutants like sulfur dioxide (SO₂) and carbon monoxide (CO). These are not the only pollution indicators of concern and few other parameters have been subject to empirical testing. Moreover, a number of empirical studies²⁴⁸ demonstrate *little empirical support* for the expected rise and fall in environmental degradation associated with the EKC, even for SO₂ and CO. There are also counterexamples to the EKC hypothesis. For instance, while taking strong steps to manage pollution by creating and enforcing environmental requirements, Singapore was able to experience robust

²⁴⁵ ISO 14001 is a widely used international standard to which firms can become certified. Certification requires that a firm formulate, maintain and implement an environmental management system. To become certified to ISO 14001, the firm must make a number of commitments, including:

- prevention of pollution
- compliance with legislation
- continual improvement of the EMS

These commitments help drive the firm’s improvements in overall environmental performance. For more information, see the ISO website: http://www.iso.org/iso/iso_14000_essentials

²⁴⁶ World Bank, 2006a, Pakistan Strategic Country Environmental Assessment, Volume I: Main Report Report No. 36946-PK, World Bank, Washington, DC, p. i.

²⁴⁷ For examples of recent studies of the existence of the EKC, which typically contain detailed literature reviews, see Bertinelli, L. and E. Strob. 2005. The Environmental Kuznets Curve semi-parametrically revisited. *Economics Letters*, 88:350–357; Stern, D.A. 2004. The Rise and Fall of The Environmental Kuznets Curve, *World Development*, Vol. 32, No. 8, pp. 1419–1439; Perman, R. and D.I. Stern. 2003 Evidence from panel unit root and cointegration tests that the Environmental Kuznets Curve does not exist. *Australian Journal of Agricultural and Resource Economics*, 47 (3): 325–347.

²⁴⁸ Stern, D.A. 2004. The Rise and Fall of The Environmental Kuznets Curve, *World Development*, Vol. 32, No. 8, pp. 1419–1439; Perman, R. and D.I. Stern. 2003 Evidence from panel unit root and cointegration tests that the Environmental Kuznets Curve does not exist. *Australian Journal of Agricultural and Resource Economics*, 47 (3): 325–347.

economic growth without having to suffer significant increases in pollution concentrations.²⁴⁹ The mixed findings suggest that it would be questionable for Pakistan to embrace the EKC argument as a reason for not prioritizing environmental management while simultaneously promoting industrial growth. Moreover, in many instances reducing waste generation via CP and controlling waste releases via end-of-pipe treatment can be economically efficient. In other words, from a societal point of view, it may be less costly to reduce pollution than to suffer the environmental damages that it causes, especially if damages that are not customarily monetized (e.g., the total social cost of carbon emissions) are considered.²⁵⁰ In addition, prioritizing industrial environmental management will be essential if Pakistani firms are to be competitive in international markets like the EU in which business customers demand high environmental performance from their suppliers and often require certification to international standards, such as ISO 14,001.

This annex concerns the deterioration of ground and surface water quality in Pakistan and what can be done to reduce environmental degradation. Water pollution comes from many sources: organic wastes from households; a wide variety of industrial wastes, including organics, oil and grease, heavy metals, and other toxic materials; and high temperature cooling water releases from power plants. Nonpoint sources, such as runoff from farms and urban areas, add to the pollution burdens on surface and groundwater systems. Examples of major industrial sector contributors to water pollution in Pakistan include textiles, leather, pharmaceuticals, ceramics, petrochemicals, food processing, and steel, which are spread over Pakistan's four provinces, with the largest share of industries located in Punjab and Sindh. Of the 6634 registered industries in the country, 1228 are considered to be highly polluting.²⁵¹

The small and medium sized enterprises (SMEs) in the manufacturing sector are of special significance because they number in the tens of thousands, making it a challenge for even well funded environmental authorities to keep track of waste releases from so many firms. A striking feature of SMEs is the vast number and the very small size of firms in Pakistan's SME sector. For the manufacturing sector, the total number of firms with less than 50 employees was about 582,000, based on Pakistan's 2005 Economic Census.²⁵² Of these, approximately 531,000 (91%) had 1-5 employees. Another 38,000 or so firms had 6-10 employees, bringing the percentage of firms with ten or fewer employees to nearly 98% of firms with 50 or fewer employees.²⁵³ Notwithstanding that waste discharges from SMEs are typically small; the cumulative impacts are large as a result of the large number of firms and the hazardous materials, such as heavy metals, released by many SMEs.

²⁴⁹ For examples of the innovative environmental management strategies used in Singapore, see Chin, A.T.H. 1996. "Containing air pollution and traffic congestion: Transport policy and the environment in Singapore," *Atmospheric Environment*, 30 (5): 787-801.

²⁵⁰ Ackerman, F. and E.A. Stanton, 2011, *Climate Risks and Carbon Prices: Revising the Social Cost of Carbon*, Economics for Equity and the Environment Network, Available at http://www.e3network.org/social_cost_carbon.html Accessed November 14, 2011.

²⁵¹ Sial, R.A. et al., 2006, Quality of effluents from Hattar Industrial Estate, *Journal of Zhejiang University Science*, 7(12): 974-980

²⁵² The Federal Bureau of Statistics, GoP, 2005 Economic Census, Islamabad. Available at <http://www.statpak.gov.pk/fbs/content/economic-census-2005> . Accessed August 3, 2011.

²⁵³ Although definitions of the cutoffs for defining SMEs vary, there is little question that enterprises with 50 employees or less would be called SMEs by any reasonable definition. In fact, Pakistan's Small and Medium Enterprise Development Authority (SMEDA) uses a cutoff of 250 employees in defining SMEs. In any case, referring back to the 2005 Economic Census data, there were only 1,122 manufacturing establishments with more than 51 employees. Thus regardless of the definition of SME and likely problems with incomplete data, there is little question that firms with less than 10 employees dominate the manufacturing sector in terms of numbers of firms.

Although data limitations make it difficult to obtain accurate estimates, it was recently estimated that only about 8% of the urban wastewater in Pakistan is treated before discharge and the corresponding figure for Pakistani industries is only 1%.²⁵⁴ The vast majority of wastewater is released untreated into drains, canals, and rivers, with the consequence that some sections of rivers have been converted into the equivalent of open sewers. Given the seriousness of the impacts of water pollution on human health and welfare, and the potential for poor industrial environmental management to reduce the competitiveness of Pakistani firms engaged in exports, reducing water pollution deserves a high priority.

While extensive environmental regulations exist in Pakistan, they are ignored by many (but certainly not all) firms because they find the National Environmental Quality Standards (NEQS) excessively stringent and because the enforcement capabilities of environmental authorities are so weak that failure to comply with regulations is often not penalized. Indeed, monitoring capabilities are so inadequate that noncompliance is often not even detected. In interviews conducted in the course of this study and reported below, many SMEs indicated that they are not even aware that their wastewater releases are regulated by national water pollution control requirements.

Workable approaches to improve industrial water quality management in Pakistan exist, and they include taking the following measures: revisions in the NEQS to reflect conditions on the ground in Pakistan; and creation of common (or “combined”) effluent treatment plants (CETPs) in industrial clusters, with the construction of these plants supported by a revival of the pollution charge law. A number of Pakistani firms engaged in international trade are interested in NEQS compliance because of pressures by international business customers to attain certification to ISO 14,001. The latter requires regulatory compliance (or a demonstration of progress in attaining compliance). Many firms engaged in exports view ISO 14,001 certification as a way to enhance their competitiveness in international markets, but they are often stymied in certification attempts because they cannot afford to comply with the NEQS. Having unattainable standards has discouraged many firms and caused some to ignore the requirements completely. Therefore revisions of the NEQS are called for. Other elements of a recommended strategy for improving water quality involve expanding existing Cleaner Production (CP) programs (so that more firms can take advantage of CP options) and constructing CETPs in industrial clusters, which would provide a manageable approach for SMEs to have their wastewaters treated. While an argument could be made for requiring discharge standards to be based on ambient water quality standards, that is a goal for the long term because of the time and expense involved in setting up such a system in Pakistan. In 2010, Pakistan passed the 18th Amendment to its Constitution and it requires decentralizing the existing institutional arrangements for environmental protection down from the central government to provincial governments. This will require considerable time because new provincial laws and regulations will need to be enacted and the capacities of provincial environmental protection agencies will need to be expanded significantly so that they can monitor compliance with the new laws and regulations and take actions to enforce those requirements.

The analysis herein synthesizes and extends data gathered by consultants who worked in the context of the World Bank’s “Non-Lending Technical Assistance” project for the GoP’s Ministry of Industries.²⁵⁵

²⁵⁴ Azizullah, A. et al., 2011, Water pollution in Pakistan and its impact on public health — A review, *Environment International*, op. cit. 491-2. See also WWF – Pakistan. 2007. Pakistan’s Water at Risk, Water & Health Related Issues In Pakistan, Freshwater & Toxics Programme, WWF – Pakistan, p. 3.

²⁵⁵ The reports (all unpublished reports for the World Bank) are as follows: Azher Uddin Khan, 2010, Evaluation of Industrial Environmental Management-Pakistan; Ralph Luken, 2008, 2009 and 2010, Cleaner Production In Pakistan; and Ch. Laiq Ali, 2011, Implementable Recommendations for Cleaner Production Programs in Pakistan; and Badar Ghauri, Santiago Enriquez, Hammad Raza, et al., 2011, Policy Options to Address the Cost of Air Pollution in Pakistan.

The information gathering strategy employed surveys of random samples of firms in key industries (particularly leather and textiles) served by Pakistan's three existing CP centers: the Cleaner Production Centre (CPC), the Cleaner Production Institute (CPI), and the National Cleaner Production Centre-Foundation (NCPC-F). In addition, a number of interviews were conducted with: (i) staffs at three of Pakistan's cleaner production centers; (ii) officials with Pakistani environmental agencies in charge of determining compliance with environmental requirements by the firms; and (iii) staffs of relevant, business chambers, industrial trade associations, and civil society organizations.

The remainder of the annex is organized as follows. The next section summarizes the institutional framework for industrial environmental management in Pakistan, with a focus on laws and regulations concerning water quality management. Section 3 and 4 discuss the reasons for gaps in the implementation of water pollution regulations and changes environmental authorities can make to close the implementation gap, respectively. Section 5 presents strategies for promoting compliance with water pollution control regulations by firms, and the final section contains conclusions.

3.2. Framework for Environmental Management in Pakistan

To place the practice of water pollution control in context, this section summarizes Pakistan's regulatory framework for managing air and water pollution and solid waste. Initial efforts to establish a framework for environmental management in Pakistan occurred in 1975 when, as a follow-up to the *1972 UN Conference on the Human Environment* in Stockholm, Pakistan created the Federal Ministry of Environment. In 1983, the Ministry promulgated the Environmental Protection Ordinance of Pakistan. The Ordinance was used to establish a more complete administrative structure, and this began in 1984 with the creation of the Pakistan Environmental Protection Council (PEPC), the apex body for environmental management in Pakistan. Several years later in 1993, the Pakistan Environmental Protection Agency (Pak-EPA) was established.

Momentum for a major effort to protect the environment occurred in the context of the *1992 UN Conference on Environment and Development* in Rio de Janeiro. In that year, Pakistan developed a National Conservation Strategy and the NEQS were promulgated a year later. These standards established requirements on concentration for municipal and industrial effluents, industrial gaseous emissions, and motor vehicle emissions; they also placed limits on noise pollution.

In 1997 the Pakistan Environmental Protection Act (PEPA) was passed to supersede the 1983 Ordinance. The 1997 law -- which is broadly applicable to air, water, soil, marine and noise pollution, as well as hazardous wastes -- empowered the GoP to frame and enforce regulations for protecting the environment. Among other things, PEPA, 1997 provided the framework for implementing the National Conservation Strategy and establishing Provincial Sustainable Development Funds, which are authorized by PEPA, 1997, but currently not in place; and established an environmental impact assessment (EIA) system.

PEPA, 1997 had significant implications for Pakistan's environmental administrative structure. It gave new powers and authorities to the Pak-EPA, and allowed for the establishment of provincial environmental protection agencies. Four Provincial EPAs have been created (Punjab, Sindh, Khyber Pakhtunkhwa and Baluchistan and are authorized to implement PEPA, 1997 in their respective provinces. The 1997 law also reconstituted the Pakistan Environmental Protection Council (PEPC) by making the prime minister the head of the Council and including in the Council representatives from trade and industry organizations, NGOs, educational institutions, the media, and various ministries. PEPA, 1997 also empowered the GoP to constitute Environmental Tribunals that could hear cases brought under the law, with one tribunal to be established in each province. In addition, the law allowed for the designation of Environmental Magistrates to issue penalties for violations of selected environmental requirements.

3.3. Gaps in Implementing Water Pollution Control Requirements

Before the 18th Amendment to Pakistan's Constitution, the overall regulatory structure for environmental management in Pakistan – in terms of organizations and legislation --was, in broad terms, consistent with the systems adopted in other countries at similar levels of development. However, changes are currently being made pursuant to the devolution of responsibilities to provinces required under the 18th Amendment and thus it is difficult to comment on how Pakistan's regulatory structure will compare with those of other developing countries. That said, even before the decentralization process began, regulatory authorities in Pakistan faced a number of challenges, as detailed below.

In terms of overall leadership, an important shortcoming was the absence of leadership on the part of the PEPC, Pakistan's apex environmental body. The Council failed to exert the leadership expected of an apex body, and the evidence for that is that PEPC failed to meet at least twice yearly as required under PEPA, 1997. Indeed, PEPC failed to meet *at all* between 2004 and 2010.

A particularly important challenge faced by environmental regulatory agencies, particularly the provincial Environmental Protection Agencies (EPAs), is the lack of capacity in terms budgets, staffs, and monitoring equipment, to implement Pakistan's National Environmental Quality Standards. Because of shortfalls in monitoring and enforcement capacity, many firms fail to comply with NEQS.

The challenges in enforcing compliance with NEQS are assessed by considering results from recent studies. A 2011 examination of NEQS implementation by Azizullah, A. et al. indicates that the requirements have not been effectively implemented. According to that assessment:

Government has introduced different programs like Pollution Charge System, Self Monitoring and Reporting, Cleaner Production in Industry and Common Effluent Treatment Plants to control the pollution due to industrial wastes. But unfortunately no one is implemented appropriately due to weak law enforcement and the [pollution] problems remained the same The main hindrances in implementation are insufficient budgetary allocations and lack of effective coordination and communication among the responsible authorities like federal, provincial and local entities. Political interference cannot be excluded from the factors hindering implementation of environmental laws.²⁵⁶

A consultant report prepared by Ralph Luken for this NLTA reached similar conclusions. Luken's assessment characterized the extent of industrial wastewater treatment in Pakistan as follows:

- 50–100 operating wastewater treatment plants in a context in which there are an estimated 8000–10,000 major firms releasing industrial wastewater;
- One CETP that provides primary treatment of wastewater for the cluster of leather tanners at Kasur and does not comply with the NEQS; and ,
- One CETP that provides an up-flow anaerobic sludge blanket and aerobic post treatment for approximately 80 out of 130 tanners at Korangi Industrial Area (Karachi)

The Korangi CETP provides the secondary treatment needed to meet the NEQS, but it has suffered from operating problems because of shortfalls in revenues collected from firms connected to the treatment facility. Only nine of the 80 tanneries connected to the facility that were supposed to install pretreatment

²⁵⁶ Azizullah, A. et al., 2011, Water pollution in Pakistan and its impact on public health — A review, *Environment International*, 37 (2): 479-497

in the form of chromium recovery units have done so. Also, because of failure to pay fees, the Pakistan Tanners Association made noncompliance reports to the Sindh EPA.²⁵⁷

Luken²⁵⁸ concluded his overall assessment by noting that the PAK-EPA and provincial authorities have yet [as of 2009] to take actions that would require polluters to bear the full cost of pollution reduction:

- Provincial authorities have yet to take actions that would require polluters to bear the full cost of pollution reduction:
- The provincial environmental authorities have yet to issue discharge licenses because they are still waiting for guidance from the PAK-EPA.
- There is no comprehensive monitoring of pollutant discharge; it is only done by provincial authorities in response to public complaints.

The provincial authorities have undertaken very few enforcement actions and the PAK-EPA has yet to issue guidance on: (i) how to go about enforcement actions, and (ii) the applicability of civil and criminal sanctions.

An indication of the extent of noncompliance with the NEQS is given by results from a 2009 -- 10 survey of leather tanneries and textile processing firms conducted as part of this NLTA. The survey involved structured interviews with CEOs and senior managers of firms in three cities: Sialkot, Lahore and Karachi. Implementation of the survey involved interviews by Pakistani consultants that lasted three to five hours per interview. The survey included about 25% of the 222 leather tanneries using the services of the Cleaner Production Center (CPC) office in Sialkot, and about 25 % of the 45 tanneries served by the Cleaner Production Institute (CPI) in Lahore and Karachi. The survey also included a random sample of the 117 textile processing firms served by CPI.²⁵⁹ The firms to be surveyed were all randomly selected.

The survey centered on leather tanneries and textile processing for two reasons: (i) textiles and leather are two key sectors in Pakistan's manufacturing economy; and (ii) textiles and leather are among the most polluting industrial sectors, and, within these sectors, production of cloth and tanning leather are the most polluting processes. While leather is not as important as textiles in terms of contributions to Pakistan's economy, the pollution from leather elevates its significance from an environmental perspective. Results below concern a subset of survey responses, namely those for which all relevant questions were answered; in all figures, "n" represents the size of the sample that contained usable responses for the variables presented.

Results indicate that the awareness of NEQS varied significantly by firm size: larger firms were more aware of NEQS than smaller firms. The survey responses for the question on NEQS awareness were usable for 57 firms.²⁶⁰ All but one of the large firms were aware of the existence of the standards, but only one-third of the SMEs knew anything about NEQS. Figure A3.1 shows the distribution, by firm size of the 57 firms; the vertical axis represents the number of firms. As indicated in the figure, 37 of the 42 SMEs are leather tanneries, whereas 13 of the 15 large firms are engaged in textile processing. The firms

²⁵⁷ Luken, R. 2010, 2009 and 2008. Consultant Reports commissioned by the World Bank. Washington. D.C.

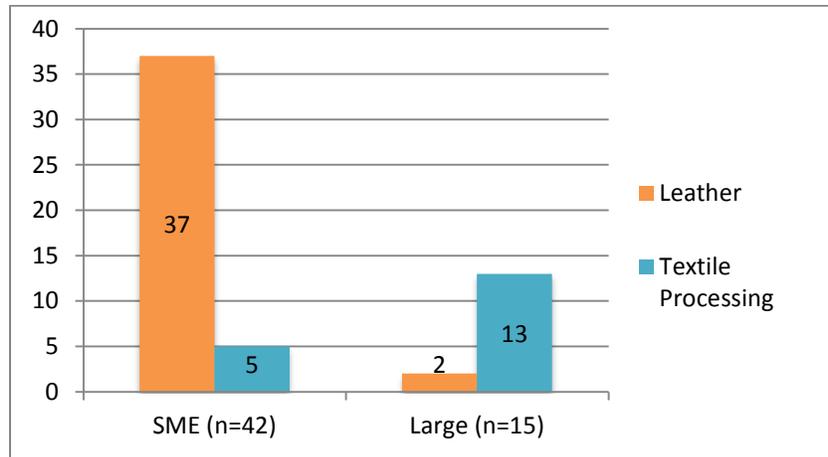
²⁵⁸ Luken, R. 2009. Equivocating on the polluter-pays-principle, op. cit, p. 3480.

²⁵⁹ Through its offices in Lahore, Faisalabad and Karachi, CPI has implemented CP interventions in textile processing firms in Punjab and Sindh. CPI provides services to 45 such firms in the Lahore area, 51 in Faisalabad, and 21 in Karachi.

²⁶⁰ Some firms did not answer the question and other firms provided answers that were inconsistent with answers to other questions.

represented in Figure A3.1 (and the two figures that follow it) were those that responded fully to questions on NEQS awareness, NEQS compliance, and whether or not they exported outputs.

Figure A3.1. Distribution of 57 respondents by firm size and sector



For the 42 SMEs, the firms that had the least awareness of NEQS were those that sold only in domestic markets; all but one of the 15 large firms knew about the existence of NEQS, regardless of whether they exported their outputs (Figure A3.2). NEQS awareness on the part of SMEs was greater for firms active in international markets. As Figure A3.2 reveals, firm size and engagement in exports are correlated, with a far higher share of large firms (typically in the textiles processing sector) selling either all or part of their output overseas.²⁶¹ (The term “engagement in exports” in the caption for Figure A3.2 is a shorthand way of saying a firm either sold all of its output in international markets or sold part of its output domestically and part internationally.) Whether a firm was aware of NEQS was significantly correlated with *each* of the following variables: firm size, industrial sector, and whether a firm exports all or part of

²⁶¹ To determine the statistical significance of the correlation coefficients, the “*p*” statistic was calculated as an estimate of the probability that the observed correlation could have occurred by chance alone. The lower the value of *p*, the more likely the result was not a chance occurrence. A 0.05 level of statistical significance indicates that there is only a 5% chance that the correlation occurred by chance alone. The “ χ^2 *p*-value” in subsequent tables summarizing correlation analysis results is associated with the Pearson Chi-Square test of independence, which is implemented to evaluate whether the observed frequencies of two variables are independent. Correlation analyses were performed using techniques for categorical variables; a categorical variable (sometimes called a nominal variable) is one that has two or more categories, with no intrinsic ordering to the categories. For the case in which each variable could only take on one of two values, the Pearson Chi-Squared Statistic (ϕ) was calculated to indicate the strength of the correlation. For example, the variable NEQS awareness has only two categories: the respondent is either aware or unaware of NEQS. The value of ϕ ranges from -1 to 1, where 0 represents no correlation, 1 represents a perfect positive correlation, and -1 represents a perfect negative correlation.

For cases in which there were more than two values for a categorical variable, Cramer’s V (represented by the symbol “ ϕ_C ”) was calculated to provide an indication of the strength of the correlation. For instance, this was the case in calculating the correlation between NEQS awareness and engagement in exports, where engagement in exports is represented by one of three possible categories: domestic only, international only, or both domestic and international. The value of ϕ_C can range between 0 and 1.

For both ϕ and ϕ_C , a correlation coefficient of 0 represents no correlation, and the greater the deviation from 0, the greater the strength of the correlation. While there are no accepted rules, a value of ϕ or ϕ_C between 0.3 and 0.5 is often considered to reflect a moderate strength of association, whereas values above 0.5 are considered strong. For more on this interpretation, see AcaStat Applied Statistics Handbook,

<http://www.acastat.com/Statbook/chisqassoc.htm> Accessed October 17, 2011.

its output.²⁶² It is difficult to separate the individual influences of firm size, industrial sector and engagement in exports because (except for industrial sector and engagement with exports) the three variables are themselves correlated with each other.²⁶³ For example, in comparison to leather tanneries, textile processing firms in the survey were relatively large (Figure A3.1).

²⁶² In analyses of correlation, values for statistics indicating the strength of correlations with NEQS awareness are tabulated below.

	NEQS Awareness	
	χ^2 p-value	ϕ -coefficient
FIRM SIZE (SME vs Large)	0.00002	0.548
INDUSTRY (Leather vs Textile Processing)	0.002	0.355
MARKET (Domestic vs International or Both)	0.025	0.323*

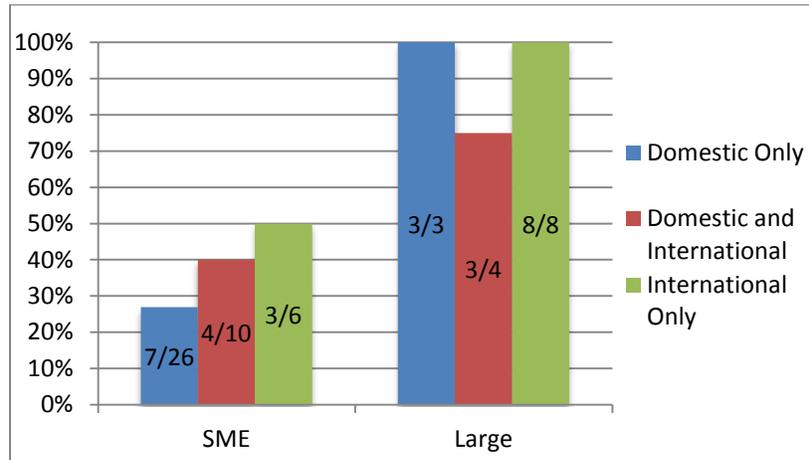
* Value corresponds to Cramer's V (ϕ_C), as opposed to the Pearson Correlation Coefficient (ϕ).

²⁶³ In analyses of correlation, values for statistics indicating the strength of two-variable correlations among firm size, market and industry are tabulated below.

		FIRM SIZE (SME vs Large)	MARKET (Domestic vs International vs Both)	INDUSTRY (Leather vs Textile Processing)
FIRM SIZE (SME vs Large)	χ^2 p-value		0.0038	1.4E-07
	ϕ -coefficient range: -1 to 1		0.438	0.668
MARKET (Domestic vs International vs Both)	χ^2 p-value	0.0038		0.332
	Cramer's V range: 0 to 1	0.438		0.175*
INDUSTRY (Leather vs Textile Processing)	χ p-value	1.4E-07	0.332*	
	ϕ -coefficient range: -1 to 1	0.668	0.175	

- Value corresponds to Cramer's V (ϕ_C), as opposed to the Pearson Correlation Coefficient (ϕ). Note that the association between market and industry is not statistically significant.

Figure A3.2. Variations in Awareness of NEQS with Firm Size and Engagement in Exports
(Numbers within bars correspond to total firms aware out of total firms responding; n=57)



Another finding from the survey was that a number of firms engaged in international trade were experiencing pressure from business customers to obtain ISO 14,001 certification, which would require that they eventually satisfy the NEQS. Many such firms were motivated to meet the national standards but a number of them felt discouraged because they could not afford to do so.

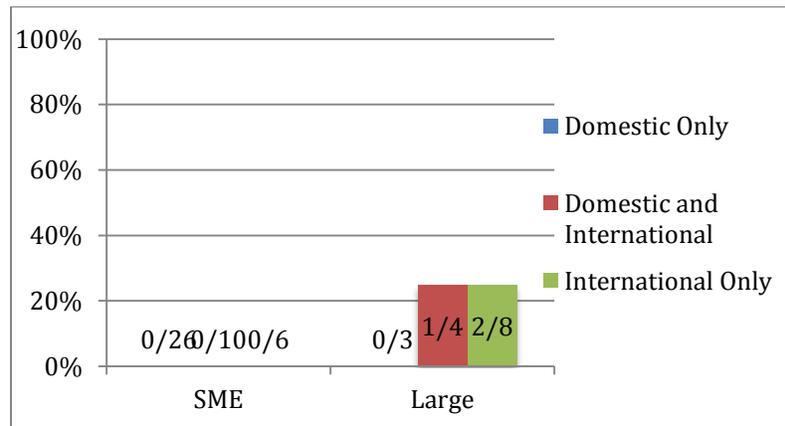
Figure A3.3 shows results for NEQS compliance for the same 57 firms in Figures A3.1 and A3.2, and the extent of noncompliance is striking: 54 of 57 firms failed to satisfy the NEQS. None of the 42 SMEs satisfied the standards. While the compliance results for large firms were better in relative terms, they were nonetheless poor. Only 3 of the 15 large firms were in compliance. All three of these firms were engaged in exports and the one firm that elaborated on the response indicated that the motivations to comply with NEQS were “international customer demands” and “increased competitiveness.”²⁶⁴

²⁶⁴ Values for parameters indicating the strength of correlations with NEQS compliance are tabulated below.

	NEQS Compliance	
	χ^2 p-value	ϕ -coefficient
FIRM SIZE (SME vs Large)	0.022	0.294
INDUSTRY (Leather vs Textile Processing)	Not statistically significant	
MARKET (Domestic vs International vs Both)	0.074	0.351*

* Value corresponds to Cramers V (ϕ_c), as opposed to the Pearson Correlation Coefficient (ϕ).

Figure A3.3. Variations in NEQS Compliance with Firm Size and Engagement in Exports (Numbers within bars correspond to total firms in compliance out of total firms responding; n=57)



A number of reasons were given for the lack of compliance with NEQS by firms that were aware of the standards but out of compliance, and by far the most common was the inability to afford construction of a secondary wastewater treatment plant needed for compliance. By far, the most common rationale for the failure to comply is summarized by this representative comment from one respondent:

Installation of water treatment plant is required, it is expensive and also considered a dead investment as we also have to spend to operate it and do not get any revenues. Moreover, it requires space for its installation that we do not have.

A number of firms mentioned the need for the construction of “combined effluent treatment plants” (CETPs). Respondents making this argument varied in their terminology with some using CETPs to refer to “centralized” or “common” effluent treatment plants. It was typically inferred that these facilities, which would treat industrial wastewater from multiple sources, should be built and operated by others (e.g., the government, or managers of an industrial cluster, or an industrial association), with fees paid by users, presumably based on the volume and strength of their wastes. Another reason mentioned for non-compliance was the unrealistic nature of the NEQS. Some responders said the standards were excessively stringent, especially given conditions in Pakistan. For example, some firms said the standards for biochemical oxygen demand and chemical oxygen demand were too rigorous; they had constructed primary treatment plants but could not meet the standards for these parameters and they could not afford to build secondary treatment plants.

Given the large number of point sources of wastewater and the limited resources devoted to environmental protection in Pakistan, it would be difficult to implement the NEQS without cooperation and support from firms. But obtaining such support requires having discharge standards that are realistically attainable and applied uniformly to firms of a similar size. Additionally, firms need to know that enforcement will be evenhanded to ensure a “level playing field” in the sense that similar firms (i.e., firms in that same industrial subsector using similar production processes) are treated by environmental authorities in the same way in terms of compliance inspections, penalties, and so forth.

The 1993 NEQS did not elicit industrial support because many firms felt the numerical concentration limits were without an adequate basis in logic, arbitrary in many respects and generally unattainable.

SMEs argue that they do not have either the funds for the space to build wastewater treatment plants and thus the only way that many of the SMEs located in industrial clusters can come into compliance with NEQS is with the construction of CETPs. Also, as noted in the survey results above about wastewater treatment plants being a “dead investment,” Pakistan lacks a “culture of compliance” in the sense that compliance with water pollution control regulations is not a social norm in any sense.

The subject of whether or not the current version of NEQS is appropriate is an important one for Pakistan's economic development. Firms that are unable to comply with NEQS and have no hope of doing so will be unable to become certified to ISO 14,001, which requires that noncompliant firms develop plans for coming into compliance with NEQS.

When the NEQS were first issued they were roundly criticized by industry as being both arbitrary and unattainable. Under the circumstances, a set of revisions were made based on a broadly consultative process during the 1996 - 99 period. The process was undertaken by a PEPC-appointed Environmental Standards Committee (also referred to as the Shams Lakha Committee, named after the committee chair), and in 2000 the resulting NEQS revisions were promulgated by PEPC. However, according to Kahn,²⁶⁵ the process of implementing the revised version of the NEQS was stymied by the following events between 1999 and the early 2000s, which changed radically the on-the-ground conditions in Pakistan: (i) the martial law government that came to power in 1999 showed little interest in environmental issues; (ii) events of September 11, 2001 and the US-led invasion of Afghanistan that began soon thereafter had significant repercussions in Pakistan; and (iii) there was an attendant drop in momentum for NEQS implementation by environmental authorities and NGOs. With these changes, the Government of Pakistan's priorities shifted away from many other aspects of government, including industrial water pollution control.

The 1999 modifications in the NEQS were supposed to increase firm compliance to NEQS, but they did not. According to an assessment by Kahn,²⁶⁶

Industrial associations during 1996-1999 in response to consultation process established environmental leadership, environmental committees, and cells. During 2000-2002 most of the environmental committees became dormant due to the absence of any consultation forums at the national and provincial levels. Industrial associations mandated these committees and cells to negotiate with the government and NGOs counterparts on environmental issues. Once the EPAs and NGOs became inactive by themselves then it was natural that the institutional arrangements created in reaction also became inactive.

Many enterprises have indicated an interest in meeting the NEQS but feel stymied because compliance with the standards appears to be well beyond their reach in the current economic context and with current problems of public safety. As mentioned, one of the difficulties is that many regulated firms feel they cannot afford to construct the types of effluent treatment facilities, typically involving chemical and biological treatment processes, needed to meet the NEQS. Also, treatment plant construction is often infeasible because of space constraints. The existence of unattainable NEQS requirements combined with

²⁶⁵ Khan, Azher Uddin. 2003. Past, Present, and Future of NEQS Implementation in Pakistan, unpublished. Sixth Sustainable Development Conference 11-13 December 2003, Islamabad. For an abstract, see: SDPI Research and News, 6th SDC Special Bulletin, Vol. 10, No. 6, November - December 2003. Available at http://sdpi.org/sdpiold/help/research_and_news_bulletin/SDPI_%20research_and_news_bulletin_nov_dec_2003/articles/Day%20two%20articles/NEQS.htm Accessed July 19, 2011.

²⁶⁶ Ibid.

the government's weak environmental enforcement program has led many firms to ignore compliance issues completely. Many of the firms in the aforementioned survey of firms in the leather and textile sectors pinned their hopes of meeting standards in the future on having CETPs built in industrial clusters with subsidies from the government and international donors. This would take much time. In the meantime, firms argue they can only meet the NEQS if they are made less stringent.

The current situation poses stumbling blocks for enterprises trying to attain certification to ISO 14,001 because, as a condition for certification, firms must either be in compliance with the NEQS or demonstrate reasonable progress in meeting the standards. This link between NEQS compliance and ISO 14,001 is notable because certification is increasingly being required by buyers of Pakistani exports in Europe and elsewhere. Without the ability to become certified, Pakistani firms will not be competitive exporters in those contexts.

There is another challenge associated with the NEQS aside from their being beyond the capabilities and resources of many of Pakistan's firms, particularly SMEs. The additional challenge is that the NEQS standards are incomplete because they are based only on concentration (in units such as milligrams per liter) and not on concentration *and* mass flow rate (in units such as metric tons per day). Limiting concentration alone does not constrain the total quantity of waste released. The appropriate way to control total waste quantities is to limit both concentrations and the mass per unit time of waste released.

3.4. Enhancing Environmental Performance of Firms via Cleaner Production

As mentioned, the weak record of EPAs in enforcing water pollution control requirements means many firms can ignore the NEQS without facing penalties. As a step toward making improvements, it would be logical for Pakistan to augment the capacity of EPAs to monitor and enforce compliance with environmental requirements. However, this will be a long-term project because Pakistan is currently undergoing a process of transferring environmental regulation responsibilities from the national government to the provinces pursuant to the 18th amendment of the Constitution. The limited staff that existed in EPAs will be busy in doing the technical and administrative work to assist with this transition process.

Pakistanis need not wait for the long term to see progress with efforts to improve water quality. Results from the aforementioned survey of firms in the leather and textile sectors suggest that short-term progress can be made by placing much more emphasis on the use by Pakistani firms of cleaner production (CP) practices. Cleaner production is commonly defined -- using the United Nations Environment Program's (UNEP) conceptualization -- as "the continuous application of an integrated environmental strategy to processes, products and services to increase efficiency and reduce risks to humans and the environment,"²⁶⁷ and the definition encompasses all similar concepts, such as eco-efficiency, pollution prevention, and waste minimization. This definition, which is widely used by international organizations, does *not* include traditional, end-of-pipe waste treatment as cleaner production. The essence of CP is the modification of product designs, production processes, technologies, and operation/maintenance practices to generate less waste at the source and take advantage of opportunities for on-site recycling and reuse.

Results from the industry survey indicated that even though the enforcement of the NEQS is not strong in motivating CP activity, many of the surveyed firms adopted significant numbers of CP measures and were able to reduce waste discharges at the same time they were cutting costs.²⁶⁸ Instead of pressure to satisfy environmental requirements, the main factors motivating CP implementation centered on: the

²⁶⁷ United Nations Environment Program <http://www.unep.fr/scp/cp/> accessed November 19, 2011.

²⁶⁸ Annex 3, Cleaner Production and ISO 14,001 in Pakistan's Leather Tanneries and Textile Processing Firms.

availability of free or low cost CP-related audit services and advice from Pakistan's three cleaner production centers; pressure to improve environmental performance from business customers (particularly international customers); local environmental concerns; and the motivation and knowledge of individual owners and managers about the ability to enhance competitiveness using CP.

Continuing pressure on Pakistani exporters for improved environmental performance can be expected from the many multinational corporations (e.g., Wal-Mart, IBM, General Motors, and many others) that have stepped up pressures on suppliers to comply with ISO 14,001 and/or score well on audits of a factory's performance against specific environmental and sustainability performance criteria.²⁶⁹ More generally, more multinationals are becoming deliberate in "greening" their supply chains, and this will further increase pressure on Pakistani suppliers in business-to-business transactions.²⁷⁰

In short, given the country's goal of expanding exports of manufactured goods, the GoP cannot afford to be passive about firms' approach to environmental performance. Doing so would leave Pakistani exporters at a disadvantage. To remain competitive, Pakistani firms selling abroad will need to be proactive in becoming certified to industry environmental standards like ISO 14,001 (as well as quality-control standards like ISO 9,000). The environment-related pressure will only increase over the next several years as the EU implements its new regulation on chemicals and their safe use: Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). The stepped-up emphasis by multinationals on environmental responsibility through factory environmental audits and sustainability indexing means environment-related factors can be decisive factors in determining suppliers' success in winning purchasing contracts.²⁷¹

The aforementioned survey of Pakistani firms engaged in CP also found that firm size and extent of operation in international markets helped explain rates of adoptions of environmental management systems and certifications to ISO 14,001. SMEs working in domestic markets generally lagged significantly behind large firms with international business customers. Such results point to the need for the GoP to be more aggressive in fostering adoption of CP and environmental management systems (EMS) as well as certification to ISO 14,001 in order to both improve the competitiveness of Pakistani firms and enhance environmental quality.

3.5. Recommended Approach for Improving Industrial Environmental Management

The impediments to reducing industrial water pollution in Pakistan can be summarized as follows:

- Because of the limited capacity of EPAs in Pakistan, many firms do not face pressure to either comply with NEQS or face notable penalties for noncompliance.

²⁶⁹ Peglau, R. and M. Baxter, 2007, A decade of ISO 14,001, *ISO Management Systems* (May-June): 13 – 20.

²⁷⁰ Srivastava, S.K., Green supply-chain management: a state-of-the-art literature review, *International Journal of Management Reviews*, 9: 53-80; and Walker, H., Di Sisto, L., and D. McBain D, 2008, Drivers and barriers to environmental supply chain management practices: lessons from the public and private sectors. *Journal of Purchasing Supply Chain Management* 14 (1): 69-85. Although definitions vary, Srivastava defines green supply chain management as "integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life."

²⁷¹ Ma, J., 2010, Greening Supply Chains in China: Practical Lessons from China-based Suppliers in Achieving Environmental Performance, WRI Working Paper. World Resources Institute, Washington, DC.

- A large numbers of firms indicated that even if they wanted to satisfy the NEQS requirements, they would be unable to afford the expense of building the necessary treatment facilities; in some cases they added that they lacked space to build a plant.
- Because the NEQS are based only on concentrations, the standards fail to constrain the total quantities of waste entering streams (i.e., mass flow rates).

Pakistan's gaps in implementing environmental regulations are well-known, and there have been many recommendations on how the gaps can be closed. For example, a 2000 UN Industrial Development Organization (UNIDO) report recommended the following as measures for strengthening the regulatory system and institutional capacities in Pakistan:

- Development of ambient air quality standards and drinking water quality standards;
- Strengthening of monitoring infrastructure for air and water quality, e.g. strengthening of laboratories and establishment of air monitoring stations;
- Updating existing monitoring protocols on the basis of the latest developments for effective monitoring;
- Strengthening of staff capabilities in the area of cleaner production, pollution prevention and monitoring, environmental audits, EIAs, public disclosure, community handling procedures and generally for the effective implementation of environmental policies;
- Procedure reforms for implementation of environmental laws, with emphasis on increased responsibility, accountability and de-centralization of authority;
- Effective government action to remove the financial constraints of regulatory agencies and improving job satisfaction and recruitment procedures (including safeguards against political pressure).²⁷²

Recommendations of this sort have been made often in Pakistan, with little effect. The recommendations above center on increasing the capacity of environmental protection agencies, but this is likely to take a long time because of the disruption in routine operations caused by the devolution of environmental responsibilities to the province pursuant to the 18th Amendment to Pakistan's constitution. Below a different approach is recommended, one that focuses on promoting incentives at the firm-level as a way to harness the self interest of firms in enhancing their competitiveness by improving their environmental performance. The recommended approach involves four components:

- Revision of discharge requirements using interim NEQS
- Incentives to control total quantities of waste discharge using pollution charges
- Use of CETPs in industrial clusters
- Increased emphasis on cleaner production and ISO 14,001 certification
- Shift to setting discharge limits to meet ambient water quality standards

Progress on the first floor of these components can be made in the short term; the final item on setting discharge limits to meet ambient water quality standards is a long-term aspiration and not an immediate priority.

²⁷² Aftab, Z. et al. , 2000, Industrial Policy and The Environment in Pakistan, NC/PAK/97/018, (draft dated Dec 11, 2000). Accessed at <http://www.unido.org/fileadmin/import/userfiles/timminsk/rio10-ind-pakistan-eng.pdf> July 19, 2011, p. 46.

3.5.1. *A Set of Interim NEQS*

One way Pakistan can make timely progress in cutting the toll of industrialization on human health and the environment is to prepare a set of interim NEQS that are realistic and reasonably attainable under conditions that currently prevail in Pakistan. The overall approach to revision could include an initial step that involves the prioritization of environmental parameters linked to adverse effects on human health. In terms of water pollution control, reducing morbidity and mortality caused by wastewater releases should be a top priority.

On an interim basis, the current NEQS levels for water quality can be revised downward substantially for parameters relatively less damaging to human health at current levels, such as wastewater discharges of biochemical oxygen demand (BOD) from all but the most significant point sources of BOD. Top priority should be given to imposing stringent concentration restrictions on releases of coliform bacteria, heavy metals, and other hazardous substances. Priority should also be given to maintaining standards at levels to avoid notable nuisance conditions and prevent damage to important ecosystems. A second level of priority can be given to other traditional indicators of water pollution, such as BOD and total suspended solids (TSS). An exception can be made for point sources of water pollution that generate very large quantities of BOD and TSS (e.g., food processing, textile preparation and dyeing, and leather tanning). Over time, as institutional learning occurs, Pakistan's environmental authorities will be well positioned to increase the level of stringency used in regulating pollution parameters initially given a lower priority. In addition to reducing water pollution by making compliance feasible for many more firms, a revised, more attainable NEQS will give a boost to firms eager to enhance competitiveness by satisfying ISO 14,001 certification requirements.

Revision of the NEQS can be accomplished by creating the equivalent of the Shamslakha Committee of the late 1990s.²⁷³ This committee included experts and stakeholders, and did its work by consulting extensively with representatives of enterprises, industry associations, NGOs and the public sector. The new standard setting committee should be charged with determining *interim* NEQS that are realistic for firms to meet while the process of building new CETPs is underway. In addition, the committee should also determine the number of years for which interim standards are to apply, and it should also determine the permanent NEQS that will hold after this interim period. By proceeding in this way, firms will be able to comply with the interim NEQS and therefore enhance their chances of having their environmental management systems certified to ISO 14,001. By having the committee also determine permanent standards, designers of CETPs will have the information they need (i.e., the permanent NEQS, as opposed to the interim NEQS) to ensure that the CETPs meet the permanent standards.

Although provincial EPAs will not be well positioned to enforce the interim NEQS in the short term, firms that are motivated to enhance their export competitiveness should be able to meet the interim standards, thereby satisfying the green supply chain management requirements of multinationals for acceptable environmental performance and certification to ISO 14,001. The permanent NEQS can be more rigorous and protect both human and environmental health in the broadest sense.

3.5.2. *Incentives to Control Total Quantities of Waste Released Using Pollution Charges*

Pakistan's NEQS, even in revised form, will not be effective in bringing down mass flow rates of wastewater releases because the standards are based only on concentration. Incentives for reducing mass flow rates can be put in place using a system of pollution charges that account for both concentration

²⁷³ The NEQS created by the Shamslakha Committee of the late 1990s were not effectively implemented because of the political upheavals in the early 2000's, the period immediately following the Committee's work.

levels and the volume flow rates of effluent discharges. An initial step in moving forward with this approach involves reviving the long dormant system of pollution charges authorized by PEPA, 1997. Section 11 (2) of that law includes a provision authorizing the creation of a pollution charge system:

The Federal Government may levy a pollution charge on any person who contravenes or fails to comply with the provisions of subsection (1), to be calculated at such rate, and collected in accordance with such procedure as may be prescribed.

The previously mentioned Shams Lakha Committee developed rules for the pollution charge system in the later 1990s. However, the Pak-EPA did not enforce the rules, partly because government priorities shifted to the “war on terror” in the post-9/11 period; less attention was given to NEQS at that time. Consequently, by the early 2000s, both industry and provincial EPA's lost whatever interest they once had in the pollution charge system, and the rules developed up to that time were never finalized.²⁷⁴

Pollution charge systems are used throughout the EU and in many countries around the world.²⁷⁵ If the charges are set high enough, as they are in the Netherlands, they provide a significant incentive for firms to cut pollution. Even when charges are set much below the marginal cost of wastewater treatment, they still advance the cause of pollution control because some of the revenues from the charge schemes can be used to support EPA monitoring and enforcement efforts and some can be returned to firms as subsidies to construct wastewater treatment plants. Pakistan's moribund pollution charge system can be restructured such that firms pay charges based on both the concentrations and mass flow rates of their discharges. Based on experience in other countries, EPAs will have an incentive to monitor and enforce the pollution charge scheme because they will receive part of the revenues generated.

Discharges from firms can be measured frequently to get accurate measures. However, for standardized industrial processes, some countries approximate the quantity and quality of effluents using coefficients linking inputs, for example labor and raw materials, to effluents. Firms that feel this approximate method overestimates their charges can use direct measurements of their waste releases instead of using the approximate method.²⁷⁶

The pollution charge approach thus provides an opportunity to generate funds that can be used to subsidize the cost of constructing both CETPs and treatment plants built by individual firms. Revenues generated from these charges can be placed in Provincial Sustainable Development Funds, which can be established under Section 9 of PEPA, 1997. The law further indicates that these funds may be used, inter alia, to support the prevention and control of pollution.

In summary, following procedures used in many countries, pollution charges collected could be used in two ways. The bulk of revenues can be directed towards providing subsidies that will hasten the cleanup

²⁷⁴ According to Luken,(2010) the pollution charge system did not move forward because the government and firms could not agree on the amount of funding generated by pollution charges that would be returned to firms as subsidies for constructing wastewater treatment facilities. Luken , 2010, Consulting Report for the World Bank.

²⁷⁵ For information on the effluent charge systems used in three European countries, see Jan C. Bongaerts and Andreas Kraemer. 1989. Permits and Effluent Charges in the Water Pollution Control Policies of France, West Germany, and the Netherlands, *Environmental Monitoring and Assessment*, 12 (2): 127-147. As another example, the system in China is detailed by Dasgupta, S. et al., 2001, Inspections, pollution prices, and environmental performance: evidence from China, *Ecological Economics* 36: 487–498

²⁷⁶ Jan C. Bongaerts and Andreas Kraemer. 1989. Permits and Effluent Charges in the Water Pollution Control Policies of France, West Germany, and the Netherlands, *Environmental Monitoring and Assessment*, 12 (2): 127-147.

of major point sources of pollution. A portion of the revenues could be directed to supporting environmental protection agencies, and this will provide agencies with incentives to monitor pollution discharges carefully and enforce pollution charge requirements rigorously.

In order to create interim NEQS and implement the pollution charge system, there will be a need for strengthening institutional capacity, as highlighted in the above-cited UNIDO report. As mentioned, during this period of decentralization of environmental regulation responsibilities, strengthening institutional capacity will be a gradual process. That said, a start can be made in the short term and the revenues from the pollution charge scheme will provide an ongoing source of support for the EPAs.

3.5.3. Use of CETPs in Industrial Clusters

Many enterprises in Pakistan, particularly SMEs, face major difficulties in constructing wastewater treatment facilities on their own because of financial constraints and space limitations. One way to deal with these challenges is to construct and operate CETPs in industrial clusters. Pakistan already has many such clusters, but effluents from the vast majority of firms in these clusters remain untreated. CETPs can be effective in this context, particularly when the firms are all of the same type (e.g., clusters of tanneries). As mentioned before, CETPs exist in industrial clusters in Pakistan: a primary treatment plant at Kasur and the secondary treatment plant at Korangi. Both plants suffer from operating challenges due to failure of firms to make required payments. The secondary plant at Korangi has reportedly experienced operating problems because individual tanneries have not put in chromium reduction units at their individual facilities as required. In general, even in clusters, firms that release wastewaters that would disrupt the operation of the CETP must pre-treat their wastes to prevent operating problems at the treatment plant.

Considerations are different in circumstances that allow enterprises to connect to municipal sewer networks that have effluent treatment systems. Because such treatment works are generally not designed to handle some types of industrial wastewaters, on-site pretreatment is often required for firms discharging to municipal sewer networks. By using pretreatment, operations at municipal treatment plants will not be disrupted. As mentioned, firms releasing wastes to CETPs may also be required to engage in pretreatment. This can be done by using on-site treatment as well as materials recovery and recycling methods or other types of cleaner production measures to reduce the quantities of waste generated.

Pakistan faces a major short term challenge: resource expenditures for treatment plant construction are not likely to show results in the form of improved environmental quality until substantial numbers of municipalities and firms come into compliance with standards. In the near term, many effluents that receive treatment will be released into polluted drains and waterways. For example, the CETPs of Korangi and Kasur tanneries are discharging their treated water into polluted drains and having only marginal impacts in improving surface water quality. In other words, because releases from CETPs and other treatment plants are mixing in streams and other watercourses with substantial quantities of untreated municipal and industrial wastes, significant improvements in streams, lakes and other water bodies may not be apparent in the short term. Other challenges occur when municipalities have no treatment systems. These circumstances can be demoralizing to firms that come into compliance with water pollution control regulations, but they represent short-term problems that will diminish over time as more firms and municipalities come into compliance with standards.

The construction of wastewater treatment facilities -- whether they be CETPs, individual industrial facilities, or municipal treatment plants -- is not enough. It is also essential that treatment facilities be properly designed and effectively maintained and operated. As evidenced by the experiences that Kasur

and Korangi, this can be challenging if the firms connected to the CETPs do not carry out their responsibilities for pretreatment and payment of required fees.

There are several advantages associated with the recommended focus on using CETPs and municipal treatment works for all but the large industrial facilities that have the space and funds to build their own treatment units. CETPs take advantage of economies of scale in wastewater treatment construction and operations, thereby allowing firms to overcome the cost constraints that block most firms from building individual treatment systems. In addition, CETPs allow for treatment of many firms that do not have the space to build their own treatment facilities. Also, by limiting the total number of individual treatment plants, the human resource requirements for designing and operating treatment systems and monitoring performance can be significantly reduced. EPAs will therefore have a smaller number of facilities to inspect for NEQS compliance. Given that there are an estimated 8000–10,000 major firms releasing industrial wastewater and a huge number of industrial SMEs, it would otherwise be infeasible for Pakistani environmental officials to enforce regulations.

3.5.4. Increased Emphasis on Cleaner Production and ISO 14,001 Certification

There are important relationships between cleaner production and end-of-pipe wastewater treatment. CP can cut costs of waste treatment because less waste is generated; these two methods for pollution prevention used in conjunction with one another can facilitate firm's ability to comply with domestic and international environmental requirements. In addition, CP can provide economical measures for meeting requirements for pretreatment by firms discharging to CETPs.

In the short term, investments can be made to expand Pakistan's existing CP centers. The justification for this is that those centers already have effective and mutually supporting relationships with managers and staffs at the firms they have served. The expansion can involve two different dimensions. One is to move from the current situation where the centers interact only with several hundred firms to a program that also includes deliberate efforts to disseminate an understanding of Cleaner Production at firms not directly served by the centers. A second area of expansion involves moving beyond current services -- which emphasize energy and environmental audits as a basis for specific CP measures -- to services that help firms develop environmental management systems and view those systems as well as CP as integral parts of their business strategies. In order to improve their competitive positions, Pakistani firms need to develop an appreciation for the broader relationships between Cleaner Production, environmental management systems, satisfaction of the NEQS and certification to ISO 14,001. The latter is important because business customers in the EU and the US are increasingly applying pressure on Pakistani exporters to become certified to ISO 14,001.

The certification process requires a firm that is not in compliance with NEQS to have a plan to come into compliance. The construction of CETPs and the use of interim NEQS can make it possible for a much larger number of Pakistani firms to develop plans for complying with the NEQS, as required for ISO 14,001 certification. By emphasizing the connections between CP, wastewater treatment, and compliance with NEQS, firms will be able to make appropriate decisions on how much waste to reduce and how much treatment to employ.

The importance of certification to ISO 14,001 will only increase in the future because multinationals are ratcheting up the pressure on their suppliers as part of their programs to implement green supply chain management. Eventually, such multinationals will be looking at not only their suppliers but also at the firms that supply their suppliers. In the case of Pakistan, this can include many of the firms that are not exporting their outputs but are supplying firms that do export.

3.5.5. *Making a Long-term Shift to Discharge Limits that Meet Ambient Water Quality Standards*

Given that the existing NEQS are concentration-based standards, meeting the NEQS will not ensure that ambient stream quality is sufficiently high to accommodate intended uses. The customary way to remedy this situation is to set ambient water quality standards and then design discharge requirements so that ambient targets can be met.²⁷⁷ This is a complex undertaking that can be considered as a long-term goal. Even the process of establishing ambient water quality standards itself can take years. PEPA, 1997 authorized the setting of ambient standards but progress has been slow because of a lack of needed data on existing water quality conditions and shortfalls in financial resources and suitably trained staff.

The complexities in using this approach are demonstrated by the experience in the US since passage of the US Clean Water Act in 1972. Implementation of that act called for setting effluent limits in discharge permits based on two requirements: best available technology requirements defined using a complex categorization scheme consisting of municipalities and more than fifty industrial sectors and requirements to meet ambient water quality standards. For the first decade of implementation, permits were issued largely based on best available technology requirements. During the 1980s, following a series of court actions, the US EPA initiated a process of revising its approach so that ambient water quality conditions would be accounted for more carefully. The issues were exceedingly complex because many of the nonpoint sources -- e.g., wastewater from agricultural areas and urban runoff -- remained unregulated and growing in significance at the same time that point sources were being treated using best available technology. To make progress, US EPA introduced a complex scheme based on "total maximum daily loads," defined as the maximum amount of a pollutant that a body of water can receive and still safely meet ambient water quality standards.²⁷⁸ As of 2011, the implementation of the total maximum daily loads system remained far from complete.

For Pakistan, a system of pollution discharge licenses (or permits) based on attainment of ambient water quality standards is a worthy long-term goal. It would allow for the development of a management approach that accounts for differences in the nature of the watercourses receiving wastes as well as differences in quantities of wastewater released. This overall approach recognizes that some streams could be designated for low-quality uses such as industrial cooling water and other streams could be intended for higher quality uses, such as domestic water supply.

The several recommendations discussed above are feasible over different time spans, but the changes would require, at several stages, approval from PEPC. This could be problematic because PEPC is a body that has met very infrequently in the past. This underscores the importance of political will in making progress toward improving water quality in Pakistan.

3.5.6. *Considering a Tax to Deal with Chromium Wastes from Tanneries*

A significant water pollution control challenge in Pakistan is linked to the discharge of chromium wastes from leather tanneries. There are two common oxidation states for chromium: Cr (VI), hexavalent chromium, which is a soluble and highly toxic aqueous contaminant; and Cr (III), trivalent chromium, which is more stable in ambient environmental conditions, insoluble, and considered nontoxic. The

²⁷⁷ Ambient standards are distinguished from discharge requirements. While ambient standards can legitimately be framed in terms of concentration only, discharge requirements should include limits on *both* concentration and mass flow rate.

²⁷⁸ For the history of the TMDL approach, see Birkeland, S. 2001, EPA's TMDL Program, *Ecology Law Quarterly*, 28-2: 297 -325.

chromium used and discharged by tanneries is predominantly the relatively innocuous Cr (III), although in some tannery practices Cr (VI) is also involved. While Cr (III) is the predominant species, several studies support the view that in the context of tanneries, there is a risk of oxidation of Cr (III) to Cr (VI) and potential dispersion into the aqueous environment. The highest risks of oxidation occur if tannery sludge is exposed to very high temperatures or if the sludge or sediments in the discharge environment contain manganese oxides, particularly in the absence of strong reducing agents such as organic matter, FE (II) or sulfides.²⁷⁹ The reason pollution from tanneries is so challenging is because most of the several hundred tanneries are SMEs that release untreated wastewater. Because they are small and numerous, it is difficult for EPAs to conduct monitoring and control water pollution from this sector using traditional environmental regulations.

A possible response to this challenge that is worth considering involves imposition of a tax on chromium sulfate, which is a basic input to the leather tanning process. The underlying notion is that a tax on a chromium sulfate would result in higher prices to tanneries, and would provide them with incentives to reuse and recycle chromium. OECD countries have imposed hundreds of environment-related taxes on inputs such as pesticides, but a search of the literature on green taxes suggest that a product tax on chromium sulfate as a pollution control measure has not been used elsewhere, and therefore Pakistan would be in the position of having to learn by doing if such a tax were imposed.

In addition to the risks associated with innovation in this area, a number of issues would need to be explored in depth before a tax on chromium could be considered seriously. One such issue is the potential negative impact of a chromium tax on the competitive position of Pakistan's leather exports. In addition, studies would need to be done of ways to offset these adverse effects by subsidizing chromium recycling and reuse at tanneries. In this way, the tax on chromium sulfate would provide the incentive to consider recycling seriously and a subsidy program would make it financially feasible to do so.

3.6. Conclusions and Recommendations

Pakistan has an elaborate framework for environmental management, including detailed regulations governing the control of water pollution, but regulations are not effectively implemented. Currently, the institutional framework for environmental management is in transition because the 18th Amendment to Pakistan's Constitution requires that environmental regulations be decentralized to become responsibility of the provinces. Pakistan's past implementation problems are well known and many recommendations for improvement have been made, but the recommendations have typically been general and often not followed.

The approach recommended herein consists of several specific changes that can be effective. The main element of the approach builds upon the self-interest of firms to improve their competitive positions and decrease their costs by adopting economically efficient cleaner production approaches and becoming certified to ISO 14,001. Certification requires that firms have environmental management systems in

²⁷⁹ Given that Cr (VI) is a strong oxidant, it is likely to be reduced to the more stable Cr (III) species, particularly in circumstances where organic matter is present (Fendorf, 1995), as is the case for tannery sludge. However, documentation of appreciable Cr (VI) concentrations in surface and groundwater despite presumed Cr (VI) reduction have led to investigations on the potential for the oxidation of Cr (III) to Cr (VI) (Avudainayagam, 2003). Results of such studies indicate that, in context of tanneries, it is possible for Cr (III) to be oxidized to Cr (VI) by oxygen at high temperatures in a solid phase, or by manganese oxides in the discharge environment or sludge when in an aqueous phase, (Apte, et al., 2005). Although this conversion is largely transient in the presence of reducing agents that will convert Cr (VI) back to Cr (III), depending on discharge conditions (e.g. into environments high in manganese oxides and low in organic material), it may be possible for some Cr(VI) to enter the aqueous phase before reduction back to Cr(III), thereby contaminating local water sources. (Apte, et al., 2006).

place and be meeting applicable environmental regulations (or making progress towards meeting regulations). A start has already been made in this direction: Pakistan has three active cleaner production centers with solid records of experience. The work of these centers should be expanded beyond their current focus, which centers on the leather and textiles industries, and focuses largely on conducting audits and making recommendations for specific CP measures. Much more emphasis should be given to the relationships between cleaner production, wastewater treatment, environmental management systems, NEQS and ISO 14,001.

Many Pakistani firms selling in international markets have experienced the increasing pressure being applied by international business customers for enhanced environmental performance by their suppliers, and these pressures are only expected to increase as multinationals and other, smaller firms continue to embrace green supply chain management. Other sources of environment-related pressure on Pakistani exporters will take the form of the EU's REACH requirements, which are scheduled to unfold over the next several years.

Another aspect of the approach recommended herein involves changes in the NEQS to bring them in line with what is reasonably attainable given the current economic conditions and political instability in Pakistan. This change, which involves creating less stringent interim NEQS to be applicable over a fixed period of time, will make certification to ISO 14,001 feasible for many firms that are now blocked from doing so. The focus of the NEQS revisions should be in maintaining relatively demanding requirements for pollutant indicators linked to adverse impacts on human health and important ecosystems. Coliform bacteria is an example of a parameter that should be stringently regulated, since biologically contaminated water supply plays a significant role in the high rates of infant morbidity and mortality associated with diarrheal diseases and typhoid. Relatively demanding requirements should also be in place for other water quality parameters linked with human health, such as heavy metals. The NEQS can be revised downward for other parameters such as BOD, except for industries that have relatively high BOD loadings.

Other recommended changes involve giving life to the legislatively-approved pollution charge system so that revenues can be generated to subsidize construction of CETPs in industrial clusters, thereby making it possible for SMEs to comply with standards. The charge system would also motivate environmental protection agencies to do their work thoroughly, since a portion of the charges collected could be earmarked as revenues for those agencies. The potential for a tax on chromium sulfate to manage the challenges associated with chromium wastes from tanneries should be analyzed. These wastes have the potential for increasing ambient environmental levels of hexavalent chromium, a highly toxic chemical.

To make long term progress in enhancing water quality, however, there is no substitute for building a culture of compliance with water pollution control regulations. This requires improved citizens' understanding of the costs of degradation as a way to build broad public support for making improvements in environmental quality. It also requires political independence on the part of environmental officials implementing regulations.

Broad public support and political independence may be difficult to organize in the short term, but there are a number of straightforward changes that regulators can make to foster compliance by firms. Consider Pakistan's widely ignored requirements for self monitoring and reporting of pollution discharges. Environmental authorities can increase the submission of reports by making it standard practice to treat failure to submit self monitoring reports as being equivalent to a failure to meet discharge requirements; this would expose delinquent firms to noncompliance penalties.

Environmental authorities could also educate dischargers by clearly defining expectations on what

constitutes compliance and the penalties for noncompliance. In addition, penalties for noncompliance should be made predictable by having them be based on a uniform national water pollution policy. The US Environmental Protection Agency has accomplished this by calculating penalties using standard procedures: the baseline penalty is the present value of funds saved by a firm by remaining out of compliance (e.g., by not building and operating required wastewater treatment facilities). This baseline penalty is increased based on factors such as the seriousness of the violation and the compliance history of the firm. These types of changes, in which firms understand that regulations will be enforced and noncompliance will be penalized using standard procedures, will eliminate firms' concerns that competitors are being treated more leniently.

One way or another, the costs of dealing with pollution will be paid, and having pollution control requirements is a way of determining who pays. Pakistan has not adopted the "polluter pays principle," which has been employed in a number of OECD countries. The idea behind the principle is that, in general, the cost of pollution control, prevention and remediation should be borne by the polluter. Failing to adopt the principle means that someone other than the polluter is paying substantial costs.²⁸⁰ For example, allowing firms and municipalities to discharge effluents that decrease human health and welfare constitutes a transfer of wealth *from* those who bear the burdens of pollution (e.g., in the form of adverse health effects, increased health care costs, and diminished ability to use water resources) to those who are releasing the wastewaters and degrading natural waterways. In addition to this wealth transfer, economic inefficiencies could be significant as there is no balancing between the incremental cost of waste reduction and the incremental damages caused by waste releases. To allow wastewater to be released without effective regulatory controls is to accept the potential for significant economic inefficiencies and condone implicit practices of social burden shifting (e.g. burden shifted from polluters to the general population in form of health and welfare costs). Significantly, it is often the poor who suffer most from this burden shifting because they are the least able to take actions to defend against pollution.

²⁸⁰ For more on this point in the context of Pakistan, see Luken (2010), who observed that, in addition to the monetary costs of environmental degradation, there are several practical adverse effects, such as the government's failure to obtain funds from pollution charges that could be used to support wastewater treatment. Luken, R.A., 2010, Consulting Report Commissioned by the World Bank.

ANNEX 4. CLEANER PRODUCTION IN PAKISTAN'S LEATHER TANNERIES AND TEXTILE PROCESSING FIRMS²⁸¹

4.1. Introduction

For more than 15 years, a number of initiatives have been launched to advance cleaner production (CP) practices in Pakistan. Among the key actors in moving CP forward, Pakistan's cleaner production centers and their funders stand out. Other notable stakeholders in CP include industrial trade associations, such as the Pakistan Tanners Association and the All Pakistan Textile Processing Mills Association.

This annex examines CP at leather tanneries and textile processing firms served by two of Pakistan's three CP centers.²⁸² The center with the broader scope, in terms of geographic coverage and industrial sectors served, is the Cleaner Production Institute (CPI), which has headquarters in Lahore. (Figure A4.1 contains a location map.) The Institute was created in 2004 with support from the Royal Netherlands Embassy, which had previously supported a program on environmental technology and CP in Pakistan from 1996-2003. The Cleaner Production Institute provides services (primarily in Lahore, Karachi and Faisalabad) to firms engaged in leather tanning and textile processing, and to a lesser extent in the sugar and pulp and paper sectors. For technical services, CPI often partners with NEC Consultants, one of Pakistan's larger environmental consulting firms.

²⁸¹ Note: this annex was prepared by Leonard Ortolano, Ernesto Sanchez-Triana, Ch. Laiq Ali, and Susan Rebellon. This annex is based primarily on consultant reports prepared by Ch. Laiq Ali, R. Laiq and A. Khan as part of the Mainstreaming Sustainability into Pakistan's Sustainable Industrial Growth, Non-Lending Technical Assistance. The findings, interpretations, and conclusions expressed in this appendix do not necessarily reflect the views of the staff or Executive Directors of The World Bank or the governments represented by the Executive Directors.

²⁸² The third center, the National Cleaner Production Centre-Foundation is as much a for-profit consulting firm as a CP center. It provides services (primarily to the oil and gas sector) that include: compliance monitoring of industrial effluent and emissions, incineration and bioremediation to dispose hazardous waste, environmental impact assessments and energy audits. It is omitted in this analysis because it was not possible to assemble sufficient high quality data from the firms served by NCPC-F.

Figure A4.1. Location Map



The second center examined herein is the Cleaner Production Center (CPC), which is headquartered in Sialkot, a city about 125 km (78 mi) north-west of Lahore and only a few kilometers from the Indian border. CPC was established in 1999 as a joint project of the Pakistan Gloves Manufacturers and Exporters Association and the Trade Development Authority of Pakistan. Its operations focus on leather tanneries in and around Sialkot. Both CPC and CPI provide highly subsidized services to firms and their ability to provide plant level energy and environmental audits and other CP-related services at current levels depends on their success in securing funding from international aid organizations and/or the government.

This annex discusses the reasons firms adopt cleaner production measures by analyzing the results from a survey administered to firms served by CPC and CPI. Data was gathered in the course of a 2009-10 survey of firms conducted as part of this analytic work in two industrial subsectors: leather tanning and textile processing. The survey involved structured interviews with CEOs and senior managers at firms in three cities: Sialkot, Lahore and Karachi. Implementation of the survey involved interviews by Pakistani consultants that lasted three to five hours per interview. In addition to the survey, detailed case studies were also conducted at several firms.

Many firms surveyed in the course of this analytic work adopted significant numbers of CP measures. The main factors driving CP implementation centered on: the availability of free or low cost CP-related audit services and technical assistance from the two CP centers; pressure from international business customers on firms engaged in exports to improve their environmental performance; local environmental concerns; and the advantages of CP in terms of cost savings, increased product quality, and enhanced overall competitiveness. Only a few firms took action in response to pressure from environmental protection agencies (EPAs) and many small and medium sized enterprises (SMEs) had no contact at all with EPAs. Firm size and extent of international customer base were key factors associated with the extent of CP adoption. SMEs working in domestic markets lagged significantly behind large firms with international business customers (especially customers from the EU and US). Firm size and extent of operation in international markets are also correlated with rates of adoption of environmental management systems and certifications to ISO 14,001.

The organization of the remainder of the annex is as follows. The next section summarizes the study approach and data sources, and this is followed by sections 3 and 4, which examine the adoption of CP in leather tanneries and textile processing sectors, respectively. Section 5 summarizes case study results at two relatively high performing firms—one tannery and one textile processing firm -- served by the CP centers to elaborate on some of the motivations for adopting CP measures and the benefits that result from adoption. Section 6 looks at the links between ISO 14, 001 and environmental protection in Pakistan. The penultimate section discusses results in the context of the broader literature on factors affecting CP adoption and the last section contains conclusions.

4.2. Study Objectives and Data Gathering Approach

The annex identifies the parameters that help explain why some firms served by the centers have embraced CP fully and others have taken only modest steps to adopt CP measures. In doing so, the annex also explores the principal motivations of firms for implementing CP measures as well as their adoption of environmental management systems (EMS) and certification to ISO 14,001.

The overall objectives of the analysis reported herein is to learn about CP adoption and use in Pakistan by examining several questions in the context of leather tanneries and textile processing firms served by CPI and CPC. The following are among the principal questions explored:

- How do firms conceptualize cleaner production and what did they do with the technical information about recommended CP measures?
- What motivates firms to adopt CP measures and one of the resulting benefits?
- Are firms aware of Pakistan's National Environmental Quality Standards (NEQS)?
- What linkages, if any, do firms see between cleaner production, compliance with NEQS, environmental management systems and certification to ISO14,001?
- Do firms see linkages between CP and their overall business operations and management strategies?²⁸³

The analysis synthesizes and extends data gathered by three consultants who worked in the context of a broader World Bank “Non-Lending Technical Assistance” project for the GoP’s Ministry of Industry.²⁸⁴ The information gathering strategy employed surveys of firms served by the CP centers. In addition, a number of interviews were conducted with: (i) staffs at CPC and CPI; (ii) officials with Pakistani environmental agencies in charge of determining compliance with environmental requirements by the firms; and (iii) staffs of relevant business chambers, industrial trade associations, and civil society organizations.

The key data source is a survey undertaken using interviews by Pakistani consultants that lasted three to five hours per surveyed firm. Typically, those interviewed included a firm’s CEO and/or its top managers. The survey included about 25% of the 222 *leather tanneries* using the services of the CPC office in Sialkot and about 25 % of the 45 tanneries served by CPI in Lahore and Karachi. The survey also included a sample of the *textile processing* firms served by CPI, which, through its offices in Lahore,

²⁸³ In an effort to explain observed outcomes, calculations were made to discover correlations among key variables (e.g., correlations between firm size and use of EMS). These correlation results are detailed in the summary report: “The Greening of Pakistan's Industrial Sector: A Necessary Condition for Meeting Pakistan's Economic Development Goals”

²⁸⁴ The consultant reports (all unpublished reports to the World Bank) are as follows: Azher Uddin Khan, 2010, Evaluation of Industrial Environmental Management-Pakistan; Ralph (Skip) Luken, 2008, Cleaner Production In Pakistan; and Ch. Laiq Ali, 2011, Implementable Recommendations for Cleaner Production Programs in Pakistan.

Faisalabad and Karachi, has implemented CP interventions in 117 textile processing firms in Punjab and Sindh.²⁸⁵ The firms to be surveyed were all randomly selected.

The survey centered on leather tanneries and textile processing for two reasons: (i) textiles and leather are two key sectors in Pakistan's manufacturing economy; and (ii) textiles and leather are among the most polluting industrial sectors, and, within these sectors, production of cloth and tanning of leather are the most polluting processes. While leather is not as important as textiles in terms of contributions to Pakistan's economy, the pollution from leather elevates its significance from an environmental perspective. Results below concern a subset of survey responses, namely those for which all relevant questions were answered; in all figures, "n" represents the size of the sample that contained usable responses for the variables presented.

In addition to the survey, case studies of several of the surveyed firms were conducted to document in detail the CP measures undertaken by the firms and the costs and benefits of selected measures. The case studies presented herein concern a tannery in Sialkot and a textile -processing firm in Faisalabad. The case study firms were not randomly selected and they are not representative firms. Case studies firms were selected opportunistically, based on the ability to gain access to records and staff.

²⁸⁵ CPI provides services to 45 such firms in the Lahore area, 51 in Faisalabad, and 21 in Karachi.

4.3. CP Performance at Tanneries Served by CPC and CPI

Tanning is a process for converting animal skins into leather by treating the skins with natural or synthetic chemical agents to preserve and toughen them. Although tanning is an ancient technique based on the use of tenants, modern methods use chrome salts and are much faster, taking hours rather than weeks. As preparation for tanning, the skins are unhaired, degreased, desalted and soaked in water. The next stage involves the actual tanning and other chemical treatments. This is followed by the application of “retanning agents” and dyes to provide the physical strength and properties desired. This is followed by surface applications to color and protect the leather or mask its imperfections.

The history of the leather industry in Pakistan is as old as the country itself. At the time of independence there were only a few tanneries producing sole leather and they were small scale operations. The industry started developing during 1950s from Karachi and Lahore and gradually spread to other cities. As of the end of 2010, there were more than 2,500 leather processing units (including both registered and un-registered units). Over the years, the number of registered tanneries in the country has increased from 529 in 1999 to more than 700. However, in recent years the leather industry experienced a decline in exports, with the share of the leather sector in Pakistan’s total exports dropping from more than 10% in 1989-90 to just over 5% in more recent years.

The two cleaner production centers have standard protocols for giving advice on CP measures to tanneries. As shown in Table A4.1, their protocols differ. CPI considers a standard set of 37 CP measures in its work, whereas CPC analyzes only 19. Table A4.1 presents the CP measures in the words and order employed by the two centers.

Table A4.3. CP Options Provided to Leather Tanneries by CP Centers

Option	CPC Leather Tanneries	CPI Leather Tanneries
1	Awareness about handling of hazardous chemicals & storage techniques	Blow down on the basis of TDS measurement
2	Awareness about quick quality tests to ensure uptake of chemicals	Boiler feed water treatment; installation of RO Plant;
3	Chrome management & chrome recycling techniques. Guidance on avoidance of usage of heavy water	Chemical substitution (hazardous chemicals to environment friendly)/Conservation
4	Chrome recovery	Chrome recovery plant
5	Construction of grit chambers	Chrome recycling & reuse
6	Environmentally friendly chemicals	CO2 de-liming (complete demonstration at laboratory scale)
7	Enzymatic sulfide free un-hairing	Compressor pressure optimization
8	Good housekeeping & floor management	Dust collector; construction of septic tanks; and installation of screen bars;
9	High chrome exhaustion techniques	Good housekeeping and floor management
10	Improvement in intensity of light through testing	Heat recovery by the installation of heat exchanger
11	Installation of dust collectors	Implementation of process control laboratory (basic five-test capability)
12	Mechanical de-salting before soaking	Improved chemical storage practices
13	Posting of safety signs & awareness trainings.	Improvement in boiler’s instrumentation/replacement of old boilers with new energy efficient boilers

14	Process/recipe improvement reports	Improvement in lighting (replacement with energy savers); installation of new generator.
15	Reduced amount of salt for preservation	Improvement in the instrumentation of the compressed air system
16	Reduction in water consumption by better housekeeping methods.	Improvement of condensate recovery system
17	Solid waste collection equipments for chemical handlings.	Inspection, repair and replacement of steam traps
18	Use of energy efficient meters	Installation of compressed air receiver tank
19	Use of personal protective equipments for chemical handling.	Installation of guns/ small diameter pipe on compressed air service points
20		Installation of safety valves, pressure reducers, steam flow meters at steam distribution system
21		Installation/optimization of economizer on boiler's stack
22		Insulation of bare/improperly insulated hot surfaces (steam and condensate pipelines, hot water and steam condensate tanks)
23		Lime recycling
24		Maintenance of steam distribution system
25		Optimization of boiler's burner; installation of temperature controller.
26		Optimization of boiler's operating pressure
27		Posting of MSDS [Materials Safety Data Sheets] signs within the chemical store
28		Posting of safety signs and associated awareness training
29		Power factor optimization
30		Preventive maintenance of thermal, electrical and mechanical systems; installation of humidity controller
31		Replacement of compressor (piston with screw)
32		Salt de-dusting; equipment installation and implementation
33		Segregation of tanned and un-tanned solid waste
34		Use of de-dusted salt in pickling process
35		Use of energy efficient motors / installation of energy efficient spray plant, etc.
36		Use of personal protective equipments (PPEs) for chemical handling
37		Water conservation (from continuous to batch wash, float control through flow meter and low flow techniques

4.3.1. CPC in Sialkot

In terms of total numbers of firms served, CPC plays a dominant role in moving the CP agenda forward among tanneries in and around Sialkot. In doing so, however, it faces substantial challenges, primarily because about 95 % of the tanneries involved are SMEs. (Adapting the definition used by Pakistan's, Small and Medium Enterprise Development Authority [SMEDA], SMEs are defined herein as firms with less than 250 full time employees.²⁸⁶) In general, SMEs have limited resources available for investments in CP and environmental management; in addition, their managers and staffs often lack training and experience in environmental management in general and in CP in particular, and they often have little capacity for the type of technology innovation and change associated with CP.²⁸⁷

The Cleaner Production Center works with 222 of the 250 tanneries located in 10 different clusters in the Sialkot area. 56 of the 222 tanneries were selected at random for inclusion in the survey, and 86% of the surveyed firms indicated that they focus on domestic markets. Most firms surveyed reported their staff size, and it was clear from their responses that the vast majority of firms self identified as "small," with some having as few as 6 workers and many having staffs of less than 15. Nearly all of the few relatively large firms would also be considered SMEs, given that their staff sizes were almost always well below 250. The surveyed firms oriented toward domestic markets reported that they do not have experience with multinational firms that are pressuring their suppliers to improve environmental performance as part of broader efforts to "green" their supply chains and satisfy importing-country environmental regulations, such as European Community regulation on chemicals and their safe use (EC 1907/2006): Registration, Evaluation, Authorization and Restriction of Chemical substances (REACH).²⁸⁸

In working with the tanneries, CPC routinely provides them with information on the range of CP measures shown above in Table A4.1. To illustrate the levels of uptake of CP measures, overall results for the adoptions by firms in Sialkot are shown in Table A4.2. As shown in the table, there is widespread acceptance of CP measures and the firms clearly have seen resulting benefits. The benefits reported by survey respondents include: notable monetary benefits in the form of cost savings; improvement in the environment for workers in terms of health and safety, reduced releases of pollutants to the air and water, enhanced compliance with legal obligations of industry, and improved competitiveness.

²⁸⁶ SMEDA (Small and Medium Enterprise Development Authority), 2007, *SME Led Economic Growth – Creating Jobs and Reducing Poverty*, Ministry of Industries, Production & Special Initiatives, Government of Pakistan, Islamabad. This source includes other criteria for defining SMEs: paid up capital up to Rs. 25 million and annual sales up to Rs. 250 million. The report also acknowledges that other GoP agencies use different definitions and recommends that they all adopt the SMEDA definition.

²⁸⁷ For a review of the literature on the challenges faced by SMEs in environmental management, see Del Brio, J.A., and B., Junquera, 2003, A review of the literature on environmental innovation management in SMEs: implications for public policies, *Technovation*, 23:939 – 948; see, also, Korea-World Bank, , undated, *Environmental Management of SMEs and Industrial Zones for China*, Available at: http://siteresources.worldbank.org/INTEAPREGTOPEENVIRONMENT/Resources/Envi_Man_SME_China.pdf Accessed November 21, 2011

²⁸⁸ Under REACH, manufacturers and importers are required to gather information on the properties of their chemical substances, which will allow their safe handling, and to register the information in a central database run by the [European Chemicals Agency \(ECHA\)](http://ec.europa.eu/chemicals/) in Helsinki. A very few of the tanneries surveyed mentioned their need to demonstrate that they were not using chemicals on the "candidate list" of substance of very high concern released by the EU in 2008.

Table A4.2. Extent of CP Interventions Implemented in Sialkot (n=56).

No.	CP Measure	Benefits	Percentage (%) of firms implemented the CP Measure
1	Awareness about handling of hazardous chemicals & storage techniques;	Improved health and safety	73
2	Awareness about quick quality tests to ensure uptake of chemicals;	Quality improvement	88
3	Chrome management & chrome recycling techniques. Guidance on avoidance of usage of heavy water;	Environmental improvement and cost savings	11
4	Chrome recovery;	Environmental improvement and cost savings	14
5	Construction of grit chambers;	Pollution control	32
6	Environmentally friendly chemicals;	Environmental improvement	59
7	Enzymatic sulfide free un-hairing;	Environmental improvement / pollution control	0
8	Good housekeeping & floor management;	Energy / water conservation, cost savings, good company image	75
9	High chrome exhaustion techniques;	Quality improvement / environmental improvement	80
10	Improvement in intensity of light through testing;	Better working condition	52
11	Installation of dust collectors;	Pollution control, improvement of working conditions / improved worker health and efficiency	63
12	Mechanical de-salting before soaking;	Salt/energy/water conservation, cost savings	16
13	Posting of safety signs & awareness trainings;	Improvements to working environment	52
14	Process/recipe improvement reports;	Quality control and improvement	84
15	Reduced amount of salt for preservation;	Cost savings	7
16	Reduction in water consumption by better housekeeping methods;	Water conservation, reduced effluent	79
17	Solid waste collection;	Environmental improvement	55
18	Use of energy efficient meters;	Energy conservation and cost savings	38
19	Use of personal protective equipments for chemical handling.	Improvement to personal health and safety	66

As shown in Table A4.3, of the 19 CP measures suggested to the tanneries in and around Sialkot, 13 measures were adopted by more than half of the surveyed firms. This robust uptake of CP measures occurred even though 43% of the 56 surveyed firms had no understanding of the concept of cleaner production²⁸⁹ and another 43% only had a vague idea of what the term “cleaner production” meant. Put

²⁸⁹ In the context of this annex, cleaner production (CP) is defined -- using UNEP’s conceptualization -- as “the continuous application of an integrated environmental strategy to processes, products and services to increase efficiency and reduce risks to humans and the environment” and encompasses all similar concepts, such as eco-efficiency, pollution prevention, and waste minimization. This definition, which is widely used by international organizations, does *not* include traditional, end-of-pipe waste treatment as cleaner production. A definition that

differently, most firms surveyed in Sialkot were not able to give a formal definition of CP, nor were they able to demonstrate a thorough understanding of all the benefits of CP. This raises a question: given that firms do not understand CP at a conceptual level, why have they embraced CP measures? This outcome is explainable inasmuch as the firms adopted many proposed CP measures that involved low cost and had obvious financial benefits; examples are given by many options grouped under the rubric of "good housekeeping."

Table A4.3. CP Measures Adopted by at least 60% of 56 Surveyed Tanneries Served in Sialkot

Rapid quality tests to ensure the uptake of chemicals-- improved product quality (88%)
Prepare process and recipe improvement reports -- quality control (84%)
Use high chrome exhaustion techniques –product quality and environmental protection (80%)
Improve general housekeeping and floor management – reduced water and energy usage (75%)
Improve chemical storage and handling–enhanced worker health and safety (73%)
Install dust collectors -- a measure to enhance worker health and safety (63%)

The need to meet environmental standards and avoid penalties for noncompliance was not a reason for implementing CP for a vast majority of the 56 surveyed firms. About 79% of the respondents from the 56 firms either were completely unaware of Pakistan's NEQS or had no knowledge of whether or not their firms were in compliance with those standards. Moreover, many of the respondents had virtually no contact with either the national or provincial environmental regulatory authorities. This lack of significance of environmental regulations on CP adoption is notable given that a key factor in explaining CP adoption in other countries is the firms' desire to meet applicable environmental standards and avoid noncompliance penalties.²⁹⁰

In addition to being unconcerned about environmental regulations, 75% of the surveyed tanneries had not adopted environmental management systems. Moreover, only 25% of the survey respondents claimed to be familiar with ISO 14,001 certification, and a scant 13% of the firms were either ISO 14,001 certified or working toward becoming certified. Most of the surveyed firms in Sialkot sell primarily in domestic markets, and they are not under pressure from international business customers to adopt EMSs and become certified to ISO 14,001. Moreover, survey responses indicate many of the firms do not see any linkage between an EMS and improvements in product quality or environmental performance. Only about a quarter of the firms had conducted energy audits and environmental audits. Collectively, these results indicate that meeting applicable environmental regulations is not an important consideration to the vast majority of the 56 surveyed tanneries in the Sialkot area.

When queried about how they had obtained CP-related information, 88% of the 56 respondents mentioned the significance of the information, guidance and training provided by the CPC and/or the Pakistan Tanners Association. In general, CPC played a key role in advocating for adoption of cleaner production measures, and it did so by providing a number of services without charge. This included making the tanneries aware of applicable cleaner production options and providing consultation services throughout the CP implementation process. In some instances, CPC provided equipment, such as desalting tables. In numerous cases, it provided design documents, for example, for dust collectors.

captures the essence of CP is one that mentions the modification of designs, production processes, technologies, and operation/maintenance practices to generate less waste at the source and take advantage of opportunities for on-site recycling and reuse.

²⁹⁰ See, for example, Warren, K. A. and L. Ortolano, "Pollution Prevention Incentives and Responses in Chinese Firms," *Environmental Impact Assessment Review*, Vol.19, No.6 (1999), pp.521-540; and Jiang, R.J., and P. Bansal, 2003, "Seeing the need for ISO 14, 001," *Journal of Management Studies*, 40:4, 1047 -- 1067.

In terms of factors motivating the implementation of CP measures, 79% stressed the desire to improve worker health and safety conditions and to protect the environment. Between 60 and 65% of respondents mentioned cost savings (e.g., via reduced use of materials or chemicals) and product quality improvement (an important factor in maintaining competitiveness) as factors influencing their decision-making.

Survey respondents were also asked to highlight obstacles to implementing CP measures. Based on the responses from the 56 firms surveyed in the Sialkot area, the following obstacles appear to be typical for these firms:

- High cost of CP equipment and technology
- Low education levels of workers and owners
- Insensitivity of staff members to environmental issues
- Lack of professionals with the needed knowledge and skill to implement CP measures
- Absence of support for CP measures on the part of workers and owners

As examples of cost constraints, a number of respondents indicated that financial constraints prevented them from installing dust collectors and purchasing water flow meters. As will be clear from the discussion below, the situation is quite different in Lahore, where, apart from the traditional concerns for high returns on investments and short payback periods, the tanneries faced no notable obstacles to CP adoption.

4.3.2. *CPI in Lahore*

The CPI office in Lahore works with 20 tanneries in and around the Lahore area and five of them were selected at random for inclusion in the survey. In contrast to tanneries in Sialkot where SMEs dominate, the tanneries in Lahore included both relatively large SMEs (staff sizes as high as 120) as well as a few large firms, one of which had a staff size of 500. Each of the five surveyed tanneries operated in both local and international markets.

Based on responses to the survey, it was clear that most respondents from surveyed firms in Lahore had a thorough understanding of CP and the associated benefits, which they characterized as: energy and water conservation, product quality improvement, reduced costs, and enhanced competitiveness. Like CPC, one of the services provided by CPI includes details on CP options available to tanneries.

Four out of the five surveyed firms adopted 25 of the 37 CP measures presented by CPI (i.e., about 68% of the total number of options). Some of these measures -- installation of dust collectors and improved general housekeeping and chemical storage and handling measures -- were the same as those widely adopted by the surveyed firms in Sialkot. In contrast, however, the surveyed firms in Lahore adopted many additional CP options, particularly those aimed at reducing energy use and associated costs. These included:

- Installation of energy efficient spray plants;
- Preventative maintenance of thermal, electrical and mechanical systems;
- Improved boiler operations (e.g., by replacing old, inefficient boilers and conducting boiler blow down on the basis of measurements of total dissolved solids);
- Power factor optimization measures;
- Installation of safety valves, pressure reducers and steam flow meters in steam distribution systems; and
- Insulation of bare or inadequately covered hot surfaces, such as steam and condensate pipelines;

- and
- Improvements in condensate recovery systems.

Although only one of the surveyed firms in Lahore was in full compliance with the NEQS, the other four were aware of those standards and were interested in meeting them. The firms generally mentioned that adoption of CP measures, such as facilities for chrome recycling and reuse, allowed them to meet NEQS requirements for some pollution indicators. However, they emphasize that secondary treatment plants would need to be constructed in order to fully satisfy NEQS requirements. Significantly, construction of secondary treatment facilities was generally singled out as *the* major environment-related investment, an investment that some firms had not made because they could not do so without government assistance, which had not been forthcoming.

Four of the five surveyed tanneries had already implemented EMSs and the other was in the process of developing a system. Only one of the firms is certified to ISO 14,001, but the others were working toward certification. In responding to questions about EMSs, the firms mentioned the usual advantages in terms of improved environmental performance, with all but one of the firms noting linkages between EMS implementation and the firm's ability to compete effectively by satisfying the demands of international customers. Moreover, 3 of the 5 firms felt their international sales had grown because they had adopted an EMS.

CPI was a key source of information for these firms. Indeed, CPI had conducted environmental and energy audits for all of the firms and identified applicable CP measures based on the audits; CPI also guided the firms in conducting benefit-cost studies and technical specifications for the options. In terms of the motivations to implement CP measures, the five respondents made it clear that they were aware of the advantages of CP: reduced costs (e.g., improved efficiency of energy and water use); enhanced competitiveness, especially in international markets; improved conditions for workers; enhanced quality control; and improved levels of environmental protection. A number of the respondents mentioned their personal interests in CP and all five emphasized their awareness of environmental issues and their concern for maintaining a reputation in their communities for having environmentally friendly operations.

Notwithstanding these environment-related concerns, four of the five firms indicated that their decisions on which CP measures to implement were based *primarily* on careful calculations of costs and benefits. These respondents emphasized that short payback periods and cost savings were key factors in making decisions.

4.3.3. *CPI in Karachi*

CPI – Lahore's Karachi Office works with 25 tanneries in Sindh, mostly in the Karachi area. Tanneries in Karachi include both large firms and SMEs. A survey was conducted on a random sample of 5 of these 25 firms, all of which operate in both domestic and international markets to varying levels. Survey results indicate that only 20% of the respondents had a clear understanding of CP concepts, 40% had vague understanding, and the remaining 40% did not have any idea at all about CP on a conceptual level. The owners of SMEs knew very little about CP concepts and adopted a relatively small number of CP options. In contrast to the owners of the large firms, the owners of the SMEs appeared to be substantially less interested in CP. That said, all of the firms carried out environmental and energy audits with the help of CPI, and the larger firms among them implemented a substantial number of CP measures. The audit services were provided with no charge. For many of the measures suggested based on audit results, the reports from CPI included estimates of costs and gains. This was pivotal in firms' decision in whether to implement CP measures.

Of the 37 different CP measures presented by CPI, the following four measures were adopted by at least 4

of the 5 firms: dust collectors, improved chemical storage practices, and power factor improvement equipment, and posting Material Safety Data Sheets in the chemical storage area. And three of the firms implemented 10 or more of the 37 CP measures. These included the 4 measures mentioned above as well as: substitution of hazardous chemicals with less hazardous ones, compressor pressure optimization, good housekeeping, insulation of bare hot surfaces, safety awareness trainings, improvement of boiler efficiencies, and use of personal protective equipment for chemical handling. The gains reported from implementing these CP measures centered on improved energy efficiency, cost savings, and improved worker health and safety.

Interestingly, four of the five firms were in full compliance with NEQS. This notable outcome is a result of the four firms having their effluents diverted to the combined effluent treatment plant (CETP) in the Korangi industrial area, a treatment plant designed to treat their effluents to attain full NEQS compliance. This CETP, a project of the Pakistan Tanners Association-Southern Zone, is part of a broader effort to develop an institutional framework for the sustainable management and operations of future CETPs in Pakistan. The one surveyed firm that was not connected to the plant was unable to meet the NEQS compliance requirements. The firm's manager indicated that meeting the NEQS would require the firm to build its own treatment plant, something the firm was not pursuing because of the high cost and the absence of available land.

Only one of the five firms was ISO 14001 certified and one other was in the process of implementing an EMS but it was not yet certified. These two firms were implementing CP measures as part of a broader effort to gain certification to ISO 14001. When queried about the motivational factors for implementing an EMS and certifying to ISO 14,001, the two respondents noted pressures being exerted by international business customers and their ability to gain competitive advantage in international markets.

Another notable result from the survey in Karachi concerned obstacles to CP implementation. The survey results pointed to a lack of skilled staff and professional services for CP and problems with workers who resisted use of personal protective equipment for use in handling chemicals. The issue centered on the attitude of workers: they felt they could work more efficiently if they didn't use the personal protective equipment.

4.4. CP Performance at Textile Processing Firms Served by CPI

Textile processing is a general term that covers everything from "singeing" (protruding fiber removal) to finishing and printing of fabric. Textile processing units in Pakistan apply a range of procedures ranging from desizing and bleaching to calendering (i.e., use of heavy rollers under pressure to smooth and flatten fabric and for other purposes). Other processes include texturing, mercerizing (a treatment used to increase luster and improve strength among other things) and dyeing of yarns. Processing involves extensive use of water and chemicals and results in large quantities of highly polluted wastewater.

Pakistan's textile processing sector has more than 700 industrial units and is the country's most important industrial sectors. In addition to serving domestic markets, the sector accounts for over 60% of the country's total exports. In 2005-06, the sector contributed 8.5% of Pakistan's GDP and employed 38% of the country's total manufacturing labor force. Recently, however, the sector has been struggling to compete with Chinese, Indian and Bangladeshi products that are eroding its market share -- primarily because of lower prices -- and growth in textile exports has slowed. Many of the firms are located in Lahore, Karachi and Faisalabad. Table A4.4 lists the 40 CP measures that CPI reports to the textile processing firms that it serves.

Table A4.4. CP Options Provided to Textile Processing Firms by CPI

Blow down on the basis of TDS measurement.	Noise control.
Color coding of utility supply lines.	Power factor improvement.
Compressed air leakage control.	Pressure drop reduction in steam distribution system.
Compressed air pressure setting (pressure reduction).	Pressure reduction at boiler.
Countercurrent washing sequence at bleaching and mercerization machines.	Recovery of flash steam.
De-scaling of heat exchangers attached with jets, kiers and other machines.	Replacement of magnetic ballasts with electronic blasts.
Establishment of process control laboratory.	Replacement of old motors with high efficiency motors instead of rewinding.
Implementation or retrofitting of steam condensate recovery. Includes installation of condensate recovery tank, etc.	Replacement of oversized or inefficient steam boiler. In addition, installation of waste heat recovery boilers, etc.
Improvement of boiler efficiency/overhauling and tuning	Replacement of oversized/undersized motors. Replacement of conductors; installation of VFD motors, etc.
Improvement of light intensity at the work place.	Replacement of T-12 tube lights with T-8/T-5.
Installation of adjustable burner instead of fixed burner at singing machine.	Reuse of cooling water being wasted from different machines such as singeing, dryers, compressors etc.
Installation of caustic recovery plant.	Reuse of mercerization wash water for post desizing washing process.
Installation of digital meters for recording daily production.	Reuse of steam condensate as boiler feed water.
Installation of heat exchanger on hot wastewater streams to recover energy. (Installation of economizer)	Safe chemical handling and storage and use of PPEs.
Installation of inverters.	Safety guards at machines.
Installation of temperature controllers on the hot process baths to monitor temperature and control steam consumption. (Installation of temperature gauges)	Solid waste management.
Installation of time meter at turbine for monitoring running hours of water turbine to estimate water consumption.	Stack monitoring of steam boiler/heaters/generators.
Installation of water softener and RO plants on boiler feed water.	Steam leakages control.
Installation of water, steam and gas flow meters to monitor water, steam and gas consumption in boiler as well as in different processes. In addition, installation of water shut-off valves, etc.	Substitution of hazardous chemicals with environment friendly.
Insulation of steam, steam condensate pipe lines and bare hot surfaces. Teflon coating on dryers, etc.	Upkeep of steam traps.

4.4.1. CPI in the Lahore Area

The CPI office in Lahore provides services to 45 textile-processing firms in and around Lahore, Gujranwala, and Sheikhpura, which is referred to herein as the "Lahore area." Eleven of these 45 firms were selected at random for inclusion in the survey. Most of the surveyed firms are large. About 45% of those firms operate at the international level, 18% work both locally and internationally, and about 9% are involved in indirect export through firms in Karachi.

Survey results indicate that 73% of the respondents had only a vague idea of what constituted CP. However, the overwhelming majority of firms responded positively to the 40 different CP measures presented by CPI. For example, more than 80% of the 11 firms adopted 15 of the 40 proposed measures

(Table A4.5).

Table A4.5. CP Measures Adopted by at Least 80% of Surveyed Textile Processing Sector Firms Served by CPI in the Lahore Area

Measures to provide energy-related cost savings	Measures to improve worker health and safety	Other measures
Overhauling and tuning up of boilers to improve boiler efficiencies (91%)	Measures for safe chemical handling and storage (82%)	Installation of temperature gauges for improved monitoring of process temperatures -- improved product quality and energy and cost savings (91%)
Power factor improvements (91%)	Improved workplace lighting intensity (82%)	Monitoring of stack emissions for process optimization -- environmental protection and energy savings (91%)
Blow down based on total dissolved solids measurements (82%)	Safety guards at machines (82%)	Insulation of steam, steam condensate pipelines and bear hot surfaces, and use of Teflon coating on dryers -- conservation of steam, water and energy (82%)
Compressed air leakage control (82%)		Enhanced solid waste management (82%) -- environmental protection
Implementation or retrofitting of steam condensate recovery (82%)		Elimination of hazardous chemicals by employment of environmentally friendly substitutes -- and improved worker health and safety (82%)
Improved upkeep of steam traps (82%)		
Improved control of compressed air and steam leaks (82%)		

Firms were queried to identify their sources of information for CP, and 91% responded by mentioning CPI as an effective source of knowledge and guidance. Firms also gained knowledge on CP by conducting, under CPI guidance, internal environmental and energy audits, doing systematic benefit and cost comparisons, and learning of the experiences of other companies. About half of the respondents listed the following factors as having played a key role in decisions to adopt CP measures: technical knowledge of owners, in-house technical capabilities, and concern for the environment. Notwithstanding the stated concern for the environment, the main factors that influenced their CP implementation decisions centered on the ability to reduce energy and water use and improve boiler efficiency; these were mentioned as keys to keeping down production costs and maintaining competitiveness.

Notwithstanding the attention given to CP measures, only 1 of the 11 firms complied with NEQS requirements. Most had not heard much about the NEQS and some had not heard anything at all. Most of the firms, including several classified as large, had no interactions with the Punjab Environment Protection Agency and many characterize the construction of a wastewater treatment plant as a "dead investment." The one firm in compliance is large and views meeting NEQS as a way to respond to international business customer demands and, more generally, to enhance its ability to expand its international business volume.

Motivations to implement an EMS varied among the firms: 64% cited the demand of international buyers as the main motivation, and 36% mentioned the CPI trainings on the subject as a factor. The remaining 27% of the surveyed firms felt that EMSs were not relevant for their firms and had no intention of even trying to develop a system. Only 36% of the surveyed firms had a well functioning EMS, and 18% were

in various stages of implementation. Although 64% of the responding firms were familiar with ISO 14,001, only 18% were certified.

A number of respondents clarified impediments to implementing CP measures. Apart from the usual concerns about short payback periods and high rates of return, the factors mentioned included: lack of motivation on the part of owners, the lack of availability of vendors to provide CP equipment and technologies, labor challenges including non-cooperative staff, and production losses associated with shutdowns during implementation of retrofits and rehabilitation works.

4.4.2. *CPI in the Faisalabad Area*

CPI has an office in Faisalabad that provides services to 51 firms in the area's textile processing sector. A random sample of 14 of these 51 firms was selected for inclusion in this survey.

While the surveyed firms in Faisalabad were generally large, more than half served only local markets. Survey results indicated that 4 of the 14 surveyed firms had no understanding of CP concepts, 7 were vaguely familiar with the general idea; only 3 of the respondents had a deep understanding. Of the 11 firms that responded to a question about markets served, 8 sold outputs *only* in Pakistan; and of the 9 firms for which data was available on staff size, six would be classified as large. CPI presented the same 40 CP measures that were used in the Lahore area. Of those, 11 of the 14 surveyed firms implemented more than 80% of the 40 CP measures, and many of those are the same as the ones listed in table A4.2 above.

As a result of pressure from international business customers to meet applicable environmental standards, some of the surveyed firms selling abroad are struggling to comply with NEQS. However, only 14% of the firms have achieved full compliance and they did so by installing their own effluent treatment plants. Another 29% of the firms are having difficulties meeting NEQS because of the high costs of installing individual effluent treatment plants. They felt full compliance with NEQS was essential in order to compete in international markets.

A number of respondents in Faisalabad suggested that the key to meeting NEQS was to use public-partnerships to construct CETPs in clusters of industries. The CETPs could be paid for by user fees, where each participating firm's fees would be calculated based on type and amount of effluent to be treated. A number of owners of textile processing facilities in the Khurrianwala industrial area along Jaranwala Road were working on a strategy to develop a CETP paid for by users' contributions.

Firms operating only domestically felt an EMS was not applicable in their circumstances. Many interviewees mentioned a general concern for the environment, but those claims were not entirely consistent with responses to questions about factors affecting CP decisions: 71% of respondents said their firms were motivated to adopt CP measures because of the potential for energy savings and cost reductions. Of the 14 surveyed firms, only 5 had EMSs. Two firms implementing EMSs did so partly because of international customer pressure, however most firms with an EMS said they implemented their systems out of concern for the environment and to create an image of being an "environmentally friendly company." Firms adopting EMSs generally felt that the results included improved working conditions and increased demand for their products. Eleven of the firms were familiar with ISO 14,001 and the benefits of certification, but only 4 are certified; however, another 3 are at various stages of working to secure certification.

The key sources of information about CP measures were CPI (for 12 of the 14 surveyed firms in Faisalabad) and the technical knowledge of the firms' staffs (5). Other information came from the All Pakistan Textile Mills Association and the experiences of other companies.

Interestingly, 5 of the 14 surveyed firms felt that their businesses were not competitive and they cited a number of factors. Pakistan's ongoing energy crisis affected many, and half of the firms said non-availability of electricity and gas -- particularly unscheduled and frequent load shedding -- is practically pushing them out of business. Indeed, 6 of the 14 firms said that they have had orders canceled because they could not deliver on their commitments. Another 2 felt that continual price hikes for inputs, particularly for raw materials and chemicals, together with rising utility tariffs, are pushing Pakistan's textile processing industry towards collapse. Maintaining a competitive position has been particularly difficult in international markets.

4.4.3. CPI in the Karachi Area

CPI's Karachi office provides services to 21 textile-processing firms in Karachi area. Five of these 21 firms were surveyed, and the results indicate that all the firms have only vague ideas about the CP concept, but they see the benefits of CPI's activities. Education levels of owners vary considerably but all owners of surveyed firms have a deep understanding of their business operations. One of the five firms works exclusively in domestic markets, and two of the five work primarily in international markets; two operated in both domestic and international markets.

Of the 40 CP measures proposed by CPI, 26 measures were adopted by at least four of the 5 surveyed firms. Many of the measures adopted are the same ones adopted by textile processing firms in the Lahore (Table A4.5). For many CP measures, the driving force was cost savings from reductions in energy and water use. In characterizing the benefits from these measures, the respondents mentioned, in addition to enhanced environmental protection, improvements in competitiveness due to cost reductions, product quality improvements, and enhancements in the firms' image.

Only two of the five firms were in full compliance with NEQS. These firms were large and export oriented, and compliance to NEQS was required due to pressure from international business customers. At the time of the survey, another two of the five firms had little knowledge of NEQS but were working to obtain information, and the fifth had no idea that NEQS even existed and had had no contact with the provincial EPA.

Four of the five firms are implementing EMSs, but the fifth had no plans to do so. The two firms working heavily in international markets were motivated to implement EMS as a way to meet demands of international customers and cut production costs, with the result being enhanced competitiveness. All five of the firms are aware of ISO 14001, but only two of them are certified and one is working toward certification.

4.5 Motivations for CP Adoption and Resulting Benefits in Case Study Firms

4.5.1. Leather Tannery in Sialkot

A case study covering a large leather tannery in Sialkot was conducted as part of this NLTA. This firm is not representative in any sense. It was selected because the firm provided good access to its records and staff.

The firm's managers had only a vague concept of the meaning of cleaner production, but as a result of the interactions with CPC and responses to the audit results and managers, they were well aware of benefits from adopting CP measures.

The case study firm in Sialkot implemented most of the CP measures that were presented to them by CPC staff members. Illustrations of the CP measures adopted and their respective benefits are described below:

- A CP measure for chemical conservation involved adopting proper weighing procedures and avoiding spillage of chemicals and no investment was required for implementation. The savings resulting from this measure were PKR 0.25 million per year, including a savings of 5 ton/year of chrome, an amount that was previously released as wastewater that had been destroying cultivated land and contaminating drinking water supplies.
- One CP measure involved technological changes for basifying chemicals in chrome tanning. This measure resulted in savings of PKR 1 million per year, savings of 20 tons per year of chrome, cuts in time needed for basifying, and improvements in the quality of leather.
- A CP measure based on repairing and maintaining machines resulted in savings of PKR 0.5 million in only 8½ months.
- A CP measure introducing new control techniques to reduce thermal and electrical losses resulted in savings of about PKR 1.67 million per year.
- Among other significant examples is the use of a roller coater that saved PKR 1.5 million in 11 months and resulted in 80% reduction in gaseous emissions.

The following are the main factors that motivated this firm to adopt many of the CP measures suggested by CPC.

- Information provided by CPC and endorsements of CP concepts by the firm's associates.
- Demands for improved environmental performance by customers, particularly international customers.
- Pressures exerted by environmental protection authorities for compliance with NEQS.
- A sense of responsibility on the part of the managers for improving health and environmental conditions.
- Savings in costs and materials and reductions in waste generated that resulted from adopting CP measures.

The firm's managers were also asked to comment on some of the impediments they faced in implementing CP measures. They pointed to challenges with the lack of proper training of staff and the staff's generally low educational levels; they also mentioned what they characterized as an "unprofessional attitude" towards CP. The firm's managers also noted that some of the measures recommended by CPC were not implemented because of their high costs.

The surveyed firm was well aware of the NEQS and, despite its interest in meeting the standards, it had been unable to do so. At the time of the case study interviews in 2010, the firm's management had begun construction of the necessary treatment facilities, and the firm anticipated that it would satisfy the NEQS in the future.

4.5.2. *Textile Processing Firm in Faisalabad*

A case study was conducted at a textile processing firm in Faisalabad that operates in international markets; although the firm's managers did not provide information regarding numbers of employees, they indicated that the firm was of "average" size.

Notwithstanding that this firm's managers had been working with CPI and the Cleaner Technology Program (CTP) for Textile Industry for several years, they were unable to provide anything but a very vague definition of cleaner production. The firm operates only in domestic markets and is not in compliance with the NEQS. Although it is well aware of the standards, it feels that the benefits of compliance are not worth the cost: in order to come into compliance the firm would have to construct a wastewater treatment plant, a construction project it deems as completely infeasible. The firm is not certified to ISO 14,001; it does not yet have an EMS, but it is in the process of developing one. The managers complained about the education and skill levels of workers and the difficulties in building a culture of information sharing and in-house cooperation and support among staff members.

The following are examples of CP measures that were implemented as well as the gains associated with those measures:

- By basing the blow down of the boilers on the measurement of total dissolved solids, the firm was able to reduce state losses by 7 to 8%.
- Using a program for stack monitoring, the firm gained advantages in the form of energy savings and reduced maintenance costs.
- By installing four gas flow meters to monitor the gas consumption, the gas bill decreased from PKR 18,418 per day to PKR 13,000 per day.
- Pressure reduction at the boiler has saved approximately PKR 84,000 per month.
- A costly intervention involved installation of a heat recovery boiler that resulted in significant savings in heat energy.
- Another costly intervention involved installation of CO₂ recovery system; this was still in the process of implementation and the expected installation cost was PKR 10 million. By implementing this option, the firm expects to take advantage of what it perceives is a huge demand for dry ice by beverage companies such as Coca-Cola and for firefighting equipment, such as fire extinguishers etc. Moreover, additional savings are expected due to carbon credits.

The following were among the firm's motivations for implementing the various CP measures: cost savings, improvements in product quality, environmental protection, enhanced health and safety of workers, and improvements to the overall competitiveness of the firm. In addition, managers mentioned that CPI and the All Pakistan Textile Mills Association played key roles in raising their awareness of CP by means of seminars and workshops.

4.6. ISO 14,001 and Environmental Protection in Pakistan

ISO 14,001 is only one of several voluntary standards and environmental requirements relevant to firms in Pakistan. The ISO 9000 series of standards for quality management have long been important. However, a number of the surveyed firms, particularly SMEs serving only domestic markets, seemed unaware of the ISO 9000 series of standards. Moreover, firms exporting to the EU will need to become familiar with REACH and comply with its requirements as the REACH implementation process unfolds. In addition, a number of multinationals are now conducting audits on the performance of suppliers'

factories and checking audit results against specific environmental and sustainability performance criteria, such as air emissions, water discharge, management of toxic substances and hazardous waste disposal.

Given that Pakistan's environmental agencies are not effectively enforcing environmental regulations among the surveyed firms, an increased reliance on ISO 14,001 certification can play a key role in improving environmental performance of tanneries and textile processing firms, among others. Although environmental regulatory enforcement is weak within Pakistan, international pressures have and will continue to exert pressure on firms to take measures to meet environmental standards, including ISO 14,001: an increasing numbers of foreign businesses (including multinational apparel manufacturers and purchasers of Pakistani finished leather and textile products) are explicit in requiring suppliers to be ISO 14001 certified.

Access to international markets is becoming increasingly difficult for firms that do not adhere to ISO 14001 or other environmental standards imposed by large multinationals that purchase Pakistani exports.²⁹¹ Given the importance of these corporations as potential buyers of Pakistani manufactured outputs, their actions are extremely significant. The increased scrutiny on environmental and corporate social responsibility through supplier scoring and sustainability indexing has attracted significant attention.²⁹² Eventually, environmental performance may stand along with traditional measures (e.g., price, quality, and delivery time) in decision- making regarding purchasing.²⁹³ In many cases, it is already serving as a constraint.

In an example reported by Hafiz,²⁹⁴ Azgard Nine Ltd., a Pakistani textile company with considerable international business, became certified to ISO 14001 to fulfill global customer requirements, gain a competitive edge by improving its environmental performance, conserve energy and natural resources, and minimize waste. Azgard Nine believes it gained marketing advantages by observing the code of conduct of international customers. Moreover, the company believes its EMS played a role in its success in working with globally significant clothing companies, such as H&M, Diesel and NEXT.

In brief, ISO 14,001 certification is important for Pakistani firms for three reasons:

- An EMS certified to ISO 14001 provides a framework for discovering potential process improvements and energy conservation options that can cut costs and generate less waste.
- ISO 14001 is increasingly being used by export-oriented Pakistani firms to establish their credibility in terms of environmental responsibility in foreign markets that require adherence to environmental standards.
- Many multinationals have explicit requirements mandating that their suppliers be in compliance with home country environmental regulations, and an increasing number of companies require compliance to ISO 14001.²⁹⁵

²⁹¹ Many multinationals have explicit requirements that suppliers be in compliance with home country environmental regulations, and an increasing number of companies require compliance to ISO 14001. Vandenbergh, M.P. 2007, "The New Wal-Mart Effect: The Role of Private Contracting in Global Governance UCLA Law Review, Vol. 54, p. 913.

²⁹² Jun, M., et al., 2010, Greening Supply Chains in China: Practical Lessons from China-based Suppliers in Achieving Environmental Performance, WRI Working Paper, World Resources Institute, Washington, DC.

²⁹³ Based on "Value streaming," <https://valuestream2009.wordpress.com/category/iso-14001/> More generally, see Jun, M., et al., 2010, Greening Supply Chains in China: Practical Lessons from China-based Suppliers in Achieving Environmental Performance, WRI Working Paper, World Resources Institute, Washington, DC.

²⁹⁴ Ur Rehman Hafiz, A. 2010. "Is there any potential of increased environmental performance through ISO 14001 in manufacturing companies in Pakistan?" *Journal of Sustainability*, Issue 3, No. 1.

²⁹⁵ For evidence of this, see Vandenbergh, M.P. 2007, "The New Wal-Mart Effect: The Role of Private Contracting in Global Governance UCLA Law Review, Vol. 54, p. 913.

4.7. Discussion

The literature on factors affecting the adoption of cleaner production and other environmentally proactive strategies is extensive and goes back for decades. Recent reviews of this literature indicate that there is broad agreement that both internal and external factors are involved in motivating adoption of CP measures and procedures. Internal factors consist of the characteristics and capabilities of firms that influence their ability to adopt CP measures and to move toward implementation of an EMS and certification to ISO14,001. External factors are forces outside of a firm that influence its competencies and routines, including, for example, the existence of rigorously enforced governmental environmental regulations that cause firms to adopt CP as a means of reducing waste treatment costs in satisfying requirements.

There is also general agreement that drivers fall into three broad categories:

- Government actions, including the promulgation and enforcement of environmental regulations as well as market-based instruments, such as effluent charges and tradable pollution permits.
- Market-based pressures, including demands on suppliers linked to green supply chain management and pressures to cut production costs while maintaining or enhancing product quality.
- Community pressure, such as the environment-related pressures exerted by NGOs and the media as well as the public at large.

Generalization within and across countries is often not helpful because of high variations in CP drivers (and barriers) across countries, industrial sectors and firm sizes.²⁹⁶ Moreover, there are variations even for a particular sector and firm size within the country; for example, some leather sector SMEs in Pakistan have embraced CP whereas others have not.²⁹⁷ In general, however, there is agreement that SMEs have particular challenges in implementing CP measures (e.g., limited financial resources and lack of staff trained in environmental management).

The discussion below clarifies ways in which the findings herein for leather tanneries and textile processing firms are consistent with what might be expected based on the literature and ways in which the results are strikingly different.

4.7.1. Environmental Regulations

Some research highlights the importance of existing environmental regulations and perceptions of future environmental regulations as drivers for the adoption of CP and EMSs. One of the striking features of the results herein is that environmental regulations per se were *not* a key driver. This is clear from the behavior of SMEs in the tanneries subsector in Sialkot: 79% of the surveyed firms were either not aware of NEQS or had no idea of whether they were in compliance. They experienced minimal pressure to comply with environmental regulations and typically faced no penalties for noncompliance. Only 27% of the textile processing firms in Lahore complied with NEQS and many of those out of compliance called the treatment plants needed to come into compliance as “dead investments” in the sense that from

²⁹⁶ Luken, R. and Van Rompaey, R, 2008, Drivers for and barriers to environmentally sound technology adoption by manufacturing plants in nine developing countries, *Journal of Cleaner Production*, 16S1: S67 -- S77

²⁹⁷ On this point more generally, see Darnall, N. 2001. Adopting ISO 14001: Why Some Firms Mandate Certification While Others Encourage It. Paper for presentation at the Twenty-Third Annual Research Conference for the Association for Public Policy Analysis and Management Fall Conference: “Public Policy Analysis and Public Policy: Making the Connection,” November 1-3, Washington Monarch Hotel, Washington, DC. Available from <http://ndems.cas.unc.edu/document/Motivations+for+ISO+14001+mandates.pdf> Accessed May 13, 2011.

the firms' perspective there is no return on investment. The complete lack of interactions of many of these firms with EPAs means that a customary driver of CP implementation-- monitoring and enforcement of environmental requirements by government agencies-- is practically absent.

In a number of cases, the attempt to satisfy the NEQS was important in influencing firms' behavior, but compliance generally were not spurred by a desire to meet Pakistan's environmental requirements. The driver for compliance with NEQS was more often the need to become certified to ISO 14,001 to retain international business customers and enhance competitiveness. Interest in certification itself was generally driven by pressures imposed by multinational business customers who see their own certification to ISO 14,001, as well as certification by their by suppliers as a legitimate means for them to meet demands of their stakeholders (e.g., customers, shareholders and environmental NGOs).

In order for a firm to certify to ISO 14,001, the firm must either satisfy applicable environmental regulations or have a plan for doing so. A number of surveyed firms indicated that adopting CP measures has moved them closer to compliance with NEQS, but they still fall short because they are unable to construct a secondary effluent treatment plant. They have typically cited problems in raising the needed capital and/or the inability to access sufficient land. Among SMEs queried about what it will take to bring them into NEQS the consensus is that they can only do so if CETPs were constructed to accept effluents from multiple SMEs within an industrial cluster.

In the context of environmental regulations, results herein for the leather tanning sub-sector are strikingly different from those reported by Luken and Van Rompaey based on their nine-country study of drivers and barriers to environmentally sound technology adoption.²⁹⁸ Aggregating across nine countries, they found that the dominant driver for CP in the leather -tanning sub-sector was anticipated future environmental regulations. This subject did not even come up in interviews conducted at the tanneries included in survey discussed herein.

4.7.2. *Economic and Community-based Incentives*

Interview results were consistent in signaling the significance of monetary cost savings as a factor driving CP adoption for the vast majority of the surveyed firms. While the survey results contain frequent mention of good environmental citizenship, CP options were primarily adopted because they were able to conserve on energy, water, and input materials and thereby drive down the cost of production. In some instances, CP measures were also adopted because they enhanced product quality.

A closely related issue centers on the financial gains obtainable by maintaining and augmenting sales to international business customers. Here EMS and certification to ISO 14,001 play important roles. Some companies only do business with suppliers that have an EMS that has been certified to ISO 14001.²⁹⁹ Moreover, Pakistani firms have been stymied in exporting to some OECD countries because products have not met international environmental standards.³⁰⁰

²⁹⁸ Luken, R. and Van Rompaey, R, 2008, Drivers for and barriers to environmentally sound technology adoption by manufacturing plants in nine developing countries, *Journal of Cleaner Production*, 16S1: S67 -- S77

²⁹⁹ Bowen, F.E., Cousins, P.D., Lamming, R.C., and Faruk, A.C. 2001. Explaining the implementation of green supply initiatives: the role of supply management capabilities, *Production and Operations Management*.

³⁰⁰ Khan, S.R., Khwaja, M.A., and Khan, A. M. 2001. Environmental Impacts and Mitigation Costs associated with Cloth and Leather Exports from Pakistan. *Environmental and Development Economics*, 6: 383-403. Cambridge University Press. Available from

http://journals.cambridge.org/download.php?file=%2FEDE%2FEDE6_03%2FS1355770X01000213a.pdf&code=2d40a43b3eda97f2e051a6bcc1b17fc3 Accessed August 31, 2009

For many firms, the main reason for adopting an EMS was to meet demands of international business customers. Obtaining a competitive advantage in international markets was a key factor for firms trying to become ISO 14001-certified. The dilemma for many such firms however is the obstacle they face in meeting NEQS requirements. There was a broad consensus among those interviewed that the NEQS requirements are unattainable for many firms given the economic and public safety conditions in Pakistan. Moreover, many respondents complained that the NEQS were promulgated without meaningful consultation with the regulated community. Because the NEQS requirements are widely viewed as unattainable and because penalties for noncompliance are not a major threat, there is massive noncompliance.

In general, surveyed firms felt little pressure from domestic customers to improve environmental performance. In a few isolated instances, the motivation for CP adoption was the need to enhance the reputation of the company as being “environmentally friendly” among members of the local community. In order to stimulate domestic demand for environmentally friendly products, Pakistani consumers need to be willing to pay for products that are somewhat more expensive because they have been produced in ways that are more environmentally sensitive. This may occur in the long term, but the circumstances in Pakistan are such that in the near term domestic consumer preferences are unlikely to drive enhanced environmental performance.

4.7.3. Organizational Variables

One of the barriers frequently mentioned in the literature on CP and industrial environmental management concerns the difficulties many firms have in learning about environmental protection options. In this connection, the roles of CPC, CPI and industry trade associations in diffusing information regarding CP interventions are particularly notable. Survey results make it clear that these institutions have played central roles in providing information about CP options, particularly in the context of environmental and energy audits performed by CPC and CPI. For many of the firms included in this research, these cleaner production centers represented the main source of their information regarding cleaner production options. The challenge for Pakistan, however, is how best to extend the work of cleaner production centers and industrial associations well beyond the several hundred firms that they currently serve. At a minimum, Pakistan would be well served to extend the dissemination of CP methods and procedures to the several thousand major industrial sources currently not served by cleaner production centers.

The role of leadership from CEOs and senior managers in the adoption of CP options is another frequently discussed topic in the literature. Many survey respondents indicated that their firms either moved forward in implementing CP or neglected to adopt CP because of the attitudes of their CEOs towards the environment in general and CP in particular. Another set of internal issues concerns the attitudes and actions of workers. This is made clear by the number of survey respondents that mentioned that workers resisted using personal protection equipment that would safeguard them in handling chemicals. In these circumstances, effective leadership from CEOs and top management would be critical in orchestrating behavioral change at the shop floor level.

In the context of the results reported herein, the influence of internal factors is most evident for SMEs. These firms often had challenges in accessing capital and thus many selected mostly CP options that were either low-cost or practically free. The leaders of many small firms were not aware of cleaner production related issues, and some seemed much less eager to pursue CP options than managers of large firms. The exceptions were SMEs working in international markets and experiencing pressure from international business customers to improve their environmental performance. In these instances, the SMEs were more responsive in adopting CP and establishing EMSs.

4.8. Conclusions and Policy Implications

The work of CPC and CPI has been pivotal in launching CP activities in Pakistan, but their work to date only represents a beginning. Indeed, given that the CP centers have good working relationships with the firms they serve, they are well positioned to be key actors in improving Pakistan's environmental quality. Indeed, they are better positioned than the provincial EPAs because the latter are busy with administrative duties in implementing the major overhaul of institutions for environmental management now underway in response to the 18th Amendment to Pakistan's Constitution. This Amendment requires, among other things, the devolution of many significant environmental management responsibilities from the federal government to the provincial governments.³⁰¹ There are many unanswered questions associated with this devolution process, and it will take much time to devise and implement the new regulatory structures that need to be put in place. It will also take considerable time before the provincial EPAs have the staffs and budgets to conduct environmental monitoring and enforcement at levels that motivate many firms, especially SMEs, to comply with NEQS. Under the circumstances, the self-interest of firms in using CP to cut costs, improve product quality and enhance competitiveness is likely to be a more significant factor in improving environmental quality than a reliance of traditional regulations implemented by EPAs.

As part of this study, discussions were held with representatives of industry associations and industrial units on different aspects of industrial environmental management. Significantly, firms in the textile and leather sectors ranked demands from the importing countries and buyers as a driver of environmental compliance, but firms that sell domestically do not face similar pressures to comply. Exporters indicated that implementation of cleaner production and energy efficiency measures helps them to increase competitiveness, maintain ISO 14001 certification, and increase their business opportunities in international markets. The higher revenues obtained from selling in international markets is sufficient to pay the cost of compliance with environmental requirements by these exporting firms. Notwithstanding the potential benefits, many exporting firms remain out of compliance with NEQS and are unable to certify to ISO 14,001.

One of the principle drivers for CP implementation -- the enforcement of ambient environmental quality standards -- is largely absent in the firms examined in the study. Indeed, a large number of SMEs with significant pollution loads are completely unaware that Pakistan has NEQS requirements. Instead of pressure to satisfy environmental requirements, the main factors motivating CP implementation center on: the availability of heavily subsidized CP-related services; local environmental concerns; the awareness of CP by firms' owners and managers of cost savings associated with CP; and, for firms engaged in exports, pressure from international business customers to improve their environmental performance.

There is little likelihood that Pakistan will be able to improve its environmental monitoring and enforcement in the short term because of all of the work that will be required of provincial EPAs in assisting with the devolution of environmental laws and regulations from the national government to the provinces. Under the circumstances, a renewed focus on implementation of CP and a drive to get firms to establish EMSs and become certified to ISO 14,001 would have two main advantages: improving the competitiveness of Pakistan's manufacturing firms and enhancing Pakistan's environmental quality. However, unless the NEQS are made less stringent on an interim basis to reflect conditions on the ground in Pakistan, this strategy will not be effective. Currently, the numerical limits in the NEQS are viewed by many firms, particularly SMEs, as being arbitrary in many respects and in any case beyond their reach. Indeed, funding constraints and the limits of available land would make it a practical impossibility for many Pakistani firms to build their own wastewater treatment plants, which are typically required in order

³⁰¹ The text of the 18th Amendment Bill is available at: <http://www.infopak.gov.pk/Constitution/Full%20text%20of%2018th%20Amendment%20Bill.pdf> Accessed October 21, 2011.

to meet the NEQS. Thus in order to make progress in improving environmental quality and enhancing the competitiveness of Pakistan's manufacturing industry, it would be appropriate to revise, on an interim basis, the NEQS to levels that would be attainable given the conditions in Pakistan. Simultaneously, increased efforts could be made to build combined effluent treatment plants to serve SMEs located in clusters. These changes would go a long way toward making it possible for Pakistani firms, particularly SMEs, to satisfy the NEQS, thereby removing one of the main impediments they face in becoming certified to ISO 14,001 and improving their ability to compete in international markets.

ANNEX 5. INSTITUTIONAL FRAMEWORK FOR ENVIRONMENTAL QUALITY MANAGEMENT³⁰²

5.1. Introduction

This annex discusses the GoP's administrative and legislative structures and capacity for managing environmental quality. The regulatory framework has undergone significant changes and revisions since initial efforts to establish a framework for environmental management in Pakistan occurred in 1975 when, as a follow-up to the *1972 UN Conference* on the Human Environment in Stockholm, Pakistan created the Federal Ministry of Environment (Table A5.1). Momentum for a major effort to protect the environment occurred in the context of the 1992 United Nations *Conference* on Environment and Development in Rio de Janeiro. In that year, Pakistan developed the National Conservation Strategy, and the first version of the National Environmental Quality Standards (NEQS) was promulgated in 1993. As indicated in Table A5.2, the NEQS were originally issued under the 1983 Environmental Protection Ordinance. Consultations with major stakeholders were initiated in April, 1996, and a revised version of the NEQS for ambient air was approved by the PEPC in December, 1999; the new version became effective in August, 2000.

The Pakistan Environmental Protection Act (PEPA), 1997 established a comprehensive framework for environmental management that includes a number of major environmental management entities and their specific responsibilities for environmental protection, including: the Pakistan Environmental Protection Council; the Pakistan Environmental Protection Agency (Pak EPA); provincial environmental protection agencies in Punjab, Sindh, Khyber Pakhtunkhwa and Baluchistan; and environmental tribunals and magistrates created under PEPA, 1997, which have the power to hear environment-related cases and impose sanctions (e.g., monetary fines and prison sentences) for non-compliance with environmental requirements.

Until recently, the umbrella responsibility for environmental priority-setting and policy formulation in Pakistan rested with the federal Ministry of Environment (MOE) and the umbrella responsibility for regulatory enforcement rested with the federal Environmental Protection Agency (Pak-EPA). However, the passage of the 18th Amendment to the Constitution of Pakistan in 2010 resulted in the dissolution of the former ministry (in 2011) and a downscaling of the Pak-EPA's scope of work. On October 26, 2011, the Prime Minister announced creation of the Ministry of Disaster Management (MDA) at the Federal level, which became the Ministry of Climate Change (MCC) in early 2012. The overall chronology of events linked to environmental protection in Pakistan is given in Table A5.1.

³⁰² Note: This annex was prepared by Ernesto Sanchez-Triana, Santiago Enriquez, Hammad Raza, Rahul Kanakia and Ghazal Dezfuli. The annex is based primarily on consultant reports prepared by Hammad Raza, Santiago Enriquez, Rahul Kanakia and Ghazal Dezfuli as part of the Mainstreaming Sustainability into Pakistan's Sustainable Industrial Growth, Non-Lending Technical Assistance. The findings, interpretations, and conclusions expressed in this appendix do not necessarily reflect the views of the staff or Executive Directors of The World Bank or the governments represented by the Executive Directors.

Table A5.1. Key Elements of Pakistan’s Environmental Management Framework, 1983–2010

<i>Act or Regulation</i>	<i>Year</i>	<i>Requirement</i>
Pakistan Environmental Protection Ordinance	1983	Established the requirement to prepare an Environmental Impact Assessment for development projects
National Environmental Quality Standards(NEQS)	1993	Issued standards applicable to industrial and municipal liquid effluents and industrial gaseous emissions
Pakistan Environmental Protection Act	1997	Replaced the Pakistan Environmental Protection Ordinance of 1983. Established PEPC, the apex body for environmental protection and the Pakistan Environmental Protection Agency (Pak-EPA). Provided a formal mandate for the Pak-EPA to propose NEQS and enforce approved standards. Enabled the government to levy pollution charges and establish Provincial Sustainable Development Funds. Authorized creation of Provincial EPAs as well as Environmental Tribunals.
Revised NEQS	1999	Relaxed NEQS, which were considered more stringent than those of other countries in the region, and adjusted them based on Pakistan’s conditions and practice in South Asia.
National Environment Policy	2005	Established goals and high priority objectives in several areas, including water supply, waste management, air pollution and noise, among others.
Revised NEQS for Ambient Air	2009	Revised NEQS for Ambient Air, which were approved by PEPC and made effective August, 2010.
18 th Amendment to Constitution	2010	Devolution of the Ministry of Environment’s responsibilities to provincial governments and downscaling of Pakistan’s Environmental Protection Agency’s responsibilities

This annex examines Pakistan’s regulatory framework for managing air and water pollution and solid waste, including an analysis of the strengths and weaknesses of the key environmental bodies: the aforementioned provincial environmental management agencies, the judicial system and environmental tribunals, and other ministries with environmental responsibilities. In addition to outlining the principal institutions for environmental quality management, the significant challenges faced as a result of the implementation of 18th Amendment to Pakistan’s Constitution (which mandated, among other things, the devolution of many significant environmental management responsibilities from the federal government to the provincial governments) will be analyzed. This annex is divided as follows: the second section is a description of the agencies tasked with environmental management, including an analysis of their institutional capacity to implement their respective responsibilities and functions. The third section contains recommendations for enhancing environmental management at the central and provincial levels. The fourth section summarizes this annex’s conclusions and recommendations.

5.2. Analysis of the Environmental Administrative Framework

The devolution process was still underway as this annex was being prepared. It describes the existing framework as of mid 2012 and recognizes that some federal institutions, such as the Pakistan Environmental Protection Council, may still change as a result of the devolution of GoP responsibilities to the provinces required by the 18th Amendment.

5.2.1. *Pakistan Environmental Protection Council*

The Pakistan Environmental Protection Council (PEPC) is the apex decision-making body on environmental issues in the country. PEPC was established under the Pakistan Environmental Protection Ordinance (1983), and was later reconstituted based on section 3 of PEPA, 1997. The Council is headed by the Prime Minister of Pakistan, and the Federal Minister of Environment served as the Vice-Chairman. Membership of the Council is comprised of multiple stakeholders: Chief Ministers of four provinces, Provincial Environmental Ministers, 35 ex-officio representatives (industry, technical professional, trade unions, NGOs), and the Secretary of the Ministry of Environment (MOE). The dissolved Ministry of Environment served as the Council's secretariat.

Major functions of the PEPC are to: supervise implementation of PEPA 1997, coordinate and supervise enforcement of PEPA, approve comprehensive national environmental policies, approve National Environmental Quality Standards (NEQS), provide guidelines for the protection and conservation of natural resources and habitats, integrate sustainable development into national development plans and policies, instruct relevant institutions to prevent and control pollution, undertake research activities, and execute sustainable development and research projects. The PEPC has the powers to establish issue-specific committees and invite any technical expert, government representative or NGO to assist in supporting the implementation of its functions.

Major achievements of PEPC take the form of approvals. It has approved: the Pakistan National Conservation Strategy, the revised NEQS of 1999, the National Environmental Action Plan, and the National Environmental Policy of 2005. An important function of PEPC (under section 4 (e) of PEPA) is to “*co-ordinate integration of the principles and concerns of sustainable development in to national development plans and policies.*” However, PEPC has not performed this function well because it has remained almost non-functional for most of its tenure. Not only has PEPC failed to meet at least twice yearly as required under section 3 of PEPA 1997, it failed to meet at all between 2004 and 2010. As the apex environmental institution in Pakistan, PEPC's weak performance does not reflect well on the GoP's commitment to the environment.

5.2.2. *Ministry of the Environment (dissolved in 2011)*

The Ministry of Environment (MOE) was established as a full-fledged ministry in 2002. Before, it was part of the Ministry of Local Government and Rural Development. The MOE was established under the Federal Government Order (not covered by PEPA 1997), and it was second in the hierarchy of environmental institutions. The MOE's formal mandate comprised the design and implementation of national environmental policies, plans and programs, including environmental planning, pollution control and prevention, ecology, forestry, wildlife, and human settlements, particularly in areas such as urban water supply, sewerage and drainage. The Ministry was also responsible for negotiating and implementing agreements with other countries and international organizations in the areas of environment, housing, and physical and human settlements. The 18th Constitutional Amendment, adopted in 2010, devolves all these responsibilities from the MOE to the provinces.

MoE had been successful in incorporating environmental concerns in most of the national level policies and sensitizing development ministries on the environmental issues. However, it had struggled with the implementation of environmental programs and policies and with the formulation of new policies. For example, Pakistan's Mid Term Development Framework (MTDF) allocated Rs. 28.3 billion for the environment sector for 2005-2010. An allocation of Rs. 19 billion was made during the past four years, but only 60% of these funds were utilized. In most cases, line departments and agencies of the MOE were responsible for project implementation, but these had been generally implemented by Pak-EPA. In a few

cases, the MOE also implemented projects independently, as in the case of the National Environmental Information Management System. Most of these projects received financial support from multilateral or bilateral institutions, although there are a few cases where the Federal Government was the sole funder.

5.2.3. Pakistan Environmental Protection Agency

Before the 18th Amendment, the Pakistan Environmental Protection Agency (Pak-EPA) was the federal agency responsible for implementing the PEPA in the national territory; this activity was under the administrative control of the Environment Division of the MOE. Pak-EPA had a broad range of functions, including the administration and implementation of PEPA and the associated rules and regulations. Other relevant functions of the Pak-EPA are the preparation, national and international coordination, and implementation of environmental policies; preparation of the annual National Environmental Report; formulation, enforcement, and revision of NEQS; and conducting environmental monitoring whenever required. Until 2010, Pak-EPA was the umbrella body responsible for regulatory enforcement. However, the passage of the 18th Amendment to the Constitution of Pakistan resulted in the downscaling of its scope.

A 2010 study conducted in the course of this NLTA found that Pak-EPA had faced some challenges linked to ineffective delegation of functions to lower levels within its organization structure. As a result of poor delegation, the Director General and its secretariat face excessive workloads, while second-tier directors and tiers below them typically had light workloads. Existing resources and units were hence not effectively utilized and some assigned tasks were not being carried out regularly. The Pak-EPA, which is tasked with the responsibility of publishing the annual National Environment Report has failed to produce such reports on an annual basis. Its major publication along these lines was the State of Environment Report 2005 (Draft). Publication of National Environmental Reports is essential as they document national, provincial and local environmental issues, strategies in environmental planning and implementation, and the responsibilities of different agencies in mitigating and managing the environmental issues. Moreover, these national reports can also help potential international investors and financiers interested in participating in environmental improvement initiatives to select their area of interest based on the most recent and comprehensive environmental issues pertinent to Pakistan.

5.2.4. Provincial Environmental Protection Agencies

Provincial environmental protection agencies (EPAs) were created in Punjab, Sindh, Khyber Pakhtunkhwa and Baluchistan, and they have the authority to handle environmental management tasks in their respective provinces. Each of the four EPAs is tasked with: implementing rules and regulations of PEPA; setting environmental priorities and developing new environmental regulations for their respective province; developing provincial systems for the implementation of pollution charges; preparing provincial level environmental disaster management plans; collecting data on environmental quality (including data on polluters); responding to environmentally-related inquiries and complaints by stakeholders; monitoring vehicles emissions for controlling air pollution; operating laboratories for testing samples; and, mobilizing national and international financial resources for environmental work. Generally, these agencies only had the capacity to devote systematic attention to the review of environmental assessment documents for large projects being undertaken within the province.

In order to carry out their responsibilities, provincial EPAs have strengthened their organizational structures, established their own environmental laboratories, and set up district offices. While provincial organizations charged with the implementation of the existing legal and regulatory framework have detailed and ambitious mandates, in general, they have insufficient staff, small budgets, low political prestige, little or no political or administrative autonomy, and high staff turnover rates. The agencies are rarely adequately staffed with experts to monitor and enforce ambient air, water, and soil quality

standards; protect valuable natural resources; review EIAs of major and complex projects and monitor their implementation; and carry out meaningful public consultations with affected communities. As a result, the enforcement of mandatory regulations is lax, and stricter penalties that are sometimes available in the laws are almost never imposed due to, among other reasons, the lack of technical capacity to provide sound evidence of infractions, and the fear of political retribution. Furthermore, there is little priority setting for the use of their very limited resources based on sound analytical work, including social and cost-effectiveness criteria.

a. Inadequate Capacity of Provincial EPAs during the EIA/IEE Process

As examples, provincial EPAs generally have weak capacity to inspect and monitor projects during the Environmental Impact Assessment (EIA) and Initial Environmental Examinations (IEE) processes.³⁰³ As a result of the lack of site inspection, the EPAs rely heavily on the IEE/EIA reports, many of which are of poor quality, to make their approval decisions. The concern here is that many projects have the tendency to be approved based on environmental assessments that are inadequate in that they do not account for the actual realities of the environment and ecological setting, as well as the potential impacts of projects.³⁰⁴

The World Bank's Pakistan Strategic Country Environmental Assessment (SCEA) found that the public participation process, which is an integral part of the IEE and EIA process, was carried out merely as a formality by the EPAs rather than as a process to influence decision making.³⁰⁵ Moreover, the SCEA found that low quality IEE/EIA reports get approved as a result of poor levels of social accountability, low transparency in EPAs, and an absence of a panel of experts in the EPAs that understand the importance of high quality IEE/EIA reports.³⁰⁶

Monitoring activities after the project approval are rarely executed by EPAs. Section 10 of the IEE/EIA Regulations states that proponents of projects must submit a project completion report based on physical inspection. After the physical inspection by the EPA, the project proponent is required to submit annual operational performance reports to document the conditions of compliance as pre-determined in the IEE/EIA reports. Representatives of EPAs themselves reported during the course of this analytic work that they faced serious capacity limitations for field monitoring and making project verifications before and after project approval.³⁰⁷

The consequences for the country are, among others, (i) poor ambient quality; (ii) continuing destruction of valuable natural resources; (iii) disproportionate burden of disease on the poor and disadvantaged communities; (iv) ineffective review process of EIAs with long delays in the issuance of environmental permits, adding unnecessary costs to projects; and (v) an excessive judicialization of the environmental

³⁰³ The IEE-EIA Regulations, 2000 provides details on the preparation, submission, and review of IEE/EIAs. EIAs are conducted for proposed projects that are expected to have serious environmental impacts, whereas projects with lesser environmental impacts require an IEE. Detailed sector-specific guidelines are prepared for industrial estates. Section 18 of IEE/EIA Regulations, 2000 states that "for the purpose of verification of any matter relating to the review or to the conditions of approval of an IEE or EIA prior to, during or after commencement of construction or operation of a project, dually authorized staff of the Federal Agency shall be entitled to enter and inspect the project site, factory building and plant and equipment installed therein."

³⁰⁴ Luken, R.A. 2009. Equivocating on the Polluter-Pays Principle: The Consequences for Pakistan, *Journal of Environmental Management* (90), pp. 3479-3484, Available from <http://www.sciencedirect.com/science/article/pii/S0301479709001996>

³⁰⁵ World Bank. 2006. Pakistan Strategic Country Environmental Assessment.

³⁰⁶ Ibid.

³⁰⁷ Khan, 2010.

permitting process.³⁰⁸ The following section provides an evaluation of the capacities of provincial EPA to carry out their respective functions:

b. Assessment of the four provincial EPAs

Environmental Protection Department-Punjab (EPD)³⁰⁹: Unlike the Pakistan EPA and MOE, the EPA Punjab delegates assigned functions to lower levels. However, the EIA unit's workload for IEE/EIA regulations was found to be too burdensome and excessive; only one Director, one Deputy Director, three inspectors, and one sub-engineer handle EIA workloads. The EIA Section received 257 applications and processed 173 applications in 2008. However, a large number of applications were able to be processed because EIA Section officials skip making mandatory field visits before and after project implementation. The performance for field monitoring of projects is almost non-existent. Moreover, the EPA's performance in helping to enforce NEQS in industries and monitoring results is poor.

Sindh Environmental Protection Agency (Sindh EPA)³¹⁰: Unlike the Punjab EPA, the Sindh EPA has played an important role in helping enforce NEQS in industries. It provided strong support for the implementation of CETPs for Korangi tanneries in Karachi, and it issued warnings to those tanneries which were not paying their share of operations and maintenance costs for the combined effluent treatment plants. In response to the efforts of the Sindh EPA, most of the tanneries are paying monthly charges and arrears for the operation of CETPs. Sindh EPA staff also is active in making field visits to make sure that large industries are in compliance with NEQS. In the past 15 years, almost all the multinational industries have installed treatment plants under the enforcement campaigns of Sindh EPA.

Baluchistan Environmental Protection Agency (BEPA)³¹¹: The capacity and capability of BEPA could not be assessed properly due to the agency's light workloads as well as the low level of industrial activity that takes place in the province.³¹² Industrial environmental management monitoring is not common, which is partially due to the small industrial base. Multi-national industries located in the Hub Industrial Trading Estate are mostly in compliance with environmental legislation as per their international corporate policies. Most of the oil and gas exploration and abstraction companies are multinational and these companies generally are in compliance with their sector environmental guidelines established by Pakistan EPA. Enforcement of NEQS in the domestic industry sector in Baluchistan remains low; however, this was found to be primarily due to the stringency of NEQS which are well beyond the capabilities and resources of most of Pakistan's industries. It appears that the quality of IEE/EIA reports is generally good.

³⁰⁸ Miglino, 2011. "SEPSA: Environmental Management Component." Consultant Report for the World Bank; and Khan, 2010. "Industrial Environmental Management in Pakistan" Consultant report for the World Bank. Washington, D. C. Washington, D.C.

³⁰⁹ The Punjab EPD is headed by a DP. Four Directors (Director of Planning & Coordination; Director of IA; Director of Monitoring, Investigation and Implementation and the Laboratories Director) are placed under the DG. Source: Khan, 2010.

³¹⁰ The Sindh EPA is headed by a DG. Under the DG, there are three directors: Technical Director, Administration Director, and the Laboratory Director. Recently, the Sindh EPA has appointed a technically qualified professional DG, an appointment which is anticipated to improve agency operations and streamlines its operations in line with its core mandate and functions. Source: Khan, 2010.

³¹¹ The BEPA agency is headed by the DG, who is assisted by two directors (IEE/EIA and the Administration Director). Four Regional deputy Directors and one Deputy Director work under the EIA/IEE Director.

³¹² The Hub Industrial Trading Estate (HITE) is the only formal and operational industrial estate in the entire province. Trading and oil & gas are other industries in the province. The small industries are mainly primary product processing units which general minimal environmental impacts. Source: Khan, 2010.

Khyber Pakhtunkhwa Environmental Protection Agency (KP EPA³¹³): Similar to the BEPA, the industrial base of KP is fairly small and characterized by small enterprises. Most of these enterprises do not come under the ambit of PEPA 1997. Nevertheless, KP EPA has prepared environment management manuals for these small industries to help reduce environmental risks. KP EPA has been active in promoting CP practices in the small industries. The capacity of KP EPA to enforce NEQS was found to be moderate. The existing team for the Deputy Director Pollution Control unit is comprised of only two people, a rather small team that is charged with the enforcement of PEPA 1997 throughout the province. Most of the projects currently under implementation are in line with the mandate of KP EPA. The EIA unit of KP assigns functions to lower levels.

c. Provincial Sustainable Development Funds and (PSDF) and Associated Boards

The PEPA 1997 provides the framework for the establishment of Provincial Sustainable Development Funds (PSDF),³¹⁴ which are supposed to be used to fund projects with an environmental objective; e.g., environmental protection, pollution control, sustainable development, etc. The PSDF is allowed to generate funds from governments and the private sector, as well as international sources. PSDF boards must consist of six official members, a maximum of ten representatives from the private sector, NGOs and donors, and Director Generals of the relevant Provincial EPA. Major functions of PSDF boards include: granting financial sanctions for projects, investing funds, and monitoring projects financed by the PSDF. The PSDF Board (Procedure) Rules 2001 state the operational procedures for running the operations of the PSDF Board.

However, PSDFs are non-functional as a result of the following factors: a low interest by provincial EPA's in establishing PSDFs; lack of capacity and capabilities of provincial EPAs to fund them; inadequate government seed funding; and weak implementation of pollution charge rules. The non-functionality of PSDFs is a major constraint in the implementation of CETPs and other large environmental projects under public-private partnership arrangements.³¹⁵

d. 18th Constitutional Amendment and Impact on Provincial Environmental Management

The 18th Constitutional Amendment devolved responsibilities for environmental management to sub-national governments, and the ambit of each of these agencies increased considerably with the Amendment and the resulting retreat of the federal government from the responsibility for environmental management. However, in the months since the adoption of the 18th Constitutional Amendment, provincial governments have taken over environmental management responsibilities in an *ad hoc* manner. In Punjab, for example, District Environment Officers have been appointed in most districts. However, in the other three provinces, the environment departments have set up regional offices. While decentralization of environmental management responsibilities offers a number of benefits, including the capacity to respond more effectively to local priorities, there are also significant tradeoffs and risks. For example, unequal definition and enforcement of environmental standards, as well as differences in the capacity of environmental agencies, could lead to more severe environmental degradation in different parts of the country.

³¹³ This agency is headed by the Director General (DG), which is assisted by a Director. Under the Director, five Sections, each headed by a Director General, have been established. These Sections are: (i) EIA, (ii) Planning; (iii) Analyses; (iv) Pollution Control; and (v) Chemist. Source: Khan, 2010.

³¹⁴ Section 9 of the Pakistan Environmental Protection Act, 1997 provides, inter alia, for the establishment of Provincial Sustainable Development Fund (PSDF).

³¹⁵ Khan, 2010.

Initiatives and enforcement of environmental quality regulations are to a large extent the responsibility of the provincial EPAs. Uneven demographic, industrial and environmental characteristics across different territories in the country have created disparities in the degree of enforcement and the number of initiatives related to environmental quality issues. In addition, many environmental issues cut across geographical barriers, and systematized mechanisms for inter-sectoral coordination to tackle cross-cutting issues and harmonize common interventions have not been created in Pakistan. In spite of all the directives contained in the regulations stressing the importance of coordination among concerned agencies, by May of 2012, no formal mechanisms existed for agencies involved in environmental management to participate in a consultative process with other provincial or sectoral agencies for priority-setting, design and implementation of interventions, and monitoring, and evaluation of effectiveness. Inter-sectoral coordination for the oversight of cross-cutting issues is also nonexistent. Some attempts have been made to establish focal points within other non-environment ministries, but interactions among these focal points have not yet been institutionalized.³¹⁶

5.2.5. *The Judiciary and the Enforcement of Regulations*

In Pakistan, the judiciary has played an increasingly important role in the enforcement of environmental laws. When regulatory avenues for environmental enforcement fail, the judicial system is often the only other recourse for resolving environmental conflicts. An independent judiciary and judicial process enhances implementation, development, and enforcement of pollution control regulations. The Supreme Court of Pakistan has considered several cases regarding the degradation of the environment and the protection of a clean environment and has concluded that the right to a clean environment is a fundamental right of all citizens of Pakistan, covered by the right to life and right to dignity under Articles 9 and 14 of the Constitution.

The High Courts in the provinces have also intervened and rendered decisions affecting future environmental management. One example of court policy intervention led to the establishment of the Lahore Clean Air Commission. The Lahore High Court appointed the Commission to develop and submit a report on feasible and specific solutions and measures for monitoring, controlling, and improving vehicular air pollution in the city of Lahore.

a. Environmental Tribunals

Section 20 of PEPA, 1997 authorizes the federal government to establish as many Environmental Tribunals (ETs) as it considers necessary and specify the territorial limits or class of cases under which each of them shall exercise jurisdiction. In accordance with the Act, the Tribunals are staffed by Environmental Magistrates appointed by the federal and provincial governments among senior civil judges. The environmental tribunals and magistrates have the power to hear environment-related cases and impose sanctions for non-compliance with environmental requirements. Firms charged with non-compliance face the following *possible* penalties: imprisonment (a maximum of two years), monetary fines, closure of the firm, or confiscation of factory machinery, equipment, and other assets. EPAs, with the approval of the courts, may also continue to penalize the offending firm with each subsequent violation. Penalties are rare, however, as most firms formally charged with non-compliance to PEPA eventually implement required environmental measures. In the early 2000s, there were only a few cases of mild penalties being levied against offenders.

Currently there are four Environmental Tribunals, one each at Lahore, Karachi, Peshawar, Quetta. These are headed by a Chairperson and two members: one member is a technical expert and the other is a legal

³¹⁶ World Bank, 2011. "Policy Options To Address The Cost of Outdoor Air Pollution in Pakistan". Draft Report. August 2011

expert. At present, the Environmental Protection Tribunal, Lahore is the only fully staffed ET, whereas ETs in Karachi, Peshawar and Quetta are not fully functional primarily because some key posts are vacant. The ET is the key fact-finding authority in cases and issues related to environmental pollution as per PEPA, 1997 Private individuals can also use ETs to seek relief for their grievances against the alleged polluters.³¹⁷

By establishing a constitutional right to a clean environment and demonstrating a willingness to address matters of environmental policy, the Courts have empowered citizens with legal standing enabling them to enforce environmental laws through administrative and judicial proceedings. While this right has been established by the Courts, there are no citizen suit provisions in the enabling environmental statutes. Existing and future laws would be needed in order to explicitly provide for citizen enforcement. Public interest advocacy can be a powerful force for improvements in environmental management, one that could be supported through environmental law associations and the establishment of environmental law clinics at universities.

5.3. Other Government Agencies with Environmental Responsibilities

The Planning Commission of Pakistan contains an environment section, comprised of a Chief and Deputy Chief, under the Member, Infrastructure. Similarly, all four provinces have an environment section in their Planning and Development Department. The aim of these departments is to incorporate environmental concerns into the overarching development policy of the province and ensure that environmental concerns are reflected in the schemes and projects that the province is developing.

Several federal sectoral ministries are important players in the design and implementation of environmental policies. The Ministry of Petroleum and Natural Resources (MoPNR) is responsible for combating adulteration of fuel and increasing standards, especially by decreasing sulfur content for fuel refined in the country. The Ministry of Industries (MoI) is responsible for regulating the types of vehicles that can be imported, potentially reducing imports of high-polluting vehicles at the gate. The MoI is also responsible for measures aimed at modernizing the fleet of public service vehicles and scrapping older and more polluting vehicles. However, the MoI has not yet established an environmental unit within its organization. Pakistan's National Environmental Policy, Midterm Development Framework, and the 2011 Framework for Economic Growth express that that environmental management and sustainability components need to be incorporated in the Industry Policy of Pakistan. The Ministry of Finance (MoF) and MoPNR are responsible for fuel pricing and subsidies. The Ministry of Energy (MoEn) is responsible for clean fuel imports and encouraging the use of CNG in vehicles. Finally, the Ministry of Agriculture (MoA) is responsible for regulating the burning of sugarcane fields and agricultural waste. However, there is no mechanism in place to allow these different agencies to coordinate with key environmental management agencies. This problem has been exacerbated for these federal Islamabad-based agencies because primary environmental management responsibilities have been devolved to the four provinces.³¹⁸

³¹⁷ This paragraph is based on the website of the Ministry of Law and Justice and Parliamentary Affairs. http://202.83.164.27/wps/portal/Moljhr!/ut/p/c0/04_SB8K8xLLM9MSSzPy8xBz9CP0os_hQN68AZ3dnIwMLN09zAyOfYDNTTwsTAwtzU_2CbEdFAHjnARI!/?WCM_GLOBAL_CONTEXT=/wps/wcm/connect/MoljhrCL/ministry/general/environmental+protection+tribunal Accessed August 5, 2011.

³¹⁸ World Bank, 2011.

5.4. Comparison of Pakistan's Environmental Requirements with Those of Other Countries

As part of this NLTA, a review was conducted of environmental laws and regulations in India, Sri Lanka, Bangladesh, Nepal, Bhutan, and Maldives in comparison with the environmental legislation of Pakistan, but it was conducted before the 18th Amendment to the Constitution was passed (the devolution of environmental regulations to the provinces is currently underway and thus not subject to analysis). The goal was to evaluate the comprehensiveness of PEPA, 1997 in comparison with countries in the region that have similar ecological and economic conditions. The comparative analysis involved an examination of the following: environmental acts, rules and regulations; penalties (fines and imprisonment); and level of environmental regulatory enforcement.

Environmental laws of all the countries have similar aims, goals, and objectives. The high level of similarity in the environmental legislation of these countries is mainly because environmental laws in each of these were designed with technical assistance from OECD countries.³¹⁹ Variations exist in administrative structure owing to differences in the governance arrangements and institutional hierarchy within each country. All the countries have concentration-based discharge standards and they mandate that industries and municipal pollution sources comply with these standards. An inter-country comparative analysis of environmental standards reveals that Pakistan's NEQS is either at par with the comparable standards of other countries or in some cases, such as BOD, they are more lenient. Information on the technical basis used for developing these standards by countries is not available; therefore it is not possible to comment on the scientific basis of the limits set in the environmental standards.

In all the countries examined, environmental rules apply to both the public and private sectors. Enforcement authorities have been extended to all levels of governments, including central governments and district governments, to monitor pollution sources for the compliance of environmental standards. Detailed rules and regulations are either supported by environmental laws or they are notified separately using executive authorities of the central governments. The subjects covered by legislative instruments are generally the same across countries, but there are differences reflecting the geographic and ecological circumstances of the countries. For example the main emphasis of environmental legislation of Bhutan and Nepal is on the conservation and protection of forest resources, whereas in the case of India and Pakistan, owing to diversity of ecological assets, there is equal emphasis on conservation and protection of many types of natural resources, not just forest resources.

Penalties (in the form of fines and imprisonment) have been included in the environmental laws of all the countries in the comparative analysis. Variations with respect to size of penalties exist owing to differences in the penalty structure for offences under different national and local laws. In each of the countries, penalties are to be applied for both private and public sector organizations. Each of the laws includes provisions for the creation of environmental courts but variations exist owing to differences in judicial systems and structures.

Country specific information needed to determine the level of *enforcement* of environmental rules in these countries was limited. However, based on documents and mass media information, it can be crudely assessed that India is ahead of other countries in the enforcement of environmental requirements. This appears to be the case for the following reasons: India is a democratic country with a civil society that is comparatively more active and conscious of environmental issues; courts in India appear to be more vigilant with regard to environmental issues; and India has experienced more stable economic growth.

³¹⁹ World Bank. 1999. Greening Industry: New Roles for Communities, Markets, and Government.

Based on an assessment of information in documents and mass media, it appears that industries in all of these countries are, for the most part, not complying with the environmental requirements. The countries enforcement and compliance efforts have suffered because of the use of a one-size-fits-all approach that relies on use of concentration-based discharge standards using poorly developed command-and-control strategies. Initiatives, especially in Pakistan and India, have been undertaken to adopt cleaner production approaches with the aim of making progress in pollution reduction. Many success stories of alternate approaches for pollution reduction exist in these countries.

5.5. Augmenting the Capacity of Governments to Meet Environment-Related Responsibilities

5.5.1. Provincial-level Units

The work of following up on the environment-related requirements of the 18th Amendment of the Pakistan Constitution will fall heavily on the provincial EPAs, and they will require considerable strengthening to carry out their expanded duties. The 18th Amendment requires that much of what is now national environmental policy be translated down and recast as provincial environmental policy, and the provincial EPAs are likely to be tasked with carrying out the staff work needed to facilitate these changes. However, provincial EPAs are not currently well-staffed and lack the capacity to effectively enforce environmental regulations. Evidence for this is that the majority of SMEs participating in the survey of firms carried out as part of this NLTA were not aware of the existence of NEQS and many firms had no contact at all with an EPA. In addition, provincial EPAs have limited funding for designing and implementing programs to address high priority environmental problems. They also lack the ability to effectively implement existing environmental impact assessment requirements, especially for large infrastructure projects. The capacity of the provincial EPAs should therefore be expanded by significantly increasing the numbers of provincial EPA staffs as well as their levels of professional education and experience. Funding will also be needed to augment the EPAs' capacity to conduct environmental monitoring and enforce compliance with environmental requirements. Augmented funding and staffing for provincial EPAs should be a near term priority.

In order to respond effectively to the environment-related implications of the 18th Amendment, environmental units should be created within the Planning and Development departments of provincial governments. These departments have a wide range of responsibilities linked to economic development, including preparation of the provincial "annual development programs" and five-year plans, and monitoring the use of annual development program funds. By having environmental units within the provincial planning and development departments, these departments would become more sensitive to the linkages between industrial environmental performance, industrial competitiveness, and economic growth. In the near term, the Planning and Development departments should create environmental units that are tasked with integrating environmental considerations into the work of the departments. The new environmental units could also conduct analyses for department officials and department staffs in other units on how the environmental performance of firms in the province is affecting their competitiveness as well as human and environmental health within the province.

5.5.2. Ministry of Climate Change

The new MCC contains staffs that were part of the former Ministry of the Environment. The capacity of this apex unit should be strengthened significantly in the short term by the addition of funding and experienced environmental professionals. The new environmental apex unit should carry out the following functions:

- *International environmental negotiations* –Staff members of the apex unit should travel with Pakistan’s delegations to conferences at which international environmental agreements are negotiated to assist the delegations by providing information related to the state-of-the environment and the accessibility of state-of-the-art technologies in Pakistan as well as the feasibility of meeting proposed agreement conditions.
- *National environmental policies* – Notwithstanding the devolution process linked to the 18th Amendment, there is value in having a single set of baseline environmental norms so that all Pakistanis can enjoy a level of environmental quality consistent with protecting human health. These baseline norms could be embodied in national environmental policies developed by the apex unit; individual provinces can develop different norms, but they should be at least on par with standards developed by the apex unit for all of Pakistan.
- *Trans-boundary environmental issues* – Issues involving two or more provinces should be mediated by the apex environmental unit because provinces lack the resources to manage such matters effectively. The unit should also assist in dealing with cross-boundary issues involving other countries.

The MCC should also be given responsibility for *coordinating* the institutional strengthening and capacity building of provincial EPAs and environmental units to be created within the planning and development departments of provincial governments. The coordination function can involve such activities as the following for each province.

- Acquiring baseline data (e.g., ambient air quality concentrations), and assessing the impact on the environment of proposed policy changes and reforms.
- Disseminating information on good environmental management practices and facilitating coordination among provincial EPAs.
- Strengthening provincial environmental impact assessment systems to increase technical capacity of reviewers, improve administrative frameworks, increase supervisory strength, and handle increased caseloads resulting from new responsibilities falling on provinces as a result of the 18th Amendment.

The new apex environmental unit should also have responsibilities for: creating incentives for enhanced coordination among sub-national environmental units, providing measures to reduce vulnerability to natural disasters, enhancing public disclosure and strengthening accountability. Each of these responsibilities is clarified below.

- *Co-financing as an incentive for sub-national coordination* – One way for the apex environmental unit to incentivize coordination among sub-national environmental units involves having the ability to co-finance investment projects at the sub-national level; subsequent financing could be made contingent on attaining results.
- *Reduced vulnerability to natural disasters* -- Floods, mudslides, and earthquakes have the potential to cut vital transport links and otherwise wreak havoc, including massive disruption of industrial activity; the devastation caused by the 2010 floods provides an example. Given the significance of natural disasters in Pakistan, the GoP should task the apex environmental unit to work with others in MCC with developing measures to reduce vulnerability to such disasters.
- *Promoting transparency via public disclosure* – The apex environmental unit should take a leadership role in providing guidance to Pak-EPA and the provincial EPAs on how to introduce more systematic efforts to raise citizens’ awareness of environmental issues (e.g., health impacts of pollution) and thereby promote transparency and accountability. Examples of methods for accomplishing this include: more extensive publication of data on key environmental indicators

(including health statistics or data on pollution loads); wider use of public forums to discuss environmental impacts of development initiatives; and broader and more detailed review and discussion of environmental management tools. Guidance should also be provided on measures to disseminate information in a manner that is easily interpreted and can allow individual citizens, communities, the media and NGOs to play a role as informal regulators; this level of citizen engagement would also promote accountability on the part of those being regulated.³²⁰

- *Strengthening accountability* -- Pakistan has active civil society organizations which play an important role in implementing projects, delivering services to the poor, and participating in policy debates. However, civil society organizations have limited capacity to participate in monitoring environmental policy implementation and to hold environmental institutions accountable. The apex environmental agency could provide guidance to Pak-EPA and the provincial EPAs on ways to support development of technical capacity within civil society organizations concerned with environmental issues.

A timetable including specific actions for improving Pakistan’s Environmental Framework using a national level apex environmental agency is given in Table A5.2.

Table A5.2. Recommended Actions for Improving Pakistan’s Environmental Framework by the Ministry of Climate Change

<i>Recommended Action</i>	<i>Timeframe</i>
Creation of climate change unit with ability to provide assistance to Pakistan’s climate negotiations team, based on climate change research conducted by the Global Change Impact Studies Center	Short Term
Assigning responsibility for reducing vulnerability to natural disasters	Short term
Setting coordination incentives, possibly with a coordination fund to co-finance regional projects	Medium term
Provide guidance to EPAs on transparency and public disclosure issues	Medium term
Provide guidance to EPAs on establishing accountability mechanisms	Medium term

5.5.3. Other National-Level Units

It is recommended that the Ministry of Industries (MoI) seize the opportunity to take a leadership role in developing a national strategy for the diffusion of CP and EMS and the certification of firms to ISO 14,001 and other international standards. This can be done by creating an environmental unit within the MoI to take on the aforementioned leadership and coordination functions.

New environmental units should also be created within the Finance Ministry and the Ministry of Industries in order to augment their ability to advocate for improved industrial environmental management. As mentioned in the Finance Ministry’s *2010-11 Economic Outlook*, “a comprehensive growth strategy is being evolved, to increase productivity, efficiency, and competitiveness of the economy, and to ensure high growth rates that are both sustainable as well as more equitable” (Pakistan Finance Ministry, 2010-11, p. 2). Given the impacts of environmental performance on firms’ competitiveness, it will be important for the Ministry of Finance to have a unit with staff capable of highlighting to top officials in the Ministry the links between industrial environmental performance and competitiveness. This will facilitate inclusion in annual budgets of adequate funding and programming for CETP construction and CP dissemination. As in the case of the Finance Ministry, an internal unit should

³²⁰ For examples of how this has been done in China using the China Water Pollution Map, see Jun, M. et al. (2010).

be created within the Ministry of Industries so that the links between industrial environmental performance and competitiveness can be integrated into the Ministry's work. This would enable the Ministry's activities to reflect the importance of industrial environmental performance on firms' productivity and competitiveness.

5.6. Augmenting Pakistan's Quality Infrastructure

National infrastructure linked to quality management (widely referred to as "quality infrastructure") consists of institutions engaged in standardization, metrology, testing, inspection, certification and accreditation. It is often expensive, time consuming and complicated for firms to gain access to this infrastructure. Providing these services is an important element in maintaining Pakistan's export competitiveness. Pakistani firms can go abroad to access the needed quality infrastructure, but this poses special challenges for SMEs; they seldom use overseas service providers if there is no domestic capability. Also, sending equipment for calibration overseas is excessively burdensome. Moreover, using overseas auditors for ISO 9,001 and ISO 14,001 certifications are impediments for Pakistani firms interested in obtaining those certifications, and it is also challenging for firms to use overseas auditors in trying to meet restrictions imposed under WTO Agreements on Technical Barriers to Trade. For these reasons, Pakistan should view the development of quality-related infrastructure needed by firms as a priority element in the country's export strategy.³²¹

Pakistan has made a good start on development of quality infrastructure by creating the Pakistan Standards and Quality Control Authority (PSQCA), Pakistan National Accreditation Council (PNAC), and the National Physical and Standards Laboratory (NPSL). However, these organizations do not yet have the capacity needed to serve Pakistani firms engaged in exports effectively. The capacity of PSQCA, which is Pakistan's National Enquiry Point under WTO's Technical Barriers to Trade and SPS agreements, should be strengthened significantly in the short term.

PSQCA should be allocated with the resources and staff needed to serve as a communications bridge between standard-setting organizations affecting exports and Pakistani exporters. This bridging activity would involve enhancing the vertical linkages needed to supply information to and receive information from export-oriented firms. The bridging function has two main elements. PSQCA should: (i) make Pakistani exporters aware of trade and environmental issues so that they can make necessary adjustments in a timely way; and, (ii) provide information representing the perspectives of Pakistani exporters to organizations engaged in setting standards. To carry out this bridging function, PSQCA should design and implement a system to collect, track and release information concerning foreign environmental standards and requirements for products. In the case of government-set standards, PSQCA should educate exporters about standards that are currently under development. The bridging function also requires PSQCA to solicit, collate and relay the views of Pakistani exporters as inputs to the standard-setting process during the comment periods mandated by the WTO's Agreement on Technical Barriers to Trade.

5.7. Conclusions and Recommendations

The recent shifting of Pakistan's environmental regulatory and policy-setting priorities has further disorganized Pakistan's already overburdened environmental regulatory apparatus. As of mid-2012, Pakistan's apex environmental organization is the Ministry of Climate Change (MCC). The Ministry is new and its situation is uncertain, while understaffed provincial EPAs are unable to compel mandatory compliance with the NEQS; hence, compliance can only be expected on a voluntary basis. This Ministry

³²¹ Material in this paragraph and the ones that follow is based on Gujadhur (2010).

has authority over the Pakistan EPA and has policy-making and planning functions as they relate to environment. While the Ministry is a policy-setting body, the Pakistan EPA is a federal regulatory agency tasked with enforcing Pakistan's environmental regulatory framework. The exact responsibilities and powers of the MCC and Pak-EPA have yet to be worked out, as these bodies are taking up the portfolio of the Ministry of Environment, which was abolished in May 2011 under a decentralization scheme mandated by the eighteenth amendment to the constitution of Pakistan (whose intent was to return many federal powers to the control of the provinces).

The MCC should receive the budget and staff needed to carry out key coordination functions on environmental matters with provinces and international bodies. Responsibilities for this new apex environmental agency should include, strengthening of institutional capacities to conduct the following responsibilities, among others: developing national environmental policies, engaging in international environmental negotiations, dealing with trans-boundary environmental issues, and promoting inter-provincial coordination. The apex environmental agency should also be given responsibility for coordinating the institutional strengthening and capacity building of provincial EPAs and environmental units to be created within the planning and development departments of provincial governments.

Each of the four provinces possesses a provincial EPA, which is tasked with numerous responsibilities for implementing environmental programs. Provincial EPAs have the authority to handle environmental management tasks in their respective provinces (e.g., implementing rules and regulations of PEPA, 1997). With the possible exception of reviewing few environmental assessment documents for large projects being undertaken within the province, these agencies do not have the capacity to devote systematic attention to their regulatory responsibilities. Institutional challenges faced by Pakistan in terms of environmental management include poor technical and monitoring capacity by key environmental agencies. Provincial environmental protection agencies do not have the capacity to effectively monitor and enforce ambient air, water, and soil quality standards, review environmental impact assessments (EIAs) of major projects and monitor their implementation, and carry out meaningful public consultations with affected communities. Following passage of the 18th Amendment, which devolved environmental responsibilities down to provinces, questions remain about the capacity for provinces to carry out and promote compliance with environmental regulations, given their already poor institutional capacities.

Provincial EPAs should be provided with budgets, staffs and equipment needed for effective environmental monitoring and enforcement. In addition, environmental units should be created within the Planning and Development departments of provincial governments, the Finance Ministry, and the Ministry of Industries to make these agencies more sensitive to the linkages between industrial environmental management and competitiveness.