DO INFORMAL METHODS TO CONTROL POLLUTION WORK? A CASE OF INDUSTRIAL POLLUTION IN PAKISTAN.

Samina Khalil
Applied Economics Research Centre
University of Karachi,
Karachi, Pakistan.
E-mail: skhalil@aerc.edu.pk

—Abstract —

The formal environmental pollution control and regulatory system in Pakistan has failed to achieve the policy objectives and targets to control growing pollution levels in Pakistan. The ineffectiveness of the regulatory system underscores the need to explore the potential use of informal approaches to control industrial pollution. The focus group discussion with the stakeholders in the Korangi industrial area revolve around a broad theme of environmental supply and environmental demand indicators that form the basis for exploring the potential use of informal regulations to complement a regulatory system, alongside community activism.

Key Words: *Regulatory framework, Informal approaches, Community activism*
JEL Classification: Q53, Q56, Q58,

1. INTRODUCTION

The key determinant of effectiveness of any government is how well formal regulatory systems achieve policy objectives. Given the ineffectiveness and many weaknesses of the regulatory framework in developing countries, firms treat the environment as a free input and undertake no effort or inadequate measures to control emission (Afsah et al., 1996). The formal regulation system to control industrial pollution in Pakistan has failed to achieve its targets in an increasingly industrializing and low income setting. Despite a hierarchical institutional setup, strong legal framework and the existence of a large bureaucracy for dealing with environmental regulation, the reported evidences verify the public perception that environmental performance of industries in Pakistan remains weak.

In this paper, section 2 deals with the literature review followed by Institutional/ Organizational setup in section 3. Impediments to effective environmental protection are given in section 4 while industrial pollution control using informal

regulations is discussed in 5th section. Section 6 deals with broadening the vision beyond state regulators followed by the potential role of informal regulations for controlling industrial pollution section 7. Conclusion is given in section 8.

2. Literature Review

In the past few years, a number of studies have emerged in literature, recognizing the limitations of formal regulations to stem pollution in developing countries and advocating broad-based efforts to complement a regulatory system. In settings marked by high unemployment and low literacy rates, inadequate institutional capacity may seriously impair the ability of the environmental regulatory agency to conduct effective monitoring and enforcement (Pargel and Wheeler 1996; Mookherjee and Png 1992, 1995). As regulatory authorities lack the resources to use conventional instruments in many developing countries, information disclosure is at least an important first step. One of the vital chaerterstics of this approach is the inclusion of all stakeholders; community, industry, consumers and non-governmental organizations along with government and media representatives (Wheelar et al. 2000). The results of empirical analyses carried out by Pargel et al., (1997 b) on water polluting industries in India clearly depict a strong influence of the community on pollution control. A similar kind of study by Murty and Prasad (1999) on India shows a significant negative relationship between the political participation of local communities and the BOD. Dasgupta and Wheeler (1997) have analyzed the determinants of citizens' complaints in China and found these to be an increasing function of the levels of income and education.

3. Institutional / Organizational setup

The Pakistan Environmental Protection Ordinance (PEPO) 1983 was the first piece of legislation by the Government of Pakistan in this area and can be termed the principal public statement and national commitment to deal with environmental problems in the country. Its objective was 'to provide for the control of pollution and the preservation of the living environment' in Pakistan. The key components of the ordinance focus on the establishment of an institutional regulatory system and management structure, design environmental policies and launch environmental impact assessment (EIA) at all levels of development projects from designing to construction.

Figure-1: Pakistan's regulatory institutional arrangement for control of pollution

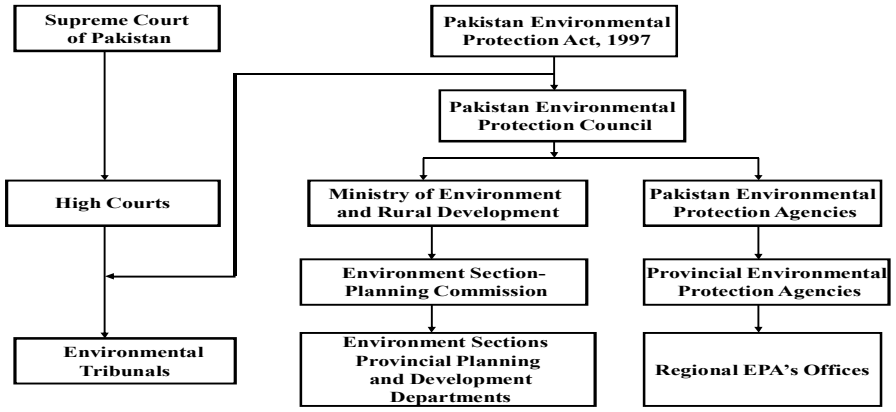


Figure 1 illustrates the environmental functionaries and regulatory authorities with various federal and provincial responsibilities in order to oversee implementation of environmental laws and regulations. The period between 1983 and 1997 can be seen as the campaign phase of environmental legislation for the realization of the Pakistan Environmental Protection Act (PEPA) 1997, which superseded the PEPO 1983. For major environmental policy initiatives (and legislations) taken by the Government of Pakistan, see Appendix 1.

4. Impediments to effective environmental protection

Although the institutional and legal setup to promote environment friendly activities in industrial and other sectors of the economy are in place, as described above, the deteriorating environmental conditions in the country, as indicated by undesirable levels of pollutants in the ambient environment, depend on various factors. The following constraints to effective environmental protection are identified:

4.1. Political instability

In 62 years of independence, Pakistan has experienced unstable governments and shifts between military government and democracy which has resulted in inconsistent and ineffective policies in every walk of life. The uncertainty of governance in the country has not allowed policies to take root and achieve their desired targets.

4.2. Economic instability

The economic priorities of the country have been skewed in favour of the large defense budget and consequently foreign debt continues to mount. Pakistan's per capita income is US$ 1027 (2008-2009) and has decreased in recent years. This has a direct impact on industrial pollution. According to the Annual Report of the World Bank (2007), there is a 1% decline in the intensity of organic pollution of water (the amount per unit of industrial output) for each percentage increase in per capita income. Overall, the data reveal that pollution intensity falls by 90% as per capita income rises from US$500 to US$20,000. It is important to note that the fastest decline occurs before countries reach middle-income status.

4.3. Inadequate institutional capacity

Although in the past two decades complete environmental institutional and regulatory machinery has emerged in the country, it is still unable to implement environmental policies effectively. Lack of technical know-how, insufficient training opportunities, dearth of planning capacity, inadequate staff, infrastructure and monitoring systems and most importantly allocation of meager budgets all aggravate poor environmental conditions. The PEPA has a well-equipped laboratory, but it is non-functional because of inadequately trained staff.

4.4. Lack of information

It is imperative on the part of regulatory bodies to collect, process, and organize environmental information for use by policy makers, environmental managers, technical experts and citizens. But the quality of the information processed by the PEPA, its reliability, representativeness (lack of bias), periodicity and comparability are not satisfactory and cannot be better than the quality of the primary data. Secondary data on water quality from various point sources, organic content of soils at various sample points, and other such data, are unfocused and scattered. Lack of information or access to required information on cleaner technologies, sources of funding and assistance, and markets for environmentally friendly products is also a major constraint for environmentally sound and sustainable development.

4.5. Financial constraints

Ever increasing annual budgetary cuts due to austerity measures, sanctions imposed by the international community and cuts in the share of the environment sector in public sector development programs (PSDP) affect the environmental agenda. The allocation of Rs. 982.2 million in FY 1999-2000 as compared to Rs.

8.5 billion in FY 2008-2009 in PSDP for the environment sector represents an 8% decrease in the total allocation of PSDP for this sector over a period of almost a decade (PSDP report, 2009).

4.6. Lack of political will in the government

There has been a significant increase in environmental awareness among the educated urban masses in the country due to the efforts of international and local NGOs, but environment is still a low priority area for government. Government ministries and line departments are unaware of the need for mainstreaming conservation in annual development plans. In the last four years, the PEPC, the highest environmental policy making body, met only once. The Government of Pakistan has been unwilling to stop subsidies on energy and water prices, which encourage inefficient resource use as this may impact on industrial production costs. The lowest tier in the government machinery can play a vital role in environmental protection and pollution control activities as they are close to the communities, but most of the time local governments have remained inactive.

5. Industrial pollution control using informal regulations

The unsatisfactory performance of a regulatory system in many developing countries, like Pakistan, in controlling industrial pollution, and the failure of government initiatives and environmental laws, raise the question as to whether there are other options that can be adopted to safeguard the environment. The model of informal regulation as presented by Pargal and Wheeler (1995) follows the convention in defining emissions as the use of 'environmental services' which can be an additional factor of production in an augmented KLEM (Capital, Labour, Energy, Material) framework. The price of pollution which is implicit in this regard could be either a penalty or compensation which the affected community may demand. This input price can be differentiated from other prices as it may be plant-specific and optimizing communities may be tolerant towards polluting mills if they are employed by them or receiving local contracts and other compensations. On the other hand, communities may actively observe or monitor damaging impacts of industrial discharge on their local environment. Hence the price of pollution is an expectation not a certainty as mills learn about the expected penalties or compensations for damage by observing patterns of community monitoring and activity and subsequently decide to minimize the expected cost of polluting.

5.1. Environmental supply

The concept of 'environmental supply schedule' given by Pargal and Wheeler (1995) reflects an acknowledgement of the community's property rights in the environment, by industries. Affected communities can influence the costs on firms in terms of penalties or compensations depending on the intensity of pollution levels. So from the view point of industry, the result is an 'environmental supply schedule' which shifts inward as average community education levels and income increases. The schedule depends on various factors as identified by survey in some Southeast Asian countries (Hartman, Huq and Wheeler, 1994) including the level of community organization, information, legal or political recourse, media coverage, NGO presence, the efficiency of existing formal regulation and the opportunity cost of time. Many of these factors are likely to be correlated with the socio-economic (education and income) levels of the community.

5.2. Environmental demand

Once the industrial production units are faced with a community–determined environmental supply schedule, the pollution demand schedule reveals the adjusted pollution to the optimal point through cost minimization by production units[1]. The significant determinants of the environmental demand schedule are identified as: i) output - pollution load which is expected to grow with output: however the relationship between plant size and pollution abatement has indicated that scale economies in abatement are the general rule for which we can anticipate the elasticity of pollution with respect to output to be significantly less than one; ii) relative input prices: the material inputs and pollution seems to have complementary relationship but the cross price relationship of pollution with inputs like labor, capital and energy are not clearly signed; iii) sector-type of manufacturing units and products: for example, textile processing industry has enormous potential to generate much higher water pollution per unit of output than automobile or electronics assembly iv) efficiency: production firms which are more responsive to incentives for pollution control are termed as profitable and well-managed firms generating fewer waste residuals per unit of output.

These efficient firms are anticipated to be cleaner firms; ownership-multinational firms are expected to be environmentally friendlier than their local counterparts[2].

[1] This is quite analogous to a standard input demand function

[2] There is substantial anecdotal evidence to support this proposition (see Birdsall and Wheeler, 1993)

6. Broadening the vision beyond state regulators

The traditional or command and control policy discussion has a narrow focus, which is an interaction between the state and the production units. Environmental economists believe that economic instruments can be effective regulatory instruments under the right conditions in developing countries.

A broader model given by Afsah et al. (1996) as preconditions for applying any instrument to control industrial pollution are based on the larger premise of informal approaches. This includes the local community and market agents as key players in the determination of a mill's environmental performance.

The main features of their model are derived from studies on two developing countries (China and Indonesia) which highlight the effect of local conditions on the actual enforcement practices of regulatory agencies and public disclosure of environmental performance ratings for factories.

6.1. The community

Evidence from developing economies of the effective and influential role of communities residing in the vicinity of industrial estates in controlling pollution is provided by a range of authors (Huq and Wheeler, 1993; Pargal and Wheeler, (1996); Hettige and Witzel, 1996). Better educated and affluent communities are well organized, politically active and possess bargaining power. They can assert their strong position in ensuring the enforcement of environmental norms. Small community groups and NGOs can also use their leverage as complementary efforts to ascertain compliance by manufacturing units. There are various types of agents of informal regulation which vary from country to country. Community leaders, social organizations, local religious institutions, citizens' movements or politicians act in a similar pattern. Polluting mill owners commonly negotiate with local communities directly when they become affected, and respond to social norms feeling potential threats of penalties or sanctions from political activism.

6.2. The market

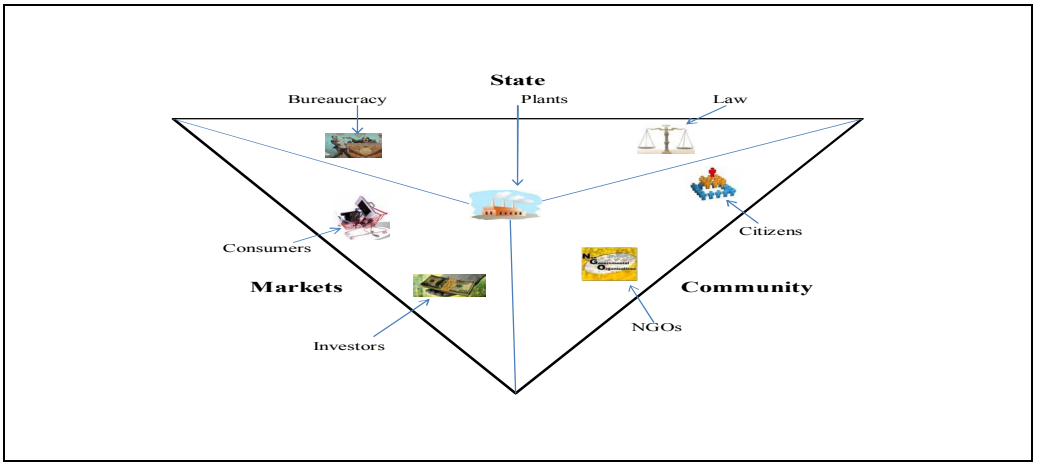
Producers subsequently seek to market their output in local, national and international markets and deal with agents, which influence their revenues earned and costs incurred. Consumers in industrial countries are environmentally sensitized and growing awareness of environmental considerations among buyers in developing countries has substantial impacts on their consumption decisions. The global advent of environmental legislation and institutional regulations has compelled investors to take environmental performance into account.

Internationalization of investment and growth of new stock markets is a recent phenomenon. Environmental polluters find themselves in a disadvantaged position when it comes to doing business with international financers, industrial equipment and engineering services.

6.3. Multiple agents and multiple incentives

The presence and active participation of other stakeholders in ensuring a pollution-free environment implies that state regulators lose their role as sole enforcers of regulatory policy but gain the potential for greater effectiveness of their efforts. The regulator's role is commonly confined to designing, monitoring and enforcing rules and standards. The complementary nature of informal regulations in the form of power of communities and markets could lend enormous leverage to state institutions in successfully implementing environmental policies. Figure 2 shows the 'Regulatory Triangle' in which state institutes like bureaucracy and environmental tribunals are joined by market agents, that is, consumers and investors on one hand and community agents like citizens and NGOs on the other hand to act as catalysts and effective agents of accruing desired outcomes from public policies. This triangular framework incorporates information-oriented approaches, such as voluntary participation / compliance programmes and public disclosure of a plant's environmental performance. Optimal combinations of regulatory tools could be applied depending on social, economic and institutional conditions specific to an individual country.

Figure-2: The new model: Multiple agents and multiple incentives



Adapted from Afsah et al. (1998).

7. The potential role of informal regulations for controlling industrial pollution

Communities living in the industrial estates of Karachi bear the brunt of incessant discharge of water and air pollutants from industrial production activities. I conducted focus group discussions with communities living in the Korangi Industrial Area (KIA) of Karachi to explore the potential of informal regulations in order to effectively control industrial pollution.(Appendix 2 and 4, show the communities' socio economic attributes and main themes of the focus group discussion, respectively).

7.1. Enabling factors and key outcomes of focus group discussion

The focus group discussion was held in the office of the councilor of the Korangi town area in July 2009. The discussion revolved around two main themes; environmental supply and environmental demand, to seek the community's participatory role in informal regulation in order to complement the formal regulatory system of industrial pollution control. The area councilor informed the group that the population of the area is around 0.5 million and more than 50% of the community lives in the unplanned area in the vicinity of industries with little access to public services. There are 56 schools for boys and 22 for girls that provide education at the secondary level. There are only 6 degree colleges in the area but no university to provide higher education to the community. The school teacher informed us that the primary school dropout rate is very high among the community children because of the variety of reasons, foremost being poverty and meager resources. The average education period is six years and the literacy rate is 42% as compared to 61.5% of Karachi's urban literacy levels. Majority of the young students never enter college to pursue higher education. Unskilled and semi-skilled industrial workers constitute more than 80% of the total labour / persons employed from the community areas adjacent to various industries. The average income of these industrial workers is between US $ 34–94 which is very low compared to skilled workers. Generally, women in this area are not involved in any income generating activities outside their homes, where they earn money by producing small handmade items at home.

The KIA area specific and primary environmental challenges that were identified in the focus group discussion are industrial wastewater polluting streams, rivers and the Arabian Sea, inadequate sewage collection and treatment is a situation that recently has resulted in dangerous flooding. Negligence in safe and quick disposal of hazardous solid waste, especially by chemical industries, has resulted in various life-threatening incidents which the community has to endure over the

last few years. The indiscriminate nature of industrial waste water discharge is causing serious environmental problems such as contamination of ground water, including water drawn for drinking and irrigation of small agricultural plots. More than 30% of the population is suffering from kidney ailments caused from drinking polluted water. Children have no recreation facilities like parks and playgrounds and they end up playing on wastelands where industries usually dispose of untreated hazardous solid waste which puts children in an extremely precarious situation.

The participants were of the opinion that people in the community are generally aware of environmental issues and the CBOs and NGOs working in the social sector also have an agenda, which they continuously pursue, to create environmental awareness among the masses. The international NGOs, like IUCN Pakistan, also collaborate with the local CBOs to undertake micro-level environmental projects like sanitation, composting and tree planting. An important component of growing awareness about environmental issues among the community is the ability of the NGOs to work with the local communities, targeting their needs and involving the communities in the design, operation and execution of various environmental projects. The print and electronic media were identified as immensely effective tools for creating environmental awareness. Generally people in the community watch television as their only source of entertainment and learning in the absence of other means of recreation. Even most of the poor households own a television and the visual effects are powerful enough to convey social messages to illiterate community members.

The question of whether the recently launched political setup and democratic governmental institutions and their consolidation have any role in motivating the community to environmental activism was also debated by participants in the focus group. Pakistan has a long history of 62 years of independence and has experienced the governance of the country swinging between military dictatorship and democracy. The participants focused their attention on the nexus of community participation and democratic governance in the country. Consensus emerged in favour of the argument that democratic norms are a mechanism for the transformation of individuals into active citizens in the battle against environmental injustice. The environmental demand side of the focus group discussion was based on the industrial profile of the area (See Appendix 3 and 5).

The environmental management or waste disposal programmes in KIA are ongoing projects initiated by different agencies. The Combined Effluent Treatment Plant (CETP) will have the capacity to treat a total of 36,000 m^3 of

effluents per day. This plant is still not operative because of some bureaucratic hurdles. The treated effluent discharged from the CETP is expected to meet the NEQS requirement. **See Appendix 6 for Scope of informal initiatives for effective industrial pollution control.**

8. CONCLUSION

The arguments and discussion in this paper are based on the premise that in spite of a formal and organized regulatory institutional / legislative setup to control environmental pollution in Pakistan, including industrial pollution, the system has failed to achieve its targets. The literature on informal regulations provides empirical evidence for successful implementation of informal regulations in developing countries as complementary tools to effectively implement regulatory policies. The discussion in the first section of this paper establishes the workings and organizational structure of government agencies in Pakistan who are responsible for planning and implementing activities for preserving and protecting the environment and for controlling pollution. Promulgation of necessary legislation and key environmental policies also reflect the concerted efforts by the government to achieve its objectives.

Given various impediments faced by regulatory authorities to check the relentless discharge of industrial water and air pollution, the need was felt to explore other means to complement existing regulatory policies. The focus group discussion with stakeholders and community members in KIA has helped in developing insights into the potential use of informal regulatory mechanisms through environmental activism of the affected communities.

BIBLIOGRAPHY

Afsah, Shakeb, Benoit Laplante, David Wheeler (1996), "Controlling Industrial Pollution: A New Paradigm Policy" *World Bank Policy Research Paper* 1672. Washington D.C.: World Bank.

Birdsall, Nancy, & David Wheeler (1993), "Trade policy and industrial pollution in Latin America: Where are the pollution havens?"*Journal of Environment and Development*, Vol. 2, No. 1, pp. 137–149.

Dasgupta, Susmita, David Wheeler, (1997), Citizen Complaints as Environmental Indicators: Evidence from China, *World Bank Working Paper 1704,* Washington D.C.: World Bank.

Hartman, R., Mainul Huq and David Wheeler (1995) "Why Paper Mills Clean-up: Results from a four-country survey in Asia", *Policy Research Department Working Paper*, Development Research Group, World Bank, Washington, DC.

Hettige, Mala and David Witzel, (1996), "Pollution Control Priorities for Mexico", World Bank,Policy Research Department (mimeo).

Huq, Mainul and David Wheeler (1993), Pollution reduction without formal regulation: Evidence from Bangladesh. In: *Environment Department Working Paper, No. 1993-39*, Washington D.C.: World Bank.

Mookherjee, Dilip & Png, I P L, (1992), "Monitoring vis-a-vis Investigation in Enforcement of Law," *American Economic Review, American Economic Association,* Vol. 82, No.3, pp 556-65.

Mookherjee, Dilip & Png, I P L (1995), "Corruptible Law Enforcers: How Should They Be Compensated?," *Economic Journal,* Royal Economic Society, Vol.105, No 428, pp 145-59.

Murty, Narasimha. and Ramana Prasad (1999), "Emissions Reduction and Influence of Local Communities in India", in M.N. Murty, A.J. James and Smita Misra (eds.), *Economics of Industrial Pollution Abatement: Theory and Empirical Evidence from the Indian Experience*, Delhi: Oxford University Press

Pargal, Sheoli and David Wheeler, (1995), Informal regulation of industrial pollution in developing countries: Evidence from Indonesia. In: *Policy Research Department Working Paper, No. 1416*, Washington D.C.: World Bank.

Pargal, Sheoli and David Wheeler, (1996), "Informal regulation of industrial pollution in developing countries: evidence from Indonesia", *Journal of Political Economy*, Vol. 104 No.6, pp.1314-27.

Pargal, Sheoli., Mala Hettige, Manjula Singh, and David Wheeler (1997b), "Formal and Informal Regulation of Industrial Pollution: Comparative Evidence from Indonesia and the United States", *World Bank Economic Review*, Vol.**11** No.5, pp. 433-50.

David Wheeler, *et al*. (2000), *Greening Industry: New Roles for Communities, Markets and Governments*. World Bank Policy Research Report, New York: Oxford University Press.

Appendix 1

Environmental policy initiatives and legislations

The major environmental policy initiatives taken by the Government of Pakistan are as follows:

Table A: Main environmental policy initiatives

National Environnemental Conservation Strategy (NCS)	NCS is a broad-based policy statement aimed at achieving environmentally sustainable economic and social development in Pakistan. Three overriding objectives of the NCS are: • Conservation of natural resources • Sustainable development • Improved efficiency in the use and management of resources. Operating principles to achieve these objectives: • Greater public participation in development and environmental management • Merger of environment and economic decisions • Lasting improvement in the quality of life
National Environmental Quality Standards (NEQS)	Under the PEPO, 1983, NEQS were issued for municipal and industrial effluents, industrial gaseous emissions and motor vehicle exhaust and noise. Pak-EPA, however, did not issue Statutary Regulatory Order (SRO) until 1994. SRO required all production units to immediately comply with the new standards after July 1994. Under the PEPA, 1997, NEQS were revised with full consultation with the private sector, industrialists, trade and business associations and NGOs. The municipal and liquid industrial effluent standards cover 32 parameters. The standards for industrial gaseous emissions specify limits for 16 parameters and the standards for motor vehicles prescribe maximum permissible limits for smoke, carbon monoxide and noise. Revised standards cover discharge limits of effluents into inland water, sewage treatment plants (operational) and the sea.
Self Monitoring and Reporting System (SMRS)	SMRS was introduced in 1998 which takes into account the resources and interests of both the regulators and industries. It makes the country's industry owners and operators responsible for systematic monitoring of their environmental problems. This system classifies industry into three categories A, B and C, reporting their emission levels after every month, quarterly and biannually respectively each corresponding to a specified reporting frequency. The SMRS procedure requires industries to have discharged effluents tested by the PEPA certified / accredited laboratory and use the specially designed

	software package to enter the results in electronic forms and send these forms to their respective EPAs.
Pollution Charge Programme (PCP)	PCP was introduced in 1999 and according to this program the industrial unit is to ensure the correct calculation, reporting and payment of the pollution charge by industrial units. The units of Pollution per unit of production are the basis for calculation of the pollution charge by the industrial units. The pollution charge is calculated by multiplying the pollution level with actual production during the charge payable period, and with the applicable rate per pollution unit for the year. The major flaw in PCP is that the applicable rate per pollution unit is arbitrarily determined with reference to the actual cost of pollution abatement. The collection of the charge and its use is still not revealed, thus creating few incentives for serious efforts of pollution abatements by producers.

Appendix 2

Table B: Socio-economic and environmental characteristics of KIA

Korangi Industrial Area (KIA)	Established in mid sixties, the KIA became operational in 1970. It is situated in the southeast of Karachi and spreads over 3,500 hectares. About 3,000 industrial and commercial units are currently in operation in the Karachi Industrial and Trading Estates (KITE)
Economic importance of KIA	KIA has a 40% share of the total leather export from Pakistan. As per the last survey conducted in 2004, there are about 400 textile units in KIA, and they contribute 7 -10% of the total textile export from Pakistan. Also, KIA processes the major portion of the total crude oil used in Pakistan. It provides employment to about 20% of the total labor force employed in the manufacturing sector of Pakistan. Besides these, there are also other small and medium size units whose many individual contributions add to the total. It is clear that KIA has an important role to play in the national economy of Pakistan.
Poverty	Industrial labourers make up the majority of the employed population in the areas adjacent to KIA. Many of the labourers work in KIA while some work in the neighboring areas of KIA. A small proportion of the population is

	also employed by various government departments. Average earnings in the area amount to approximately Rs 2,500-5,500 (US$ 43 -94) per month.[3]
Employment	People from surrounding areas come to the industrial area for work. The industries employ approximately 25,000 workers; the employment density in KIA is about 15.6 persons per acre as compared to an employment density of 2.3 persons per acre for Karachi.
Industrial characteristics	The larger KIA area houses an estimated 1207 industrial units of various sizes producing textiles, leather, ceramics, chemicals, and automobile parts.[3] Textile manufacturing up a significant portion of industrial activity within KIA with approximately 372 factories operating in KIA. The textile sector generates liquid waste during dyeing and bleaching of grey fabric. The total revenue generated from this industrial estate in terms of goods, services, taxes, duties, and wages is an estimated Rs1.6 billion (US$ 27 million) a day. Total gross exports for 2007- 8 from KIA amount to approx US65 million [4].

[3] Data obtained from the members of Korangi Association of Trade and Industry 2007

[4] Korangi Association of Trade and Industry 2007

Appendix 3

Table C: Category wise industries operating in KIA

S.No	Category	Units
1	Textile and Allied	372
2	Leather and Allied	192
3	Engineering works	128
4	Food, Tobacco and Beverages	85
5	Pharmaceuticals and Chemicals	63
6	Plastic products	40
7	Ice factories	37
8	Paper products	20
9	Chicken feed factories	18
10	Wood and Allied	16
11	Petrochemicals	14
12	Rubber products	12
13	Power plants	3
14	Others	207
	Total	**1207**

Source: Korangi Association of Trade and Industry 2007

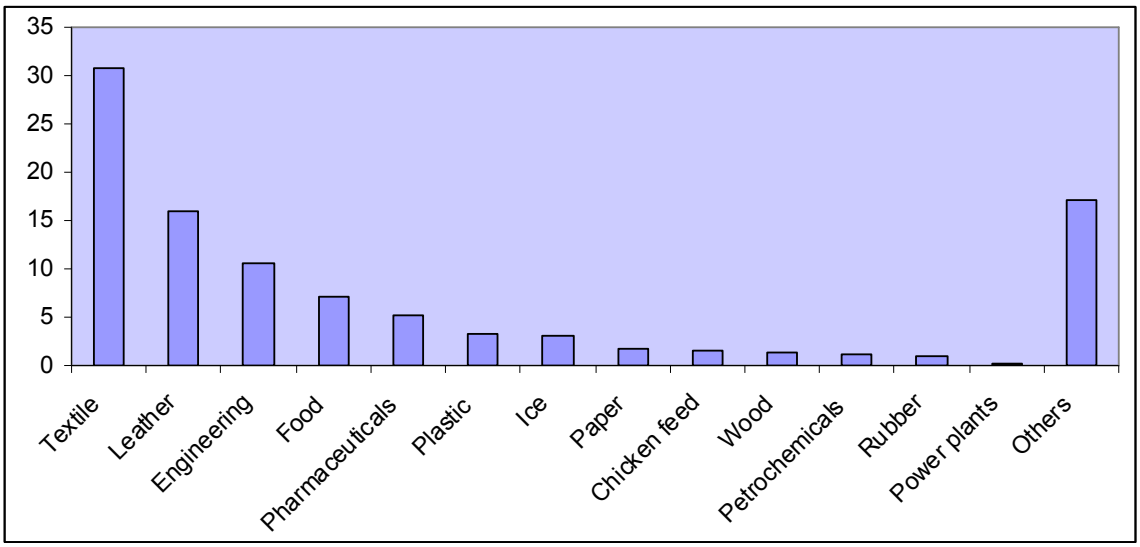
Appendix 4

Table D: Focus group discussion in KIA

Participants	Topics of discussion
• Area councilor (Local Government) • Community based organization (CBO) workers • NGO member (IUCN) • Community school teachers • Mill workers • Member of Korangi Association of Trade and Industry (KATI) • Representative of women organizations • EPA Sindh's representative	*Environmental supply* • Community's literacy level and education facilities • Employment situation • Environmental challenges faced by the community • Environmental awareness among community members • Role of CBOS and NGOs in environmental management • Communities' participation in political activities *Environmental demand* • Types of industries • Size of manufacturing units • Waste disposal system • Ownership of industries • Industrial compliance with NEQS

Appendix 5

Figure-1: Percentage of different types of industry in total industries in the KIA



Source : Korangi Association of Trade and Industry 2007

Appendix 6

Scope of informal initiatives for effective industrial pollution control

The focus group discussion concluded with identification of constraints and challenges to an informal regulatory system in KIA for the community and possible options to overcome them. The participants forged a consensus that there is an enormous scope for environmental activism by the community. In an urban industrial area of Karachi of more than 0.5 million inhabitants, democratic institutions like the local government system provide meaningful opportunities to poor community for active participation and interest in both community and local politics. Following are the observations and recommendations by the participants of the focus group discussion to create a conducive environment for active community involvement.

- The interconnection and correlation between social issues of KIA and its environmental issues is significantly high. There is a need for integration of issues that cut across different social and community groups to formulate an environmental policy which includes informal actions that truly reflect the relationships between development and the environment.

- The stable democratic governance system and inclusion of the community in the social and political arenas is imperative. People are not only aware of and active on environmental issues, but they incorporate this participation into their perception of citizen and political rights.

- Indicators of poverty and low literacy lead many researchers to expect low levels of awareness and political participation specially related to environmental issues among poor residents of urban industrial estates. In general, however, the residents of KIA exhibit a comparatively high level of political awareness and activity, even on environmental issues that are generally viewed as the domain of affluent and more educated classes of society.

- It is not feasible for the poor community to make material contribution to the environmental projects launched by many CBOs and NGOs but many community members have contributed time or labor which is reasonable, given that these residents have little money to contribute to community projects.

- It was also observed by the participants of the focus group discussion that the print and electronic media and local news coverage of pollution does not only have an influence on polluting behavior of industries but also educate the community to make its role more effective. However, the effect of informal regulation on polluting behavior is not immediate. Only sustained publicity about polluting activities of industrial units is anticipated to lead to a significant fall in pollution generation.

- The community also registers complaints to the area councilor's office about the environmental problems specially issues that affect daily living like polluted drinking water and solid waste.

- Contrary to the general belief that the level of information about the environmental issues in low-income communities of KIA is limited, knowledge of issues not of immediate concern to those communities can be quite high. The community is aware of issues of basic sanitation but they are also aware of the problems of global warming, deforestation, and nuclear pollution.

- The ever increasing cost of living and poverty levels does pose a major constraint to proactive role of the community in mobilizing their energies to control industrial pollution, but many young community members do participate in rallies and projects on environmental issues organized by CBOs and NGOs.

- Given the above observations, the case for informal regulations in KIA is potentially strong. Awareness and willingness to play pro active roles of community in controlling industrial pollution is encouraging. The realization of the community about their human and political / democratic rights contains sufficient promise to enable towards development with sustainability for future generations.