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## **Implementing a Developing Country's Global Environmental Commitments: Industry Perspectives on Potential Pollution Prevention Programs in Bangladesh**

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### **Abstract**

*This chapter is positioned in the literature that discusses the tension between global environmental commitments and local implementation from the perspective of a developing country. It focuses on the implementation of international conventions, treaties and protocols signed and ratified by Bangladesh, as evidenced by the existence of related programs. The programs examined in this study were proposed by the Asian Development Bank in 1994, based on international best practices for industrial pollution prevention. The chapter also frames the regulatory, market-based and voluntary initiatives on a policy continuum from compliance, cooperative and collaborative approaches and compares the perceived existence of these approaches. The business perspectives of these programs are analyzed in the tannery, pulp and paper, fertilizer, textile and cement industries. Results show that although there are environmental regulations for preventing industrial pollution in Bangladesh, they are not as effective or comprehensive as they could be. The study also found that voluntary programs and economic incentive programs are present to a very limited extent. This study raises questions as to how to improve the implementation of global governance initiatives to which countries like Bangladesh make commitments.*

### **Key Words**

International commitments, national government regulations and programs, pollution prevention, industry perspective, policy continuum, developing country, Asia, Bangladesh

## Introduction

Heavy industrialization continues to compromise the environment; consequently, human health is also being compromised in many developing nations. This is the case in countries where the prominence of heavily polluting industries remain active, such as Bangladesh's leather tanning, pulp and paper, fertilizer, textile and cement industries (Hoque and Clarke 2012); Mexico's leather tanning industry (Blackman 2008); and, India's cement, pulp and paper, and chlor-alkali industries (Blackman 2008). Globalization and the reality that state borders do not bind pollution produced from heavy industrialization, make the environmental issues of one country an international concern. It is often the case that intergovernmental organizations, such as the United Nations (UN) and the Asian Development Bank (ADB), will put pressure on these countries to sign international environmental agreements (Asian Development Bank 1994). These intergovernmental organizations exert pressure on countries in two ways: (1) offering carrots in the form of financing; and/or (2) using sticks in the form of trade sanctions (Barrett 1999). The tension arises when global commitments are made by developing nations as local implementation can be challenging. Issues such as inadequate financing, limited technical capabilities, weak institutions, and lack of befitting laws are barriers to meeting international commitments (Alam et al. 2008).

Although a few studies focus on the developing country context, the literature review shows that most research in this area has been conducted in developed countries. To our knowledge, no academic study has as of yet been undertaken in the context of Bangladesh that highlights potential pollution prevention programs from an industry perspective. For this reason, the researchers feel that this study, 'Implementing a Developing Country's Global Environmental Commitments: Industry Perspectives on Potential Pollution Prevention Programs in Bangladesh' is an important contribution to the extant literature. This in-depth study on potential pollution prevention programs carries importance for Bangladesh because it can enhance the country's formulation of government policies and programs.

Theoretically, this chapter is situated in the literature that discusses the gap between global commitments and local implementation. It first discusses the global landscape, highlighting global environmental challenges, and the role of large-scale intergovernmental organizations in managing these challenges. Then, it considers the varying policy options available to governments for implementing environmental management and pollution prevention commitments by placing them on a continuum from mandatory to voluntary. This paper empirically explores these policy options from a business practitioner's perspective and determines which programs exist in five intensive polluting industries in Chittagong, Bangladesh. The research questions guiding this study are:

- (1) To what extent are internationally recommended programs, such as those suggested by the Asian Development Bank, implemented in a developing country?;
- (2) How are these programs perceived by business?; and
- (3) On a policy continuum from mandatory to voluntary industry participation, which programs are perceived by the business community to have the most uptake?

This chapter provides a summary of the findings from each research question, discusses the study's practical and theoretical implications, and concludes with a section on limitations and next steps.

## **Global Challenges and Pressures**

Environmental pollution problems accrue from such trans-boundary sources as acidic deposition, ozone depletion, global warming, and surface water pollution (Callan and Thomas 1996). Today's business world is confronted with severe pressure from global environmental concerns to take essential measures for environmental protection, along with its business activities (Gomez and Rodriguez 2011; Pun and Hui 2001). Panwar (2002) reports that globalization has created a new movement for policy dialogue to encourage sustainable industrial development programs in all countries.

A number of international environmental agencies and conferences have been playing a significant role to preserve and protect the natural environment around the world. Some of these conferences include the United Nations Conference on Environment and Development (UNCED) and meetings related to the United Nations Framework Convention on Climate Change (UNFCCC). Further, the contributions of international agencies like the United Nations Environment Program (UNEP), United Nations Development Fund (UNDF), World Bank (WB), and International Monetary Fund (IMF) are also worth mentioning (Uberoi 2004). Caplan (2003) reported that the Global Environmental Facility (GEF) was established (in 1990) by the World Bank, United Nations Development Program (UNDP) and the United Nations Environmental Program (UNEP) to finance developing countries in implementing their sustainable development plans. Over its 17 years, the UN's Global Environment Facility (GEF) has allocated US \$7.5 billion intended to help tackle key global environmental problems (Mee et al. 2008).

There are significant opportunities for strengthening the capacity of environmental governance at national and local levels within Asia and the Pacific region (Asian Development Bank 2001). According to the Eco-Trade Manual (Komma Consultants BV 1996), United Nations Industrial Development Organization (UNIDO) works with a number of countries in the preparation of Environmentally Sustainable Industrial Development (ESID) strategies aiming at formulating government policies and programs, which would promote Cleaner Production (CP) as an essential element of sustainable development plans. In this regard, UNIDO contributed to an environment pollution control program for leather industries in South-East Asian countries, financed by the governments of Austria, Denmark, Germany, Switzerland and Nederland (Alam 2002).

Numerous international environmental conventions, treaties and protocols have been created in the last 50 years (Ebbesson 2010). The Government of Bangladesh has signed and ratified a number of international conventions, treaties and protocols relating to the conservation and protection of the natural environment, as shown below in Table 1.

-----INSERT Table 1 about here -----

## Local Implementation

There are programs that governments can choose from to promote pollution prevention in industry operations (Asian Development Bank 1994). Figure 1 shows policy options presented by the Asian Development Bank that governments might employ for local pollution prevention to meet commitments made in international treaties, conventions and protocols (ITCPs).

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Sources for Figure 1: (Asian Development Bank 1994; Callan and Thomas 1996)

While these policy options exist, there are a number of barriers that come up when developing countries attempt to meet goals set in international treaties, conventions and protocols. Some barriers include insufficient funds, skilled labour, and information, as well as poor coordination and institutional integration (Alam et al. 2008). Despite these barriers, international conventions continue to have a strong influence on planning processes in many Asian countries (Alam et al. 2008). While regulations often exist in developing countries, they can be challenging for government to force pollution-generating industrial business units to abide by them. For example, clusters of small and medium-sized enterprises (SMEs) create severe pollution problems given conventional regulatory approaches are typically ineffective (Blackman and Kildegaard 2010). Additional challenges for the local implementation of voluntary programs in developing countries are ineffectively enforced regulations and non-regulatory pressures placed on industry (Blackman 2008). Therefore, if governments improve the legitimacy of their current regulations, they can incentivize polluter participation and integrate voluntary programs into their policy programs.

## Policy Continuum

The following section discusses these policy options on a continuum from compliance to collaborative. Strong government actions (regulatory intensive) are related to firm cooperation, as many firms adopt sustainability strategies only when coerced to do so by government (Clemens and Papadakis 2008; Urpelainen 2011). Complementary partnerships and collaboration can also be used for addressing meta-problems associated with achieving sustainability (Clarke and Fuller 2011; Huxham et al. 2000; Trist 1983). Contemporary environmental governance will not necessarily result in a complete shift from mandatory regulation to voluntary compliance or market mechanisms; rather, it will combine mandatory and voluntary approaches in an innovative and complimentary way (Falkner 2003; Ruggie 2004; Vogel 2008). The relationships formed between private and public stakeholders are complex (Falkner 2003; Vogel 2008), which result in nested systems of governance that integrate the broader global frameworks that were not historically present (Ruggie 2004). This section delves deeper into each classification of policy option by discussing them on a continuum from mandatory to voluntary. Figure 2 integrates themes from bodies of work in political science, public administration, environmental management, and collaboration theory.

-----INSERT Figure 2 about here-----

### ***Compliance***

The compliance policy classification commonly referred to in the literature as ‘command and control’ represents the traditional approach that governments take to manage environmental impacts of industrialization (Lynch-Wood and Williamson 2011). For instance Khanna and Anton (2002, p. 539) say that, ‘the United States has traditionally relied on mandatory command and control environmental regulations to protect environmental quality’. Environmental regulations are also an important driver in developing countries, especially for pollutant intensive industries (Salomaa and Watkins 2011; Watson and Emery 2004). This type of approach is defined by rigid mandatory regulations that are enforced by the state (Asian Development Bank 1994). The primary advantage of this approach is that it is considered legitimate and forces action. At this level, environmental regulations provide a means for government to ensure that all companies reach a minimum environmental standard (Frederick et al. 1992; Ravichandran and Balasuadaram 1999). The criticism of this approach is that it is costly to government because it requires regular monitoring and enforcement (Whitten et al. 2007). In this approach, the level of communication between government and industry is one direction, and the level of collaboration at this stage is quite low.

### ***Cooperative***

The next set of policy options available to governments for pollution prevention and environmental management are classified in this analysis as cooperative. This category includes a range of market-based instruments (MBIs). MBIs have become increasingly popular in environmental policy (Clarke and MacDonald 2012; Roseland 2000). The World Bank's perception of ‘new environmentalism’ emphasizes the need to apply market-based initiatives instead of command-and-control regulations to make industries pollution-free (Ravichandran and Balasuadaram 1999). Governments can choose from an array of MBIs to incentivize industry behavioural change through market signals for improved environmental practices (Bocher 2011; Collins and Scoccimarro 2008; Roseland 2000). Some MBIs include taxes and charges to disincentivize poor environmental practices, and rebate programs and tradable permits to incentivize positive practices (Roseland 2000; Whitten et al. 2004). Advantages of using MBIs is that they are comparably less expensive than regulatory approaches (Stavins 2003) and, in theory, they have the potential to be effective, efficient and flexible (Whitten et al. 2004). The disadvantages are that they do not ensure compliance from industry since the success of these instruments are highly context dependent and require the presence of certain institutions which developing countries often lack (Kathuria 2009). Therefore, a thorough analysis of the environmental, social, political and economic context is essential to the design of MBIs (Stavins 2003). In this policy approach, the level of communication between industry and government is moderate, and cooperation between both parties is required.

### ***Collaborative***

There is a broad array of voluntary instruments that range from state-driven voluntary programs, such as the awards and technical assistance programs (Asian Development Bank 1994), to privately enforced international regulations and standards, such as ISO 14000 (Chittock and Hughey 2011). A voluntary compliance program is a pollution prevention program which is voluntarily taken by the owners of industries (Fisher and Thorburn 2011). The government can exert control over the polluting industries to reduce the amount of pollutants through promoting such voluntary compliance programs (Arimuraa et al. 2008; Urpelainen 2011). Further, these

non-regulatory voluntary programs can be used side by side with different regulatory approaches. That being said, without stringent mechanisms for enforcement and punishment to ensure compliance, voluntary instruments rely ‘... on the voluntarily supplied participation, resources, and consensual actions of governments and/or firms’ (Vogel 2008, p. 264). This type of instrument will often rely on a collaborative process to gain legitimacy. Collaboration between government, industry, and other actors is a useful way to gain credibility and trust between key actors and a means to engage new industry partners in sustainability during the implementation phase (Chittock and Hughey 2011). Here, collaboration as defined by Gray (1989, p. 5) as ‘a process through which parties who see different aspects of a problem can constructively explore their difference and search for solutions that go beyond their own limited vision of what is possible’. It is often the case that voluntary environmental approaches will use collaborative arrangements between business, regulatory agencies, or central governments to gain industry commitment (Chittock and Hughey 2011; Clarke 2011). The strength and weakness of voluntary programs is that they are innovative and novel, meaning that both their potential and limitations are yet to be fully explored. In this policy option, the level of communication between government and industry is quite high; key actors are actively collaborating with each other.

### **Policy Continuum in Bangladesh**

In Bangladesh, a number of industrial enterprise units were established in different areas of the country after independence was achieved in 1971, but environmental issues were not seriously considered at that time. More recently, industrial pollution has become an area of growing environmental concern in Bangladesh (Nishat et al. 2001). The study by Rahaman (1992) reveals that many people are being affected by industrial pollution in Bangladesh. Bangladesh is home to 30,000 industrial units, consisting of 24,000 small and cottage, and 6,000 medium and large enterprises; this creates colossal environmental problems (Reazuddin 1994). That said, environmental regulations do exist in Bangladesh and the Government of Bangladesh is committed to the protection of the environment (Belal and Owen 2007). Unfortunately, regulations ‘are routinely flouted due to lack of enforcement by relevant agencies which appear to be corrupt, weak and ineffective’ (Belal and Roberts 2010, p. 313). There are also examples of corporate social responsibility in Bangladesh (Islam and Deegan 2008; Sobhani et al. 2009), though voluntary measures that have no government involvement are outside the boundaries of this study. Below are details about the existing programs in each of the three policy types (compliance, cooperative and collaborative).

### ***Compliance: Environmental Regulations***

The environmental regulations of Bangladesh have connections with the British-laid legal system as the British rulers formulated most of the laws (Gain 1998). Islam (2002) reports that the Government of Bangladesh set up a full-fledged Ministry of Environment and Forest (MoEF) through replacing the small Department of Environment and Pollution Control (DEPC) in the 1980s. Now there is a Department of Environment (DoE) under the MoEF. About 200 environment-related regulations deal with the protection of the natural environment in Bangladesh (Khan 2000). The main objectives of environmental regulations in Bangladesh<sup>1</sup> are:

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<sup>1</sup> The important environmental regulations that currently exist are: National Environmental Policy (1992), National Environmental Action Plan (1992), Forest Policy (1994), Environmental Conservation Act (1995), Environmental Conservation Rules (1997), National Conservation Strategy (1997), Bangladesh Environment Conversation (Amendment) Act (2000), and Environmental Court (Amendment) Act (2002) (Reazuddin and Hoque 2002).

protection of environmental health; control of environmental pollution; conservation of natural and cultural resources (Chowdhury 1999). In particular, the objective of the Environmental Conservation Act (ECA)-1995 is to conserve and improve the quality of the natural environment and to control pollution. It serves as the prime legislative framework for environmental protection and management in Bangladesh, while the Environmental Conservation Rules of 1997 exist to enforce it (Kabir 2005). In Bangladesh, according to the Environmental Conservation Rules, 1997, if any industry violates the emission standard of gaseous, liquids or solids, the DoE can issue warning and direction to reduce it within a stipulated time. That being said, at least one recent study states that these laws are not properly implemented (Mohammad 2011). Table 2 below summarizes some of the compliance type regulations that exist, four of which exist in Bangladesh.

-----INSERT Table 2 about here -----

***Cooperative: Economic Incentive Programs***

The Government of Bangladesh can adopt programs based on economic incentives. The operators of leather tanning operations in Dhaka have suggested that an incentive based approach would be more effective and fair (Barber and Pfefferle 1994). In the case of industry, there is a desire to use economic incentives to complement regulatory approaches in order to improve environmental management in regards to waste-minimization and eco-labeling initiatives (World Bank 2006). A report from the MoEF which was done in collaboration with the International Union for Conservation of Nature (IUCN) and funded by the GEF and UNDP details Bangladesh’s desire to explore potential partnerships on Non-Kyoto Market Mechanisms such as Methane to Market, Carbon Sequestration Partnership Program and Asia-Pacific Partnership Program (MoEF 2007). Below Table 3 highlights and explains popular economic incentive programs<sup>2</sup>.

-----INSERT Table 3 about here -----

***Collaborative: Voluntary Compliance Program***

Another option available the Government of Bangladesh for the management of environmental issues and pollution control are voluntary compliance programs. These programs often require collaboration from industry, government, and other stakeholders for their success. Collaboration has been identified as a tactic to gain the required participant buy-in as these programs operate on a voluntary basis. Below is Table 4 summaries the voluntary compliance programs examined in this study.

-----INSERT Table 4 about here -----

The remainder of this chapter focuses on the methodology and results of the Bangladesh study. This is followed by a discussion that integrates the results of the featured case study and the literature presented.

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<sup>2</sup> Note this table does not include the activity of economic incentive programs in Bangladesh. Economic incentive program were not found by this study to have a presence in Bangladesh.

## Methods

The Industrial Pollution Projection System (IPPS)<sup>3</sup> approach was used by the experts of World Bank, in 2001, to select the top ten most environment-polluting industries of Bangladesh (Nishat et al. 2001). The top most environment-polluting industries are: tannery, pulp and paper, pharmaceutical, fertilizer, industrial chemicals, textile, food, metal, cement, petroleum and others (Nishat et al. 2001). From these top ten most environment-polluting industries, five sample industries were selected for this study due to their availability in Chittagong. The lead researcher had better access to the Chittagong industrial zone than other zones in the country. The selected industries are: tannery industry, pulp and paper industry, fertilizer industry, textile industry, and cement industry. All five of these industries are ‘red category’ industries, which mean that the Government of Bangladesh has classified them as highly polluting<sup>4</sup>. The six heavily polluted districts (hot spots) in Bangladesh are: Dhaka, Gazipur, Chittagong, Khulna, Narayanganj, and Bogra (Islam and Miah 2003). Two industrial enterprises have been selected (through convenience sampling) from each sample industry as sample enterprises from Chittagong. The Chittagong industrial zone is the second largest industrial zone<sup>5</sup> in Bangladesh, and is typical of other industrial zones in Bangladesh.

The study is exploratory in nature (Patton 2002); sample enterprises have been selected based on the needs of the study and willingness of enterprises to furnish the pertinent data. Five senior executives of each sample industrial enterprise were selected as respondents. The interviewees were all located in operations departments and were suggested by the operations manager as being a key informant. Numbers of respondents are shown below in Table 5. In order to collect the needed primary data, a combination of methods was used in this study. The methods were in-person, semi-structured interviews, written questionnaires, and the maintenance of a notebook. All 50 respondents filled out both the written questionnaire and participated in an interview.

-----INSERT Table 5 about here -----

The lead researcher determined the awareness and attitude of respondents relating to each program in Figure 1. To do this, during the interview, the lead researcher explained each program to the respondent to determine the industry awareness and a positive or negative attitude. The lead researcher then reduced all the relevant information regarding industrial pollution prevention into a tabular form (Yin 2003), following the deductive framework shown in Figure 1. This was further analyzed and the ‘industrial enterprises’ practices’ were determined. In categorizing the industry awareness of this type of program, 50% of respondents or above was coded ‘yes’; otherwise it was coded as ‘no’. The same 50% rule was used for the

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<sup>3</sup> IPPS stands for ‘Industrial Pollution Projection System’ and was developed by the World Bank. IPPS depends on sector estimates of pollution intensities, also called the emission factors, expressed in pollution per unit of output or employment. IPPS is capable of making reasonable projections for all the major industrial pollutants (Nishat et al. 2001).

<sup>4</sup> In Bangladesh, as per Environmental Regulation 1997, all industries have been divided into four categories: Green, Orange A, Orange B and Red. Red is the most polluting. The list of industries of these four categories is in schedule 1 of the Environmental Conservation Rules ’97 (ECR 1997).

<sup>5</sup> There are more than 140 industries in Chittagong: 19 tanneries, 26 textiles mills, 1 refinery, 1 TSP fertilizer, 2 chemical, 5 fish processing, 2 cement factories, 1 paper rayon mill, 1 steel, 2 soap factories, 4 dyeing factories, and about 75 other small industries (Islam and Miah 2003).

‘positive’ and ‘negative’ coding of industry perspective. Evaluation of existing government environmental programs was carried out in 2012 through the Ministry of Environment and Forest’s website.

## **Results**

The specific results of this study are summarized in Table 6. This is followed by a summary of the results in regards to how each regulatory or program exists in Bangladesh and the related industrial enterprises’ practices.

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### ***Compliance – Industrial Enterprise Practices in Bangladesh - Mandatory Regulations***

This section displays the study’s results in terms of industrial enterprise perceptions, opinions, and practices in regards to mandatory regulations imposed by government agencies. As noted earlier in Figure 1, this study specifically considered four types of regulations a) mandatory pollution audits and prevention plans, b) banning of certain chemical products, c) mandatory toxic release reports, and d) mandatory environmental performance standards.

#### ***a) Mandatory Pollution Audits and Prevention Plans***

Some executives of technical services of the sample industrial enterprises claimed that they learned about pollution prevention plans from their industrial unit, though they do not actually have a plan. Respondents commented that the programs should be made obligatory by the government for every industrial plant to prevent pollution. Respondents also commented that government would need to have a fair idea of the waste-generating scenario of a polluting industrial plant by examining the pollution audit report; such a report could be prepared by professional auditors.

#### ***b) Banning of Certain Chemical Products***

Although there are some regulations in this regard, the existing regulations are not working effectively in the banning of certain chemicals, products and management practices in the industrial enterprises of the study area. The field visit of the researcher uncovered that the tannery industry, pulp and paper industry, fertilizer industry, and textile industry have been using toxic and harmful chemicals (chromium, chlorine, ammonia, and various dyeing chemicals) in their manufacturing processes. Respondents of sample industrial enterprises report that the use of toxic and harmful chemicals in industrial plants is not monitored by the enforcement agency. They comment that if the Government of Bangladesh would have banned the import of certain toxic chemicals through regulatory measures, industrial pollution could have been significantly prevented.

#### ***c) Mandatory Toxic Release Reports***

Respondents of sample enterprises commented that the industrial units, and those particularly belonging to ‘red category’ industries, are required to submit a report regarding the harmful effluent. In this report, the industry is liable to disclose information related to harmful pollutants to the DoE. Industrial enterprises do not supply accurate information regarding generated pollution from their plants. In most cases, manipulated data are submitted to the

Department of Environment (DoE). Officials of the DoE are also not active enough to verify the genuineness of the submitted report.

*d) Mandatory Environmental Performance Standards*

Respondents of sample enterprises comment that they do not follow any mandatory performance standard in order to prevent industrial pollution. Yet, the respondents do state that mandatory performance standards can prevent industrial pollution significantly. In their opinion, the Government of Bangladesh can impose regulation to follow environment-friendly manufacturing processes for 'red category' industries. This may help in bringing desired improvement in industrial pollution prevention.

***Cooperative – Industrial Enterprise Practices for Economic Incentive Programs***

This section discusses the study respondents' perceptions of and industrial practices with economic incentive programs. Specifically this study focused on industrial engagement with a) pollution charges, b) financial and fiscal subsidies, c) deposit-refund systems, and d) tradable emission permit systems.

*(a) Pollution Charges:*

No information has been found regarding the implementation of product charges in sample industrial enterprises. Some respondents are found in sample enterprises to understand product charges, that is, that the imposition of a product charge on polluting industries can reduce the use of polluting inputs such as raw materials and chemicals. Further, that the uses of non-polluting raw materials and chemicals can be increased in industrial plants in order to avoid product charges. They commented that the central Government of Bangladesh could impose a product charge on polluting industries under the supervision of the Department of Environment (DoE).

Respondents of the sample industrial enterprises expressed an unawareness regarding the idea of a user charge. Respondents commented that pulp and paper industries have been using forest resources as raw material, which can be prevented through a user charge.

Collected primary information does not support the existence of emission charges in the industrial enterprises in Chittagong, Bangladesh. Interviewees reported that although some emission standards have been fixed by the Department of Environment (DoE), no tax is being imposed for excess emission discharge. Respondents are convinced that an emission charge is an important economic instrument, but it is still very challenging to introduce to Bangladesh industrial plants. According to the view of respondents, it is very hard to accurately measure discharged emissions from industrial enterprises. Government would need to allocate funds to develop institutional set-up, so that government can later collect tax by implementing emission charges.

*(b) Financial or Fiscal Subsidies*

The subsidy system is not available as a part of pollution preventive efforts for industrial enterprises in Bangladesh. The majority of executives of sample industries are familiar with the idea of providing financial subsidies. Respondents commented that under a financial subsidy system, government financial institutions can provide various types of low-interest bearing loans to non-polluting industries. Respondents reported that the owners of industries are interested in procuring low-interest bearing loans for facilitating their pollution- preventive efforts. However,

it is necessary to monitor so that the recipients of such a loan do not use it for other purposes. If the Government of Bangladesh is able to provide the financial subsidies to the polluters, polluting industries will be definitely motivated to accept this assistance.

*(c) Deposit-Refund System*

The deposit-refund program is not found to be in existence in the industrial enterprises in Chittagong, Bangladesh. Respondents commented that government can demand mandatory deposit during the time of establishment of a new industrial enterprise and that later government can curtail money from the deposited amount in case of any kind of environmental damage caused by that industry. Here, environmental damages could be assessed through physical inspection by the inspectors of the DoE. Respondents commented that the deposit-refund program could be imposed not only for massive environmental damages, but also for the violation of any kind of environmental standard fixed by the DoE for industrial enterprises.

*(d) Tradable Emission Permits System*

The emission permit trading system is not employed in the sample industrial enterprises. Interviewees from the sample enterprises are fully unaware of the pollution permit trading system. Respondents commented that the pollution permit trading system is not feasible for Bangladesh industries.

***Collaborative - Industrial Enterprise Practices for Voluntary Compliance Programs***

The following section presents the results of this study in regards to enterprise perceptions, opinions, and practices of industrial voluntary compliance programs (which have government involvement). The programs highlighted in this section are: a) technical assistance programs, b) exchange programs, c) research, development and demonstration programs, and d) environmental award programs. Because most corporate social responsibility (CSR) programs have no government involvement, they are outside the boundaries of this study.

*(a) Technical Assistance Programs*

Based on the interview findings, existing technical assistance programs for the control of environmental pollution do not work effectively in simple industrial enterprises. Respondents reported that the owners of industries do not come forward to voluntarily take part in technical assistance programs because government initiatives are found to be insufficient. According to the opinion of the respondents, owners of industries need to come forward to start this type of voluntary program at the initial stage.

*(b) Exchange Programs*

Adequate educational programs have not been introduced in the sample enterprises to explain the importance of the prevention and control of industrial pollution. Respondents commented that the government can provide assistance to employees of industrial enterprises to enhance their knowledge regarding environmental aspects through environmental educational programs. Respondents reported that more technical information exchange programs, such as environmental education and technology transfer programs, need to be introduced through coordinated efforts between industry and the Government of Bangladesh.

*(c) Research, Development and Demonstration Programs*

Research and development (R&D) units have been observed in large-scale industrial firms (e.g., pulp and paper and fertilizer industries). Respondents commented that industrial plants' R & D units do not provide a significant contribution to pollution prevention and control activities. Respondents commented that the Government of Bangladesh could encourage these industrial plants to set up R & D by providing financial and logistical support.

*(c) Environmental Award Programs*

Respondents of the sample enterprises reported that award programs for environmental aspects are not working effectively in motivating industries to mitigate their pollution-generating activities. They commented that an initiative for more awards programs at the district level would encourage industrial plants in taking active measures for reducing their generation of pollution. They reported that the achievement and recognition of being awarded such an environmental award, would ultimately create a good image in the competitive market for that company.

**Discussion and Conclusion**

To reiterate, the research questions guiding this study were: (1) To what extent are internationally recommended programs, such as those suggested by the Asian Development Bank, implemented in a developing country?; (2) How are these programs perceived by business?; and, (3) On a policy continuum, from mandatory to voluntary industry participation, which programs are perceived by the business community to have the most uptake? While these questions are all answered in detail in the results section of this paper, this discussion provides a summary of the findings. The theoretical contributions of this paper concern local implementation in a developing country of global environmental commitments, and the use of coercive, cooperative and collaborative approaches.

***Synopsis of Findings for Research Question 1***

Mandatory regulations in Bangladesh were found to be the most common and recognized ways that governments manage environmental issues and prevent pollution. Executives of sample industrial enterprises reported that all industrial enterprises have been divided into four categories based on their location and environmental impacts<sup>6</sup>. Industries in the Orange A and B categories are required to have Initial Environmental Examinations (IEE), while industries in the Red category are obligated to perform comprehensive Environmental Impact Assessments (EIAs) (Rasheed 2002). That being said, respondents of sample industrial enterprises made the assertion that EIAs are often biased due to corruption of technical experts of the DoE.

According to the Environmental Conservation Act '95 (ECA), the Director General, or any person empowered by him, has the power to collect samples of air, water, soil or other materials from the industry premises. It is evident that the DoE officials are sufficiently empowered to inspect any place or any document to find out any pollution related activities. Still respondents indicated that monitoring of the DoE does not work effectively, because of the rampant corruption of DoE officials. This invisible corruption practice makes the inspection work ineffective. Respondents of sample enterprises suggested that honest magistrates should be deployed in the inspection team to perform the job properly of containing industrial pollution. The environmental regulatory measures cannot work effectively without proper monitoring.

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<sup>6</sup> The categories are: (1) Green category; (2) Orange A category; (3) Orange B category; and (4) Red category.

In case of failure to comply with such directions, legal action can be taken against the violators. But respondents indicated that sample industrial enterprises have been violating environmental regulations, yet adequate disciplinary actions have not been taken. They suggested that rigorous imprisonment and penalties need to be imposed in the cases of gross violation of environmental rules, and this requires a strong monitoring system under the supervision of the inspectors of the DoE. Respondents also commented that a good amount of revenue can be collected by enforcing the penalties for non-compliance of regulations, and perhaps considered as a revenue-raising task.

It is the responsibility of industrial plants to inform the DoE of any discharged pollutants, which are in excess of the prescribed limit, and which are due to an accident (Sarif 1999). Yet, it has been found that most of the owners of industrial plants do not perform this responsibility properly; rather, they conceal the fact regarding the occurrence of an accident to avoid the officials of the DoE. Respondents also reported that Environmental Clearance Certificate (ECC) from the DoE is obligatory for every industrial unit. Thus, it appears that although there are various environmental regulatory measures for controlling industrial pollution, these are not enforced effectively.

### ***Synopsis of Findings for Research Question 2***

As can be seen through this study, there are numerous regulations and programs that governments around the world are pursuing in order to mitigate environmental impacts of businesses and, in particular, to help with the greening of industries, more generally (Asian Development Bank 1994; Callan and Thomas 1996; Daugbjerg and Svendsen 2011). The deductive framework (i.e., Figure 1) used in this study provides a comprehensive way to consider the implementation of global environmental commitments through different government regulations and programs in Bangladesh. From the perspective of the executives in the tannery, pulp and paper, fertilizer, textile and cement industries, many of these programs do not exist in Bangladesh, and if they do, they are poorly implemented.

The mandatory measures, such as pollution prevention plans, existed in some enterprises. Currently, there is no accurate reporting to government about toxic releases; there is reporting, but it is not accurate. Also, there are some regulations banning some chemicals, but no effective monitoring to ensure that they are not used in practice. Performance standards do exist, but respondents indicated that they conceal accidents. Regulations have even less effect, as corruption ensures that Environmental Clearance Certificates are easily obtained. There was openness to economic incentive programs, and some understanding about pollution charges, financial subsidies, and emission permits. The deposit-refund system was a new concept to the interviewees. There was a desire by the executives for government-led voluntary compliance programs, but only if they involve industry representatives in their design.

With little pollution-prevention activity occurring as voluntary initiatives within these five very polluting industrial sectors, respondents expressed an interest in government playing a much larger role. They expressed their desire for both command-and-control approaches, and economic incentive programs. With each comment came the caveat that the regulations and programs require monitoring, and that these reports should be written by external auditors, thereby ensuring their accuracy. The corruption documented in other studies (Belal and Roberts 2010; Dammania et al. 2003) was also observed here. This corruption was not unique to government employees, but also the industries themselves indicated that their self-reporting is inaccurate.

### ***Synopsis of Findings for Research Question 3***

The results of this study show that in Bangladesh the government relies on the use of compliance policy options for pollution-prevention and environmental management. The Government of Bangladesh uses three of the five policy options available from the compliance categories, while it only uses one of eight policy options available on the cooperative and collaborative end of the continuum. Although the Government of Bangladesh technically has regulations in place, the threat of the enforcement is weak. These findings are consistent with Blackman's (2008) work, which highlights similar challenges of weak regulation enforcement found in other developing countries such as Mexico and India. The threat of regulation gives more power to policy options such as market-based instruments and voluntary compliance programs (Harrison and Antweiler, 2003; Blackman, 2008). Without strong enforcement of regulations, business has less incentive to participate in voluntary options, as their advantage is that they cost less and allow for more autonomy than regulations. A potential consequence of weak regulatory enforcement might be the inability to effectively implement cooperative and collaborative policy options.

### ***Implications***

The contributions of this study are relevant for different audiences. The policy decision-making by governments in developed countries, regarding the conservation and protection of the natural environment of developing countries, is often hindered because of the lack of reliable information on the implementation. The findings of this study provide authentic information to the policy makers of developed and developing countries about the existing situation so that they can formulate strategies and programs for better implementation aimed at sustainable industrial development for developing countries in general and Bangladesh in particular. In addition, the findings of this study can provide information needed to help the policy decision-makers verify whether the Government of Bangladesh is working in the most effective manner to fulfill its commitment to global environmental conventions, treaties and protocols.

For the Government of Bangladesh, this study highlights the potential to increase the mix of policy approaches. It is known that command and control has challenges with enforcement, so also having market based instruments and collaborative initiatives might incentivize the desired behaviour.

For international agencies, such as the Asian Development Bank, these findings are particularly relevant. They highlight the need for the international agencies to not only provide support to develop regulations, but also to enforce them. Greater capacity (both financial and knowledge) is needed. In addition, ongoing monitoring mechanisms that consult users may be needed to ensure programs are being understood, valued and properly implemented in the desired way. Finally, as there are a number of policy options, for some issues it might be more effective to work directly with business. For example, the Asian Development Bank already works with banks in Bangladesh to support micro-finance efforts.

Many researchers in developed countries are not fully aware of the existing situation of command and control measures and market-based instruments in developing countries. The findings of this study can provide them further insights into the possibility of generalizing theory so that it is also relevant for developing countries. The findings can also help academics by highlighting the developing country reality and indicating potential future research directions. Furthermore, in categorizing ADB's policy options from compliance to collaborative, this study

has made a novel contribution by providing an innovative way to think about pollution prevention policy options as a continuum.

### ***Limitations and Future Research Suggestions***

This study reveals how important it is to conduct research in developing countries on the greening of industry. In Bangladesh, in practice, government plays an insufficient role in ensuring environmental protection. The regulations and global commitments exist, but their implementation is not comparable to developed countries given the lack of effective monitoring and level of corruption. Voluntary initiatives are also very rare in domestic industrial companies. Interestingly, many of the executives interviewed were aware of the pollution-prevention programs that exist in other countries, but were looking for government to take more initiative. Interviewees retain the perception that voluntary initiatives are costly, so prefer it to be mandatory or there to be sufficient incentive. With little stakeholder pressure (Hoque and Clarke 2011), and managers who do not value pro-environmental behaviour (Bansal 2003), punishment, recognition and/or reward from government are needed instead. Because reward is desired, market-based instruments might work very well in Bangladesh. That being said, although cooperative and collaborative approaches are less common than compliance policies, they do exist, and there appears to be interest in these types of policies. The Government of Bangladesh has an opportunity to move towards a more diverse policy mix that incorporates innovative approaches to pollution prevention.

All of the industrial enterprises studied in this research project were domestic companies. There are multi-national companies in Bangladesh which have voluntary pollution-prevention programs, such as Bata shoes and their tanneries (Bata 2011). There are also examples of corporate social responsibility in Bangladesh in other sectors (Islam and Deegan 2008). Industries such as tannery, pulp and paper, and fertilizers are known to be some of the most environmentally-polluting industries in the country (Nishat et al. 2001), so one might assume these companies should experience comprehensive standards and monitoring or intense public pressure to pursue voluntary initiatives, which is clearly not the case.

These findings highlight the need for further research into the greening of industry in developing countries. Some of the questions that have emerged from this exploratory study include: What strategies for greening of industry are effective in a developing country context?; What voluntary programs are relevant for developing countries?; Why are some sectors more interested in pollution prevention than other sectors?; and, What drives, or might drive, pollution prevention in developing countries? This study also raises questions as to the effectiveness of global governance initiatives to which countries like Bangladesh make commitments.

In conclusion, this exploratory study: considers business perspectives on what government rules, programs and practices exist for these industries, and determines that compliance approaches are more utilized than cooperative or collaborative approaches. As Bangladesh moves forward, it will be essential for this country to ensure the stable enforcement of compliance policy programs. If they do so, they will have potential to be quite innovative in their approach by integrating cooperative and collaborative options into their policy mix. In other words, if Bangladesh first strengthens their regulations, they are more likely to gain increased traction for policies such as market-based instruments and voluntary programs. The results from this study show that Bangladesh is currently moving towards a more diverse policy mix, but requires further progress to ensure implementation of their global environmental commitments.

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## TABLES

**Table 1: International Conventions, Treaties and Protocols (ICTPs) Signed and Ratified by the Government of Bangladesh**

Convention, Treaty, Protocol	Year	Signed/ Ratified
Cartagena Protocol on Bio-safety to the Convention on Biological Diversity	2000	Signed
Kyoto Protocol to the United Nations Framework Convention on Climate Change	1997	Signed
International Convention to Combat Desertification	1994	Ratified
Agenda 21, UNCED	1992	Signed
United Nations Framework Convention on Climate Change	1992	Ratified
Convention Concerning Safety in the Use of Chemicals at Work	1990	Signed
Convention on Civil Liability for Damage Caused during Carriage of Dangerous Goods by Road, Rail and Inland Navigation Vessels	1989	Signed
Montréal Protocol on Substances that Deplete the Ozone Layer	1987	Ratified
Vienna Convention for the Protection of the Ozone Layer	1985	Ratified
Convention Concerning Occupational Safety and Health and the Working Environment	1981	Signed
Convention on the Conservation of Migratory Species of Wild Animals	1979	Signed
Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration	1977	Signed
Convention Concerning the Prevention and Control of Occupational Hazards caused by Carcinogenic Substances and Agents	1974	Signed
International Convention on the Establishment of an International Fund for Compensation for Pollution Damage (as amended)	1971	Signed

Sources: (Alam et al. 2008; Gain 1998)

**Table 2: Summary of Mandatory Type Regulations**

Regulations	Requirements	Goal(s)	Bangladesh Enforcement Agency
a. Mandatory Pollution Audits and Prevention Plans	1. Pollution Audits 2. Prevention Plans	To assess the progress of pollution prevention progress.	Ministry of Environment and Forest (MoEF)
b. Banning of Certain Chemical Products	1. Ban on the sale and use of polythene	To reduce the use of toxic and hazardous chemicals	Ministry of Environment and Forest (MoEF)
c. Mandatory Toxic Release Reports	1. Report toxic chemical use	Does not exist in Bangladesh	Does not exist in Bangladesh
d. Mandatory Environmental Performance Standards	1. Maintenance of certain standards	To achieve pollution prevention targets	Bangladesh Standards and Testing Institution <sup>7</sup>

<sup>7</sup> See: <http://www.bsti.gov.bd/about.html>

**Table 3: Summary of Economic Incentive Programs**

Incentive	Examples	Function	Goal(s)
a. Pollution charge	<ol style="list-style-type: none"> <li>1. Product charge</li> <li>2. Effluent or emission charge</li> <li>3. User charge</li> </ol>	Fee imposed on firms that pollute.	<ol style="list-style-type: none"> <li>1. Removes economic incentive to pollute.</li> <li>2. Form of revenue for government to offset costs of environmental damage.</li> </ol>
b. Financial or fiscal subsidy	<ol style="list-style-type: none"> <li>1. Consumer rebates for purchases of environmentally-friendly products</li> <li>2. Soft loans for business planning to do environmentally friendly products</li> <li>3. Monetary incentives to maintain environmental standards.</li> </ol>	Financial assistance for firms who choose or plan to reduce pollution.	<ol style="list-style-type: none"> <li>1. Encourage pollution prevention practices.</li> </ol>
c. Deposit refund system	N/A	Polluting industries are required to deposit an up-front charge for their role in pollutions, which is rebated upon investigation to reveal significant improvements in pollution-reduction.	<ol style="list-style-type: none"> <li>1. Removes economic incentive to pollute.</li> <li>2. Encourages pollution-reduction activities.</li> </ol>
d. Tradable emission permit systems		Polluters can emit polluting emissions, but are given tradable pollutions credits, which they can buy or sell.	<ol style="list-style-type: none"> <li>1. Financially reward non-polluters using market mechanisms.</li> <li>2. Allows authorities to limit overall pollution. Often focused on air or watershed pollution.</li> </ol>

**Table 4: Summary of Voluntary Compliance Programs**

Program	Function	Goal(s)	Activity in Bangladesh
a) Technical assistance program	Government provides environmental management technical support to industries.	1. Reduce hazardous waste generation. 2. Improve to management of hazardous waste products	United Nations Industrial Development Organization contributed to a pollution prevention program for leather industries in South East Asian countries (Alam, 2002)
b) Exchange program	1. Education transfer programs 2. Technology transfer programs	1. To share knowledge about environmental management and pollution prevention 2. To Transfer environmentally-friendly technology from developed to developing countries	No known approved policy for foreign technology transfer programs in Bangladesh (Islam, 2007)
c) Research, development and demonstration programs	1. Funding for R & D programs targeted at environmental issues. 2. Funding for personnel education and training programs.	1. To promote the development of ecologically sustainable products (Ananda, Domazetis, & Hill, 2009) 2. To promote the development of technologies that minimize and control pollution.	No known program exist
d) Awards programs	1. Reward and recognize significant environmental achievements.	1. Encourage waste reduction and pollution prevention efforts (Asian Development Bank, 1994).	The Bangladesh Government annually grants the National Environmental Award (Zaman, 2011)

**Table 5: Category-wise Respondents from Sample Industrial Enterprises**

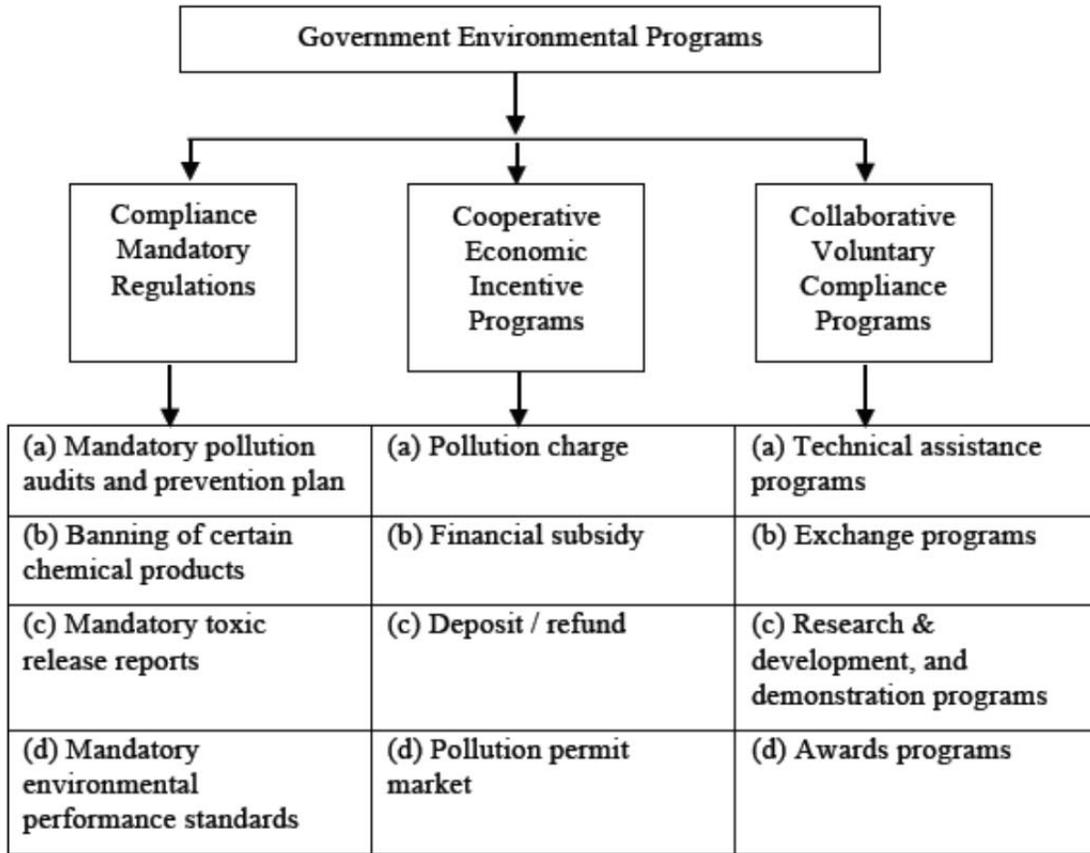
Name of sample industry	Number of sample industrial enterprises	Number of sample respondents
Tannery Industry	02	(5+5)=10
Pulp and Paper Industry	02	(5+5)=10
Fertilizer Industry	02	(5+5)=10
Textile Industry	02	(5+5)=10
Cement Industry	02	(5+5)=10
Total	10	50

**Table 6: Existence of Industry Perspective of Environmental Programs**

<b>Continuum</b>	<b>Environmental Programs</b>	<b>Programs Active in Bangladeshi Plants</b>	<b>Industry Awareness of this type of Program</b>	<b>Industry Perspective (once explained)</b>
<b>Compliance (Mandatory Regulations)</b>	(a) Mandatory pollution audits and prevention plans (b) Banning of certain chemical products (c) Mandatory toxic release report (d) Mandatory environmental performance standards	(a) (no) (b) (yes) (c) (yes; not accurate disclosure) (d) (yes)	(a) (yes) (b) (yes) (c) (yes) (d) (yes)	(a) Positive (b) Positive (c) Positive (d) Positive
<b>Cooperative (Economic Incentive Programs)</b>	(a) Pollution charge (b) Financial or fiscal subsidies (c) Deposit-refund system (d) Tradable emission permits systems	(a) (no) (b) (no) (c) (no) (d) (no)	(a) (product) (yes) (user) (no) (emission) (yes) (b) (yes) (c) (no) (d) (no)	(a) Positive (b) Positive (c) Positive (d) Negative
<b>Collaborative (Voluntary Compliance Programs)</b>	(a) Technical assistance program (b) Exchange program (c) Research, development, and demonstration programs (d) Environmental award program	(a) (no) (b) (no) (c) (no) (d) (yes)	(a) (no) (b) (no) (c) (yes) (d) (yes)	(a) Positive (b) Positive (c) Positive (d) Positive

**List of Figures:**

**Figure 1: Combination of Programs for Pollution Prevention**



Sources: (Asian Development Bank 1994; Callan and Thomas 1996)

**Figure 2: Policy Continuum**

