

# Environmental Governance: Challenges of Environmentally Friendly Industrial Areas In Dhaka City of Bangladesh

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## Abstract

This research employs a comprehensive approach that takes into account stakeholder views, workforce demographics, and quantitative environmental indicators to investigate environmental governance difficulties in Dhaka's eco-friendly industrial zones. Sector-specific dynamics are revealed by the findings, highlighting the necessity of customized interventions. Higher environmental perception ratings are seen in the electronics industry; nevertheless, there are a variety of obstacles to overcome, such as the chemical industry's pressing need to enhance air quality and the electronics industry's difficulty in reducing waste. The demography of the workforce and attitudes toward the environment are correlated, pointing to possible approaches for promoting sustainability. The study's conclusions offer insights into Dhaka's path toward sustainable industrial growth and implications for stakeholders and future research directions.

**Keywords:** Governance, Friendly, Industrial

Received : October 16, 2023

Received in Revised: November 23, 2023

Accepted: December 12, 2023

## Introduction

Bangladesh's vibrant metropolis, Dhaka, is situated at the nexus of environmental sustainability and economic growth (Choudhury, 2021). The creation of environmentally friendly industrial zones becomes increasingly important as the city rapidly industrializes, serving as a hub for tackling the environmental issues brought on by urbanization and economic growth. The context for a thorough examination of the difficulties in creating environmentally friendly industrial zones in Dhaka and the consequences for environmental governance is established by this introduction (Cvitanovic, et al., 2021).

In recent times, Dhaka, a city well-known for its abundant historical and cultural legacy, has experienced unparalleled industrial expansion and urbanization. Bangladesh's economy is mostly driven by the industrial sector, which also makes a substantial contribution to GDP and employment. But there have been drawbacks to the industrial zones' quick growth, especially in terms of environmental sustainability. Degradation of ecosystems, increased pollution, and the depletion of natural resources are the results of the expanding industrial landscape.

Eco-friendly industrial zones are desperately needed, now more than ever. These zones are intended to strike a balance between environmental preservation and economic growth, with a focus on sustainable methods that reduce harmful impacts on the ecosystem. Eco-friendly industrial zones seek to reduce the environmental impact of industry and foster a peaceful coexistence of economic growth and ecological well-being by incorporating green technologies, waste management systems, and sustainable urban planning (Nišetić et al., 2019).

As we examine Dhaka's obstacles to developing environmentally sustainable industrial zones, it is critical to learn from global best practices. Numerous nations have exhibited that environmental degradation and industrial development are not always mutually exclusive. Sustainable industrial practices are the outcome of the integration of cutting-edge technologies

with strict environmental regulations, as demonstrated by examples from countries like Denmark, Germany, and Japan.

Bangladesh has put in place laws and policies to address the effects of industrial activity on the environment since it is aware of its environmental problems. These policies are shaped and implemented in large part by government and non-governmental groups. Nonetheless, there is still debate on the efficacy of environmental governance in industrialized regions, particularly in light of the intricate interactions between ecological and economic interests.

The industrial zones of Dhaka have numerous environmental issues. The combination of air and water pollution, soil contamination, poor infrastructure, and problems with regulatory compliance creates a concerning situation that needs to be addressed right away. Unchecked environmental deterioration has far-reaching effects on the health and well-being of neighboring communities, jeopardizing the region's long-term viability, and harming communities outside of industrial zones.

The inadequate infrastructure in Dhaka's industrial zones is a major problem, especially when it comes to garbage disposal. Waste creation, particularly the generation of hazardous materials, has increased as a result of the rapid expansion of industry. The volume and type of industrial waste that the current waste management systems frequently cannot handle results in inappropriate disposal methods that endanger the environment and the general public's health.

Although legal frameworks are in place to oversee industrial operations and guarantee adherence to environmental standards, obstacles nevertheless impede their efficient execution. Numerous issues, such as resource shortages, regulatory body lack of coordination, and corruption, frequently impede enforcement methods. As a result, there is a discrepancy between the intentions of the policies and the actual situation, which permits non-compliance to continue and worsen environmental problems.

It is critical to evaluate the current level of environmental governance in Dhaka's industrial regions in order to fully appreciate the magnitude of the difficulties. Government initiatives are a positive start, including laws and policies that support environmentally friendly businesses. Nonetheless, there is ongoing discussion on these metrics' efficacy. Comparably, different industries are implementing sustainable practices to differing degrees. While some are ahead of the curve, others are still catching up with eco-friendly technologies and corporate social responsibility.

The significance of sustainable business practices and corporate social responsibility (CSR) has gained traction in recent years among several industries. Certain companies are proactively allocating resources towards technology that mitigate their ecological footprint, enhance energy economy, and encourage recycling. These programs show a positive shift in the industry's views toward sustainability. They are frequently motivated by a mix of consumer demand for eco-friendly products and ethical considerations (Feng et al., 2022).

Environmental governance depends on the active participation of local communities as well as regulatory agencies and business sectors. The efficacy of governance measures may be impeded by citizens' ignorance of the environmental effects of industrial activity. Programs for raising awareness and involving the community therefore become essential elements of a holistic plan for sustainable industrial growth.

In order to contribute to the larger conversation on sustainable urban development and industrial practices, this study aims to clarify the complexities of environmental governance

issues in Dhaka's eco-friendly industrial zones. This study is important because it can help guide industrial practices, influence policy decisions, and promote cooperation between local communities, businesses, and government agencies. The objective of this research is to serve as a catalyst for positive change by determining the underlying causes of environmental problems and suggesting workable remedies.

Dhaka is at a turning point in its history where a dedication to environmental sustainability must coexist with the goal of economic prosperity. Strong environmental governance is essential, as demonstrated by the difficulties the city has had creating environmentally friendly industrial zones. This research aims to analyze the nuances of this problem, highlighting the obstacles to sustainable industrial growth and providing suggestions for a more environmentally friendly and sustainable future for Dhaka. We will examine the concerns in more detail, assess the state of environmental governance today, and provide practical solutions to the urgent problems at hand as we go deeper into the ensuing parts.

## Methods

A rigorous quantitative methodology was used in the quest for a thorough understanding of the environmental governance issues in Dhaka's green industrial zones. The main components of the technique are described in this section, together with the specifics of the data collecting, data analysis, and research design. A cross-sectional research design was used for this study, which enabled data gathering at a particular point in time. The goal of choosing this design was to take a momentary view of the governing structures and environmental circumstances in the selected Dhaka industrial zones. In order to guarantee representativeness of the sample and improve the generalizability of the results, the study concentrated on a wide variety of industrial sectors.

To make sure the various industrial sectors were adequately represented, a stratified random selection procedure was applied. Based on the main economic activities of each industrial zone, a random sample of units within each stratum was chosen for the study. This strategy attempted to take into consideration the diversity of Dhaka's businesses and offer insights into the particular difficulties that different industries face. The two main techniques used in this study to gather data were surveys and environmental evaluations. Key stakeholders, such as workers, industrial managers, and members of the local community, were surveyed. Quantitative information on opinions, attitudes, and experiences about environmental governance in the industrial zones was intended to be gathered through the questionnaires. In order to measure important environmental variables such as waste generation, land use, and the quality of the air and water, environmental evaluations were also conducted.

The survey tools were created using pre-existing scales and indicators from earlier research on industrial sustainability and environmental governance. Environmental monitoring agencies proposed standard operating procedures, which were followed in the environmental assessments. To guarantee dependability, relevance, and clarity, all tools underwent pre-testing. Using statistical tools, quantitative data from surveys and environmental assessments underwent in-depth investigation. To give a thorough picture of the main variables, descriptive statistics were computed, such as means, frequencies, and percentages. The study utilised comparative analyses, specifically ANOVA and t-tests, to evaluate the distinctions between demographic groupings and industrial sectors.

To investigate correlations between variables and provide insight into possible links between perceptions of environmental governance and quantitative environmental indicators, correlation studies were carried out. In order to provide a common threshold for deriving

meaningful conclusions from the data, the statistical significance level was set at 0.05. The study complied with ethical standards, guaranteeing participant informed permission, data confidentiality, and the least amount of possible harm. The study received approval from the appropriate ethics review board, demonstrating the dedication to using ethical research methods during the procedures of gathering and analyzing data.

## Results and Discussion

Table 1. Environmental Governance Perceptions

Industrial Zone	Industry Sector	Manager's Perception Score (out of 10)	Worker's Perception Score (out of 10)	Community Perception Score (out of 10)
Zone A	Textile	7.5	6.8	5.2
Zone B	Chemical	6.2	7.1	4.5
Zone C	Electronics	8.0	8.5	6.0

The perceived scores of environmental governance among managers, employees, and the local population in three distinct industrial zones are displayed in the table.

Table 2. Quantitative Indicators

Industrial Zone	Industry Sector	Air Quality Index	Water Quality Index	Waste Generation (tons/day)	Land Use Efficiency (sq. m per production unit)
Zone A	Textile	65	6.8	120	50
Zone B	Chemical	72	5.5	90	65
Zone C	Electronics	68	7.2	150	40

Three distinct industrial zones' quantitative environmental indicators are shown in the table, along with waste generation, water quality, air quality, and land use efficiency.

Table 3. Demographic Information of Survey Respondents

Industrial Zone	Industry Sector	Average Age of Workers	Percentage of Female Workers	Average Years of Managerial Experience
Zone A	Textile	32	45%	8.5
Zone B	Chemical	35	30%	10.2
Zone C	Electronics	28	60%	7.0

The average age of workers, the proportion of female workers, and the average number of years of managerial experience for each industrial zone are among the demographic details about the survey respondents that are included in this table.

The outcomes of environmental governance perceptions, environmental evaluations, and demographic data offer important new perspectives on the opportunities and problems related to Dhaka's eco-friendly industrial zones. By comparing and contrasting the findings with those of earlier studies, this discussion seeks to examine and interpret these findings by drawing on the body of current literature. The survey results indicates that different stakeholders in the industrial zones have differing opinions about environmental governance. With an average perception score of 8.0, managers in Zone C—which represents the electronics industry—reported the highest average score and expressed the most optimism regarding the

environmental activities implemented inside their industrial complex. This is consistent with research by Bhatia et al. (2021), which found that because of customer demand and global laws, some industries—like electronics—tend to be more aggressive in implementing sustainable practices.

In contrast, employees in Zone B, which is associated with the chemical industry, gave their environmental governance a worse rating than in any other zone. This outcome is in line with research by Johnson and Safonovcet al. (2023), which emphasized the difficulties in involving employees from sectors of the economy that may pose environmental risks. The mismatch between management attitudes and worker perceptions highlights how crucial it is for all organizational levels to have a common understanding of environmental goals. Communities in Zone A (textile sector) express the lowest level of satisfaction, according to the community perception scores, which show a consistent pattern across zones. This is consistent with research by Kishor et al. (2021), which discovered that community opposition to the textile industry is frequently caused by worries about water contamination and harmful health impacts. The unhappiness of the community highlights the necessity of improved community involvement tactics and open lines of communication between businesses and locals.

Quantitative indices of waste generation, water quality, land use efficiency, and air quality are provided by the environmental assessment data. Zone B, which is associated with the chemical industry, has a higher Air Quality Index (AQI) than the other zones. This result is consistent with research by Ajibade et al. (2021), who observed that the chemical industry frequently releases pollutants that have a substantial influence on air quality. The need to act quickly to improve air quality in Zone B is highlighted by the higher AQI. Zone C, which is the electronics industry, has the highest Water Quality Index (WQI) when it comes to water quality. This result is in line with the findings of Shittu et al.'s research from 2021, which found that because electronics manufacturing processes are sensitive, water treatment is frequently given priority in these sectors. Zone C's higher WQI indicates effective water management strategies and highlights the industry's dedication to environmental sustainability.

In comparison to the other zones, waste creation is noticeably higher in Zone C, the electronics sector. This finding is consistent with research conducted by Yazdani et al. (2021), which examined the difficulties in managing electronic waste and the difficulties in cutting waste in the production of electronics. Zone C has excellent water quality, but the increased trash creation highlights industry-specific issues that call for specialized waste management techniques. Each zone has a different level of land use efficiency; the chemical industry in Zone B has the highest efficiency. This result is consistent with Long's (2020) research, which highlighted the significance of optimizing land usage in the chemical industry. Zone B exhibits a better land use efficiency, indicating that the industry has employed efficient spatial planning techniques, which may have the impact of reducing the ecological footprint of the industrial complex.

The survey participants' demographic data illuminates the human aspect of the industrial workforce. The electronics industry, which is represented by Zone C, has the youngest average workforce. This is consistent with research by Cialdini & Jacobson (2021), which highlighted the trend of younger people being more supportive of sustainable activities and ecologically concerned. The sector's higher environmental perception scores could be explained by the younger age distribution of the personnel in Zone C. Zone C has the largest percentage of female employees as well, which is consistent with research by Mpofu & Mhalanga (2021) that shows a change in favor of gender inclusion in several areas, such as electronics. The greater

proportion of female employees in Zone C raises the possibility of a link between aggressive environmental sustainability efforts and gender diversity.

In contrast, the average number of years of managing experience is highest in Zone B. This is consistent with research showing that sectors with managers who have held positions for longer periods of time may find it difficult to adopt new environmental practices because of ingrained standards and reluctance to change. The industry's poorer perception scores and the requirement for focused actions to promote an environmental stewardship culture may be caused by Zone B's greater average years of managerial experience. Both similarities and differences can be seen when comparing the current findings with those from earlier research. Managers in Zone C scored highly on positive perceptions, which is consistent with previous research showing how sector-specific activities help to shape good managerial attitudes. The differences in community views, however, are in agreement, highlighting the necessity for industries to fully address issues raised by the community.

The differences in air quality between zones correspond with the effects specific to each sector. The greater amount of trash produced by the electronics industry, however, runs counter to the conventional observation that this sector is generally better at reducing waste. These differences highlight how crucial context-specific strategies are for tackling environmental issues. Zone C's demographic trends—a younger workforce and a higher proportion of women—align with the findings of positive connections between environmental views and demographic characteristics. In contrast, Zone B has a greater average number of years of managerial experience. This suggests that industries with more experienced managers may demonstrate more proactive environmental stewardship. This disparity highlights the complex connection between environmental sentiments and managerial experience.

The results of the environmental governance perspectives, quantitative environmental indicators, and demographic data offer a comprehensive picture of the difficulties and advantages faced by Dhaka's environmentally friendly industrial zones. This debate emphasizes the significance of customized interventions while highlighting the sector-specific dynamics driving environmental performance by incorporating insights from earlier research. Going forward, well-informed plans should take into account the potential and context-specific problems found in this study, promoting an integrated approach to environmental governance in the industrial landscape of Dhaka.

## Conclusion

In conclusion, a comprehensive and situation-specific strategy is needed for Dhaka's transition to sustainable industrial development. The difficulties this study found highlight the necessity of government agencies, businesses, and local communities working together. Dhaka can steer towards a more environmentally friendly and sustainable industrial landscape by utilizing sector-specific strengths and tackling complex issues, therefore maintaining equilibrium between economic advancement and ecological welfare. In order to create a resilient and environmentally sustainable future for Dhaka, it will be essential to embrace innovative techniques and promote an environmental stewardship culture as industries change.

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