A Critical Analysis of Implementation of Economic & Industrial Development Strategies in Pakistan

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Abstract:

This study examines the environmental challenges faced by Pakistan, focusing on pollution caused by industries such as textiles and tanneries. Despite having laws like the Pakistan Environmental Protection Act (PEPA), enforcement remains weak due to factors such as limited resources and insufficient governmental will. The industrial sector, particularly in textiles, is a major contributor to air and water pollution, significantly impacting the environment and human health. Public perception surveys reveal widespread dissatisfaction with government efforts and a lack of awareness about environmental regulations. The paper proposes short-term and long-term recommendations to address these issues, including raising public awareness, promoting renewable energy, incentivizing cleaner production practices, and enhancing industrial compliance through stricter enforcement. The establishment of Environmental Tribunals across provinces and better coordination among stakeholders is also essential for effective environmental governance in Pakistan.

Key words:

Environmental Pollution, Industrial, Environmental Laws, Public Awareness, Renewable Energy

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Introduction

In reaction to rising pollution, most developed states have been successful in endorsing environmental laws. However, developing countries like Pakistan face challenges in enacting environmental regulations, which can be attributed to, among other factors, limited capacity, lack of resources, and lack of willingness by authorities. Despite having environmental protection legislation, such as the Pakistan Environmental Protection Act (PEPA, 1997) and, post-devolution, the Punjab Environmental Protection Act (PEPA, 2012), pollution levels related to air and water remain major problems, predominantly in industrial areas.

According to the World Bank, Pakistan's industrial sector is responsible for approximately 22% of the country's total greenhouse gas emissions, making it a significant contributor to climate change (World Bank, 2020). In Pakistan, the textile industry is characterized by high levels of air and water pollution and solid waste (Sial, 2018). The rise of tanneries in Pakistan has caused severe environmental degradation, as untreated tannery wastewater is released into nearby water bodies.

Industrialists consider environmental protection an unavoidable business compulsion imposed by foreign buyers and willfully neglect to maintain the standards of their products utilized by domestic consumers, mainly because compliance requires a significant amount of socio-economic responsibility, along with consistent monitoring, maintenance obligations, and resources.

Statement of the Problem

The unbridled industrial development in Pakistan has led to severe environmental degradation, posing significant threats to human health, biodiversity, and the ecosystem. Despite having policies, laws, and regulations in place to protect the environment, the implementation and enforcement of these measures have remained challenging. This has resulted in widespread environmental pollution, loss of biodiversity, and degradation of natural resources, all of which impact the country's economic and social development. Therefore, a critical analysis of environmental protection policies, laws, and practices in relation to industrial development in Pakistan is essential to identify gaps in the existing framework and suggest measures for their effective implementation.

Scope of the Study

This research aims to provide a critical analysis of the environmental protection policies, laws, and practices in relation to industrial development in Pakistan. The study will focus on the legal and institutional framework for environmental protection, the enforcement mechanisms for

environmental laws and regulations, and the role of the government, industry, and civil society in promoting sustainable industrial development.

Literature Review

Pakistan is experiencing rapid economic growth, along with high population and urbanization growth. Ineffective natural resource management over many years and a long history of unplanned development have not only had negative impacts on Pakistan's socioeconomic fabric but also on its environment, particularly in urban areas. Safeguarding public health and preserving natural wonders has made environmental protection increasingly important. In order to make informed decisions and facilitate sustainable development for future generations, environmental impact assessment (EIA) offers a systematic process for examining the environmental consequences of a development-related initiative (Glasson et al., 1999).

The environment is degrading rapidly due to the expansion of urban settlements on the best agricultural land, pollution of streams, destruction of fisheries by industrial effluents, and the promotion of narrow agricultural practices that encourage the extensive use of chemical pesticides. The list could go on and on as time passes. Thus, we urgently need to develop institutions and enforce laws to overcome environmental problems (McKinney & Schoch, 2003).

The important national institutions in Pakistan that play or could play a significant role in safeguarding the environment can be broadly classified into two categories: (a) governmental institutions and (b) non-governmental institutions. Presently, both the government and non-governmental sectors are addressing environmental issues. Internationally, Pakistan is a member of several organizations established to safeguard the regional and global environment, such as the United Nations Environment Programme (UNEP) and the South Asia Cooperative Environmental Program (SACEP) (Trzyna & Didion, 2013). Pakistan is also a signatory to a number of Multilateral Environmental Agreements (MEAs) and has acceded to other non-legally binding instruments, such as the Earth Summit held in Rio de Janeiro, Brazil in 1992, and Agenda-21 Rio Principles and the Johannesburg Plan of Implementation, which aim for the sustainable development of natural resources (Razzaque, 2004).

Among them are the United Nations Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), the United Nations Convention to Combat Desertification (UNCCD), the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, the Convention on Migratory Species (CMS), the Ramsar Convention on Wetlands, the Basel Convention on the Control of Trans-boundary Movement of Hazardous Wastes and Their Disposal, the Rotterdam Convention on Prior Informed Consent for Certain Hazardous Chemicals and Pesticides in International Trade, the Stockholm Convention on Persistent Organic Pollutants (POPs), and the Montreal Protocol on Substances that Deplete the Ozone Layer (Naureen, 2009).

Different government agencies and departments have been established to deal with various areas of environmental pollution. These agencies have the power to form expert advisory bodies, issue permits, and grant licenses allowing companies or factories to pollute within a limited and mandated manner. The provincial institutions are primarily concerned with resource augmentation and conservation. The major natural resource management and protection responsibilities for forests, agriculture, and water lie at the provincial level, even though these authorities are often overwhelmed by federal projects. Examples of these organizations include the Water and Power Development Authority (WAPDA), the Geological Survey of Pakistan (GSP), the Pakistan Forest Institute (PFI), the Soil Conservation Department, the Irrigation Department, the Wildlife Department, the Industry and Mineral Departments, the Pakistan Agricultural Research Council (PARC), and Provincial Forestry and Livestock Departments. Many of these institutions carry out surveys, monitoring, and research work that are highly relevant to environmental protection.

Environmental law is a fast-developing branch of law. Society has increasingly turned to legal avenues to protect the environment over the past century. It attained global recognition within four decades. The twenty-first century will be dominated and guided by environmental laws, conventions, and ethics. A number of laws dealing with environmental issues have been enacted at local, national, and international levels. Yet, there are many gaps in these laws, as this field is still developing. Initially, the prime motivating force behind most environmental legislation was to protect human safety and welfare. In the broadest sense, the field of environmental law encompasses all laws, statutes, regulations, agreements, treaties, declarations, resolutions, and similar instruments that have a bearing on environmental issues. Environmental laws range in scale from local community ordinances prohibiting litter on the streets to international treaties regulating trade in endangered species or the release of stratospheric ozone-depleting substances (Naureen, 2009).

Research Methodology

For this study, a qualitative research method has been used, relying on data from research articles, journals, books, government departments, and online sources. For primary data collection, an online perception survey was conducted with 414 study respondents.

SITUATIONAL ANALYSIS OF ENVIRONMENTAL PROTECTION REGIME IN PAKISTAN: AN ANALYSIS OF INSTITUTIONAL FRAMEWORK

Environmental issues affecting Pakistan:

The following table shows some major environmental issues in Pakistan.

1	Extraordinary Gaseous Emissions	9	Inadequate Capacity for Management of Environment
2	Water Pollution from Raw Sewage	10	Poor Re-Generation of Forests
3	No Waste Disposal Management Facilities	11	Soil Degradation, Erosion and Desertification
4	Rapid Urbanization	12	Industrial Wastes
5	Lack of Co-ordination between Various Levels of Government	13	Agricultural Runoff
6	Deforestation	14	Limited Natural Freshwater Resources
7	Livelihood of Local People	15	Air Pollution
8	Destruction of Biodiversity	16	Vehicular Pollution

Source: Handbook on National Environmental Legislation and Institutions in Pakistan

Industrial sectors causing excessive pollution in Pakistan

1. **Textile Industry**: The textile industry is one of the largest and most important industries in Pakistan, but it is also one of the major sources of pollution. The industry produces a large amount of wastewater and releases harmful chemicals into the environment, including dyes, heavy metals, and organic pollutants.
2. **Power Generation**: Pakistan heavily relies on fossil fuels for power generation, which is a significant source of air pollution. Coal-fired power plants are the biggest contributors to air pollution in the country, emitting sulfur dioxide, nitrogen oxides, and particulate matter.
3. **Chemical Industry**: The chemical industry in Pakistan is another significant source of pollution, particularly due to the production of petrochemicals and other industrial chemicals. These chemicals can contaminate soil and water and pose a risk to human health and the environment.

4. **Leather Industry**: In Pakistan, the leather industry generates a large amount of wastewater, which contains various chemicals, including chromium, sulfides, and organic pollutants, which are harmful to aquatic life and contaminate water supplies. In this industry, various chemicals are used, which can lead to the emission of volatile organic compounds (VOCs) and other air pollutants. These pollutants can harm human health and contribute to the formation of smog.
5. **Steel Industry**: The steel industry in Pakistan is a major contributor to pollution, particularly in the cities of Lahore and Karachi. The industry faces several environmental challenges, including air pollution, water pollution, and solid waste management.
6. **Cement Industry**: The cement industry emits various air pollutants, such as particulate matter, sulfur dioxide, and nitrogen oxides, during the manufacturing process.
7. **Marble Industry**: The marble mining industry is one of the biggest sources of pollution in Pakistan. It causes air pollution and severely damages the flora and fauna of the surrounding area. It also causes water pollution.
8. **Brick Kilns**: The brick kiln industry in Pakistan is a significant source of air pollution and is known to have negative impacts on human health and the environment. The brick kiln industry in Pakistan typically operates using traditional methods that involve burning coal, wood, and other materials to fire the kilns. This process produces large amounts of smoke and particulate matter that can cause respiratory problems and other health issues for those living and working near the kilns. In addition, the brick kiln industry is also known to contribute to deforestation and soil erosion due to the use of wood as a fuel source.
9. **Transportation**: The transportation sector in Pakistan is rapidly growing, and it is also a major source of pollution. The use of old and poorly maintained vehicles, along with a lack of proper emissions controls, leads to high levels of air pollution in urban areas.
10. **Agriculture Industry**: Agriculture is another major industry in Pakistan, but it is also a significant source of pollution. The use of chemical fertilizers and pesticides can lead to soil contamination and water pollution, which can harm both human health and the environment (Daily Dawn, 2019 & 2023).

Main Sources of Air Pollution in Khyber Pakhtunkhwa

The following are the main sources of air pollution in Khyber Pakhtunkhwa:

1. **Crush Plants**: Dust emissions and operation of crushing machines without proper pollution control systems, with most of them installed in residential areas.

2. **Brick Kilns**: Conventional brick kilns using rubber, rexene, plastic waste/old shoes, low-quality coal, clothes, etc.
3. **Cement Industry**
4. **Vehicular Emissions**: Due to low-quality fuels, old vehicles (with no fixed age limit), and traffic congestion.
5. **Marble Industry**
6. **Mining Activity**: Uncontrolled blasting.
7. **Sugar Mills**: Gaseous emissions from the stacks of boilers.
8. **Steel Furnaces**: Steel furnaces lack proper pollution control systems.
9. **Plaster of Paris**: Open grinding of raw material.

Main Sources of Water Pollution in Khyber Pakhtunkhwa

1. **Paper Mill**: Squeezing of desolated paper, which produces wastewater.
2. **Sugar Industries**: A huge amount of wastewater is discharged outside the industry without proper treatment.
3. **Marble Industries**: Direct discharge of large amounts of wastewater into water channels.
4. **Ghee Industries**: A large amount of wastewater with oil content and sulfides is discharged outside the industry without proper treatment.
5. **Municipal Effluents**: No treatment facilities are available, and the effluents are directly discharged into water channels, polluting irrigation canals, rivers, and underground water.

Main Sources of Noise Pollution in Khyber Pakhtunkhwa

1. **Vehicles**: Old vehicles and pressure horns.
2. **Mining**: Blasting creates severe noise pollution.
3. **Generators**: Standby generators create severe noise pollution in the nearby area.
4. **Commercial Activities**: Steel, iron bars, iron doors, windows, furniture, household items, etc.
5. **Crushing of Stone**: Crushing machines.
6. **Various Industrial Activities**: Steel mills, sugar mills, chipboard factories, marble factories, etc.

(Khyber Pakhtunkhwa EPA, 2022)

Problems Associated with Marble Mining in District Buner, KP

1. Contamination of drinking water
2. Contamination of air (aerosols containing marble dust suspended in the air)
3. Disturbance of water bodies, e.g., ponds, streams
4. Impact on field production and reduced crop productivity
5. Spread of diseases, including skin rashes and eye irritation
6. Impact on fish habitats and their nourishment

7. Contamination of river/stream water
8. Disturbance of flora and fauna
9. Disturbance of natural habitats
10. Road safety

Pictures of marble mining in District Buner, KP, are provided in Annexure-A.
Source: Office of the Deputy Commissioner, Buner

Institutional Framework for Environmental Protection in Pakistan

1. **Pakistan Environmental Protection Council**: This is headed by the Prime Minister and includes relevant Federal and Provincial Ministers, as well as up to 35 representatives from various sectors. Its role is one of overall supervision and coordination, and it includes:
    1. To approve the National Environmental Quality Standards (NEQS);
    2. To approve comprehensive national environmental policies;
    3. To provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of non-renewable resources; and
    4. To ensure that sustainable development is fully incorporated.
2. **The Pakistan Environmental Protection Agency**: This is the central implementing agency for the Act. Its functions and powers are extensive and cover all aspects of implementing the Act, including:
    1. Administering and implementing the provisions of PEPA and its rules and regulations;
    2. Preparation, revision, and establishment of the National Environmental Quality Standards (subject to prior publication for the purposes of soliciting public opinion);
    3. Enforcement of the National Environmental Quality Standards;
    4. Establishment of the standards for the quality of ambient air, water, and land;
    5. Establishment of systems for surveys, monitoring, inspection, and audits to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment;
    6. Rendering advice and assistance in environmental matters;
    7. Encouraging the formation and operation of NGOs, community organizations, and village organizations to prevent and control pollution and promote sustainable development;
    8. Taking all necessary measures for the protection, conservation, rehabilitation, and improvement of the

environment, prevention and control of pollution, and promotion of sustainable development.

3. **Provincial Environmental Protection Agencies**: Each of Pakistan's four provinces has its own environmental protection agency responsible for enforcing environmental laws and regulations, monitoring pollution levels, and promoting sustainable development.

Overview of the Environmental Protection Agency Khyber Pakhtunkhwa

1. Works under the Forestry, Environment & Wildlife Department.
2. Regulation and enforcement of environmental protection laws.
3. A total human resource of 304 (121 filled, 183 vacant), including newly merged districts.
4. EPA offices: EPA Headquarters in Peshawar, Central Directorate in Peshawar, Southern Directorate in D.I. Khan, Northern Directorate in Abbottabad, Malakand Directorate in Swat, Divisional Offices in Bannu, Kohat, and Mardan, and district offices in Orakzai and Khyber.

Progress on enforcement function

Sr. No	Region	Cases Submitted to EPT
1	EPA Head Office/Central Directorate	1814
2	EPA Northern Directorate Abbottabad	631
3	EPA Southern Directorate D I Khan	695
4	EPA Malakand Directorate, Swat	590
	Total	**3730**

Total Cases with EPT	Cases Decided	Cases Pending	Total fine imposed (PKR)
3730	2012	1718	60.5 Million

(Khyber Pakhtunkhwa EPA 2022)

5. **Environmental Tribunals**: Environmental Tribunal has the power to try offenses under PEPA as well as issue arrest warrants. This body also acts as an appellate authority against the orders of EPA. There are four Environmental Tribunals each at provincial capital, however, only the Environmental Tribunal of Punjab is fully functional.

LEGAL FRAMEWORK OF ENVIRONMENTAL PROTECTION REGIME IN PAKISTAN: A COMPARATIVE ANALYSIS WITH BEST PRACTICES AROUND THE WORLD

Environmental Laws in Pakistan:

Pakistan attended and signed the Stockholm Declaration in Sweden in 1972, which is widely regarded as the first document in international environmental law to recognize the right to a healthy environment (Alam 2018). Correspondingly, in Pakistan, the reaction to the world's growing understanding of environmental issues was to include, for the first time, the subjects of "environmental pollution and ecology" in the Concurrent Legislative List of the Constitution of 1973 (IUCN 2007); the establishment of the Environment and Urban Affairs Division within the Ministry of Housing and Works at the Federal level in 1974 (Naureen 2009); and the creation of a separate Ministry of Environment in the Federal Government.
With the inclusion of "environmental pollution and ecology" in the Concurrent Legislative List of the Constitution, the Federation was vested with executive and legislative jurisdiction over the same. Therefore, in 1983, the President of Pakistan, exercising legislative powers conferred by Article 89 of the Constitution, promulgated the Pakistan Environmental Protection Ordinance, 1983 ("PEPO"). By the early 1990s, environmental law in Pakistan was governed by the PEPO.

With this background in environmental law, Pakistan participated in the United Nations Convention on Sustainable Development held in Rio de Janeiro, Brazil, in 1992 and became a signatory to the Rio Declaration on Sustainable Development (Alam 2018).

1. **National Conservation Strategy (NCS) 1992**: The National Conservation Strategy was a professionally researched project (Khan, 2014) that provides a comprehensive framework for sustainable development in Pakistan. This strategy outlines a comprehensive approach to conserving Pakistan's natural resources, including forests, wildlife, water, and soil.
2. **Pakistan Environmental Protection Act (PEPA) 1997**: The Act provides "for the protection, conservation, rehabilitation, and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development" (EPA 1997). It expanded on environmental matters covered in the earlier PEPO and defines "environment" as air, water, land; all layers of the atmosphere, all organic and inorganic matter and living organisms; the ecosystem and ecological relationships; buildings, structures, roads, facilities, and works; all social and economic conditions affecting community life; and the inter-relationship between any of the above factors (Section 2 Ibid).

The Act envisages a Pakistan Environment Protection Council ("PEPC") to be the supreme policy-making body, supported by the Pakistan Environment Protection Agency ("Pak-EPA"), Provincial Environmental Protection Agencies, Provincial Sustainable Development Funds to be managed by Provincial Sustainable Development Fund Boards, and Environmental Tribunals and Environmental Magistrates.

3. **National Environmental Quality Standards (self-monitoring and reporting by industries) Rules, 2001**: These are the most important rules under the Pakistan Environmental Protection Act, 1997, as they prescribe pollution limits for industry. They place obligations upon all industries to submit correct and timely Environmental Monitoring Reports to the Federal Environmental Protection Agency.
4. **National Environmental Policy (NEP) of Pakistan 2005**: The National Environmental Policy (NEP) of Pakistan was first formulated in 2005, with the aim of promoting sustainable development while protecting the country's natural resources and ecosystems. The policy was updated in 2012 to reflect the changing environmental challenges faced by the country. The NEP outlines the government's commitment to promoting sustainable development through the integration of environmental considerations into all aspects of decision-making. It emphasizes the need to address climate change, biodiversity conservation, pollution control, and natural resource management.
5. **National Climate Change Policy 2012**: The national policy on climate change aimed to focus on the issues related to the sectors of agriculture, forestry, water, and coastal lands, along with their biodiversity and protection of ecosystems in Pakistan (Ahmad, 2022).

C. Ten Billion Tree Tsunami Programme (TBTTP)

The government of Pakistan initiated a program to tackle the issue of climate change and deforestation in the province of Khyber-Pakhtunkhwa from 2013–2018. The project is known as the Billion Tree Afforestation Project (BTAP). One salient feature of the project is that it adopted a participatory approach for the plantation campaign (Rayan, Gruehn, & Khayyam, 2021). The project was praised internationally, and the international community encouraged the expansion of this initiative to other provinces as well (Ehtasham et al., 2022). After BTAP in KPK, the government announced the expansion of the Billion Tree Project into the plantation of up to Ten Billion Trees across the whole of Pakistan. The project was then renamed the "Ten Billion Tree Tsunami Project" (TBTTP).

During Phase I of the project, during Fiscal Year 2021 (July 2020–March 2021), the program achieved the plantation of about 350 million trees.

Not only was this proven to be beneficial for climate change and environmental purposes, but the project also generated around 100,000 daily wage employees by March 2021 (Ehtasham et al., 2022).

Best Practices around the World

1. The European Union (EU)

The European Union (EU), comprising 27 countries, has a comprehensive set of environmental regulations that apply to all member states.

1. The EU's Industrial Emissions Directive sets limits on emissions of pollutants, while the REACH regulation requires companies to register, evaluate, and authorize the use of chemicals (REACH, 2023).
2. The EU also has an emissions trading scheme that puts a price on carbon emissions and incentivizes companies to reduce their emissions.
3. The EU has adopted the Industrial Emissions Directive (IED), which sets standards for industrial emissions, and the Waste Framework Directive, which aims to reduce waste generation and promote recycling.
4. The EU also promotes sustainable development through initiatives such as the European Green Deal, which sets out a roadmap for achieving climate neutrality by 2050.
5. The EU has established several voluntary programs and initiatives to encourage sustainable industrial development. The European Eco-Management and Audit Scheme (EMAS) is a voluntary program that encourages companies to adopt environmentally friendly practices and improve their environmental performance (EMAS, 2023).
6. The EU's Circular Economy Action Plan sets out a framework for transitioning to a more sustainable and circular economy, including measures to promote eco-design, reduce waste, and improve resource efficiency.
7. The EU also promotes circular economy principles, which aim to minimize waste and maximize the use of resources by reusing and recycling materials.

2. United States of America

1. The United States has the Environmental Protection Agency (EPA), which is responsible for enforcing federal environmental regulations, such as the Clean Air Act and Clean Water Act, which set standards for industrial emissions and the discharge of pollutants.
2. The EPA has also established several programs to encourage environmental stewardship among businesses and industries, such as the Energy Star program and the Green Power Partnership.

3. These programs provide incentives for companies to reduce their environmental footprint and adopt sustainable practices (epa.gov).
4. The U.S. also offers tax incentives and grants to encourage industries to adopt more environmentally friendly practices.

3. China

1. The Chinese Environmental Protection Law provides a legal framework for environmental protection and pollution control. The law requires companies to carry out environmental impact assessments and obtain environmental permits before commencing operations (npc.gov.cn).
2. The government has recently implemented stricter environmental regulations and penalties for non-compliance.
3. The Chinese government has also launched several initiatives to promote sustainable development. The "Made in China 2025" plan aims to upgrade and modernize the country's manufacturing industry to make it more sustainable and environmentally friendly.
4. The Chinese government has established a range of incentives and programs to promote sustainable industrial development. These include subsidies for companies that adopt clean technologies, tax incentives for energy-saving and emissions-reducing investments, and financial support for the development of renewable energy (csis.org).
5. The government has also established a number of voluntary programs to encourage businesses to adopt sustainable practices. These include the Green Supply Chain program, which promotes the use of environmentally friendly materials and production methods, and the Circular Economy pilot programs, which aim to reduce waste and promote resource efficiency.

4. India

1. India has a number of laws and regulations governing environmental protection, including the Air (Prevention and Control of Pollution) Act and the Water (Prevention and Control of Pollution) Act. The government has also established several institutions to oversee environmental protection, such as the Central Pollution Control Board (moef.gov.in).
2. The Indian government has established a range of incentives and programs to promote sustainable industrial development. The National Action Plan on Climate Change, launched in 2008, aims to promote sustainable development and address climate change through various measures, including energy efficiency, renewable energy, and sustainable transport.

3. The Indian government has also established several programs to promote sustainable industrial development, including the National Cleaner Production Centre and the Energy Conservation Building Code. These programs provide technical assistance and training to businesses to help them adopt environmentally friendly practices.

5. Japan

1. The Japanese government also regulates industrial pollution through laws such as the Air Pollution Control Act and the Water Pollution Control Act. These laws require businesses to comply with environmental standards and regulations and establish penalties for non-compliance.
2. The Japanese government has also established several incentives and programs to promote sustainable industrial development. These include tax incentives for businesses that adopt clean technologies, subsidies for energy-saving and emissions-reducing investments, and financial support for the development of renewable energy.
3. The Japanese government also promotes sustainable industrial development through various initiatives, such as the Eco-Products Exhibition, which showcases environmentally friendly products and technologies.
4. The government also works with businesses to develop and promote eco-friendly products through the Top Runner Program, which encourages businesses to compete to develop the most energy-efficient and environmentally friendly products.

Comparative Analysis

The relationship between industrial development and environmental protection is complex and varies widely around the world. While industrial development has brought many benefits to societies, including economic growth and improved standards of living, it has also led to increased pollution, resource depletion, and environmental degradation.

The impact of industrial development on the environment remains a major global challenge. Climate change, biodiversity loss, and pollution continue to pose significant threats to the environment and human well-being.

Here is a comparative analysis of Pakistan's environmental protection regime in comparison with some of the best practices around the world:

1. **Regulatory Framework (Command and Control Regulations)** Pakistan has a number of environmental laws and regulations that apply to industrial development, such as the Pakistan Environmental Protection Act and the National Environmental Quality Standards. However, enforcement of these regulations has been weak.
2. **Monitoring and Reporting**
   Pakistan has a National Environmental Information Management System, but the system is not yet fully operational. The country lacks a comprehensive system for monitoring and reporting on the environmental impacts of industrial activities. In contrast, countries like China and India have established comprehensive monitoring and reporting systems that allow for real-time tracking of air and water quality, with industries required to report their emissions data regularly.
3. **Environmental Impact Assessments**
   Environmental impact assessments (EIAs) are required in Pakistan for certain types of industrial development projects, but the quality and rigor of these assessments vary widely. The quality of these assessments is often poor, and they are not always conducted in a transparent and participatory manner. In contrast, developed countries have more rigorous processes for environmental impact assessments, with clear criteria for assessing potential environmental impacts and requirements for public consultation and participation.
4. **Industrial Practices (Pollution Control Measures)**
   Pakistan has a significant industrial sector, including textile, cement, and chemical industries, which are major contributors to pollution and environmental degradation. However, many of these industries operate without adequate pollution control measures or environmental management systems in place. Pakistan has limited pollution control measures in place, particularly in industrial areas. Best practices around the world include the use of pollution prevention and control technologies and the implementation of best management practices to minimize environmental impacts. In contrast, countries like Germany and Japan have implemented world-class industrial practices, focusing on reducing waste, energy efficiency, and sustainable production methods.
5. **Sustainable Development**
   Pakistan has yet to fully integrate sustainable development into its industrial development policies and practices. Best practices around the world prioritize sustainable development through the use of green technologies, renewable energy, and resource efficiency. While Pakistan has some policies and initiatives to promote sustainability, such as the Alternative Energy Development Board and the Clean Development Mechanism, their implementation has been limited.

In contrast, countries like China and Japan offer significant incentives for industries to adopt more sustainable practices, such as tax incentives and subsidies for renewable energy and low-emission technologies.

6. **Market-based Mechanisms**
   Pakistan does not have effective market-based mechanisms, such as tax incentives for industries, clean technologies, and renewable energy, to promote environmental protection.
7. **Collaborative Approaches**
   Pakistan has established a number of institutions to oversee environmental protection, such as the Pakistan Environmental Protection Agency and the National Council for Conservation of Wildlife, but collaboration between government, industry, and civil society is limited. In contrast, countries like the United States and the European Union have established collaborative frameworks that bring together stakeholders from various sectors to develop joint strategies for environmental protection. Japan has implemented successful public-private partnerships to promote environmental protection.

Corporate Social Responsibility

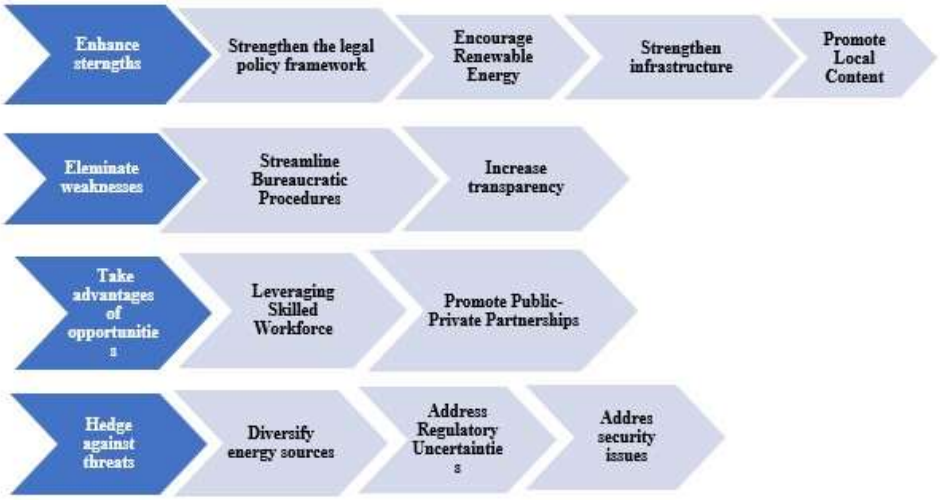
Many companies in Pakistan do not prioritize environmental sustainability, and there is little pressure from consumers or investors to do so. In contrast, many developed countries have more robust systems for corporate social responsibility, with stronger incentives for companies to adopt environmentally sustainable practices.

SWOT analysis of the Energy sector legal policy framework to promote the industry in Pakistan:

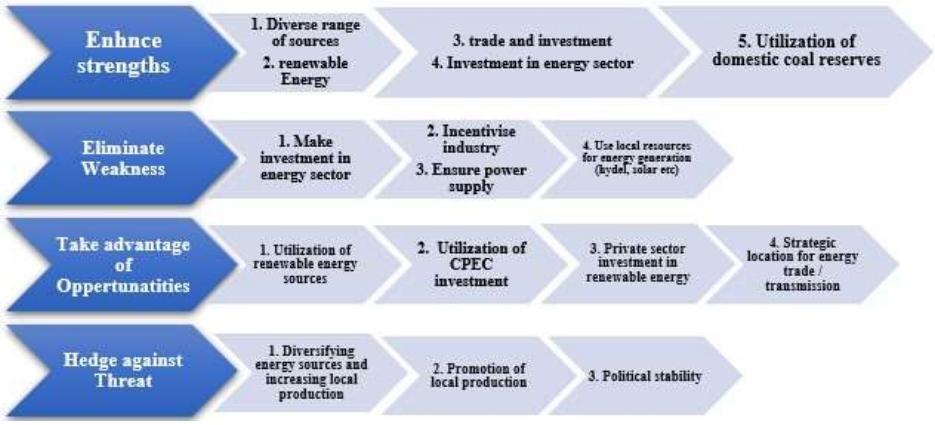
1. Strong policy framework 1. acts, policies, and regulations governing the industry 2. Diversified energy matrix 1. coal, natural gas, oil, hydropower, solar, wind 3. Private sector participation 4. Growing demand for energy 1. rapid industrialization and population growth	**Weaknesses** 1. Inconsistent implementation 2. Inadequate infrastructure 3. Lack of transparency 4. Dependence on imported energy 70% of its energy mix 1. price fluctuations 2. supply disruptions 5. Political instability
• Investment in renewable energy • Regional integration • Technology adoption • Public-private partnerships	• Political instability • Security concerns • Economic challenges • Regulatory uncertainties

SWOT analysis of Energy sector institutional policy framework to promote industry in Pakistan:

EETH analysis of Energy sector legal policy framework to promote industry in Pakistan:



EETH analysis of Energy sector institutional policy framework to promote industry in Pakistan



Perception Survey

An online survey was conducted, wherein questions were asked on the legal and institutional regime in relation to industrial development in Pakistan. A total of 414 people responded to the survey. Majority of the respondents were of the opinion that protecting the environment is one of the major challenges in Pakistan where air, water, and solid waste are the main areas of pollution. Research questions and survey results are at Annexures **A** & **B**.

GAP Analysis:

GAP analysis has been conducted within the legal and institutional framework viz a viz industrial development

S#	PRESENT STATE	KEY STEPS TO BRIDGE THE GAP	DESIRED STATE
1.	Law Enforcement Mechanism in the Industrial Sector: 2. Lack of awareness 3. Environmental Non Compliance in Textile and Leather Industry in Air Emissions, Noise Level, Wastewater, Solid Waste 4. Non Compliance in Health Sector 5. Health Impacts of Leather Industry 6. Community Health Impacts	7. Awareness campaigns 8. Establishment of Combined affluent treatment plants for cluster of industries which cannot afford to run the individual affluent treatment plants due to financial, physical or technological reasons 9. Joint coordination among top industries 10. Small and medium industry to attain some minimum standards with trained workforce. 11. Workers Health Sickness Monitoring 12. Rewards/Awards/Positive Incentives 13. Impositions of Stricter Punishments/Fines 14. Mainstreaming of Environmental Management 15. Environmental Rights of Citizens 16. Enhanced Awareness Campaign 17. Minimizing the Communication gaps with public 18. Insufficient Energy and Power Generation 19. Standardize data to be gathered	20. Awareness 21. National Conservation Plan 22. Cleaner Production 23. Regulations 24. Environmental Legislation 25. Tribunals
26.	Disposal of Clinical waste and electronic waste in Baluchistan Environmental Protection Act, 2012 only	The same may be inculcated in EPA, 1997 and laws of other provinces	Comprehensive and unified legislation
27.	Pakistan Environmental Protection Legislation suffers from lack of quantified limits and standards of carbon emissions which makes these laws ineffective and difficult to enforce	To inculcate quantification of limits and standards of carbon emissions from industries	Enactment of objective and quantified legislation
28.	Weak Implementation	Comprehensive procedures for effective implementation	Effective Implementation
29.	The regulations are generally strict and people try to use tactics to avoid their enforcement	Some sort of flexibility may be inculcated in the rules as incentive to the industrialists so that these may be enforced at the initial level	Balanced and incentivized Legislation/policies
30.	Energy Institutions, both public and private, have been providing electricity produced with less environmentally friendly and costlier fuel by cartelizing with each other.	Government has to launch more projects for producing electricity through renewable resources. Competition Commission to monitor the cartelization of power producers.	Alternate energy from renewable resources
31.	Environmental Impact Assessment guidelines are not adequate to ensure effective appraisal of large infrastructure projects such as Dams and	Adequate Impact Assessment guide lines to be prepared covering all categories of Projects besides area.	No major project without Environmental Impact Assessment

	Water Management Projects. A major Challenge associated with the large Infrastructure Project would be to address resettlement and compensation issues in the absence of resettlement policy.		

CONCLUSIONS

1. Pakistan, for the first time, included the subjects of "environmental pollution and ecology" in the Concurrent Legislative List of the Constitution of 1973 and established the Environment and Urban Affairs Division within the Ministry of Housing and Works at the Federal level in 1974, which was ultimately carved out into a separate Ministry of Environment in the Federal Government.
2. The President of Pakistan promulgated the Pakistan Environmental Protection Ordinance, 1983, which led to the promulgation of the Pakistan Environmental Protection Act (PEPA) 1997.
3. The government of Khyber-Pakhtunkhwa initiated the Billion Tree Afforestation Project (BTAP) in 2013, which was praised at the international level. Later, in 2018, the federal government initiated the Ten Billion Tree Tsunami Project (TBTTP).
4. Despite the existence of environmental policies, laws, and practices, Pakistan continues to confront significant environmental issues such as air and water pollution, deforestation, and biodiversity loss, all of which endanger both the environment and human well-being. The government's/agency's attempts to safeguard the environment have yielded no significant outcomes, and it has been established that enforcing these rules is ineffective. According to the perception survey, 96.5% of respondents named environmental degradation as Pakistan's top issue, and 67.9% were dissatisfied with the effectiveness of government agencies.
5. Industries in Pakistan are major contributors to pollution and environmental degradation (72.1% of the respondents were of the opinion that industry is the primary cause of environmental contamination in Pakistan).
6. The perception survey conducted for this study reveals that the general public is unaware of the legal and institutional framework for the environmental protection regime in Pakistan (70.9% of the respondents showed unawareness of the current legal/institutional regime in Pakistan).
7. In the western world, industries are encouraged to reduce waste and maximize resource use by recycling materials, as well as by adopting more ecologically responsible practices through taxes and grants (81% of the study respondents were of the opinion that industries should be given incentives to embrace eco-friendly technologies).

8. Environmental protection regulations in Pakistan are not very effective in terms of non-compliance. Furthermore, the absence of Environmental Tribunals (ET), except in Punjab, demonstrates the government's weakness in enforcing environmental laws.
9. The government has not taken effective measures to ensure environment-friendly practices, particularly the use of renewable energy resources and their incorporation into the legal framework for environmental protection (98% of the respondents stated that renewable energy resources should be used for environmental protection, while 80.2% stated that the government has not taken serious steps in this area).
10. Pakistan currently lacks a National Environmental Information Management System (NEIMS) to monitor and report on the environmental impacts of industrial activities.
11. There has been a lack of involvement of the local community to bridge the gap between industry and environmental protection organizations (89.6% of respondents were of the opinion that the community should be involved to bridge the gap between industry and environmental protection organizations).
12. The majority of companies in Pakistan do not prioritize environmental sustainability, and there is a lack of corporate social responsibility (CSR) to adopt environmentally sustainable practices (73.4% of the respondents were of the opinion that the Pakistani industrial sector does not prioritize environmental sustainability).

RECOMMENDATIONS

Short & Medium Term

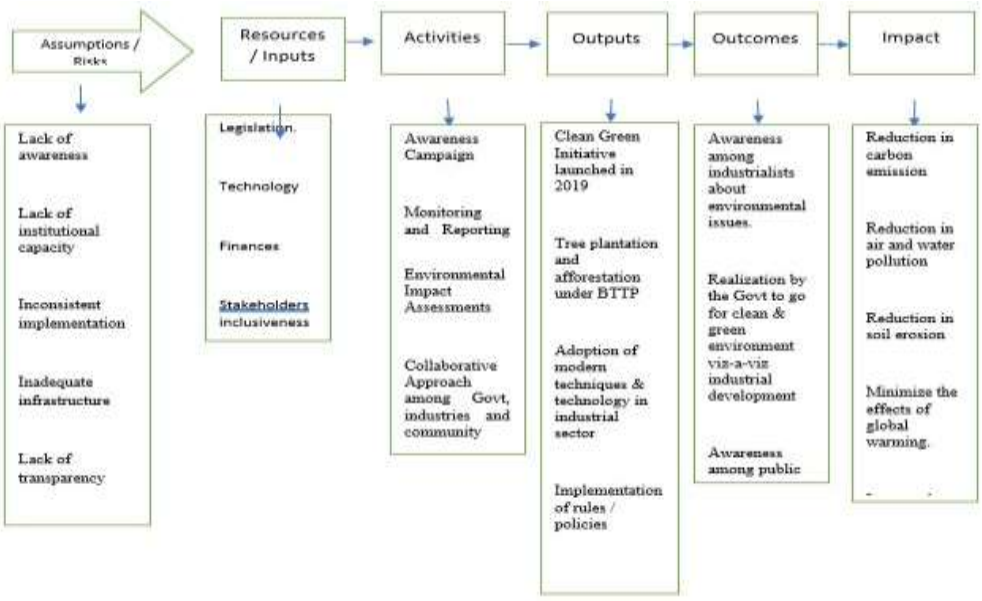
1. Raise public awareness and educate citizens about environmental issues, encouraging participation in environmental protection efforts through students and local communities. Implement rules, regulations, and policies regarding environmental protection.
2. Ensure transparency in the implementation of rules, regulations, and policies regarding environmental protection.
3. A collaborative approach among the respective government, industries, and local communities needs to be adopted. All Pakistan Textile Mills Association (APTMA), All Pakistan Textile Processing Mills Association (APTPMA), Pakistan Textile Exporters Association (PTEA), Pakistan Tanners Association (PTA), Pakistan Leather Garments Manufacturers and Exporters Association (PLGMEA), the Chamber of Commerce and Industry, Water and Sanitation Agency (WASA), Provincial Environmental Protection Agencies (EPAs), and other relevant public sector organizations should be part of one forum for better coordination and collaboration in environmental compliance through staff training and joint research.

4. Establish partnerships with international organizations to access funding and expertise for environmental protection initiatives.
5. Promote tree plantation and afforestation on the pattern of the Billion Tree Tsunami Project.
6. The government should publicize environmental reports and devise a rating system to provide incentives, rewards, and tax rebates to industrial entrepreneurs based on their performance in complying with environmental legislation.
7. In small and medium-sized industries, environmental management systems should be made compulsory, along with mandatory capacity building of the workforce through training and workshops.
8. Promote and incentivize cleaner production practices in industrial estates. Industrial symbiosis should be introduced in the master plans of industrial estates.

Long Term

1. Shift to renewable energy sources, such as hydel, solar, wind, and atomic energy, to produce clean and green energy.
2. Encourage the industrial sector to adopt modern treatment techniques and technologies by installing electronic emissions control devices and effluent treatment plants, as necessary.
3. Establish combined effluent treatment plants for clusters of industries that cannot afford to run individual effluent treatment plants due to financial, physical, or technological limitations.
4. Promote sustainable development by incentivizing industries to adopt environmentally friendly practices and technologies, similar to the EU model.
5. Environmental protection regulations in Pakistan should be strengthened in terms of enforcement for non-compliance.
6. Environmental Tribunals (ET) should be made functional in all provinces of the country.
7. During all phases of a project's lifecycle, such as planning, designing, construction, and operation, the relevant persons should comply with environmental and socio-economic requirements.
8. Industrial estates and zones should be established far from populated areas to ensure that communities are not adversely affected or displaced by pollutants discharged from industries.
9. Pak-EPA and other provincial environmental protection agencies should set industry-specific standards rather than general or uniform standards, taking into account the geographical and ecological conditions of the area where the industry is proposed to be installed.

Log frame Matrix



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