

Critical Analysis of Multi Sectoral Policies related to Marble Industry in Pakistan

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ABSTRACT

Incentive Based (IB) and Command and Control (CAC) instruments are identified in various legislative Acts and Policy documents based on the criteria of environmental economics. Despite the advantages of IB strategies the world of policy making is somewhat locked into the path of traditional approaches such as CAC and pose inertia to move forward in environmental policy making. An ethical shift is inevitable anywhere where there is a market failure and increased social costs and inefficiencies in government interventions to regulate the market. Regulations are discrete steps to address feedbacks in a complex system. Policy evaluation and testing criteria is used to evaluate and test the policies regulating marble extraction and processing in Pakistan. A set of policy and regulatory instruments are selected to be critiqued. The coexisting policy approaches found in the study shall be tested on system dynamics model for developing insights and long-term implications.

Keywords: Environmental Economics, Marble Sector, Policy Evaluation, Policy Testing

1. INTRODUCTION

Marble industry being polluter to water, air and land needs investigation on what regulatory pressures exist at present and what measures are contributing towards mitigating air and water pollution. Dimension Stone sector's stakeholders familiarity with air and water pollution, and existing policies that affect the industry needs to be explored [1]. The critical analysis is intended towards current and proposed actions for mitigating the effects and implications of such actions on marble industry. Pakistan being water scarce country needs to adopt two approaches: adaptation and mitigation in water intensive sectors such as dimensions stone sector which is also indirectly prone to be affected by

Climate change [2]. It is desired to examine some traditional and emerging policy instruments for air and water pollution, direct and indirect costs incurring from the current state of industrial operations (Policy costs) and to analyze merits and drawbacks of the policies using environmental economics tools [3]. The dynamic approaches such as system dynamics offer a promising paradigm to study multi-sectoral policies together to develop the insights into the policies that deals with a complex problem of the society, economy and environment of a region. Separate and discrete, nonintegrated efforts of policy making can undermine the very effectiveness of our Provincial Climate Change Policy and National Water Policy [4]. It is imperative to address policy matters in an integrated fashion for instance taxes on marble wastewater

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discharges and transportation of raw stone and finished products plus water fee policies that can coexist and thus can present conflicts or synergies that can be only seen through simulation runs on models. Grubb, 2013 as cited by [4] suggests CAC for very cost effective technologies and IB strategies for induced technology transformation goals.

‘Specialized means’ for exploring and understanding the connections between cause and effect variables responsible for environmental quality issues are inevitable. To do this economist use analytical models. In dealing with complex problems where everything is interconnected and is changing over time, Jay. W. Forrester’s system dynamics approach, which combines both principles of economics and engineering to model complex problems is an effective modeling approach. Computer based learning environments where space and time is compressed without any monetary burden was given name as ‘micro worlds’ by Morecroft [5], considered these micro worlds a playground for policymakers to play with their knowledge of business and social systems and to debate on policy and strategy change.

The subject of our critique is evaluation of policies related to dimension stone sector of Pakistan. Despite the advantages of IB strategies the world of policy making is somewhat locked into the path of traditional approaches such as CAC and pose inertia to move forward in environmental policy making. An ethical shift is inevitable anywhere where there is a market failure and increased social costs and inefficiencies in government interventions to regulate the market [6].

Pakistan being signatory to Multilateral Environmental Agreements (MEAs) specially concerning the "climate change" and being one of the most vulnerable country in the world to climate change has recently made policies on climate change, water, environment and many other sectors including industry. There cannot be a single policy addressing all the issues related to dimension stone sector therefore a set of policies and associated legislative Acts are selected for the critical analysis. The instruments selected for the purpose are presented in Table 1. The major focus of the analysis will be around the policies being formulated by Khyber Pakhtunkhwa

(KP) province of Pakistan under 18th amendment in the constitution of Pakistan and other National policies and instruments which are directly related to them.

For the analysis purpose the most densely populated district Buner in KP with marble factories is selected for the data collection and analysis purposes. Pakistan historically was not water stressed but recently it is becoming a water scarce country to the extent that it is feared that by 2025 the country will run out of water as it happened in Cape town South Africa [7].

Table 1: Selected Policy Instruments for Critical Analysis

S/No.	Policies	Acts
1.	Khyber Pakhtunkhwa Climate Change Policy, 2016 [2].	The Khyber Pakhtunkhwa Minerals Sector Governance Act, 2017 [8].
2.	Khyber Pakhtunkhwa Minerals Policy, 2014 [9].	The Khyber Pakhtunkhwa Environmental Protection Act, 2014 [10].
3.	Khyber Pakhtunkhwa Industrial Policy, 2016 [11].	The Khyber Pakhtunkhwa Local Government Act, 2013 [12].
4.	Khyber Pakhtunkhwa Agricultural Policy, 2014 [13].	Pakistan Environmental Protection Act, 1997 [14].
5.	National Water Policy of Pakistan 2018 [7].	The Khyber Pakhtunkhwa Factories Act, 2013, [15].
6.		The Khyber Pakhtunkhwa Industrial Relations Act, 2010 [16].

In such circumstances where changing climate is one of the major factor along with the current non-sustainable practices of the industries and people, there is a dire need to work in less water-intensive ways [17]. Water is a limiting factor in our development and at the same time ‘climate compatibility development’ approach is mandatory for developing mitigation and adaptations strategies in every sector of the country due to international

obligations on the country being signatory to certain agreements [18].

The outcome of this effort is a set of policies and regulations that are directly or indirectly related to the dimensions stone sector but spread across different sectors of development and regulation. The set of the instruments, policies and regulations will be evaluated on efficiency, cost effectiveness, enforceability, fairness, flexibility, technologically adaptive and morally considerate yet not conflicting or overlapping [3]. The resulting policies scenarios will be tested later on a model developed on a system dynamics software.

2. BACKGROUND

Dimension stone sector is water intensive in its processing operations [19]. 9.6 million liters of ground water is being extracted on daily basis in Buner KP, which is quite comparable with the European stone blocks extraction that corresponds to the loss of about 1.98 billion liters of water per year [20]. Being water scarce country at one end and threatening the ground water on the other while being vulnerable to climate change, immediately demands mitigation and adaptive measures at all levels [18]. The Climate change policy mandates all other policies to be in line with it following 'climate compatible development' framework to mitigate and adapt for the climate change effects. Translating the various guidelines into actions through regulations on dimension stone sector in Pakistan will greatly affect marble industry. In current state of affairs, it might cease to operate further, which will affect the livelihood of a large proportion of population of the area, Leaving it as it is may not be an option anymore for current environmental conditions of the district. Pakistan Stone Development Company (PASDEC) is also facing 'perverse incentives' of their policies. The major stakeholders of the system under consideration are Association of Owners of Marble factories/Industry, Environmental Protection Agency (EPA), district administration, judiciary and society at large in the district.

There are concerns about differing protection regimes in different provinces [21]. A consequence of

the Eighteenth Amendment in the constitution of Pakistan and its effects on Pakistan Environmental Protection Acts is that Procedural difficulties and inter-provincial conflict can result. Also, since Multilateral Environmental Agreements (MEAs) are Pakistan's international obligation and come under federal jurisdiction. Provincial EPAs not being delegated the powers on matters on Federal list. New instruments are needed to cover matters, which are not yet properly been addressed in the environmental laws [21]. In the last five years of government in KP a lot has been done in policy making, few of the efforts are given in Table 1.

2.1 ASSUMPTIONS

Before taking a position on the critical analysis the assumptions made are as follows:

1. The use of water is a limiting factor in the growth of dimension stone sector in Pakistan. Since regions in the country are becoming water scarce due to climate change to which the country is one of the most vulnerable in the world [18], any regulation regarding water resource consumption and management will directly affect the growth of dimension stone sector.
2. It is assumed that in spite of provincial EPAs being established in the country the agencies and line departments are unable to address the issue of environment on its merits. A case of policy failure, in other words government failure.
3. Thirdly there are presumably some perverse incentives somewhere in the mining and mineral policy/Act and industrial policy which is rendering environmental policies ineffective and inefficient.
4. The fourth assumption is that regulators and law makers are sticking to the strict CAC policies, which apparently seem very pertinent but actually not serving the intended purpose.

"Any system will produce destructive environmental impacts if the incentives within the system are not structured to avoid them" [3].

Dimension stone sector needs to be investigated for IB strategies for a reasonable progressive economic growth without adverse environmental effects [3].

One of the research questions addressed in this paper as highlighted by the Organization for Economic Co-operation and Development (OECD) (1997) is to find the intersectoral concerns related to environment being neglected in environmental Act 1997, which is said to be focused mostly on National Environmental Quality Standards (NEQs). Briefly the climate change policy, national water policy, industrial policy, and major legislations and instruments of KP Province after the eighteenth amendment are being evaluated on the basis of efficiency, cost effectiveness, equity, enforceability

flexibility, room for technological innovation and moral nuance keeping strictly the economic principles governing the growth of dimension stone sector in general restricted to the industry in Buner district of KP Pakistan. An Overview of the policies to be critiqued is as follows.

2.2 Overview of Policies and Acts

A summary of policies and acts is presented in Table 2.

S/No.	Policies	Overview
1.	Khyber Pakhtunkhwa Climate Change Policy, 2016 [18].	<p>Goal is to steer KP towards 'green growth' and 'climate compatible development'.</p> <ul style="list-style-type: none"> • Encourage water conservation by sustainable ground water exploitation, recycling of wastewater through proper treatment and its reuse (H). • Develop contingency plans for short term measures to adapt to water shortages that could help to mitigate droughts and floods (H). • Protect groundwater through management and technical measures like regulatory frameworks, water licensing, artificial recharge especially for threatened aquifers, and adopt integrated water resources management concepts and practices (H). • Legislate and enforce industrial and domestic waste management practices to protect water resources from further degradation (M). • Enact and enforce laws and regulations required for efficient water resource management (H). • Encourage cleaner production and propagate 'circular economy' concept for efficient use of resources based on UNEP's Sustainable consumption and production guidelines (M). • Determine technological needs in the province for climate mitigation and adaptation by conducting technology needs assessment (H). <p>H: high; M: medium and L: low priorities.</p>
2.	Khyber Pakhtunkhwa Minerals Policy, 2014. [22]	<p>The core policy principles related to our study area are;</p> <ul style="list-style-type: none"> • Preference to be given to integrated mining operations with linkages to upstream (pre-production, production and transportation and downstream (processing) and other mining related activities; • Formulation of a fiscal and regulatory regime ensuring fair value for KP while offering equitable rewards to private investors; • Ensuring predictable mechanisms for the evaluation of competing land, water and other resource-use options; • Eliminating and mitigating adverse social conditions and environmental degradation attributed to mining related activities; • Ensuring fair distribution of benefits from mining and related activities to meet current and future public needs; • Establishment of an effective and transparent administration and management of the mineral sector; • Giving preference to local value addition and processing of indigenous minerals.

		<p>Main aims of the regulatory framework revolve around ease of business and economic growth encompassing leases, operations and performance altogether. Defining the transition from exploration to mining rights and the transfer of these rights; Regulating the conduct of mining and labour welfare, including mine closure plan; Guarantee security of tenure and the orderly, uninterrupted carrying out of business. Specifying penalties for violations of law, license requirements, rules and regulations; Ensuring exclusivity of specified mineral rights over licensed areas.</p>
3.	Khyber Pakhtunkhwa Industrial Policy, 2016, [11].	<p>78 percent of Pakistan's marble production comes from KP.</p> <ul style="list-style-type: none"> • Development of special economic zones, facilitation centres and attracting investors is the focus of the industrial policy. • KP marble deposits are around 3 billion tons. Mining and quarrying contribute 3 percent towards the GDP. Some of the adverse factors given in the policy for the existing industry are as follows: <ul style="list-style-type: none"> ○ Unrealistic government industrial policies. ○ Access to finance from banks and market. ○ Technological obsolescence. ○ Lack of marketing channels. ○ Difficulties in procuring raw materials and skilled manpower. • The compliance with environmental Act is discussed in the policy as being very low at EIA and IEE level. KP government through EPA (KP) pledges to oversee EIA and IEE to be complied and will ensure NEQS are being strictly followed. Industrial estate is proposed in Buner with area 200 Acre with a total cost of 1580 million PKR starting the project from 2017 and completing till 2021.
4.	Khyber Pakhtunkhwa Agricultural Policy, 2014 [13].	<p>The economy of KP is said to be agrarian because of its 80 percent population being rural, with agriculture as major livelihood source. Agriculture sector being contributor of 22 percent to provincial GDP is facing challenges due to climate change and water scarcity.</p>
5.	National Water Policy of Pakistan 2018 [7].	<ul style="list-style-type: none"> • Pakistan's per capita surface water availability has declined from 5,260 cubic meters per year in 1951 to around 1,000 cubic meters in 2016 and is likely to further drop to about 860 cubic meters by 2025 trending to become water scarce country. • Fresh water becoming scarcer, country in heat surplus zone, increased stress on water resources sharing, bulk of water requirement met by groundwater, which is depleting, mandates of provincial and federal governments need clarity, water recycling and wastewater reuse are the major issues highlighted in the policy document. • The Policy is aimed at following: promotion of sustainable consumption, reliability and quality of fresh water for various uses, reducing non-revenue water and handling industrial effluents, helping adapting to climate change, reuse of water, restoration and maintenance of ecosystems, safety and security of water streams, rain water harvesting in rural and urban areas, aquifer recharge promotion and regulating groundwater abstraction. • Conservation and efficiency, storage, technology adoption, protection of water shed and catchment areas under IWRM, comprehensive regulation for ground water utilization and other uses, with planning principles focusing on fairness, enforceability and flexibility and maximum outreach. • The water uses are prioritized as follows: 1. Drinking and Sanitation (WASH). 2. Irrigation including land reclamation. 3. Livestock, fisheries and wildlife. 4. Hydropower. 5. Industry and mining. 6. Environment,

		river system, wetlands, aquatic life. 7. Forestry including social forestry. 8. Recreation and sports. 9. Navigation.
	ACTS	Overview
1.	The Khyber Pakhtunkhwa Minerals Sector Governance Act, 2017, [8].	<ul style="list-style-type: none"> • A minerals investment facilitation authority and mineral titles committee is constituted under section 3 of the Act, which consists of 15 members to be chaired by the minister of the sector in case of authority and Director General mining in case of committee comprising most of the stakeholders. In both authority and committee levels one member is from Environment department. • The procedures and code of conduct for the authority and committee is comprehensively laid down in the Act along with the periodic deliverables and the frequency of such deliverables In each domain the allotments, rate of rents, fines are defined. • Section 9 of the Act provides the details on Mineral titles, Mineral Agreements, Rights and Obligations of Mineral title holders. • Schedule-I of the Act provides area limitation for dimension stones up to 200 Acres for prospecting license and mining lease under small scale mining. Section 9 2(c) shows flexibility and provides licensing authority powers to increase or reduce the acreage over and above schedule-I. • Section 10 provides discretion to the mineral title committee in grant of license in public interest to any public organization. Initial period of mining lease is kept 30 years which can be extended on performance basis. • 14(c). The right to take and divert water on or flowing through such land and use it for any purpose necessary for exploration operations subject to and accordance with the provisions of law for the time being in force. (Needs to be checked in relation with priority given in National water policy). • Section 35 limits the mining operations within 500 meters from railway line, public road, reservoir, canal, power line, gas pipeline or other public works, or building or place or archaeological importance. • Under the provision of section 42(2) dispatch slips clearly indicating date, time, license or lease number, name of buyer, vehicle number, quantity of mineral and its destination will keep track of the resource of the area and activity. • Section 43 ensures the information gathering from the miner both financial and technical which is very important for the authority. • Under sections 44 to 49 the enforcement and compulsoriness for the skilled workmanship is ensured. • Section 52 emphasizes on meeting Pakistan's requirements first in employment, in market etc., • Section 53 on the other hand may be an impediment in the way of investments. • Section 95 gives government right to access all sort of data. • Schedule-II is about mandatory provisions in mineral agreements. (xiv) of Schedule-II is about general conditions of mineral titles and (d), (e), (f) and (g) of xiv of schedule-II is about ensuring technical and social efficiency in doing the business.
2.	The Khyber Pakhtunkhwa Environmental Protection Act, 2014, [10].	<ul style="list-style-type: none"> • The environmental protection agency EPA was established under Pakistan Environmental Protection Act, 1997 is working now under this Act, 2014. Implementation of the environmental policies is mandate of EPA and policy formulation is mandate of Environmental Protection Council. • There are 41 sections in all 1 to 40 and 41st being the 7A. It is envisioned "to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of

		<p>pollution, and promotion of sustainable development in the Province of KP". The terms 'effluents' and 'emissions' used in the Act both covers the wastes emerging from the Marble sector at large. Any marble factory qualifies for the definition of factory given in the Act. The point of discussion from this study would be KP Environmental Quality Standards establishment and approval and implementation.</p> <ul style="list-style-type: none"> • The standards established under sub clause (vii) and (viii) of sub-section (1) of section 6. A comprehensive definition of pollution is present and fine on pollution is also defined. Mineral prospecting, surveying, exploration, mining, quarrying, stone-crushing, drilling, construction or operation of factories or industrial estates, waste treatment, disposal facilities and other installations and the like in addition to use of roads or other transport systems, any change of land or water use, energy production, transmission lines, alteration, expansion, repair, decommissioning or abandonment all can be categorized as a 'project'. The term 'standards' is analogous to the standards used for CAC policies. • EPA is obligated to furnish an annual report on the state of environment in the province. • For the establishment of standards and approval from the council all the effort is to be done by the EPA. • The Enforcement is to be ensured by EPA. • Upon the climate change adaptation EPA is to coordinate and facilitate with the other departments and agencies of KP government. The industrial units established before the commencement of this Act and in many cases before 1997 Act, EPA is required to conduct environmental audits. • EPA under the provision of this Act, 2014 can review and approve mitigation plans for marble sector and carry out their environmental audits. • Section 6 2(a) and 2(b) provides EPA to recommend council for adoption of IB strategies. EPA can gather information from any 'person', EPA can seek information or assistance from any Ministry, Division, agency, authority, Agent, administration or law enforcement agency. • District level environmental councils are to be made under this Act. Where District Nazim of Local Government will be a member with other stake holders. • The government may ask to carry out strategic environmental assessment SEA under the section 12 subsection (1) for marble sector of Buner, which will cover water use, road use and pollution effects for sustainable development of the sector. • Government under this section 12 (1) can ask all stakeholders to furnish SEA report which the EPA shall circulate for public hearing and then advise government for modification in the policy or law. • According to section 13, no proponent of a project shall commence construction and operation without complying to initial environmental examination (IEE) or environmental impact assessment (EIA). However, the old industrial units shall be liable to environmental audits and will not be left on their own. • Section 18 of the Act describes all contraventions for which the offender can be penalized. The fine horizon with flexibility is defined in the Act. • The Tribunal formation and its working is described in the section 21 and 22 respectively. • All proceedings under 1997 Act shall be deemed transferred to this Act 2014. EPA shall be taking directions from the government as per the provisions of Act under section 27.
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		<ul style="list-style-type: none"> • Section 30 gives overriding effect to the Act where any inconsistency in other laws are found. • Section 32 gives the power to the Government to amend laws and rules to comply with the MEAs which are specified separately as a SCHEDULE at the end of this document.
3.	The Khyber Pakhtunkhwa Local Government Act, 2013, [12].	<ul style="list-style-type: none"> • The Article 37 of the constitution of Pakistan requires decentralization of government. • Article 140-A of the constitution provides for establishment of local government system for devolution of political, administrative and financial responsibility and authority to elected representatives. • Even at the village level the local government is to bear the responsibility for improved water supply sources, maintenance of water supply distribution and to take measures to prevent contamination of water. • The local government has the right to tax and manage the affairs at their unit level. • Section 42 of the Act provides for the taxation rules. • Section 71 1(a, b, c, d and e) provides for general powers of enforcement officers i.e., in case of any serious threat to public health, safety or welfare or danger to life or property the officer may suspend any work, seize the goods, seal the premises; demolish or remove work; or issue directions for taking corrective measures within a specified time. • Section 72 limits the officer to first attain a search warrant, which means for environmental concerns direct clauses from Environmental Acts will be needed to get such warrants. • Schedule-VII part 2 recommends on points 23 and 38 to provide bye laws which are related to the prevention of air, water and soil and to the pollution of air, water or soil. Under the same schedule the point number 15 refers to an annexure which is named 'dangerous and offensive articles and trades', among many other things point 22 refers to marble cutting and polishing which asks for bye laws in the Act.
4.	Pakistan Environmental Protection Act, 1997, [14].	After the adoption of KPEPA, 2014 ACT, the 1997 ACT document is used for reference only.
5.	The Khyber Pakhtunkhwa Factories Act, 2013, [15].	<ul style="list-style-type: none"> • The term factory do include a marble factory in its definition however a mine is not included. • Section 7 gives power to the government to exempt a factory from the Act in case the number of employs is less than 10 for last 12 months period and at the same time if the workers are more than ten the exemption will be ceased. • Under section 15 proper disposal of wastes and effluents is mandatory on factory manager or owner. The rules are not explicit and regulation is yet to be done on this section. • Section 17 is on the dust and fume and its enforcement in Marble sector is must for the safety of workers. • The Act in general provides for the worker safety, maintainability of the factory and livelihood of associated with workers and at the same time for the environmental protection.
6.	The Khyber Pakhtunkhwa Industrial Relations ACT, 2010, [16].	"To formulate the law relating to formation of trade unions, regulation and improvement of relations between employers and workmen". Not discussed in this article.

2.3 HIGHLIGHTS FROM OTHER STUDIES ON MARBLE SECTOR AND ASSOCIATED POLICIES

85 percent wastage at quarrying is attributed towards leasing irregularities that are leading to uncontrolled illegal blasting and resistance to adopt modern extraction techniques. Taxation and duties structure are also reportedly offering disincentive instead of incentivizing the value addition. It is highly emphasized to resolve regulatory and duty regimes to harvest any sort of impact through interventions such as made by PASDEC. Standardization of dimension stone's quality and its infrastructure requirement needs to be assessed and immediately adopted to cope with International market. The lack of standards is also attributed to 'lack of a cohesive organizational framework'. The waste of the dimension stone sector from the factories is a nuisance but very rightly reported that " it adds to the cost of the final product " plus a " missed opportunity to take advantage of secondary uses for the waste" [23]. A number of symbiotic relationships can be developed between marble sector and other industries especially when industrial symbiosis is seen in the context of availability of raw materials (waste of one industry) to other industry within certain proximity [24]. There are some proposed interventions related to our critical literature analysis in Table 3.

Mineral sector is operating under highly unregulated markets and also under incomplete framework [25]. In 2013 it was proposed to develop model quarry in Buner district. Table 4 highlights challenges faced by KP Mineral Development.

Pakistan Environmental Protection Act (PEPA) 1997 had overriding effect on all other laws of Pakistan, however after 2010 that is not the case anymore [21]. A few issues are raised regarding "international treaties, conventions and agreements related to the environment (implementation of treaties, reporting)". Similarly regarding "Inter-provincial coordination in environmental matters (uniformity in emission standards, EIA procedures and requirements, penalties); the extent of influence that provincial governments will have in the decisions of the council

of common interests". Other issues such as climate change, sustainable development, foreign loans and aid, taxation (green taxes) etc. are the issues of concern to be addressed at policy levels. The issues of overlap and duplication such as in local government laws, development authority laws and laws governing industry and processes pose a challenge and an opportunity to develop a proper hierarchy for the environment protection [21]. Strategic Environmental Assessment (SEA) is suggested to be included in country's laws. "Environmental audits covering all types of industrial and commercial operations", integration of "polluter pays" principle, cross boundary pollution issues between the provinces [21].

Under a Technology development fund TDF project named "Envisioning zero waste in Marble sector of Pakistan; A dynamic approach" funded by Higher Education Pakistan HEC, research is undertaken where it is hypothesized that solutions of complex problems such as marble sector being user of water, power and road infrastructure and at the same time not growing well economically yet deteriorating the environment at high rates are not simple. Also, PASDEC failing to achieve growth in sector and obvious environmental problems call for finding the leverage points in the system to address this dilemma for which this critical analysis is carried out.

3. CRITIQUE

The consequences, water quality deterioration, recharge problems, loss of biodiversity, health issues, loss of recreational locations near water bodies, at quarry site, deterioration of roads frequently due to overloading or uncontrolled loading, old technology, uncontrolled blasting and lack of skills are problems that invoke regulation [27]. Socially efficient level of effluent discharge is that level at which 'marginal abatement costs' equal 'marginal damage costs'. To maintain such levels of effluents from dimension stone sector 'enforcement costs' must also be known, which arise due to regulations and their enforcements [28]. The available public policy approaches pertinent to this study are as follows:

Command-and-control policies

Standards

Incentive-based policies

Taxes and subsidies

Transferable discharge permits

The criteria for evaluating policies related to dimension stone sector is taken from [3]. The criteria to be used is as follows

- Efficiency.
- Cost-effectiveness.
- Fairness.

- Incentive for technological innovations
- Enforceability.
- Agreement with moral precepts.

Among the public policy approaches only CAC policies and presence or absence of IB policies are identified in the selected policy instruments in this study and the same are being evaluated on the criteria mentioned above.

Proposed intervention	Expected Impact	Time Frame to Realize Impact	Key issues to Implementation	Sector Champion
Policy Issues				
Introduce a regulatory framework on mining techniques (ban explosives)	Reduce wastage by 30 to 40 %	Immediate	Promote advocacy and cost-benefit analysis	PASDEC and key firms with integrated value chain
Strengthen contract frameworks through assistance to PASDEC	Improve property rights in sector	Short-term	Promote advocacy efforts	PASDEC
Promote reduction in tariff duties for equipment and materials	Increase value-added production	Short-term	Promote advocacy efforts	PASDEC
Standards and Technology				
Provide funding to Dimension Stone Evaluation Center (DSEC) to conduct R&D for alternatives to blasting and efficient use of marble waste	Enhance value added in sector, reduce costs	Medium term		DSEC
Provide firm level technical assistance to factory owners to adopt new technologies	Improved productivity	Short term	Identifying lead firms	PASDEC, APMIA
Strengthen standards framework	Increased adoption of standards	Medium-term	Upgrade management technical capacity at PCSIR and likes	PCSIR/ Private labs
Funding to geological institutes to conduct testing on stone specifications and develop database	Enhance market information for buyers	Short term		Geological Institutes
Workforce Development				
Enhance the process of establishing model mine facilities	Increase value added production	Medium term	Collaboration between mine owners and local administration	PASDEC
Support PASDEC efforts to train operators and maintenance personal in connection to development of machinery pools for the mining sub segment	Strengthen workforce skills	Short term	Financing	PASDEC
Develop skills for marble mosaic including those needed for marketing products	Strengthen workforce	Medium term	Identification of target women's organizations	PASDEC

Issue	Institutional Gaps	Need for Strengthening
Inspection of Mines	Investor, Government and public understanding of inspectorate may be improved	Inspectorate at MDD, regularization of inspections, strengthened enforcement power
Land rights	Clear policies on land use and land access for mining may be developed	Forestry Department, Land department, Environmental protection department
Resettlement/ Compensation	Existing law and institutions may not be sufficient to address modern mining needs	Land Department
Environment	Virtually not addressed; Urgent Issue!	Environmental Protection Department
Dispute/Conflict Resolution	Formal guidelines, institutions for various disputes not clear	MDD can play role District governments role here
Foreign Investment	How federal provincial agencies are to interact with investor	Financial and foreign investment institutions must develop clear policies and protocols
Public Information	Formal, regularized communication program not in place; media training on mining will be useful	MDD can play its role
Stakeholder participation	Nascent civil society must be supported to build citizen participation	Provincial government approaches to more actively include citizens in mining
Worker protection	Inactive union/worker associations	MDD and Labor Department can focus more attention here
Skills training, education	No structured or strategic training in place for provincial residents- institutes, schools, university curriculum needed	
Financing sector reform	Provincial "Mineral Sector Reform" initiative may be supported to bring together key stakeholders	MDD can work with provincial government, donors

3.1 Efficiency

"An efficient policy is one that moves us to, or near, the point (either of emissions or of ambient quality) where 'marginal abatement costs' and 'marginal damages' are equal." The point of emissions or ambient quality gives the conceptuality of the policy or instrument. The point of focus is equal 'abatement costs' and 'marginal damages' and for that point centralized policies such as CAC rely on regulatory agency for which the agency needs appropriate knowledge of the abatement costs and damage functions. In decentralized policies the interaction of many decision makers with their own assessments of the situation is the case. The interactions reveal the information feedback in contrast to where the knowledge was providing the feedback in centralized policies.

3.2 COST EFFECTIVENESS

Here it is hypothesized that polluter has more information than public policymakers on pollution control costs. In our case it might be vice versa. Anyways, policies do create incentives for the industry to achieve cost effective pollution control using their own private information regarding the costs of alternative pollution control technologies.

3.3 Fairness

"Equity is, first and foremost, a matter of morality and the concerns about how the benefits and costs of environmental improvements ought to be distributed among members of society. The notion of equity and fairness is somewhat not simple as the benefits and cost may lie distant in time and space therefore apparently seeming not equitable may be a most

desired situation in long run providing both efficiency and equity. What is socially efficient from the perspective of a single state may not be from a national viewpoint because, for example, a state may not take account of externalities running to other states. When evaluating different environmental regulations and programs, one has to keep in mind the perspective from which this evaluation is done.

If blasting in Buner is stopped the miners won't be able to compete with other districts where blasting is allowed, hence to achieve the fairness the policy of stopping the blasting needs to be adopted nationally. The notion of 'environmental justice' come in play where mines are disproportionately situated in a province or country where the poor population is exposed to the harms related to the mining and processing of marble.

3.4 Enforceability

When it comes to enforcement as a criterion for the policy evaluation, EPA directly comes into play and it is seen that 'political will' is becoming the impediment in enforcement. Be it a blame or reality, but EPA has failed the nation in fulfilling its mandate.

3.5 Flexibility

Considering the information feedback from within the system to respond to certain conditions from the policy perspective will make a certain policy flexible. This means an essential use of arrays of situations where flexibility is required needs to be displayed. If the CAC provision such as NEQs are flexible and adjustable with time might look socially inefficient in short run but in the long run will prove to be efficient.

3.6 Incentives for Technological Innovations

CAC approach such as technology standards implementation is recommended for highly cost-effective technologies where the 'abatement costs' are known to the regulator to be very low on the other hand IB strategies provide incentive for the adoption of commercially available technologies.

3.7 Moral Considerations

The way people think about environment and how

they value fairness is given weightage in a comprehensive policy instruments where educating and giving awareness to the society on ethical grounds become inevitable to avoid policy resistance. We mostly discourage the subsidy policy however in this situation this might work differently, however we can find the discussion on this in path dependence discussion of our model, where a disturbance and positive feedback is there in a system for growth [29].

4. CANDID POLICY APPROACHES

4.1 Command and-Control: Strategies (CAC): Standards

An approach to policy where the socially efficient change is made obligatory on polluter in law by public representatives and then enforcement machinery takes all necessary steps to get it complied. CAC approach means reliance on standards. Marble industry to meet emission standards will treat its effluents, the costs to comply with standards are basically the 'total abatement costs' borne by the marble factory. The apparently simple CAC approach and appealing in normative sense to majority is in depth a lot more complex.

The three types of environmental standards mentioned by Field and Field [3] are ambient, emission, and technology standards. An ambient standard can be for air, water etc., such as setting different limits for different parameters like turbidity, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Suspended Solids (TSS) in water bodies. These can only be enforced through emissions that later lead to the ambient permissible levels expressed in terms of average concentration level over some duration of time. The assimilative capacity or the absorption capacity of nature is important factor which remains in the middle of both ambient and emission levels. The requirement by EPA on marble factories to construct settling tanks is technology standard, which also include design and engineering standards. There can also be standards applied on the products like codes given to marble finished or unfinished blocks and tiles. Thus, asking miners to use wire saws only will be a technology standard imposed on them while asking them to limit entry of pollutants into air from mining activities will make it an emission standard. In

actual conditions, instruments may use combination of all three standards. To achieve economic efficiency in the CAC approaches the standards need to be set at efficient emission levels. Discussing dimension stone sector in which from extraction, transportation and processing and over its entire value chain standards may not be applied uniformly across the whole region. The tailored policy to each differing situation, for instance marble cities, districts with many factories, area with large mines etc. will be more efficient in terms of impacts but more costly in terms of getting the information needed to set the diverse standards and enforcing them.

Here it is desired to answer; What kind of standards ought to be applied on marble sector? The justification for each standard lies in the answer whether 'marginal abatement costs' vary across sources of emissions or not. The equal standard approach fails when there is marked difference between marginal abatement costs among sources [3].

The CAC approach based on standards is thought to be deficient in creating incentives for polluters to reduce the pollution. Asking marble factories to use settling tanks to reduce the wastes into streams limits them to find better approaches. Emission standards are better than technology standards in not draining off the incentive in pollution control to develop new ideas.

For enforcement of standards another cost comes into play, which is 'marginal penalty costs'. The CAC approaches are inherently flexible in their enforcements.

4.2 IB Strategies: Emission Charges and Subsidies

CAC approaches are thought to be deficient in deriving private information from the polluters and the information to the regulator thus comes at a substantial cost, which at times agency might not be in a position to bear. Incentive-based IB strategies are well suited in such instances [3]. Two types of incentive policies are:

1. Charges (taxes) and subsidies, and
2. Market-based systems.

To marble factory owners who do not seem to take into account the social costs as damage to environment occurring from their activities, one approach is to

control the emissions by taxing them either per unit of emission or by subsidizing for each unit of reduction in emission at the source. Emission taxes are based on 'Polluters pay' principle, thereby paying for the ecological services. The incentive for the polluter here is to find the best possible way to reduce pollution. The tax system ends up in costing the factory more than through CAC approach. A rationale needs to be developed for dimension stone sector in Pakistan as to what kind of policies need to be adopted. The baseline scenario is already CAC based and that is the one polluting firm might prefer too, however society can benefit from the taxes rather than standards. The correct rate determination by the policy makers at the beginning is the key factor in implementing this IB strategy. IB approaches satisfies 'equimarginal principle' automatically even if the same tax applied across all the sources irrespective of their 'marginal abatement costs', each source would reduce pollution load and equalization will occur across all sources. If it is assumed that EPA in Pakistan and specifically in KP lacks information on marginal abatement costs of the marble factories then equimarginal principle can straightaway be applied with IB strategies. In cases where the emissions are distributed non uniformly, a single tax will address only marginal abatement cost, not differences in damages caused by the emissions from different sources the best suited instrument under these circumstances is 'zoned emission charge'. The Marble cities, industrial zones and zones for quarrying can be dealt under this instrument. The agencies come across different uncertainties such as marginal costs of abatement, emissions produced, in such circumstances emission charges bring about cost effectiveness. The enforcement of emission charges requires strict monitoring and its monitoring costs are more than required for CAC approaches [3]. Charges on emissions have the greatest leverage in terms of altering the incentives of polluters. This particular presumption can be tested on dynamic model to be developed under this project.

5. CONCLUSIONS

'Market failure' is the consequence of unregulated markets. This is true when environmental quality is seen as a 'public good'. For controlling such situations public policy is inevitable, which seems missing in our

case. Another type of failure, that makes the outcome of public policy somewhat problematic is called 'government failure', which refers to systematic tendencies and incentives within legislatures and regulating agencies that work against the attainment of efficient and equitable public policy [3]. All this happens in 'complex situations' where vantage points matter. Only looking in the right direction sometimes solve the most wicked problems. There are different sectors at stake due to dimension stone industry and each sector is governed by its own policy and laws therefore in a coexisting policies and regulations it is concluded to develop integrated assessment models where multi-sectoral policies can be tested on system dynamics model.

The penalties will increase with the violation of emission standards, which incentivize the polluter to remain well under the limits. To get higher level of compliance more resources need to be diverted towards enforcement. Here the advancements in remote monitoring technology needs to be incorporated and the provisions of environmental audits and strategic environmental assessment policy instruments come into direct play, which are totally missing in current regimes. Fines have to be set in accordance with the abatement costs *i.e.*, not to be too low as compared to the abatement costs. In case of technology standards, monitoring agency has to carry out both initial and running compliance audits. During selection of CAC approaches enforcement costs must therefore be borne in mind by the policy makers.

When local government starts charging for the ecological services rendered to the polluters unaccounted so far. Dimension stone sector will now add abatement costs and tax payments and will eventually charge the user thus making the emission charges 'transfer payments' in environmental economics terminology. The EPA in collaboration with local government and mine and mineral department may divide a territory into separate zones; Now the agency can charge on emissions differently on different zones.

If Factory Act, Industrial Relations Act get enforced, their effect would be employment taxes. The government then can reduce its employment taxes by generating a subsidy for the industry while increasing

the emission taxes, so that that the total tax revenue of the government still remains the same.

From the political stand-point in Buner where it is tax free zone it would be easy for people to agree on a pollution control policy that begins by distributing valuable new rights than by notifying people to be taxed. This brings another IB strategy known as Cap and trade (CAP). One of the objectives of our study is to align the competitive pressures that exist in both domestic and international markets with the societal benefits by incorporating the policies, which are socially efficient.

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