AN EVALUATION OF THE EFFECTIVENESS OF ENVIRONMENTAL POLICY IN JORDAN

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Abstract

This study examines the impact of the environmental policy in Jordan. The article reviews laws, measures, instruments and the implementation process and evaluates their effectiveness in banning, removing and/or reducing negative externalities in Jordan. Data was collected by administration of questionnaires distributed to all key enforcement officials working in the Ministries of Environment, Agriculture, and Health. Additional sources were laws, regulations, official documents and reports issued by the government, international organizations, NGOs and media. The study shows that Jordan's environmental policy relies solely on the command and control approach to mitigate negative externalities, while completely overlooking price-based and rights -based instruments. Such instruments are widely and increasingly employed in developed countries and have proved their efficiency and effectiveness in protecting the environment. The results of the study reveal that command and control measures are insufficient to achieve effective environmental policy and consequently are incapable of internalizing negative externalities in Jordan. The results may motivate government regulators to endorse price-based and rights-based measures, in addition to command and control measures.

Keywords: Price Based Instruments, Command and Control Instruments, Deterrence, Enforcement, Compliance, Regulation

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1 Introduction

This study examines the experience of Jordan in the area of environmental policy and practice.

The analysis measures the effectiveness of monitoring and enforcement approaches adopted and implemented by three ministries to achieve environmental compliance. More precisely the aim is to determine whether inspections, penalties and other enforcement tools of command and control approach were effective in changing the behaviour of polluters; which set of tools contribute more, and whether general deterrence is a critical factor in stimulating overall compliance.

Negative externalities cannot be totally eliminated and hence exist in all countries, with variation in the degree of harm on environment elements. Although worldwide awareness and concern of the impact of negative externalities on the environment and the quality of life started by the mid of 20th Century, negative externalities are not a new phenomenon or merely a side effect of industrialization.

Nevertheless the magnitude of negative externalities has become a real threat to quality of life and development sustainability, largely due to rapid growth in industrialization and urbanization. The discovery and production of comparatively low-cost fossil fuel has contributed to the immense growth and expansion in industry, transport, agriculture and service sectors. This growth in turn led to intensive use and misuse of natural resources. The outcome of these developments is continuously increasing per capita emissions.

In Jordan, many factors have contributed to the increase in size and diversity of negative externalities, including: unprecedented population growth, rapid urbanization, industrialization and the diversification of services. The expansion of agricultural activity, facilitated by the adoption of new technologies, use of insecticides and fertilizers to meet internal and external demand has also contributed to the problem. Furthermore, an increasingly mobile lifestyle, evolving consumption and production patterns and the use of outdated technology and machinery by industries have also been contributing factors to the level of negative externalities in Jordan.

Growing world- wide concern about the tremendous threats to the environment, often caused by uncontrolled behaviour and practices of individuals and firms, has made it an urgent requirement for governments to take action to protect the environment. In Jordan, the government response has been slow and inadequate. Political economy plays a role in a non-decisive government action. The priority of government is the availability of goods and services at low prices in addition to job opportunities to safeguard a minimum standard of living in the country as a

requirement for political stability. As such, the government has turned a blind eye to the quality of goods and services, and the impact of their production and delivery on the environment for a long time. Ultimately however, environmental issues have come into the forefront of the policy agenda in Jordan thanks to external pressure.

Environmental policy agenda encompasses most sources and symptoms of pollution, including: air, water, and noise pollution, deforestation, improper use of fertilizers and pesticides (which deteriorate soil and ground water quality), conservation of biodiversity, dust and waste from construction and carbon intensity in the residential and transport sectors.

This study is based on a survey of the perception of key officials in the ministries of Environment, Agriculture, and Health who are responsible for implementing the regulations. This survey assesses the impact of enforcement alternatives on compliance and violations. The study also presents and analyses data from government documents and a sample of media reports.

1.1 Scope and objective

This study explores the experience of Jordan in implementing environmental policy and aims to highlight aspects of success as well as aspects of failure and draw the appropriate lessons in order to enhance the performance of responsible organizations. The ultimate goal is to remove any obstacles that hinder the optimal outcome. In addition it provides an overview of the main mechanisms that have been adopted in developed countries to ensure maximum compliance, which can be tried in Jordan independently or alongside the established method.

1.2 Research questions

The study intends to answer the following questions:

1. To what extent has the environmental policy in Jordan achieved its goals? In other words, what is the impact of command and control instruments on change in the magnitude of negative externalities? What difference did regulations have made in terms of problem solving? Have the specified remedies worked?
2. Which enforcement measures proved to have a significant impact?
3. What is the degree of government commitment towards implementing its environmental policy?

1.3 The importance of the study

Environmental pollution affects Jordan in a similar pattern as many countries of the world. Eleven years have elapsed since the adoption of environment law and the foundation of the Ministry of Environment to confront this issue. It is quite important to measure the results. Eleven years are sufficient enough to achieve measurable progress. Considerable resources were allocated annually to the ministry. These resources always have an opportunity cost, especially in a country with limited resources. Environmental regulations are enacted to achieve outcomes by changing individuals' and firms' irresponsible conduct. Any policy that does not achieve its goals is not only of no value but leads to unnecessary costs on the economy and humans.

Despite the importance of the issue, there has been no independent, neutral assessment of the effectiveness of environmental policy in Jordan yet. Therefore, this study attempts to fill the gap in the literature, and to provide insight into what has been achieved thus far. It explores areas of success, as well as causes of failure, and suggests recommendations on how to address the challenges of compliance monitoring and enforcement, based on international best practices.

1.4 Article organization

This study is organized as follows: • Section One provides the literature review; • Section Two focus on the methodology, data sources and description; • Section Three presents data analysis and a demonstration of question-by-question descriptive results; • Section Four provides key findings, recommendations and conclusions.

2 Literature review

A detailed literature review of studies on the effectiveness of environmental regulations was carried out to identify methods that have had a positive impact on the outcome of environmental policies.

The literature review covers the following items:

a. Procedural definitions.

b. Conceptual definitions.

c. Alternative policies to control, mitigate, and internalize negative externalities.

d. Compliance and enforcement mechanisms.

2.1 Procedural definitions

a-1: Environment is defined as "the air, land, and water where people, animals, and plants live " (Cambridge Dictionaries Online, 2015).*" The word "environmental," however, is almost always used in reference to human interaction with the ecosystem. To increase precision, it thus seems reasonable to view "environmental" as a subset of the broader concept of "ecological," i.e., the intersection of human activities and ecological system"* from John Morelli page 5 (Morelli, 2011)

The legal definition of the environment "*is the physical surroundings that are common to human beings including the natural resources of land, air and the flora and fauna that inhibit them*" (Ganguly, na).

Environment protection law in Jordan, defines the environment as the surroundings that incorporate all living entities, resources, air, water, soil and entities established by people (The Ministry of Environment, 2006)).

a-2: Air pollutant: *"any substance emitted into the air from an anthropogenic, biogenic, or geogenic source, that is either not part of the natural atmosphere or is present in higher concentrations than the natural atmosphere, and may cause a short-term or long-term adverse effect"* (Zannetti, 2007). "*Pollution' means the direct or indirect introduction, as a result of human activity, of substances, vibrations, heat or noise into the air, water or land which may be harmful to human health or the quality of the environment, result in damage to material property, or impair or interfere with amenities and other legitimate uses of the environment*" (The Europian Parliament and The Councel of European Union, 2008). "*Emission means the direct or indirect release of substances, vibrations, heat or noise from individual or diffuse sources in the installation into the air, water or land"* (The Europian Parliament and The Councel of European Union, 2008).

Air pollution is defined as the release into the atmosphere of particulate toxic elements by natural or anthropogenic sources (Hanna Zell, 2010). *"'Emission limit values' means the mass, expressed in terms of certain specific parameters, concentration and/or level of an emission, which may not be exceeded during one or more periods of time"* (The Europian Parliament and The Councel of European Union, 2008).

a-3:Regulations. Regulation is always looked at as the same as law. Regulations are usually enacted by parliaments or legislature bodies, ministries or departments**.** *"All the various rules, procedures, and practices related to regulation will, for simplicity, be referred to here as 'regulatory policy'. They are also sometimes referred to as 'regulatory management systems'"* (OECD, 2010).

a-4: Pollution prevention can be defined as the elimination or reduction of harmful wastes and pollutants at their origin. *"the act of reducing or eliminating the use, release or generation of a pollutant or potential pollutant through source reduction, recycling, reuse, reclamation or modification of existing practices."* ((EPA), 1990).

a-5: Licensing: Government authorization to engage in a business or profession or to do something otherwise banned.

a-6: Sanctions: Devices and penalties enforced to encourage or compel compliance.

a-7: Evaluation: A systematic and objective examination of a project, program or policy. Evaluation studies focus on policy design, adoption, implementation and outcome or output. The goal of evaluation studies is to provide donors, policy makers, interest groups with their findings in a credible and useful way. The results should point out the relevance and achievement of objectives of the policy using indicators such as, impact, enhancement of efficiency, or the degree of effectiveness. Without these elements, it is not possible to determine the worth or significance of the policy or program (Rist, 2004) .

a-8: Effectiveness can be seen as a measure of how successful laws are in dealing with matters of concern. The degree of compliance provides a meaningful feedback of the effectiveness of the policy (Young, 2000)

a-9: Environmental indicators are simple measures of performance to inform evaluators and provide data regarding changes in the environment. (OECD data sources, 2013).

2.2 Conceptual definitions

b-1: Negative externality: An externality exists when one individual's consumption or firm's production impose costs on others which are not transmitted through market forces. That cost takes the form of inconvenience, economic costs, health hazards, and direct suffering (Ulbrich, 2011). Externalities lead markets to deliver products and services that lower economic efficiency because the price of the good or service is below its actual cost to society, as *"the private calculation of costs differs from society's valuation of costs"* (Krause J. K., 1997); (Gruber, 2011).

Examples of negative externalities are: Second-hand smoke effects, environmental degradation, including: deforestation, noise from factories, air pollution, impacts of pesticide and growth hormone residues on human health and ground water) (Taylor, 2011). These costs need to be internalized by ensuring all stakeholders take these costs into consideration.

b-2: The role of government: Environmental protection to control negative externalities according to most economists is the responsibility of governments since the private sector is the main source of threat to the environment. Last decades experience of developed and many developing countries and from economic studies provide third world counties with a variety of methods. They can choose the most efficient and effective deterrent techniques which suit the prevailing culture, the stage of economic and social development, its administrative expertise and its political economy (Boyan, 1992); (Elinor Ostrom, 2002); (Winston, 2007); (Daniel A. Mazmanian, 2009).

b-3: Environmental Policy: Hogwood and Gunn (1984:13-19) (cited in (Persson, 2004) defined environmental policy as *"a field of activity; or expression of general purpose to protect the environment as a prerequisite for sustainable development*". According to Osman *"Public policy making is not merely a technical function of government; rather it is a complex interactive process influenced by the diverse nature of socio-political and*

other environmental forces. These environmental forces that form the policy context lead to the variation in policies and influences the output and impact" (Osman). *"Environmental policy reflects governmental strategies that aim to solve environmental problems and enhance its quality. They define environmental values and goals that are held by society"* from (Anderson, 2010).

2.3 Policies to internalize negative externalities

Most studies and empirical research aims to come up with the most appropriate method to reduce negative externalities and internalize them. However, based on the literature review, there are two sets of policy alternatives for government to choose between. The first is economic theory based- policies. Second, Command and control regulations. The following sections review both methods briefly:

2.3.1 Economic theory based-policies

Negative externality can be defined as an inefficient allocation of resources. It is one aspect of market failure (Tresch, 2008). When conditions of competitive market are satisfied, market mechanisms are expected to attain Pareto efficiency, producing a level of output at which marginal social cost and marginal private costs are equal. However, at the presence of external effects like pollution, where production of a good or service generates harmful emissions, private costs diverge from social costs. Therefore the market no longer reaches Pareto efficiency, producing too much of the product that generates the undesired level of pollution. (James Alm, 2011); (Ulbrich, 2011).

Economic literature presents conditions under which it may be efficient, legitimate, and to some, an obligation on the governments to control negative externalities and restore efficiency through correcting the causes that led to market failure (Musgrave, 1989) (Hertog, 2010). However, not all economists accept such role for governments. They prefer the invisible hand (e.g. Friedman).

The majority of economists support the adoption of price-based and right-to-pollution policies because they are the most cost-efficient policies to internalize negative externalities at a reasonable cost, especially when the estimated costs represent a heavy burden (Fullerton, Leicester, & Smith, 2008); (Kuminoff, 2007). Economic instruments are supposed to be more economically efficient than legislative measures in that pollution reductions can be made for less cost. According to (Stavins, 2001) economic based policies allows: *"the burden of pollution control to be shared more efficiently among businesses".*

Since, negative externalities emerge because individuals and firms consider only their own costs and benefits, not the environmental costs or inconvenience to society when they decide how much to produce, consume and invest, economic instruments can make these external costs part of the polluter's decision. Polluters are supposed to realise that it is quite expensive for them to persist the old ways of production and consumption. Hence, they are expected to use their knowledge and experience to pick the best way of meeting environmental standards.

2.3.2 Prices vs. pollution rights

2.3.2.1 Price-based measures

Price-based measures uses direct and indirect taxes, Pigouvian taxes, per-unit tax, fees, excise duty, sales tax, or value-added tax as a remedy to market failure and restoring efficient resource allocation. (David Heres, 2013); (Hammar, 2004). Examples of environmental taxes include: petrol duty, vehicle excise duty, landfill tax, carbon tax and congestion charge, tax on plastic bags to restrict the extent of consumption and encourage recycling. Employing any form of these taxes represents a surcharge equal to the marginal damage caused by production of the good or service. The aim is to increase the private cost of production of goods to reflect their true cost and become equal to the social cost, eventually raising the after-tax price for consumers. The new after-tax price will induce a drop in the quantity of demand and consumption and consequently a reduction in negative externality. (Brouhle, 2004); (Robinson, 2002).

2.3.2.2. Rights-based measures:

2.3.2.2.1 Tradable pollution rights

A *"tradeable permit can be defined as a transferable right to emit a substance that can create pollution. Tradeable permits can be classified into three distinct forms – credit trading, averaging, and allowance trading"* (ELLERMAN, 2005) .

Tradable pollution rights is one of the decentralized methods for controlling negative externalities. The role of, government is restricted to setting standards for acceptable levels of environment quality. These standards represent a cut-off point between what is acceptable and what is not for each district of the country depending on the circumstances of each. Based on these standards, firms can apply to authorities to buy permits to use environment resources and release emissions up to the highest possible limit of concentrations of emissions set by authoritative agencies for that area. Firms are allowed to trade among themselves amounts of particular pollutants of the purchased permit to discharge (Belliveau, 1999); (Robinson, 2002).. This method offers firms to choose between two options, first to improve their old technology to reduce emissions from the existing process, or purchase more rights from other firms in order to preserve total emissions below

the upper limit set earlier for that area. (Taussig, 1984); (Belliveau, 1999); (Keats, 2005); (Millock, 2004).

2.3.2.2.2 Cap and trade emissions

Cap and trade is another example of market mechanism to mitigate negative externalities. Cap-and-trade *as defined by (ELLERMAN, 2005) " is an absolute cap on emissions and the ability to trade emissions under the cap. Although a logical progression from credit trading and averaging, allowance trading is in several ways a radical departure. For one thing, the compliance requirement is entirely different. Instead of determining compliance by reference to a common standard and sanctioned or compensated deviations from it, firms are required to surrender a permit for every unit of discharge. Although the cap may be very constraining in the aggregate, no firm is expected to meet any specific standard. It must only obtain and surrender an allowance that can be readily bought or sold in the market". "Two consequences flow from the cap and trade method: First, the regulator's task is not to specify an emissions standard, but a cap. This requires initial decisions concerning (1) an acceptable or optimal quantity of emissions and (2) the limits to trading, both spatially and temporally. Second, the rights to discharge are now explicit and must be allocated in some manner instead of being implicit and granted without question to the owners of the emitting facility" (ELLERMAN, 2005)p126*. This method of controlling negative externalities can achieve the environment goals without significant government intervention and at a low cost. (Zasloff, 2013).

2.3.2.2.3 The fourth form of economic-based mechanisms for constraining negative externalities

The fourth form of economic-based mechanisms for constraining negative externalities is applying Coase Theorem: this method emphasis allocating property rights principle. Coase argued that once property rights are assigned, rational participants involved in an inefficient allocation can through negotiation settle the negative externality without government intervention (Ulbrich, Public Finance in Theory and Practice, 2011).

2.3.2 Command and control regulation of negative externalities

Regulations are two types: structural and social (Kay, 1990); (W. Kip Viscusi, 2005, 4th ed.). Structural regulation deals mostly with market arrangements, such as restrictions on entry of new firms or exit, and rules specifying instructions governing professional services.

Social regulation comprises regulation of negative externalities (Fullerton, Leicester, & Smith, 2008).

Regulation means *"the employment of legal instruments (rules and norms) in order to implement public policies"* (Fullerton, Leicester, & Smith, 2008). Environmental regulations adopted by government should be backed up by the threat of imposing a variety of penalties to compel polluters to avoid actions that initiate external costs.

Command and control measures vary with the magnitude of the threat to the environment. Some activities are banned totally. Others need licenses or to satisfy a set of firm conditions and prescriptions to guarantee social optimum. Authorities are supposed to adopt either international or regional indicators to ascertain violations of the total output limit. Regulatory bodies are required to oversee, inspect, warn, and then punish non-compliers. When it is feasible, command-and-control regulations forces firms failed to comply to replace their outdated technologies and capital to lessen their emissions. Results suggest that command-and-control regulations can be more efficient than market-based solutions when principal-agent problems are taken into account (Andrews, 2006). The main criticism to command-and-control method is the difficulty to monitor effectively perfect compliance (Russell, 1990); (Robert Hersh, 1999).

3 Comparison between command and control approach and price-based approach

3.1 Advantage of regulation

Regulation that illegalizes some activity may be much cheaper to monitor and enforce than any abiding to certain limit because it require more complex investigation and record-keeping.

3.2 Disadvantages of regulation

1- Difficulty to monitor firms across the board and reversing prevailing patterns of production and consumption due to imperfect information.

2- Environmental policy needs a broader perspective. It cannot be implemented effectively by just imposing emission limits and requiring the use of more advanced capital and technologies regardless of firm's organizational and financial capabilities.

3- Decentralized mechanisms reduce the total cost of controlling negative externalities more efficiently and effectively than the centralized approach especially in cases of apparent differences in capabilities among firms (Stevenes, 2003) .

3.3 Advantages of environmental taxes and other economic instruments

The main advantages as mentioned in (Smith S. , 1992); (Bovenberg L., 2002); (Stevenes, 2003); (Fullerton, Leicester, & Smith, 2008) are:

1- Economy based methods abolish the need to seek detailed data on each firm, which lowers the authority's administrative costs. At the same time, polluters have the incentive to study all feasible options of compliance to avoid paying higher taxes.

2- Dynamic innovation incentive: Firms are more likely to adopt new technologies that have marginal cost below the tax rate.

3- Since representatives of government in abetment negotiations-in the case of command and control approach-assemble abatement costs from the firms themselves; firms have the opportunity to manipulate and control the outcome of negotiation for their own benefit. The experience of many countries which applied this method especially UK and the United States prove that the costs of monitoring pollution reduction and administration of the permits system is less than the command and control approach (Friedman).

3.4 Enforcement and compliance

Compliance refers to the change in practices of individuals, businesses and industries to meet their legal obligations. Compliance enforcement is designed to cause people to do things, cease doing things, or continue to do things (Anderson, 2010). Deterrence is critical to the success of environmental policies, because it makes companies recognize the consequences of their illegal behaviour (Anderson, 2010). Compliance strategy depends on the theory background of regulators. If they follow the rationalist theory, *"regulators may provide positive incentives, such as subsidies for compliance, for example in the form of tax breaks, which may add to firms' compliance by affecting their cost-benefit calculus"* (OECD, 2004). In other words it offers a carrot to encourage more respect to the environment while command and control always show the stick. Since companies are interested in maximizing their profit, they intend to comply if the cost of compliance is less than the cost of noncompliance or if the profit from noncompliance does not worth enforcement consequences.

Proponents of the *"normative environmental economics approach towards compliance to environmental regulations assumes that regulated agents are rational when making compliance decisions: They decide whether to comply or not on the basis of a cost-benefit analysis. This involves comparing expected compliance costs (i.e. expenses for technological and management improvement that will allow environmental requirements to be met) with non-compliance costs (i.e. costs of non-compliance fees, penalties and other associated costs) and eventually choosing the least-cost option. "* (OECD, 2004).

Determinants of compliance are: appropriate definition of environmental problems, adoption a sequence of deterrence approach, reducing the scope for conflicting interpretations of the law and the opportunity for punishment evasion for lack of evidence, reliable legal authority to firmly implement the law, collective efforts among relevant departments, allocating sufficient resources, reliance on clear standards and indicators and limits of exceedances, awareness of the rule by the target group, and ability to comply (OECD, 2000).

3.4.1 Enforcement approaches

Enforcement refers to actions taken by the government against violators to enforce legal provisions. It gives a governmental entity authority to impose sanctions (DEFRA, 2006).The consequence of weak monitoring leads to high rates of violation of environmental standards. Because monitoring is the most costly instrument, regulators substitute direct monitoring with self-monitoring (Russell, 1990) Command-and-control approach to environmental regulation requires tighter monitoring of compliance to compensate for lack of incentives, and relying only on enforcement action against non-compliers. (Gunningham, 1994); (Davies, 1998); (Russell, 1990). Prior to resorting to such procedures, use of cooperation, negotiation, and financial incentives could enhance the effectiveness of the environmental policy (Thornton, 2005); (Gray W. S., 2007).

3.4.2 Enforcement tools are

a. Non-coercive forms of action: Voluntary understanding, consideration and cooperation from regulated entities.

b. Coercive methods include: Banning activities or products outright, licensing, license suspension, license revocation, imposing new requirement for obtaining an environmental license for activities that are likely to cause significant damage (Hunter, 1996), satisfying legal standards, pre-application discussions, permit denial, permit grant with conditions, not granting work order permits, monitoring through on-site visits for inspection and investigations by qualified inspectors (Videras, 2000); (Stafford, 2006); (Hunter, 1996). The set of enforcement procedures include: Monitoring through on-site visits for inspection and investigations by qualified inspectors, issuing notices after detection of violation, administrative order, closing the facility, civil and criminal prosecution (Hunter, 1996). Empirical research has not reached a preference of one method over the others (Lubell, 2009).

Results of several previous studies on the effectiveness of coercive and non- coercive

enforcement alternatives demonstrate the following indications:

1. Administrative actions such as clean up notices and pollution abatement notices are a quick, simple, and produced positive results especially removing negative externalities once they are detected and reducing number of repeated offenses (Miller, 2005).

2. On-the-spot fines provide credible deterrence at a very modest administrative and legal cost.

3. Inspection: literature findings are inconclusive. Some studies found the impact of inspection is significant in changing violators' behaviour. Publication of the results of inspection and issuance of on-the-spot fines convince other violators in the locality or in the industry to avoid such behaviour thus encouraging compliance (Gunningham N. K., 2003); (Carlough, 2002); (OECD, 2000); (Stafford, 2006). Other studies show that repeated inspections at a plant, nearby plants, publishing compliance rates of other entities bring relatively positive and significant effect on compliance behaviour (Dietrich, 2004) (Decker, 2005); (Gray & Shadbegian, 2007); (Shimshack, 2006).

4. .Criminal lawsuits significantly reduce recidivism (Miller, 2005).

5. Public disclosure had a greater impact on emission levels and compliance than penalties (Decker, 2005); (The World Bank, 2000).

6. Large, old and unionized industries observe the regulations less and exceed permitted limits more than their counterparts. The findings also reveal that they pay no attention to inspections. (Rassier, 2006); (Gray W. &., 2005); (Gunningham N. T., 2005); (Foulon, 2002).

7. Enforcement Indicators: Formulation and adoption of indicators as a base for performance measurement, long-term commitment from senior management, and dedicated staff time for data collection and analysis proved to be essential ingredients for effective deterrence (Pascoe, 2004); (Orr Karassin, 2009).

8. Adequate physical, technical, and financial resources, suitable work environment, fair compensation, incentives, and training enabled regulatory authorities to achieve significant reductions in corporate violations (Staffords, 2003). (Stranlund, 1999).

4 Analytical framework

4.1 Methodology and data sources

Assessment of the effectiveness of enforcement measures is result-oriented. It asses the influence of the entire process including inspection, detection, and the array of penalties, and compare the achieved outcome with the planned or expected outcome (Thornton, 2005). Regulations are put in place to protect the environment. In other words, evaluation studies should, according to (Anderson, 2010), answer the question: What difference does the regulation make in the magnitude and trend of the problems?

Measurement of the effectiveness of the environmental policy requires:

1- Historical benchmarks and indicators to measure the reduction in the problem after treatment. (Carlough, 2002); (OECD, 2010). Historical indicators help determining the extent to which behaviour complies with the regulatory or policy standards. (Ellig, 2010); (Marc, 2006); (Jacobzone *et al*., 2007).

2- Examining how well the officials in the regulatory institution implemented the regulatory policy (Stéphane, 2007). The success of the administration depends to large extent on the qualifications and attitudes of the personnel in general and professionals in particular and the collaboration of governmental institutions. (Andrews., 1993); (Helmut, 2002).

4.2 The research model

The conclusion from the literature review shows that the command and control enforcement instruments most frequently used by governments to bring industries and other sources of negative externalities to compliance are: banning, licensing, monitoring, inspection, administrative notes, fines, imprisonment, and finally shutting down facilities. Since environmental protection policy in Jordan relies on the instruments of command and control approach (Ministry of Environment, 2014), this study uses those instruments as independent variables to explain variation in the dependent variable. The dependent variable is reduction in the adverse impact on environment.

The study focuses on the following areas only:

1. The effect of regulations on air, noise, and water pollution.

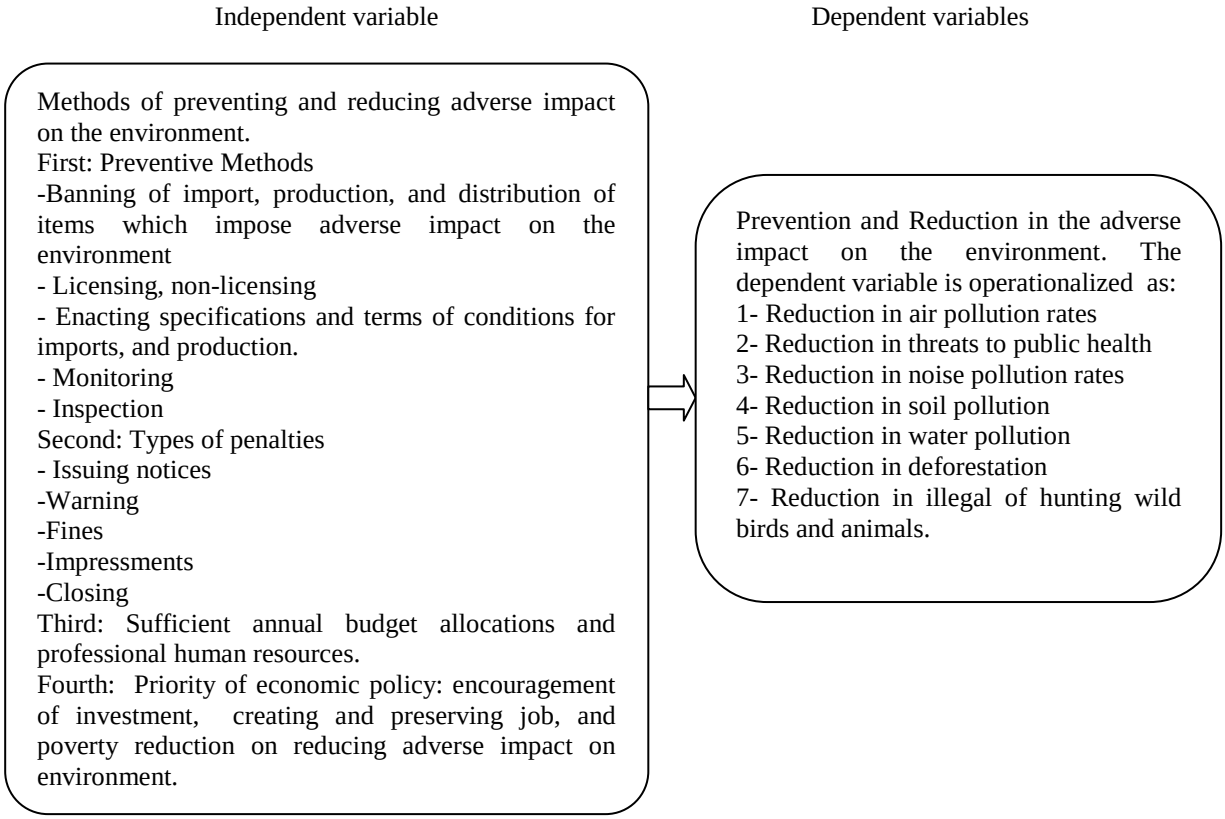
2. The effect of regulations and waste water management on water quality protection.

3. The effect of regulations on soil protection.

4. The effect of regulations on climate change.

5. The effect of regulations on habitat and species protection.

Therefore, the theoretical research model of this study consists of the following dependent and dependent variables:



4.3 Hypotheses

$H0_{1:}$ Preventive methods do not have significant impact ($\alpha \leq 0.05$) on preventing and reducing adverse effects on the environment.

$H0_{2:}$ Penalty types as specified in the regulations do not have significant impact ($\alpha \leq 0.05$) on preventing and reducing adverse effects on the environment.

$H0_{3:}$ Insufficient annual budget and professional human resources do not have significant impact ($\alpha \leq 0.05$) on the authorities' performance and capability of preventing and reducing adverse effects on the environment.

$H0_{4:}$ Prioritizing investment incentives, job opportunities, and poverty reduction before environment protection do not have significant impact ($\alpha \leq 0.05$) on preventing and reducing adverse effects on the environment.

4.4 Data sources

The analysis uses data for the measurement of the effectiveness of environmental protection regulations and implementation by responsible authorities in Jordan from secondary sources such as enacted laws and regulations, ministries annual reports, unpublished data and the media; newspapers and electronic sources.

An additional data source is provided by means of a survey. A questionnaire was developed for the purposes of this study to garner an understanding of respondents' attitude and opinions with respect to the outcome of the implementation of the environment policy. The study population consists of directors of all directorates in the ministries of Environment, Agriculture, and Health headquarters and in the 13 governorates of the country, because these ministries are involved directly in the formulation, adoption and implementation of environment protection regulations. The total number of directors is 182. To avoid the drawbacks of small samples, the questioner was distributed to the whole population because of its limited size. 171 of the questioners were returned. 165 Were complete and used in the analysis. The number represents 89% which is acceptable to draw conclusions. The data obtained from both sources provides sufficient base to answer the research questions.

A pre-test of the survey was conducted to ensure there were no issues with it, such as sequencing or wording of questions, which were identified and subsequently corrected. The final product of the pre-testing and modification task was the production of a survey that was as "user-friendly" as possible for both surveyors and respondents.

4.4.1 Data presentation

4.4.1.1 Secondary sources

4.4.1.1.1 The institutional Framework of environment protection in Jordan:

The government of Jordan has joined the international environmental protection campaign by signing

international environment protection agreements and commitments, namely: biodiversity, climate change, climate change-Kyoto protocol, desertification, endangered species, hazardous wastes, law of the sea, marine dumping, ozone layer protection and wetlands protection. Actions have been exerted by the government to translate its commitment of protecting the environment and conservation of natural resources such as enacting laws and regulations and establishing agencies responsible for implementing them.

Protection of the environment in Jordan is the responsibility of the following ministries: Ministry of Health, Ministry of Water and Irrigation, Ministry of Municipalities Affairs, Ministry of Environment, Ministry of Industry and Trade, Ministry of Agriculture, Ministry of transportation, Ministry of Energy and natural resources, Criminal investigation and law enforcement agencies, Customs Department, and Royal Environmental Police. Each one of them still executes the articles of its own law and regulations related to the protection of the environment despite the establishment of the Ministry of Environment (Ministry of Environment, 2015); (Ministry of Environment, 2014).

In addition, several by-laws and directives (detailed and procedural regulations) were enacted by the Council of Ministers such as: Regulation of nature protection, Regulation of environment protection from population in emergency cases, Regulation of water protection, Regulation of air protection, Regulation of sea environment & shores protection, Regulation of nature reserves and national parks, Regulations of management of harmful & hazardous substances, transport and handling, Regulation of management of solid wastes, Regulation or environmental impact assessment, Regulation of soil protection (Ministry of Environment.).

The investigation is restricted to three ministries: Ministry of Environment, Ministry of Agriculture, and Ministry of Health.

4.4.1.1.1.1 First: The Ministry of Health (MoH)

In 1926 the Emirate of Jordan issued the first health law and established a department for Health affairs. The department became a ministry in 1950. The latest of several amendments of the law was enacted in 2008 (The Ministry of Health).

Articles 35-39 of chapter 8 of the General Health Law number 47 for year 2008 specify the responsibility of the ministry in monitoring water purification processes performed by private firms for drinking purposes, sources of potable water, storage capabilities and appropriateness and taking regular samples of the water for inspection in the ministry labs. The articles hold the owners of firms responsible for immediate reporting to the ministry all cases of violations. The ministry has the authority to close the firm if it does not comply with safety standards.

Chapter 9 of the Health Law regulates chemical materials. The (MoH) is responsible for preparing a list of chemicals to be banned from entering the country, and a list of restricted chemicals which require licenses to be imported for specific uses, under close monitoring of the Ministry of Interior and security departments. According to article 41of the law, the MoH bears full responsibility for taking the necessary procedures to enforce the ban on the use of chemicals which represent a potential threat to public health and safety. Article 43 requires all factories dealing with harmful, dangerous chemicals to register and report regularly the uses of these chemicals and the adopted methods of recycling and disposal of waste materials to the (MoH). Article 44 specifies the right of MoH officials to inspect entities' sites, storage facilities and the production processes. Article 45 gives the ministry the authority to remove any sources of threat at the expense of the factory in case of violations and failure to implement directives in a timely manner especially reversing the violation.

Chapter 10 of the law focuses on medical wastes, open spaces that represent a blot on the landscape such as old and unoccupied buildings and/or land previously used for industrial purposes or some commercial uses, and barns.

Article 48 of the law bans illegal disposal of wastes, and affords for proper disposal at the expense of the violator after one week of issuing notice for the first time and shuttering the entity in case of repeated violations.

Chapter 11 focuses on wastewater and wastewater treatment plants. Article 51 of the chapter specifies the procedures to enforce the banning of illegal disposal of untreated sewage. The ministry is responsible for monitoring procedures to transport wastewater to designated facilities. The scope of the MoH responsibility includes sewage transport vehicles, pipelines and conveyors.

Chapter 12 focuses on smoking. Article 53 bans smoking in public places. Article 54 bans all ads and campaigns aim at promote smoking. Article 55 ban selling cigarettes to underage persons. Chapter 13, article 57 bans the production, storage and distribution of all goods representing a health hazard or which pose a threat to human health and public safety.

Chapter 15 specifies penalties alternatives. Articles 62-67 specify the penalty associated with each type of violation. Penalties consist of a range of financial fines which increase according to the size of violation; imprisonment which varies depending on the seriousness of the violation and a combination of both fines and imprisonment which varies also with the type and number of repetition of the violation.

4.4.1.1.1.2 Second: Ministry of Agriculture

The Ministry of Agriculture was established in 1929. The agriculture law was subject to several

amendments, the most recent being in 2002 (The Ministry of Agriculture).

According to article 3 of Law no 44 for 2002, the Ministry of Agriculture (MoA), is responsible for organizing and monitoring the agricultural sector in order to maintain sustainable use of Jordan's agricultural resources, while preventing any harmful consequences to the environment. The MoA is also charged with safeguarding the health of humans and animals from possible threats such as the use of additives, contaminants, toxic chemicals or bio-organisms that cause diseases. Further, the MoA is responsible for all plant life, quality of soil and water, combating animal and plant pests and diseases, immunizing animals against epidemic diseases and carrying out laboratory analyses and field tests related to agricultural production. The MoA is also charged with conserving bio-diversity, regulating and monitoring the hunting of wild birds and animals, protecting endangered species and controlling littering caused by agricultural activities. This includes safe disposal of plastic materials and empty containers of seeds and insecticides. Additionally, the MoA is responsible for verifying compliance of agricultural inputs and outputs with the technical rules issued by the Ministry.

Several articles of the law regulate the use of agricultural lands, forest lands, and pastures. The law specifies measures to protect aquatic creatures, marine life and environment, livestock, poultry, manufactured feed, veterinary medicines, bio-products, pesticides, fertilizers, growth regulators, production inputs, slaughterhouses, quarantine and venues. The law empowers the (MoA) to undertake any necessary measures in cases of detected violations of the rules and regulations; and to subject the violator to the type of punishment specified in the law. Pertinent articles include: 13/2; 14/3; 15/4,5; 16/2; 17/3; 18/6; 19/2; 20/6; 21/6; 23/2; 24/2; 27/2/d; 31; 32/b1,b2,b3,b4,5,6; 33/b; 34/7/b; 35/d; 39/b1,2,3,4,5,6; 43/b, c; 44/f,1,2,3,4; 45/f; 47/b; 49/3;50/4; 51/6,7;52/c,1,2; 53/c1,2,3; 54/b1,2; 55/c,1,2,3,4; 56/c; 57/d-h; 68.

When violations of the law occur, penalties start with issuing a warning, then fines for moderate violations, then confiscation of property, revoking of licenses, fines and imprisonment for serious or repeated violations.

4.4.1.1.1.3 Third: Ministry of Environment

Although many issues of environmental concern were taken care of by the laws and regulations of agencies named above, Jordan environmental policy has been formally adopted through the Environment Protection Law no. (1) in 2003 and creating the Ministry of Environment (MoE) (Ministry of Environment.). The Law was enacted to provide an appropriate basis for environmental policy and for the development of other regulations and initiatives. It manifests the government's commitment to environmental protection and stipulates instruments to achieve sustainable development. The jurisdiction of the ministry covers all the environment components, aiming at achieving and promoting such goals. The ministry has a dual role: pollution control and pollution prevention for Jordan's water, air and soil. Furthermore, MoE is the competent authority responsible for coordinating and cooperating at the national, regional and international levels with regard to environmental issues.

The Environment law defines the following tasks for the ministry (Ministry of Environment, 2014):

- Developing public policy for the protection of the environment and preparing plans, programs and projects necessary to achieve sustainable development.
- Preparing specifications and standards for environmental elements and components.
- Monitoring and measuring environmental impacts on natural resources elements and components through scientific centres according to adopted criteria.
- Issuing necessary environmental instructions to protect the environment and regulating the establishment of agricultural, development, commercial, industrial, housing and mining projects and other services to comply with preconditions for licensing or renewal of licences.
- Monitoring and supervising public and private institutions and entities, including companies and projects to ensure compliance with environmental standard specifications and technical regulations.
- Establishing the foundations for the regulation of harmful substances and hazardous substances and for regulations for collecting, classifying, storing, transporting, destroying and disposing of hazardous substances.
- Authorizing the establishment of nature reserves and national parks, and managing, monitoring and supervising the parks.

The MoEn has adopted the following initiatives to achieve the above mentioned tasks: waste and chemicals management program, transformation towards Green Economy, Environmental regulations, monitoring and protection of environment elements programs, pollution prevention, climate change program, management of natural resources and land use program, protecting Ecosystems, and environmental awareness program (Ministry of Environment, 2014).

Articles 6 to 12 of the law specify the penalties for each type of violation of the conditions, standards, criteria, and restrictions specified by the law. These penalties include fines and/or imprisonment and termination of the license of the violating establishment.

Notably, the law does not rely on price-based measures. All the regulations which emerged from the Environment Law follow the same policy of command and control and the same set of penalties which aims

at preventing or removing the violation and addressing any damages incurred to the environment as a consequence of the violation.

Article 13 of the environment law and by-law number 37/2005 requires all types of investment in all sectors to prepare and submit an assessment of the environmental impact of its activities and operations to the (MoE) as a pre-requisite for licensing. The minister has the authority to order any licensed establishment to present an assessment study of the environmental impact of its activities.

(MoE) further issued a directive in 2012 prescribing zoning conditions that all new establishments should abide by in order to be licensed. The requirements differ according to the sector and the extent of the expected damage to the environment.

The following tables present a sample of the efforts by the responsible ministries to monitor and deter adverse effects on the environment and the outcome of those efforts.

Table 1. Number and percentage of approved applications for new investment projects

Year	Total number of applications	approved	rejected	% of approved
2010	955	681	274	71
2011	1090	819	271	75
2012	1396	1108	297	79
2013	1461	1135	326	77
2014	1675	1224	451	73

Source: Ministry of Environment

Table 1 shows that almost 30% of proposed projects in industrial, agriculture, and services sectors were rejected by the MoE for environmental considerations. The environment law requires new investment projects to acquire approval for the intended location as a preventive measure, prior to obtaining the license. The data in the table shows high percentage of approved projects which suggest a lenient implementation of the directive. The following tables reveal an increase in pollution rates which support such suspicion.

Table 2. Percentage of pollution from several sources as registered during 2011-2013

Year	Noise			Lights			Total dust		
	% normal	% above normal	% below normal	% normal	% above normal	% below normal	% normal	% above normal	% below normal
2011	50	32	18	78	0	22	48	0	52
2012	47	0	53	65	0	35			
2013	55	45	0	95	0	5			

Source: Ministry of Health

Table 2 shows the results of monitoring activities by the MoH in three years. Noise pollution witnessed an increase above the normal level, also, lights pollution below normal range declined too. Dust monitoring was terminated by the MoH because it has become the responsibility of MoE. But no data about this source is available until now by the MoE.

Table 3. Annual number of visits and inspection by the ministry of Health

Activity	2009	2010	2011	2012	2013	Trend
Regular lab analysis of water samples	6244	3663	2660	2811	2212	declining
Comprehensive lab analysis of water samples	13	10	2	2	4	Declining &insignificant
Specialized lab analysis of water samples	708	558	477	463	432	declining
Bacterial Lab analysis of Water samples	1355	1940	3085	2832	2927	increasing
Chemical lab analysis of waste water samples	1544	1781	1748	1863	1866	increasing
Chemical lab analysis of mineral water samples	-	148	176	257	-	terminated
Chemical lab analysis of water samples	8798	5326	3895			terminated
Measurement of Air pollution	85	31	-	-	-	terminated

Table 3. Annual number of visits and inspection by the ministry of Health (continued)

Activity	2009	2010	2011	2012	2013	Trend
Inspection & samples analysis from chemical factories	87	131	102	128	88	limited
Review of imported chemicals documents	7481	9031	9436	10569	10890	increasing
Review of imported mineral water documents	442	389	276	203	257	declining
Multi purposes visits and inspection	1489	2455	2934	357	952	declining
Inspection of dumping areas	2	3	2	-	2	Few and insignificant
Inspection of waste water treatment plants	64	63	42	49	53	declining
Inspection of solid waste dumping areas	10	29	40	5	-	terminated
Inspection of Chicken Farms and Slaughter houses	2	10	-	2	3	limited
Inspection of Ice factories	22	12	16	20	20	Few and insignificant
Inspection of Water laboratories	28	24	23	27	40	Few and insignificant
Measurement of noise	3	27	29	6	4	limited

Source: Annual report 2014, Ministry of Health

Table 3 reveals that inspection procedures for many activities were terminated because it has become the responsibility of the MoE. At the same time, the number of inspections of other activities was decreasing due to budget constraints except the review of imported chemicals was increasing for security motives especially in recent years.

Table 4. Number of inspection visits to factories by the Ministry of Health

Activity	2009	2010	2011	2012	2013	Trend
Primary inspection visits	53	110	900	929	1723	Increasing
Follow up inspection visits	468	508	1386	6332	7537	Increasing
Multi- party inspection visits	115	114	794	1868	2554	Increasing
Inspection and taking samples	93	39	337	221	182	Increasing

Source: Annual report 2014, Ministry of Health

Table 4 demonstrates an increasing trend in the number of inspections of factories, which might be interpreted as a sign of increasing interest in protecting the environment and/or as a reaction to an increase in threats to the environment, and/or owing to annual growth in number of factories.

Table 5. Annual allocation of resources for the Forest Department

Years	Annual budget in US $	No of vehicles	No. Forest Inspector patrol
2009	7.7	40	40
2010	9.8	38	38
2011	10.1	35	35
2012	11.9	40	40
2013	11.5	42	42

Source: Forest Department/ Ministry of Agriculture

Table 5 shows that available resources to the department were almost constant despite the growth in responsibilities, especially the threats because forests have become increasingly an alternative source of energy for heating and cooking which can be attributed to increases in oil prices.The apparent increase in funds represent annual natural growth in salaries.

Table 6. Number of inspection and deterrence methods performed by Environment Police Patrol Department: 2012-2014

Type of activity	2012	2013	2014	Trend
Inspection	346	257	300	constant
Sending notice (Warning)	146	41	29	decreasing
Closing	49	11	15	decreasing

Source: Environment Police Department

Table 6 demonstrates annual cases of inspection and enforcement during 2012-2014. It is clear that in general, the effort is declining under the pressure of financial constraints.

Table 7. Number of detected cases of cutting and transporting trees from the forests

Years	2012	2013	2014	Trend
No. of cases	138	136	142	Constant

Source: Environment Police Department

Table 7 Presents data on monitoring efforts by the environment police department. The figures reflects constant results despite the recognized increase in threats to the forests in Jordan. This data indicates that the government is not pursuing illegal loggers more aggressively to avoid confrontation with the local populations, whom are largely dissatisfied with fuel prices set by the government (Dama, 2012); (Gerasa News, 2015).

Table 8. Number of cases of unlawful logging of trees seen by courts and percentage of sentences

Years	No. of violations seen by the courts	No. of verdicts of imprisonment and/or financial penalties	%	Trend
2009	819	730	89	Almost constant
2010	480	344	72	
2011	842	702	83	
2012	1040	890	85	
2013	1049	860	82	

Source: Forest Department/ Ministry of Agriculture

Table 8 Presents data on the deterrence activities by the Forest Department in the MoAg. The data shows that more than 80% of cases presented to courts by the Department received guilty verdicts, and sentences of either financial or imprisonment penalties. It should be noted that only very well documented cases can be sent to courts otherwise, the case can be dismissed. In addition, a high percentage of detected cases are usually settled through the illegal exertion of influence (corruption), or substituted by warnings. The severity of verdicts is unknown to the Forest Department because once the case is sent to the court it becomes within the courts' jurisdiction. Paid financial penalties must be transmitted to the Ministry of Finance directly without any notice to the Department of Forests at least for follow up.

Table 9. Number of detected and confiscated vehicles loaded with untreated organic fertilizers

Year	2010	2011	2012	2013	2014	Trend
Number of vehicles	186	271	376	221	145	decreasing
Quantity in tons	836	1670	2767	2306	1182	increasing

Source: Environment Police Department

Table 9 shows an almost 50% decline in number of detected vehicles loaded with untreated animal source fertilizers. The data indicates some sort of relaxation by the government side which may be attributable to internal security considerations, an ever increasing budget deficit in addition to corruption.

Table 10. Number of visits, detected violations, and penalties performed in Madaba Governorate in 2014

Years	No. of routine visits	No. of surprised visits	No. of first time violations	No. of repeated violations	No. of closing	No. of financial penalties
2010	4628	125	184	15	9	75
2011	4717	177	86	35	5	64
2012	5369	225	193	47	35	82
2013	6085	221	189	28	19	76
2014	8566	255	272	45	30	110

Source: Health Department in Madaba Governorate

Table 10 reveals that number of violations was increasing during the last five years despite the active role of the department. The table shows also that the burden on the department was increasing annually which require allocating more and more resources. If the annual number of routine visits is divided by 12 months, the number of visits per month were between 300 and 500. Therefore, the average number of visits to each firm does not exceed once every one to two months. There is no available data on number of imprisonments. The figures given in the table show that the command and control approach is costly.

Table 11. Estimations of CO_2 emissions of the energy sector: Air Compliance Results Summary:2000-2010

Year	1000(ton) $C0_2$	Trend
2001	15.03	
2002	15.755	
2003	16.671	
2004	18.6	
2005	20.293	
2006	20.26	
2007	20691	
2008	19.83	
2009	20.806	
2010	20.381	Emissions of year 2010/emissions of year 2001: 20.38/15.03 = 1.39

Source: Jordan's third national communication on climate change submitted to the United Nations framework convention, 2014

Table 11 shows upward trend of CO_2 emissions from the energy sector. Emissions increased by 39% in five years. The data reflects weak compliance to air quality standards regulations.

Table 12. Overall GHG emission for Jordan (Gg)

Years	PE	IP	WASTE	LULUCF	Agriculture	Net for all sectors	Change from year to year
2007	19998	1984	3190	868	1314	27354	100%
2008	19478	2124	2889	869	1325	26685	-2.5%
2009	20119	1804	2952	854	1338	27068	+14%
2010	19990	1365	3017	853	1352	26577	- 2%
2011	21181	1808	3089	851	1365	28294	+6%
2012	24272	1671	3162	1213	1386	31703	+20%
2013	26424	1858	3237	1209	1407	34138	+7%
2014	25961	1943	3296	1204	1428	33832	-1%
							+ 24%

Source: From Table A.23 Jordan's third national communication on climate change 2014

Table 12 shows that net greenhouse gases (GHG) emissions were increasing during the period (with marginal fluctuations). The net change was 24% at the end of the period in comparison with base year 2007. The data reveals ineffective deterrence and weak compliance by sources of emissions.

Table 13. GHG emissions of the baseline scenario for the waste sector

Years	CH_4 emissions from domestic Landfills	N_2O	(Gg CO_2eq)
2010	2876	141	3017
2015	3140	161	3301

Source: From Table 3.2. Jordan's third national communication on climate change 2014

Table 13 demonstrates an increase by 9% in CH_4 emissions from domestic Landfills, 14% in N2O emissions, and 9% in (Gg CO2eq) during the years 2010-2015. The data demonstrates ineffective impact of regulations on compliance.

Table 14. GHG emission for the industrial processes

Years	N_2O	Trend	CO_2	Trend	CO_2eq (Gg)	Trend
2010	0.49		1214		1365	
2015	0.59	+20%	1816	+50%	1998	+ 46%

Source: from table 3.3 Jordan's third national communication on climate change 2014

The data in table 14 show a 20%, 49.5%, and 46% increase in N_2O, CO_2, CO_2eq emissions in five years. The table illustrate also that industrial sector is the third contributor to GHG emissions in Jordan. The main contributors to the industrial process emissions are the cement industry, lime, limestone, soda ash and nitric acid manufacturing industries. Data in the table constitutes further evidence of the ineffectiveness of the MoE in changing the behaviour of firms producing different types of air pollution.

4.4.1.2 Primary data

The following descriptive statistics from the survey data are used in the analysis to examine the effectiveness of command and control method adopted by the Ministries of Health, Agriculture and Environment based on the opinion of the respondents who were the key officials in the three ministries:

Table 15 presents the mean and standard deviation of the answers submitted by the sample of respondents on the questionnaires, which represents the respondents' opinion on the effectiveness of preventive methods such as: banning, licensing, and monitoring adopted by their ministries according to the laws and regulations. It is shown in the table that except for three questions where the mean is considered low, the rest are moderate. In fact, they are in the lower part of the moderate category which result in a general mean equal to 2.57. The values of the mean indicate that preventive methods followed by the ministries were either totally ineffective or moderately effective since number 1 in the five degree scale relates to strongly disagree, while 2 refers to disagree. Therefore, the general mean falls in the "disagree" region of the scale. Moreover, when the value of the mean is below 3, which refers to the neutral category, it falls in the rejection area of the effectiveness.

Table 16 presents the mean and standard deviation of the answers for the effectiveness of the enforcement methods. The data in the table shows that the means for questions 17 and 18 were low indicating disagreement of the respondents in the sample with the effectiveness of notices and warnings method in reducing negative externalities. Although, the mean values for questions 19-27 were moderate, the conclusion is not different. The results suggest that the respondents disagree that the adopted enforcement methods including fines, imprisonment, closing of the firm, and imprisonment plus fines, have the expected impact on compliance and reducing negative externalities. However, the mean values for questions 28-32 were high. The interpretation is straight forward. Respondents agree strongly that the government is not highly committed to implement the laws protecting the environment and reducing negative externalities effectively because the penalties are lenient and not consistently implemented.

Table 17 reveals that the according to respondents answers to the questionnaire, the three government ministries did not fulfil the task of protecting the environment. They have no adequate training programs, equipment, and monitoring system which are vital requirements for the ministries to be effective in achieving the policy goals of reducing negative externalities. Scarcity of budget allocation may suggest weak government commitment.

Table 18 shows the mean values of respondents' answers. The mean values are in the high category indicating that the respondents strongly agree that influence, corruption, and conflict between government agencies responsible for environmental protection had significantly hindered the implementation of environment policy. Therefore, according to the respondents' opinions, the enforcement was ineffective in reducing negative externalities.

Table 19 shows the mean values for answers to questions 45-47. The values are in the high range of the scale reflecting respondents' agreement that the implementation of environment policy is not of high priority on the government agenda. The government is more committed to economic policy such as creating and protecting jobs, encouragement of investment and preserving markets for Jordan products in both national and international markets. The result was limited effectiveness in reducing negative externalities.

Respondents to the questionnaire were asked to identify methods of enforcement according to the contribution of each to compliance from least effective to very effective. Rank 1 refers to least effective, while rank 5 refers to very effective. Table 20 presents the result of respondents' ranking. It is obvious that notice and warning method is on the lower step of the ladder, while imprisonment plus fines is on the top step. Closing the facility is more effective than imprisonment alone.

Table 21 presents the ranking of methods of monitoring. Respondents were asked to arrange the methods from least effective to the most effective method. Rank 1 was assigned to the least effective method, while rank 5 refers to the most effective method. Data in the table suggests that inspection by Customs Department officials at the borders, ports and airports is the most effective method, since it achieved rank 5. Surprisingly, Environment Patrols received rank 2 indicating weak effect. Irregular inspection ranked as expected. Central monitoring control systems is ranked as the least effective method because the ministries as pointed out earlier had not developed a satisfactory system in terms of equipment and trained professionals.

Table 15. Impact of banning, licensing, and monitoring methods on reducing negative externalities

Question	Content	Mean	St. Deviations	Level according to the average*
1	Regulating the location of new investment projects and enterprises protected water resources, communities, and forests from pollution and consequently reduced negative externalities.	2.12	1.082	low
2	The restriction on transporting and using untreated organic fertilizers reduced widespread growth of flies, production of polluted vegetables, and polluting underground water, and consequently reduced negative externalities.	2.52	1.094	Moderate
3	Banning and not licensing importing dangerous materials, residuals and by products of foreign industries protected the environment and reduced negative externalities.	3.24	1.259	moderate
4	The restriction on utilizing waste water for irrigation of vegetables protected human health and reduced negative externalities	2.52	1.260	moderate
5	Banning cutting, transporting and distributing trees from the forests reduced threats to forests and reduced negative externalities.	2.91	1.467	moderate
6	Banning unlicensed hunting of wild animals and wild birds succeeded in protecting them and reducing negative externalities.	2.75	1.331	moderate
7	The enactment of specification for importing and manufacturing chemical fertilizers, and banning the use of growth Harmon in agriculture, reduced damage to the soil, underground water, and human health and consequently mitigate negative externalities.	2.49	1.336	moderate
8	Banning and monitoring dumping of plastic residuals, byproduct and plastic garbage protected the soil, underground water, air, humans and domestic animals health and consequently reduced negative externalities.	2.45	1.235	moderate
9	Monitoring new construction projects increased compliance to the law banning stone dry cleaning, reduced air pollution and consequently reduced negative externalities.	2.87	1.034	moderate
10	Monitoring of water sources, farms, food production and distribution , protected the environment and reduced negative externalities	2.79	1.285	moderate
11	Environment Police patrols monitoring cross roads, reduced number of vehicles smuggling un treated organic fertilizers to vegetable farms and consequently reduced negative externalities.	2.52	1.180	moderate
12	Environment Police patrols monitoring cross roads reduced smuggling of fire woods and consequently cutting forests trees as a negative externalities.	2.22	1.009	low
13	Regular inspection of production, storing and distribution sites and collecting laboratory samples reduced negative externalities.	2.58	1.132	moderate
14	Irregular inspection of production, storing, and distribution sites and collecting laboratory samples reduced negative externalities.	2.47	1.156	moderate
15	Daily inspection of fruits and vegetable markets and collecting samples for analysis of residuals of insecticide, growth Harmon and extra fertilizing reduced negative externalities.	2.15	1.202	low

Note: *Evaluation according to the Mean. The Mean of the answers is calculated based on the following criteria: 1= strongly disagree, 2= disagree, 3= neutral, 4=agree, 5= strongly agree. 0-2.33 low, 2.34-3.66 moderate, above 3.67 high. Hence, the cutting edge between effectiveness and ineffectiveness is the value of the mean 3.

Table 16. The impact of enforcement methods on compliance and reducing negative externalities

Questions	Content	Mean	Std. deviation	Level based on the average
17	Issuing notices an warnings is an appropriate method for achieving compliance and reducing negative externalities	2.30	1.240	low
18	Issuing notices and warning make violators clean up dumped materials from road sides, and open areas, and consequently reduced negative externalities.	2.26	2.26	low
19	Issuing notices and warning to entities responsible for air pollution made them reduce emissions and consequently reduced negative externalities.	2.54	1.137	moderate
20	In most cases seen by the Governor office, violators of the environment laws were forced to remove the damage they caused and consequently reduced negative externalities.	2.59	1.134	moderate
21	Financial penalties forced violators re-export all dangerous materials they brought to the country and consequently reduced negative externalities.	2.73	1.035	moderate
22	Imprisonment sentences against violators forced them to re-export all the dangerous materials they brought in to the country.	3.06	1.139	moderate
23	Imprisonment and/or financial penalties against ships' captains safeguarded Jordan's sea water and reduced negative externalities.	2.91	1.148	moderate
24	Imprisonment and/or financial penalties s against ships' captains safeguarded sea ecosystem especially Coral and reduced negative externalities.	3.1	1.180	moderate
25	Imprisonment and/or financial penalties in addition to clean up the dumped materials sentence against violators especially in water sources reduced negative externalities.	2.91	1.169	moderate
26	Imprisonment and/or financial penalties against workshops and factories forced them to install recommended equipments to reduce pollution, safeguarded the environment and reduced negative externalities	2.71	1.124	moderate
27	Imprisonment and/or financial penalties against noise pollution sources, safeguarded the environment and reduced negative externalities.	2.74	1.090	moderate
28	Closing the firm sentence by the court in cases of repeated violation, increased compliance and reduces negative externalities.	2.77	1.093	moderate
29	Vague laws and regulations make it difficult for Judges to issue sentences against accused entities.	3.69	1.131	high
30	Enforcement procedures against violates are tend to be lenient. Violators do not feel obliged to reduce negative externalities.	3.68	.997	high
31	Financial banalities are not costly enough to forbid violations and reduce negative externalities.	3.7	.969	high
32	Imprisonments sentences are usually short and can be traded for small amount of money, therefore have no effect on reducing negative externalities.	3.75	1.067	high

Note: The range is from 1 to 5 using Likert-type scale

Table 17. The impact of capacity building and allocation of resources to the ministries on compliance and mitigation of negative externalities

Questions	Content	Mean	St. Deviation	Level based on average
34	The ministry succeeded in developing an acceptable data base for monitoring environment compliance.	2.32	.932	low
35	The ministry acquire an effective monitoring system to ensure compliance to environment regulation.	2.47	.945	low
36	The ministry has adopted a set of environment standards and compliance indicators for effective monitoring and control.	2.87	.978	moderate
37	The ministry acquired advanced monitoring equipments and instruments to enable the ministry perform effective monitoring.	2.73	.942	moderate
38	The ministry conducted series of training programs to develop and enhance the professional capacity of its personnel especially professionals in environmental departments.	2.75	1.018	moderate
39	Insufficient allocation of funds in the ministry annual budget restricted its monitoring capacity especially regular and irregular inspection which minimize the reduction in negative externalities	3.8	.891	high

Table 18. The impact of influence, corruption, and conflict on law enforcement and reducing negative externalities

Questions	Content	Mean	St. Deviation	Level/ average
41	Widespread corruption enabled environmental violators of environment regulations to avoid penalties.	3.93	.944	High
42	It is difficult to enforce penalties on compliant companies and firms owned or controlled by important persons.	4.01	.009	High
43	It is difficult to enforce penalties on monopolies owned by important persons.	4.15	.942	High
44	Contradiction between agencies responsible for environment protection, enabled violators of environment regulations to escape the proper punishment.	3.91	.916	High

Table 19. The impact of government economic policy on reducing negative externalities

Questions	Content	Mean	St. Deviation	Level based on the average
45	The government has adopted a lenient environment policy to protect the competitiveness of Jordanian products	3.72	.869	High
46	The government has adopted a lenient environment policy to protect jobs and avoid increasing unemployment rate.	3.90	.924	High
47	Government investment encouragement policy takes the priority over protecting the environment and reducing negative externalities.	3.91	.999	High

Table 20. The most appropriate and effective method of enforcement

Enforcement method	Ranks				
	1	2	3	4	5
Notice and warning	80.9	2.7	3.8	6.9	4.8
Fines	1.3	66.1	7.8	6.7	17.6
Imprisonment	4.9	14.3	37	39.4	6.2
Closing the facility	1.2	14.5	41.8	24.2	18.3
Imprisonment + fine	12.3	2.4	9.6	22.8	53.1

Note: Rank: 1= least effective, 5=most effective

Table 21. The most appropriate and effective method of monitoring

Monitoring Technique	Rank				
	1	2	3	4	5
Central monitoring control systems	38.8	22.4	12.1	23	3.7
Environment Patrols	19.4	42.4	10.9	20.6	6.7
Regular inspection	18.8	20	26.1	24.2	10.9
Irregular inspection	8.9	11.6	28	32.1	19.4
Inspection by Customs Department offices	10.5	12.1	24.4	6.1	46.9

Note: Rank: 1= least effective 5=most effective

Table 22. Motivation for insufficient budget allocation for environment purposes

Motivation	Percent	Rank
General budget deficit	33.0	1
Priority on government agenda	26.7	2
Pressure from interest groups	20.0	3
Corruption	16.7	4
Change in interests and priorities of donors	3.6	5

Respondents in the sample were asked in the questionnaire to rank the motivations, according to their experience and opinion, behind government reluctance to allocate enough resources for the ministries to perform their environment tasks. Table 22 presents the ranking from 1 which refers to the most important to 5 which is the least important. It is clear that general budget deficit stands as the most important reason. All government agencies actually face difficulties in obtaining their demands. Rank 2 indicates that change in government priorities was the second most important reason for not allocating enough funds to the environment agencies. Pressure from interest groups averse to government involvement in environmental issues ranked third. The fourth rank was given according to the respondents in the sample to corruption. Corruption has developed in Jordan gradually to become a phenomenon due to many causes, the most important among them being; the government not pursuing corrupt official aggressively to avoid political instability, particularly since the "Arab Spring" events, second, government employees' salaries are at or below poverty line. Corruption is not restricted to low level officials but it is higher among top management and even politicians. The last rank was assigned to change in interest and priorities of foreign donors. The rank tells that there is no significant change on donors' side.

4.4.1.3 Media reports

This section demonstrate a sample of reports in Al Rai Newspaper which is the largest newspaper in the country and most of its shares are owned by Social Security Foundation. They reflect public concern of environmental issues, and a call for effective government actions against violators.

1) On pages 12-15 Al- Rai News paper presented on 2015-07-08 several reports and interviews describing pollution problems in the country (Editorials, 2015). One of these reports by Nessrin Dmour, says: Pollution problems in Al Karak District require immediate action. Another report by Bassam Al Salman: pollution in Al Ramtha District has become out of control. Another report held the title: 28 entrances for untreated animal source fertilizers to Jordan Valley. These roads are behind the collapse of regulation enforcement. Other reports contain the same complaints about pollution in Aqaba Port City, Ma~an City, Mafruq City, Bany Kenana City. In an interview with the minister of environment he said: "Poor coordination, inspection, monitoring, and weak law enforcement are behind the observed deterioration in environment conditions.

2) A farm was detected in Irbid governorate using waste water for vegetables irrigation. The directorate of agriculture in the governorate took

samples for analysis. The case will be presented to the governor. Potential penalties were destroying the vegetables, and cleaning/remedying the soil at the expense of the farmer (Al Raiy News paper, 2015).

3) Pollution of drinking water in the North: the sources of pollution were Olive oil refineries. Directors of Health, Agriculture, Environment, and Water Departments issued another notice to the owner who had repeatedly violated regulations by polluting water springs in the governorate, which are the main sources of drinking water (Al Raiy News Paper, 2015).

4) The cost of smoking cigarettes is increasing. The percentage of second hand smokers also increased from 53.6% to 62.4% in public places. In an interview, the respondents said that the regulations are not working, selling cigarettes to teenagers continues. The behaviour of some doctors and nurses who smoke in front of teenagers reduces their credibility and raise question regarding all the slogans on smoking related diseases (Mouhamad, 2015).

5) A committee consisting of representatives of the municipality of Al Hashemia, Departments of Health, Agriculture, and Environment, civil societies in Zarka Governorates, presented a report detailing the extent of pollution in Al Hashemia area. The report contains pictures of polluted surface water and open areas. The report indicates that the problem is persistent and devastating despite all the demands from the local population. However the government had not taken any action. According to the report, the sources of pollution were: the Jordan petroleum refinery, Al Hussain electricity generators, and Al Kherba Al Samra wastewater treatment plant, in addition to twenty two medium and small factories with a variety of products such as plastic, detergents, dairy, textiles, paper mills and refrigerators. Some of these factories were not licensed. Some did not have in-house water treatment facilities. Instead, such factories dumped different forms of polluted materials into the areas' ecosystem. Annual emissions from the refinery exceeded 33 metric tons of CO_2 and NO_2. In addition to wastewater from industrial processes, the residential area for the refinery employees also contributed to the pollution (Al Dostour News paper, 2014).

6) Al Hussain Electricity Plant generators contribute about 96 tons of C_O2 daily in addition to other gases. In addition, the station emits highly polluted wastewater which affect the ground water in the area.

7) Al Kherba Al Samra wastewater treatment plant: the plant was considered one of the four largest in the world using natural filtration technology. However, the quantity of wastewater that reaches the plant was more than double its capacity. Therefore, the released treated water to King Talal dam was useless because of high concentration of chemicals and heavy metals. Many farmers abandoned their lands because the water contaminated the soil in few years.

8) Under the title of *"Al Zarka water stream: history of pollution, without any serious solution"* published in: (ZadAlOrdon, 2015) the reporter interviewed two former ministers of water and irrigation in Jordan, Dr. Munther Haddadin and Dr. Hazem Al Naser. Both former officials explained in detail the deteriorated situation in the surrounding area of the stream. They admitted that factories around the stream dumped their wastes in the water and on land without any consideration. The pollution reaches King Talal Dam which is the destination of the stream. The quality of water in the dam caused irreversible damages to the citrus and vegetable farms in Jordan who have no alternative source of water. This situation poses a serious health concern. No solution in the near future is available. Furthermore, the former officials explained that all sources of fresh water in the region, including springs and surface water, which had previously attracted large numbers of tourists, had largely disappeared

9) Detection of high concentration of growth hormone in watermelon in the local market (Al Rai, 2015).

10) 150 detected cases of deforestation in Ajloun Governorate in four months. No response from the government to calls and recommendations for the enforcement of a stricter conservation policy according to activists (Al Rai, 2015).

11) Director of Food and Medicine Department states in an interview with Al Rai daily newspaper: influential lobbies mount pressures to be lenient in implementing standards (Al Rai, 2014) .

12) Plastic mills are the major source of Pollution, and diseases in Jerash Governorate (Al Rai, 2014).

5 Study results and conclusion

The goal of this study is to measure the effectiveness of command and control approach which has been adopted by the government of Jordan in attaining the environment policy goals; namely, controlling and reducing negative externalities. The study focused on evaluating the outcome of deterrence, monitoring, and enforcement measures of command and control approach. Quantitative changes in environment indicators in addition to descriptive statistics of the opinions of a sample of top management officials working on environmental issues in three ministries who responded to the questioner were presented to reflect the outcome of the activities of three ministries.

5.1 Major findings include

(a) Poor general deterrence effect. Table 1 shows that almost 75% of new investment projects were approved. This implies that their locations are far from water sources, communities, and forests. However this

contradicts both the survey results and the actual situation where most of the investment projects of all sorts, are either within communities or on their borders with few exceptions especially major industrial areas.

(b) Monitoring effects: monitoring generated low to moderate general impact. Table 3 demonstrates deterioration in monitoring activities. The performance of both regular and irregular inspection declined sharply or terminated completely. The frequency of inspections of major sources of pollution were few and symbolic. Table 6 reports a constant or declining number of inspections and facility shuttering by the environment patrols. The justification by the Department was a shortage in resources and avoiding conflict with violators. Mean values of the opinions of sample of respondents representing top management officials in the 3 ministries presented in Table 15 reinforce the above findings. According to their answers, they disagree that monitoring activities of the ministries were effective and achieved the goals of the environment policy of mitigating negative externalities.

B. Enforcement: data from the ministries reports and from the survey exhibit a low to moderate effect of enforcement instruments. For example, table 2 shows that pollution from noise increases 45% during the last 3 years. Table 9 shows that confiscated vehicles loaded with untreated animal source fertilizers decreased while the use of its use is increasing and also its negative externalities. Table 7 also depict a decline in number of confiscated trucks loaded with trees taken illegally from the forests in spite of the reports in the media on the alarming increase in cutting trees following series raises in energy prices. Tables 11 to 14 show that CO_2, GHG, N2O increased substantially. CO2 for instance increased by 39%, GHG increased by 24%, N2O and other gases increased by 50%. The result is more air pollution and more negative externalities. Table 16 which reflects the opinions of the respondent sample covered by the survey, demonstrates that enforcement agencies were unsuccessful in protecting the environment and reducing negative externalities. The reasons are vagueness of articles language, absoluteness of criminal and procedural laws which make indictment extremely difficult and enable violators to escape serious punishment. Penalties are not costly to violators because terms of imprisonment are in most cases can be replaced with a relatively small fine. Articles usually set upper and lower limits of punishment; judges under various sources of pressure opt to impose the lower limit. Such outcomes consequently discourages environment officials because they realize that their efforts led to no serious consequences to the violators. A significant downward trend in the number of referrals to the Department of Justice for civil environmental cases because environmental criminal prosecutions, sentences, and fines experienced significant decline. Another justification for ineffectiveness, is the influence of firms' managers or owners who can override any serious threat or pressure to comply. Both scenarios, the influence effect and legal system limitation encourage the spread of corruption which become another cause of ineffectiveness of environmental policy.

c. The justifications for the shortcomings according to the respondents were: shortage in personnel, equipment training and inappropriate control systems, databases and data analysis. In their opinion, insufficient resources has led to inverse effect on environmental enforcement and conformity to the regulations.

d. Since the economic entities main goal is to maximize their profit, they have no incentive to comply and stop pollution if they experienced no or rare inspections or enforcement actions for any reason. The following remarks by the minister of environment support the findings of this study in a very strong manner. The minister outlined the major challenges facing the Ministry of Environment (Ministry of Environment, 2014) .

-Weak regulations and standards govern pollution, and apparent failure of the environmental agencies in monitoring levels of pollution.

-Lack of public awareness of environment issues and the necessity for dealing with the threats to the environment.

-Overlap of roles and responsibilities between several environmental agencies at the same time low level of coordination among policy-makers.

-The difficulty of implementing current regulations and the slow law enforcement process.

-Management and treatment of waste from disposal and discharge and or reuse is inefficient.

-High and increasing levels of pollution especially emissions from industry and transport sources.

-Adopted environmental policies are ineffective in dealing with environmental threats in addition to poor financing and capacities, incapable human resources due to hiring policy in the public sector.

-Increasing desertification because of urban expansion, at the expense of agricultural land.

Admitting these shortcoming by the minister does not implicate immediate changes in the approach in principle. In other words the command in control is still the official method by the three ministries responsible for environment policy. In fact these remarks do not represent an evaluation of the approach but the causes of ineffectiveness from his point of view and his experience. It is our interpretation, that these comments prove that command and control is costly, it needs capital resources, human resources, commitment, vigilance, hard core government organizations.

5.2 Conclusions

The empirical evidence obtained from this study suggests that the performance of the three ministries in the essential activities: deterrence, monitoring, and enforcement was below the sufficient level required to achieve significant reduction in negative externalities. The implementation of the government's environmental policy turned out to be ineffective based on secondary data obtained from government reports, survey data, and reports in the media. Further, monitoring and enforcement activities conducted by the three ministries did not generate sufficient level of reductions in pollution indicators; at least since the foundation of the Ministry of Environment. This shortcoming is reflected by the Ministry of Environment reports, although environmental laws and regulations in general were enacted many years earlier as part of the laws of Ministries of Health and Agriculture.

There reasons for observed failure can be summarised as:

- First, Lack of appropriate funding to environment protection activities; namely monitoring and deterrence despite the generous donations from foreign governments and NGOs, in addition to international organizations.
- Second, large industries and monopolies owned or managed by influential persons or groups do not comply or only partially comply with regulations.
- Third, poor organizational capacity in the three ministries.
- Fourth, poor morale and incentive among government employees to perform their duties. This could be attributed to the fact that their financial compensation is relatively low in comparison with their counterparts in the private sector and to minimum standards of living.
- Fifth, a sense of futility of expended effort among the employees based on their experience with the performance of law enforcement bodies represented by the governors and courts. This feeling encourages them to turn a blind eye to the violations to avoid trouble or in exchange for bribes.
- Sixth, environmental issues are not a top priority of the government which is preoccupied with security issues and dealing with the unprecedented influx of refugees.
- Sixth, the political atmosphere in Jordan and the region, the tribal form of governance, weakness of democratic institutions contribute to the failure of the agencies to perform better.

5.3 Recommendations

1- The study reveals that poor delineation of each of the three concerned ministries' duties and scope of responsibility has hindered the implementation of environmental policy. The laws of Ministries of Health, Agriculture and Environment should be reviewed considerably to omit overlap in responsibilities and duplication in effort. Most environmental protection duties should be solely allocated within the jurisdiction of the Ministry of Environment. Very specialized tasks that the MoE lacks the capabilities to perform, or naturally belong to other ministry should be assigned to that ministry alone.

2- It is important for Jordan to have a comprehensive legal framework in place. The current legal system does not meet this requirement. Both, foreign as well as Jordanian investors have serious conservations toward the judicial institutions. Therefore, they either avoid investment in Jordan, or invest under conditions that differences should be settled according to the foreign laws and courts. Both criminal and procedural laws require revision and modernization in the light of past experience and the experience of developed countries to remove all pitfalls and clarifying vague articles as possible.

3- Prescribed financial penalties and fines have become obsolete and insignificant because of inflation. At the same time, the authority of judges to choose the minimum of the range of imprisonment sentence should be controlled and the trade-off between imprisonment and fines should be accepted only in exchange for very high compensation. Firms and individuals who commit serious and repeated violations and harm the environment should expect formidable punishment in order to achieve the required compliance level.

4- Effective monitoring and enforcement is costly. At the same time, disregarding the environment is more costly in both short and long run. Enough resource allocation and appropriate capacity building for environment protection agencies is a necessity for sustainable development.

5- The experience of developed countries has proven that the command and control approach is insufficient as a sole tool for environmental policy. The time has come for reconsidering price-based and rights-based measures in Jordan. This report provides practical policy review concerning the effectiveness and efficiency of alternative environmental policy instruments for greater environmental improvements.

6- Corruption should be confronted firmly by the government. At the same time the impact of unlawfully exerted influence on court proceedings and decisions as well as on administrative agencies should be controlled. Inequality in dealing with violators should be omitted.

7- These findings provide important preliminary evidence about the merits of environmental protection policy in achieving its pronounced goals. By highlighting the impact of monitoring and enforcement on measured environmental outcomes, this study will aid both policy makers in Jordan as well as the various donor agencies which have been providing assistance to Jordan to mitigate negative externalities for several years.

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