

## Improving Jordan's Law towards Sustainable Solid and Hazardous Waste Management: Lessons from USA's Environmental Laws

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**Abstract: Problem statement:** Improper handling of solid and hazardous waste will impact the living standards of a community in normal days and when disasters occur such misuse could disperse response and recovery activities due to natural or man-made disasters. **Approach:** This study discussed the Jordanian solid and hazardous waste management policies in light of USA equivalent ones with the intention to improve solid and hazardous waste management policies in Jordan. **Results:** It was found that establishing a council on environmental quality, special environmental court, a trust fund are the most actions which could improve the solid and hazardous waste management policies in Jordan. Moreover, introducing environmental taxation incentives, intensifying violation penalties, increasing public environmental awareness are strong motives which could improve the environmental conditions in Jordan. **Conclusion/Recommendations:** It is important to develop the Jordanian environmental laws in light of worldwide interest with improving environmental conditions for human being.

**Key words:** Jordan environmental law, SWM, developing environmental laws

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### INTRODUCTION

There are enormous studies that deal with solid and hazardous waste management issues in literature due to the importance of taking the integrated solid and hazardous waste management as a tool to protect the natural resources from depletion and maintain sustainable development, to protect from unintended by-product of human activities and their side-effects. In some societies, solid and hazardous waste is no longer considered unwanted product of our daily life activities such as: lifestyles, industries, tourism, agricultural activities. But it is considered a raw material in wrong place which could be of essential need for other activities whether for the same generators or others within the solid and hazardous waste generated communities or outside of such communities. If we consider a university, for example, the study waste which resulted from a student class could be used for other classes or if not possible could be collected within the university campus to be recycled. If no one is interested to recycle study within the university campus a broker could be brought in to collect the unwanted study for study recycling industry. Therefore, we see how the study waste could be a fortune for generator, broker, or study industry.

The immense interest in economics of solid and hazardous waste is appeared from emerging several industries which the raw material for its product depend mainly on generated solid and hazardous waste such as

recycled study industry, soil conditioner industry and bio-gas industry. In addition, this attracts researchers to explore different factors that contribute to sustainable solid waste investment such as: Goddard (1995); Kinnaman (2009) and Lombrano (2009).

There are different roles that community could take in order to maintain sustainable solid and hazardous waste management regardless of economical incentive which is, in most times, benefiting industry shareholders more than public. Recycled study industry benefited from using recycled study as raw materials for their industry since they are able to save extra expenses on water, energy and raw material sources and with advances in technologies such as using water-based ink, the quality of recycled study products are comparable to others which are manufactured from raw materials. On the other hand, the author feels that public did not share the advantages of participating in recycling programs such as lower study prices or better study quality which, in some cases, prevent them from participating in study recycling campaigns, even the environment is benefited from their participation. For instance, if university students were told that the prices of their books will be reduced if they bring their old ones by replacing such ones, most of them will participate in giving back their old books with the intention to reduce the cost. This of course if the financial incentive is a good one, other incentive will be through explaining the adverse consequences from consuming such study is one of the factor which could

escalate the global warming issue could motivate students to participate in such recycling campaign.

In a study to promote a community-based solid waste management initiative in local government within Thailand, Mongkolnchaiarunya (2005) investigated the factors which contribute to successful "Garbage for Eggs" recycling program. In this program, residents were encouraged to bring recycled material to exchange for eggs at monthly exchanges in local communities. Kaseva and Mbuligwe (2005) found that as a result of privatization of solid waste collection activities in Dares Salam, solid waste collection has improved from 10% in 1994-40% of the total waste generated in the city daily in 2001.

As we noted earlier, there are different factors that contribute to successful solid and hazardous waste management such as economic incentives, public involvement and stakeholders' awareness. Some of these factors need to be regulated through different governmental policies so they could be implemented effectively and efficiently given that some of the waste management practices could affect people and institutions outside the area where such practices are implemented. For example, using organic waste as source of plant nutrition will divert this part from waste-to-energy plants main stream which will affect the productivity of these plants. Therefore, one party is benefited while others could bear losses. Gupta *et al.* (1998) found that India needs better policy and guidelines to enable the municipal corporations to run the waste services efficiently in his study entitled "Solid waste management in India: option and opportunities".

In this study we will present the existing Jordanian environmental law and the policies which are related to solid and hazardous waste management and compare them with US equivalent ones with the intention to provide suggestions to improve solid and hazardous waste management policies in Jordan.

## **MATERIALS AND METHODS**

### **Solid and hazardous waste management policy in Jordan (Jordanian Ministry of Environment, 2009):**

There were different policies and regulations which deal with environmental issues in Jordan. Each ministry has its own policy to protect the environment. For example, Ministry of Agriculture has a law that prevent investment in agricultural lands, Aqaba Special Zone Authority has its own policy to protect the marine live. Not until 1995, when the government of Jordan enacted the first comprehensive environmental law No. 12, according to which the General Corporation for Environmental Protection was established as a

government body to take care of environmental matters in Jordan. This law does not explicitly address solid and hazardous waste management but it focuses on hazardous wastes management. Recently, the government of Jordan Passed the Environmental Protection Law (JEPL) No. 1 of 2003. According to this law the first ministry of environment in Jordan of its kind was established. This ministry is responsible for environmental matters and hold responsible in front of parliament for application of this environmental law.

This law contains 25 articles that handle environmental issues in Jordan. Article No 23rd from this law give council of ministers the authority to issue the necessary regulations for solid and hazardous waste management.

The management of solid and hazardous regulations No. 27 of 2005 which is issued by virtue of sub-paragraph 8 of article 23 of the previously mentioned JEPL No. 1 of 2003. The main issues in the solid waste regulations No. 27 of 2005 are:

- The ministry of environment has the following duties and tasks in cooperation with other concerned parties:
  - Preparation of plans related to solid and hazardous waste management
  - Specify the suitable equipment used in solid and hazardous waste management and methods of collection, transport, separation, storage, recycle, treatment and disposal
  - Specify methods of rehabilitation of closed landfills
  - Preparation of studies and data collection and analysis in solid and hazardous waste management
  - Carry out city/countryside street cleaning campaign
  - Carry out training programs and public awareness in the field of solid and hazardous waste management
- Any party responsible for solid and hazardous waste management should:
  - Provide proper personnel for solid and hazardous waste management
  - Provide equipment, containers and necessary tools of solid and hazardous waste management
  - Monitor the process of collection and specify the routes followed
  - Provide proper sitting of containers and maintenance and replacement
  - Take the necessary actions to prevent dumping of hazardous waste in containers and vehicles

- Record keeping of quantities, sources, treatment and equipment used in this field
- Close monitor of works: Digging, land filling, waste separation and activities of waste separation contractors according to contracts
- Prohibit open burning and random disposal of solid and hazardous waste
- The ministry of environment has the duty of new landfill sitting in cooperation with concerned parties
- The minister releases, according to secretary general recommendation, the regulations needed to implement the bylaws

**Solid and hazardous waste management policy in United States of America (USA) (US Environmental Protection Agency, 2009):** The industrial revolution in United States of America (USA) caused environmental degradation for natural resources. This deterioration had reached high level in USA in 1960s. With the increase of environmental awareness among people and institutions National Environmental Policy Act (NEPA) of 1969 was enacted following to this law the US Environmental Protection Agency (US EPA) was created in 1970. This law establish, for the first time, broad national framework for protecting the environment. This law basic policy is to assure that all branches of government give proper considerations to the environment prior to undertaking any major federal action that significantly affects the environment.

There are more than a dozen major statues or laws form the legal basis for the programs of the US EPA. Given that we are trying to improve solid and hazardous waste laws in Jordan we will list only the ones which are related to our research. Please note that the following summaries are derived from the US EPA. Further information can be gathered by visiting their website at [www.epa.gov](http://www.epa.gov).

**Resource Conservation and Recovery Act ( RCRA):** The Resource Conservation and Recovery Act of 1976 (RCRA) directed EPA to establish regulations that would manage the generation, transport, treatment, storage and disposal of hazardous wastes while simultaneously ensuring the protection of human health and the environment. The statute addresses the potential for contamination from the point of waste generation to the point of final disposal or destruction.

RCRA has been amended several times, most importantly by the Hazardous and Solid and hazardous Waste Amendments of 1984 (HSWA). Under HSWA, RCRA became focused on waste minimization and a national land disposal ban program. In order to

accomplish these goals, the following objectives were set forth:

- Proper hazardous waste management
- Waste minimization
- Reduction in land disposal practices
- Prohibition of open dumping
- Encouragement of state authorized RCRA programs
- Encouragement of research and development
- Encouragement of recovery, recycling and treatment alternatives

RCRA's "cradle to grave" rules require small businesses that generate hazardous waste to follow stringent requirements for storage, recordkeeping, pre-transportation and emergency response and preparedness.

Subtitle I of the HSWA amendments addressed the problem of leaking Under Storage Tank (UST) systems. Subtitle I includes requirements for tank notification interim prohibition, new tank standards, reporting and recordkeeping requirements for existing tanks, corrective action, financial responsibility, compliance monitoring and enforcement and approval of state programs. In 1986, Congress passed the Superfund Amendments Reauthorization Act (SARA) which amended Subtitle I to provide federal funds for corrective actions on petroleum releases from UST systems.

**Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund):** The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) established a federal "Superfund" to clean up uncontrolled or abandoned hazardous waste sites as well as accidents, spills and other emergency releases of pollutants and contaminants into the environment. The focus is primarily on sites that were contaminated in the past, rather than those currently being contaminated. The latter sites are regulated under RCRA. Under CERCLA, a system was established for obtaining funds from Potentially Responsible Parties (PRPs).

Under CERCLA, anyone who has had any involvement with a hazardous waste site targeted by CERCLA could be considered a PRP and could be held responsible for all or part of the cleanup expense. Site operators, as well as hazardous waste transporters and shippers, may be required later to contribute thousands of dollars for cleanup of the disposal site used. Small businesses that ship wastes off-site for proper and legal disposal may be wise to verify the legitimacy and track record of transporters and destination disposal sites used.

**The Superfund Amendments and Reauthorization Act (SARA):** The Superfund Amendments and Reauthorization Act of 1986 (SARA) amended the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) on October 17, 1986. SARA reflected EPA's experience in administering the complex superfund program during its first six years and made several important changes and additions to the program. SARA:

- Stressed the importance of permanent remedies and innovative treatment technologies in cleaning up hazardous waste sites
- Required superfund actions to consider the standards and requirements found in other state and federal environmental laws and regulations
- Provided new enforcement authorities and settlement tools
- Increased state involvement in every phase of the superfund program
- Increased the focus on human health problems posed by hazardous waste sites
- Encouraged greater citizen participation in making decisions on how sites should be cleaned up and
- Increased the size of the trust fund to \$8.5 billion

SARA also required EPA to revise the Hazard Ranking System (HRS) to ensure that it accurately assessed the relative degree of risk to human health and the environment posed by uncontrolled hazardous waste sites that may be placed on the National Priorities List (NPL).

## RESULTS AND DISCUSSION

There is more experience of environmental protection within USA government given that the US environmental law was established in 1969 while the first Jordanian environmental law enacted in 1995. In the Jordanian law the penalties were determined for each violation where it was more open in the USA one. The Jordanian law gives the minister the authority in all decisions which are related to any environmental issues. Decisions could be biased if not governed by council on environmental quality such as the one which NEPA allow to establish. The council on environmental quality of USA should assist and advice the president in the preparation of the environmental quality report, to develop and recommend to the president national policies that improve environment quality and to report to the president at least once each year. In Jordan, the minister is considered the decision makers in all environmental issues and sometime a group of environmental advocates could be consulted in issues

that pose public concerns. This practices should be formulated in pre-defined structure so it will not be misused by the decision makers. Therefore, we suggest establishing a council of environment that advice and oversee the minister decisions.

Article No. 11 of the JEPL No.1 of 2003 deals with hazardous waste materials and prohibited the burying of any dangerous waste materials into the Kingdom. The perpetrator of this act shall be punished by imprisonment for a period of not less than thirty days and not more than three months, or by a fine of not less than three hundred Jordanian dinars and not more than five thousand dinars.

We see how the US laws enacted CERCLA as separate act that deal with hazardous materials while in the Jordanian equivalent one it was handled through article within the Jordanian environmental law.

Under CERCLA, there is a trust fund which is supported by an excise tax on feedstock chemicals and petroleum to pay for cleanup activities at abandoned waste sites. There is no such trust fund established under the Jordanian environmental law. It is suggested to establish a trust fund that is supported by an excise tax on feedstock chemicals and petroleum.

Under CERCLA, violator should pay up to 50 million USD and if the government conducts cleanup for the violation, violators should pay up to three times of the cleanup cost. While in the JEPL, The violators pay the cleanup cost plus 25%. We think this part need to be increased so violators pay more for their violations. For instance, Exxon oil spill in 1989 cost Exxon Company more than 5 billions of US dollars for a spill of oil could worth less than 10 million. In other words, polluters could be in favor to pay the spill removal cost with 25% if it is less than what other contractors could ask. Also, some spills could cost billions in dollars, so 50 million USD will not be enough to prevent future ones. After Exxon oil some companies established their regional response center to help in containing marine oil spill with short notice and not allow the spill accident to overcome the local authorities' capabilities.

The JEPL did not classify the cleanup process for the hazardous material and especially for the abandoned hazardous sites or spills. While under CERCLA there are two kinds of response actions:

- Short term removals: Mean to know sources of releasing of hazardous waste and require prompt response
- Long term removals: Mean reduce dangers resulted from release of hazardous waste, but not thread life immediately

Table 1: Main applications of LCA

Drivers	Switzerland	Germany	Italy	Sweden
Product-related environmental problems	A	A	B	A
Cost-saving opportunities	A	A	A	B
Emerging green markets	A	A	B	B
Decision of the management	B	A	B	B
Perceived environmental discussions	B	A	B	B
Cost avoidance due to future liabilities	B	B	B	A
Collaborative study with ext. organizations	B	A	C	B
Meet eco label criteria B B B B	B	B	B	B
Initiatives by Research and Development	B	B	C	A
Encouragement by the parent company	C	C	A	B
New instruments for R and D	C	C	A	C
Environmental legislation	B	B	B	C

Source: Frankl and Frieder (1999)

Table 2: Measures to improve environmental situations in Jordan

Event type and date	No. of participants	Council on environmental quality	Special environmental court	Trust fund	Environmental taxation incentives	Intensifying violation penalties	Increasing public awareness
ERA, 20-25/8/2006 training	20	7	5	4	2	1	1
EIA, 9-13/7/2006 training	17	5	4	4	2	1	1
EIA, 12-16/3/2006 training	20	6	5	3	3	2	1
Talk, 27/8/2006	18	5	3	3	2	3	2
Talk, 28/3/2006	20	7	3	2	4	3	1
Total	95	30	20	16	13	9	6

SARA required EPA to revise the Hazard Ranking System (HRS) to ensure that it accurately assessed the relative degree of risk to human health and the environment posed by uncontrolled hazardous waste sites that may be placed on the National Priorities List (NPL). There is no such mentioning in the JEPL and we suggest having act or article within the law which specify how the government could deal with uncontrolled hazardous waste sites. This will make it easier to the government to set agenda for cleanup process according to the law.

Life Cycle Assessment (LCA) is a tool that could be used to improve the environmental situations. It is a comprehensive and has scientific bases in order to measure the environmental performance of product and service systems. It covers all stages of product or service production (cradle to grave) which includes, for example: Extracting raw material, preparing it for use in industry, manufacturing, distribution, use and disposal. LCA is widely used as a mandatory study in order to use the EU eco-labeling for products and services which could show consumers that they are environmentally safe one.

In a study for Frankl and Frieder (1999), as shown in Table 1, there were different motives for companies to implement LCA studies. Companies are ranked according to three possible levels of importance: high, medium and low. Each company could give several possible answers. As we could tell from the motives that meeting environmental legislations and eco label criteria were ranked in medium level.

There is enormous interest in establishing special environmental court in Jordan and in neighboring countries such as Kuwait which a number of Parliament members request establishing environmental court recently. In the First Marine Environmental Conference which took place in Aqaba in July 2002, in which the participants recommended establishing special environmental court. Such initiative took an international dimension as well. For instance, the Science Nobel Prize winner Adolf Scafell is advocating for establishing an International Environmental Court to deal with regional and global environmental problems.

The above discussion and research concerns were shared with experts and environmental group members during special training in environmental management issues and environmental meetings. These trainings include Environmental Risk Assessment (ERA) and Environmental Impact Assessment (EIA) ones. The participants are environmental specialists with different managerial levels who represent government and private sectors. Most training activities took place within Jordanian Environmental Society in Jordan in 2006. During the training, some participants were asked to suggest potential means to improve environmental situation in Jordan and we ranked the priorities of such means such as shown in Table 2. Luckily, there was common agreement which enables us to recommend applicable and efficient ones that could play vital role in shaping the future environmental conditions in Jordan.

## CONCLUSION

It is important to improve solid and hazardous waste management laws in Jordan. There are several alternatives that could be sought in light of social and environmental conditions. This improvement could facilitate quick response to deal with such waste due to natural or man-made disasters. Some of the recommendations to improve solid and hazardous waste management practices in Jordan are:

- Intensify the penalties so there will not be a repetition for violation and this penalty could be determined by special environmental court
- Establish special environmental courts equipped with trained environmental law specialists.
- Establish council on environmental quality to draw policies and advice to prime minister and hold accountable in front of parliament
- Develop an appropriate mechanism for SWM cost recovery based on the “polluter pays and user pays” principle
- Increase public awareness which could lead to actions so as to protect the environment
- Introduce new incentive for industry to improve their environmental performance such as environmental taxation which is based on Life Cycle Assessment (LCA)
- Establish separate law that deals with abandoned hazardous sites and specify the cleanup priorities and the sources of funds
- Create trust fund to clean up unidentified responsible party to minimize potential human and environmental risks. This trust fund is supported by excise tax on feedstock chemicals and petroleum

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