A study on collaborative environmental risk management : modeling to facilitate the prevention of soil contamination by local governments, businesses, and local stakeholders

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CHAPTER ONE

INTRODUCTION

1.1 PURPOSE AND REVIEW OF PREVIOUS RESEARCH

Significant political influence, capital investments, and human resources have been directed toward air, water, and soil pollution concerns over the past forty years. This has included endeavors by governments at the national and local level, business, and individuals with mixed results. On the positive side, there has been considerable improvement of air and water quality in developed countries like the United States, Germany and Japan since the establishment of environmental protection measures. Conversely, several complex issues related to soil contamination have hampered progress in this area. One area that has proved difficult to address has been cleaning up sites that pose a serious health risk in a timely manner. Identifying responsible parties, funding and technical issues are responsible for the delay of prompt remediation. Another complicated issue is the effect on soil contamination from non-point pollution sources. Non-point pollution originates from static and mobile sources that release toxic particles into the atmosphere, and stormwater runoff that contains hazardous materials such as heavy metals, pesticides, and petroleum based products. This creates widespread contamination and difficulty in identifying responsible parties along with the possibility of a remediated site to become re-contaminated. Finally, the presence of air and water pollution is easier to identify with our optic and olfactory systems; whereas, soil contamination has stealth-like properties that make it virtually impossible to detect without utilizing the proper technical equipment. There is a large volume of research dedicated to managing this end-of-pipe reactive approach; however, it is impossible to remove all the present soil contamination, so the author supports a proactive approach to impede further soil contamination. This thesis proposes an environmental risk management model that facilitates collaboration between small and mid-sized local governments, local communities and companies, to address the prevention of soil contamination.

Figure 1.1 illustrates how the release of harmful emissions through production, accidents, and non-point sources can re-contaminate a site that had completed its remediation if there is no prevention or an insufficient risk management system. The figure on top shows no decrease in contamination, but the figure below shows a considerable decrease with a local government collaborative environmental risk management system in place as proposed in this dissertation.

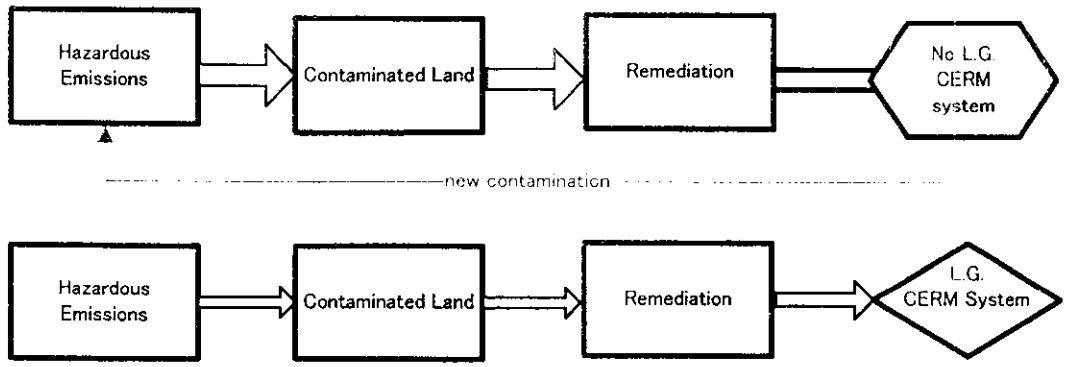

Figure 1.1: Endless Cycle of Pollution without Prevention Measures (By Author)

The definition for soil contamination in this thesis is as follows: Any hazardous or harmful substance released into the soil. Localized sources which are easily identified, and the diffuse sources which include air pollution from industry and transportation, releases by households, and pesticides and fertilizers used in agriculture management are also included in this broad definition of materials and sources in order to protect a wide-range of stakeholders involved in the proposed environmental risk management system.

The author performed a search using the two most widely used Internet search engines in Japan, and online library search engines to determine the amount of research being conducted on collaborative soil prevention measures in Japan, but found only a few papers related to this topic. The vast majority of research focuses on reactive measures and technical innovation to improve remediation efforts rather than on preventive activities.

Two papers published in Japan that closely relate to the author's work were uncovered during the search. The first written by Yong Ren [1] looks at Japanese approaches to environmental management in a structural and institutional analysis. The paper introduces how the national government, local governments, and self-governing businesses form a "Triangle of Actors". Ren introduces this consensus building as a uniquely Japanese form of negotiation that proved effective in promoting economic growth while protecting the environment. He also refers to the positive results that Japan has acquired from its pollution measures due to its decentralization approach that has given more power and focus to local authorities. The author agrees with Ren's support of consensus-building and decentralization, but suggests that soil contamination differs from air and water pollution solutions because it is impossible to detect without proper monitoring equipment: for example, soil probes, photo-ionization detectors, hydraulic/percussion drive machines, and GIS software. In addition, soil contamination is a minor

environmental issue for citizens, and it is economically and politically more complex to control. The author proposes that a small and medium-sized local government should change its organizational policy from a reactive one, to include measures that are more preventive. In this dissertation's model, the local government takes the lead to form a collaborative organization with businesses, local stakeholders, assisted by academia's tacit knowledge. Ren also cites that some pollution agreements that were accomplished in the past without the participation of local governments. Considering the general low-level of consciousness and lack of concern by the public, this type of agreement is limited to cities that are facing serious soil contamination with high public anxiety about their health.

Toshiya Kitayama detailed the important role local governments have played in pollution control initiatives. His research reflects some of the same themes as Ren, but refers to two major cases in Osaka and Yokohama to support his contention that local governments do have methods at their disposal to develop pollution control measures. He mentions three specific measures local governments can take to overcome legal and bureaucratic obstacles. The first revolves around local governments solving the problem by themselves using extra-legal strategies such as guidelines and agreements. He points out the difficulties for taking such action, especially for small and medium-sized local governments, is that they lack funds. When this situation exists, cities can use the second option, which is to work together with other cities to put pressure on the central government. The third is to react and hope that their actions will change the overall structure [2]. This flexibility is required for soil contamination because each locality has different prevention challenges that demand customized risk management strategies. The author's thesis proposes another strategy that includes a collaborative volunteer-driven network to reduce the financial burden on local governments, to raise local stakeholder environmental awareness, and to promote actions to prevent soil contamination.

Jeffery Broadbent's book *Environmental Politics in Japan* [3], details how significant macro and micro environmental influences can drive local citizens to a positive outcome. The examples he cites in his book add support that the unique system of utilizing a local government's leadership, businesses, and citizen's tangible and intangible resources, has the potential to increase involvement in the soil contamination issue. He gives examples how this change occurred in Japan, the United States, and Germany, with costly outcomes for the governments because they failed to anticipate the inherent risks.

In this dissertation, the author will present cases to support the importance of two of the three main principles in the German Basic Law for the environment:

1) The precautionary principle calls on the government to minimize risks for the environment by taking every care to address potential hazard at the source.
2) The cooperation principle states environmental protection is the joint responsibility of the

government and society; hence, provisions for public participation in environmental policy decisions are essential [4].

This research addresses three hypotheses:

1) Local governments are limited in their preventive measures by the lack of human and financial resources, and this exposes them to potentially costly liabilities that include legal costs, remediation of orphan sites, and the loss of public trust and image damage.
2) The lack of transparency, qualitative, and quantitative information about soil contamination fails to provide the necessary positive and negative forces that would motivate businesses and local stakeholders to collaborate on the development of an effective risk management system.
3) Local governments can benefit by collaborating with businesses and local stakeholders to prevent soil contamination if they take the leadership role in coordinating the development of an easy-to-adopt risk management system.

Past environmental risk, management strategies for soil contamination cases in the United States and Germany are analyzed because both countries have extensive experience in dealing with soil contamination issues, and have spent many resources into refining their environmental risk management systems. Results from those management strategies clearly uncover the importance of a more comprehensive, collaborative, and proactive approach than a simple end-of-pipe solution method currently used by most Japanese local governments. In addition, Germany and Japan both have dense populations occupying a small amount of land. This similarity provides a good comparative base to suggest the possibility for adopting programs or methods that have proved effective in Germany to Japan.

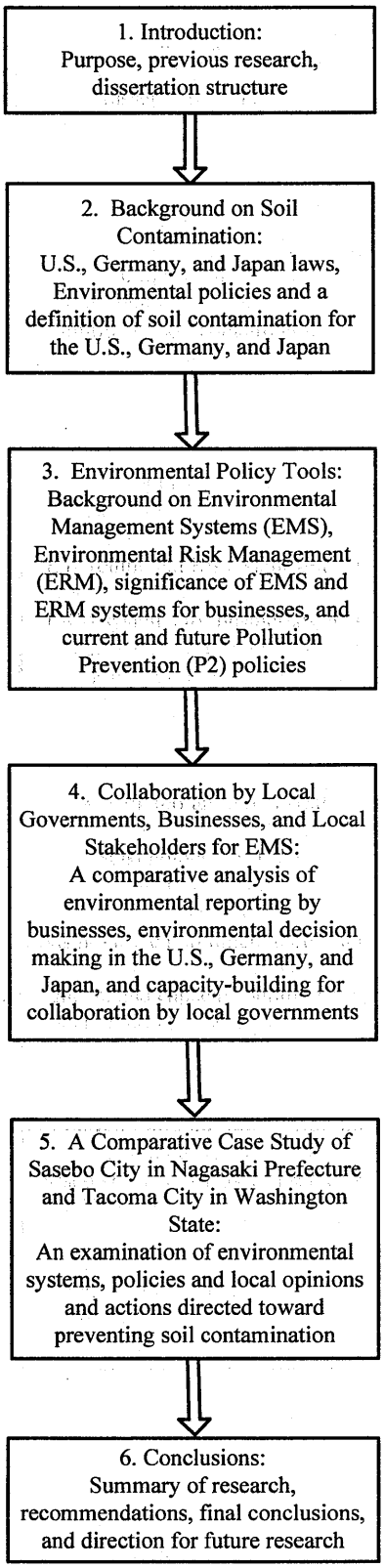

Figure 1.2: Flow chart of dissertation

(By Author)

Chapter One introduces previous research in this field, the purpose of the study, and goals of this proposal. Chapter Two examines the history of soil contamination in the United States, Germany and Japan to validate the necessity of a preventive approach. It also introduces the major laws and regulations that exist to reduce air, water, and soil pollution. The historical review presented in this thesis provides helpful clues toward future actions, necessary systematic improvements, and reinforces the danger of inaction.

Chapter Three details the significance for a company or a government to incorporate an environmental management system that includes an environmental risk management system to protect against soil contamination issues if any exist, and to prevent contamination from happening either unknowingly because of a lack of awareness, or by negligence.

Chapter Four begins with a study by the author on the level of environmental reporting by major U.S. and Japanese firms that have soil polluting potential. Then, details on the decision-making processes in the U.S., Germany and Japan assist in uncovering innovative approaches adaptable for the collaborative system in this thesis. Next, the necessary processes to establish an effective collaborative system across boundaries. Finally, details on the processes for establishing this dissertation's main proposal for a collaborative environmental risk management system that has a local government taking the leadership role in forming a partnership with local businesses and stakeholders to prevent soil contamination.

Chapter Five introduces two demographically and geographically similar cities; Sasebo City in Nagasaki Prefecture and Tacoma City in Washington to compare their actions, and responses to the soil contamination issue. Next, an investigation into the financing for environmental programs, government systems, and environmental issues each city confronts. In addition, it examines their soil pollution and protection measures that include comparing public opinion about soil contamination and the environment in general. The results support the third hypothesis that a collaborative model like the one presented in this paper provides practical benefits to any small and medium-sized local government. Suggestions for future improvements are discussed at the end of the chapter.

Chapter Six summarizes the findings of the research, introduces an example of an operation matrix illustrating the processes of the proposed collaborative system, recommendations for local governments and the future direction necessary for this research.

1.2 REFERENCES

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