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 SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 SUMMARY OF THESIS

This dissertation introduced a preventive risk management scheme for soil contamination in order to reduce the risks to human health, the eco-system and financial liabilities for present and future stakeholders. Benchmarking research on past and present environmental measures in the United States, Germany and Japan, and a comparative case study on two local governments, one in Washington State in the United States of America and the other in Nagasaki Prefecture Japan, were conducted to support the three hypotheses presented in Chapter One. Chapter One introduced that the author's risk management proposal was influenced by the precautionary and cooperation principles, which are two of the three German basic environmental values, which the author believes provide valuable direction for a sustainable society. It also reviewed past research related to soil contamination and introduced two researchers with preventive approaches that utilize the power of collaboration. The author's proposal differs from previous systems because it focuses on the benefits of collaboration on a local level instead of a national level to reduce risks.

Chapter Two reviewed the history of environmental movements in the U.S., Germany and Japan. The comparison uncovered that citizen movements in all countries during the years of heavy air and water pollution in the 1960s and 1970s forced local governments in Japan to develop their own solutions, likewise, in the United States some state and local governments created laws that put strict regulations on industries. Several examples of the media's powerful role in raising public awareness and putting pressure on the government to act were given. This influence to make changes at the local level provided support for the proposed CERM system that relies on local governments to take leadership and form a partnership with local stakeholders and businesses is a viable approach. Facts presented also indicated that a local government could acquire public support and cooperation needed for the system through mass media's exposure.

Next, the regulations and definitions for soil contamination in the three countries were compared. The United States and Japan were found to have a remedial approach with a retroactive liability clause for responsible parties. This policy has created controversy in the U.S. because of the high legal costs to prosecute and defend the cases. Germany also undertakes remedial action, but it follows the precautionary principle that encourages and supports preventive measures. Germany and Japan have established chemical-specific soil pollution standards, whereas, the United States uses site-specific calculations of the potential hazard to human health and safety.

The review of past environmental policies uncovered that the Superfund program in the United States has run out of funds and is now relying on funding from the General Budget. The amount allocated for remediation has been decreasing over the past several years, and this has promoted a change in the EPA's mission from a strict regulator to facilitator of volunteer programs that provide incentives and innovative ideas to comply with federal environmental regulations. However, the number of Superfund sites removed from the NPL is only a small portion of the hazardous sites in the U.S., and new sites are produced annually under this remedial management style.

After the Green Party gained political power in Germany in the 1980s, the once industry driven economy began to shift to an environment economy. It has also taken the lead in Europe on environmental policy development. However, after the unification, communication between the New Länder and Old Länder has been insufficient in providing accurate data on the condition of the soil, and the large number of seriously contaminated industrial and former military sites discovered in the New Länder has further complicated this.

Funds for remediation in Japan like the U.S. and Germany are insufficient, and government data on the number of sites is significantly lower than estimates by the Japan Development Bank and other experts in the private sector. It has become easier than in the past to establish a non-profit organization, and NPOs and NGOs in Japan are more effective on a local level than on a nation-wide basis supporting the proposal in this dissertation that a local program is an effective method in Japan

The final section of Chapter Two examined the different laws directly and indirectly related to soil contamination. All three countries have laws directly regulating the remediation of contaminated sites, and the U.S and Germany have laws with preventive measures; whereas, Japan depends on voluntary actions to prevent the possibility of soil contamination from occurring. In short, the chapter highlighted the trend to use a combination of C&C enforcement and voluntary agreements that suggest collaboration will continue to grow in the future; therefore, the CERM system corresponds to the current requirements.

Chapter Three began with evidence that supports the effectiveness of C&C measures in reducing pollutants. This is significant because the author believes the success of voluntary agreements lies with the existence of C&C policies. Next, it covered the background on environmental management systems, environmental risk management and pollution prevention measures. Methods to implement an EMS system successfully and the pitfalls that are common were illustrated through case studies of local governments in the United States. The examples provided support for the argument that an EMS adds value to both public and private organization because it improves environmental performance.

The importance of an environmental risk management system for soil contamination within corporations was strengthened by the case studies on companies in Japan.   Companies that failed to recognize the importance of checking for soil contamination before purchasing land experienced costly remediation fees.   Another case highlighted the dangers faced by a municipal government if it unknowingly is involved in contaminated land transactions.   In this case, the municipal government sold contaminated land to a real estate company and later reimbursed the company, costing the taxpayers eight and a half billion yen.   One of the most significant knowledge acquired from those case studies is that information about soil contamination in Japan is still limited, but it does not excuse the often-severe liability.   In order to protect against unnecessary legal and financial costs, more information needs to be made available, and both the national and local government are well suited to accomplish this.

A collaborative approach with incentives for information suppliers or gatherers can be an effective method to protect against present pollution; but more importantly, it provides a strong preventive tool.   A U.S. based NPO established a system that supplies accurate information over the Internet about contaminated sites and chemical releases was introduced.   However, no such system has been established in Japan.   The author suggested incorporating such a system in the CERM system using the PRTR reports submitted to the proper authority by requesting disclosure either by the prefecture governor or by any individual.   This would increase transparency and awareness about the soil contamination issue for all stakeholders.

Chapter Four is divided into three parts with the first reporting on the author's study on U.S. and Japanese firms' level of transparency reporting on EMS, ERM, and regulatory violations.   The top ten companies according to their net profits in their industry were selected for this comparative study.   The results uncovered the surprising fact that Japanese paper and pulp companies did not have transparent reporting even though they are required to meet stringent regulations under the Law Concerning Special Measures against Dioxins.   Construction companies that included general contractors, in each country also had poor transparency in their environmental reports.   Beverage and electric companies in both countries supplied detailed information about their EMS program, but lacked lucidity in reporting violations, fines and penalties in the ERs.   Some U.S. chemical companies also failed to report on these issues as well. Two automobile companies, Toyota Motors and General Motors, which were not included in the study, were introduced as excellent examples that companies should emulate in their future ERs.   Both companies reported in detail about their EMS programs, environmental goals, standards, environmental performance, and how their efforts have consistently prevented violations and liabilities.

The results of this study support previous work indicating that voluntary measures established by the government have limited motivational effect on dynamic firms and little to none for static ones.   It was

also revealed that creating and maintaining trust with stakeholders is accomplished through two-way communication, and the significance of top management's leadership to instill an environmental progressive mentality throughout the organization.

Part Two introduced the decision making process for the three countries. It found the EPA and the German Environment Agency use a variety of tools to increase incentives to improve environment management for soil protection. The EPA offers training programs to local governments, businesses, and local stakeholders and tax incentives to motivate each to establish better environmental management for soil. Germany introduced the Ecological Tax Reform (ETR), according to a government study, has increased employment and protected the environment. It has reduced CO_2 emissions and created 250,000 new jobs. In order to improve its insufficient soil management system it has established working groups that include members from the national government and Länder to create a unified soil protection policy. The government also receives expert advice from scientists on the Scientific Advisory Council on Soil Protection. Japan is currently undergoing a policy shift towards privatization of government organizations, so it has yet to look toward preventive policies for soil protection. It was mentioned that the MOE is recommending an environmental tax to provide funding for the troubled government pension fund while reducing CO_2 emissions to meet its Kyoto Protocol targets.

Part Three introduced the details for establishing a successful collaborative system between local governments, industry, and local stakeholders that is taking place in each of the countries compared in this dissertation. The main point in developing and implementing the any new system is that it must be kept simple. Overly complex systems failed because participants felt left out of decision-making or lost interest because of difficulty in completing required tasks. The author detailed the processes necessary to attract industry and local stakeholders to join in the collaborative program to prevent soil contamination. This system features the influence of opposite forces, which bring the participants together, and drive the CERM program under the leadership of a local government.

Chapter Five examined two demographically similar cities, Tacoma City in the State of Washington in the United States and Sasebo City in Nagasaki Prefecture Japan. They provided a good example of small to mid-sized cities that have limited budgets for the environment, industries that are prone to soil contaminating accidents, and a government that takes a dynamic approach toward environmental protection. Tacoma has an advanced Internet system that provides information and feedback to its citizens, and Sasebo supplies environment information on its web page about air, water and radiation levels. Neither city has a formal system to prevent soil contamination like the one proposed in this dissertation, but each has its own unique scheme towards pollution prevention. Tacoma and surrounding cities depend on groundwater for a large portion of its drinking water. The wells supplying drinking

water are located South Tacoma.   In the early 1980s, contamination was discovered in two of the wells, and a study discovered that poor disposal practices of hazardous wastes from local businesses were responsible.   The local government under special power granted it by the state Growth Management Law created a special zone called "Critical Area" in South Tacoma.   Special regulations and voluntary programs were set up to prevent further soil and groundwater contamination.   The mix of voluntary measures with regulations has reduced spills and so far, prevented any further hazardous chemicals from leaching into the groundwater supply.   A collaborative group led by local government officials, industry and local stakeholders have been holding meetings to draw up a draft proposal for voluntary regulations to prevent soil contamination from USTs similar to the author's proposal.

Sasebo for it size, has a reasonable number of staff in the Environment Department compared to similar sized cities in Japan.   In interviews with the manager, it was discovered that the city's main soil contamination concern lies with illegal dumping.   With limited funds, the city decided to use volunteers to patrol during the weekdays.   The city came up with the innovative idea to use retired police officers to patrol for violators.   Usually small and mid-sized cities in Japan use retired office workers to do volunteer work, but the Environment Department manager thought it would be more efficient and logical to use someone who is knowledgeable about the law and experienced in dealing with criminals.   The system has proved successful in catching or identifying guilty parties, but the city has chosen to take a lenient stance by only warning violators, forgoing the official penalty of ten million yen, which weakens the effectiveness of the law, and fails to provide a negative factor to pollute in the future.

A list of environmental active NPOs and events held in both cities revealed that there is an active and interested community eager to participate in protecting the environment, but that each of them has yet to capitalize on this potential for the soil contamination issue.

6.2   RECOMMENDATIONS FOR LOCAL GOVERNMENTS

1) Establish Working Group sessions with top executives, retired experts, students and researchers. These sessions should include major corporate and SME executives. Content should include new management policies demonstrated through case studies.   Content should cover a balance of environmental issues in the first session and then focus on specific areas thereafter with active interchange involving brainstorming and two-communication.   This builds and reinforces relationships, increases motivation to participate in the future, and stimulates innovation.

2) Involve the public in design, implementation and assessment of the environmental risk management program.   Local NPO/NGO staff, students, teachers, experts both active and retired should be included in any significant program that affects the local environment.

3) Improve the public information system.   Tacoma and Sasebo both provide excellent online

services to their citizens, but it is mostly static by design.   The author proposes a more dynamic service that supplies quicker and more personal feedback to stimulate citizen interest.   This would involve volunteers to assist the local government staff and training local stakeholders who are unfamiliar with computer usage.   Special classes could be offered that bring new groups of people together which also increases the network of informed and interested citizens.

4) Increasing environmental education and training about soil contamination.   Global warming, air and water pollution currently receive the greatest amount of classroom discussion time. However, each type of pollution is interconnected, so more balance is required to improve the overall state of the environment.

5) Increase involvement of the local mass media about events, innovations, and potential risk issues to the community.

6) Establish incentive programs that promote environmentally friendly companies, nonprofit organizations, and community groups.   Publicize their accomplishments through the mass media.   Research has shown that Japanese firms are more likely to participate in environmentally friendly activities and programs because stakeholder and consumer pressures [1].

7) Utilize local universities tacit knowledge reservoir by establishing a collaborative program that brings students, the teaching staff and businesses together to develop practical preventive soil contamination measures.

The example matrix template in figure 6.1 provides an example of what participants are involved in the system, what is required for each phase, and connects what was introduced in Chapter Three.

Phase One	Phase Two
• Organizational requirements	• Establish three working groups
• Establish core team	• Collect data to identify potential soil
• Soil contamination risk assessment	contamination by source and type
(type & source)	• Potential costs benefits of prevention
• Health & environmental consequences from	program technical availability and needs
potential soil contaminants	• Create soil contamination prevention
	information network
Phase Four	**Phase Three**
• Evaluate working group's performance	• Local government, businesses, and local
• Evaluate progress of risk management of	stakeholder implement suggested measures
potential soil contamination sources.	• Implement education and training program
• Standardize information network	• Update and check performance of soil
• Standardize education and training	information network.
methodology	• Local publicize program participants.

Figure 6.1:   CERM Matrix Template for the Prevention of Soil Contamination
(By Author)

Phase One

This first step is outlining the organizational requirements and goals for each phase of the program. Participants in this include the local government; local experts from educational institutions, retired scientists to conduct surveys on the types and sources of present and potential contamination; and local stakeholders including community leaders, NPOs and any interested citizen.   The assessment in at this early stage need not include physical monitoring activities; rather, it should develop a map of potential sources and the type of health risk it possess.

Phase Two

The core team with an expert in the field of environmental engineering, management and information science, form a working group, which includes local stakeholders that have interest or knowledge in one of the areas.   The core leader and the working group members then develop a time schedule and process chart and determine the costs/benefit ratio to the local government, businesses, and individual citizens.

Phase Three

In coordination and cooperation with the local government Environment Department, the three working groups that include businesses leaders, employees, and local stakeholders, is implemented with publicity support by the local media.

Phase Four

This phase requires qualitative and quantitative analysis of the working group and the program's performance.   By this time, the information system should have had enough time to make adjustments because of its dynamic nature featuring instant feedback from users.   The education and training programs as well should have made the most significant changes from users feedback evaluations.

6.3   CONCLUSIONS

The case studies and detailed descriptions in this dissertation provide proof that a voluntary collaborative environmental risk management system is a viable partner in conjunction with C&C measures.   One example was the success of the EPA voluntary 33/50 program in reducing hazardous chemical releases even ahead of the scheduled deadline.   Another program introduced is the ongoing EnviroStars program in Seattle Washington, which is a state supported volunteer program that is proving effective in reducing effluents and reducing operating costs.   The Working Groups in Germany linking the government and experts to formulate soil policy provide a good an example of successful collaboration across boundaries. In Japan, the past improvements accomplished by the efforts of local stakeholders and the government to pressure businesses to reduce pollutants lends strong support for the power of the individual.

The author's first hypothesis was proved correct by the data presented in Chapter Three and Chapter Five. Figure 3.2 in Chapter Three illustrated that there is a decreasing number of employees working for SMLGs Environment Departments in Japan, and an overall decrease in funds for local governments in each of the three countries mentioned in this paper.   Chapter Five presented the financial data for Tacoma City and Sasebo City that showed (Table 5.6) only a fraction was allocated for the environment from the general budget, and even less for preventive measures.

The second hypothesis was partly confirmed in Chapter Two by the lack of accurate data for contaminated sites in Germany and Japan, and further by the author's comparative study of U.S. and Japanese firms' environmental reports in Chapter Four. The author conducted an Internet search to locate comparative data on the types and percentage of contaminates in the soil for the three countries, but no accurate or complete set was found to make a comparison.   This lack of transparency was also found to exist for some major corporations investigated in the author's study.

The third hypothesis stating that local governments can benefit from collaborating with businesses and local stakeholders, proved to be correct by the positive results achieved by three collaborative non-regulatory EPA programs: 33/50, Project XL, and Performance Track introduced in Chapter Two, and the detailed explanation in Chapter Four about the benefits that collaboration produces.

This dissertation has shown that C&C policies enacted by the national and the state governments in the U.S., Germany, and Japan have had success in improving the environment, and those regulations have provided the fundamental pressure that has driven the non-regulatory programs. However, the author believes that greater success is possible from policies and commitments generated at the local level involving interested stakeholders. The case studies and the methods to achieve successful collaboration on a local level presented in this dissertation provide significant support that the author's CERM system has potential, and that a local government should govern with the cooperation of businesses and local stakeholders to prevent the risks inherent in soil contamination to protect current and future generations.

6.4   RECOMMENDATIONS FOR FUTURE RESEARCH

This research focused on small and mid-sized local governments in developed countries, but the author recognizes that developing countries are contributing greatly to air, water, and soil contamination problems as their economic development goes unchecked. Soil contamination is more complex than the other types because the degree of danger at a contaminated site can depend on the actual type of soil, the type of contaminates, and the amount of pollutant present. This requires technical equipment mentioned earlier in this dissertation, large amounts of capital, and expertise. Most developing countries do not usually have the equipment, experts, or funds to conduct such monitoring. Monitoring and remediation are essential to protect human health, but the author believes that the CERM system modeled in this dissertation can provide an inexpensive alternative to prevent the situation from worsening. However, further research on the applicability of the soil prevention scheme needs to focus on quantitative analysis to determine if it can actually prevent contamination, and by what percent it can prevent releases. Also, for environmentally non-active and static type companies, the positive and negative forces introduced in Chapter Four that should motivate these types of companies to establish the CERM system require analysis; for example, using Fuzzy Logic as method for analysis. This form of analysis is usually associated with commodities, but it is also well suited for environmental management issues because of supplies a framework to calculate the complex non-linear systems. It also allows for linguistic reasoning analysis. Pritchard gives the following example that illustrates the methodology behind the concept: "fuzzy concepts could be the historic use of trigger and action values dealing with contaminated land with mid-values where 'professional judgment' was deemed to be appropriate. An example of 'forcing' a crisp value would be the Seveso Directive, whereby a criterion for a notable accident causing immediate damage to the environment is considered to be one causing significant damage to 1 hectare or more of

aquifer (significant however is a fuzzy concept).   The implication of this might be that an incident involving damage to 0.99 hectares is not reportable. . ." [2].   As this example illustrates, a clear analysis of best management practices creates a serious challenge for future research.

6.5   REFERENCES

[1]   Uchida, Toshihiro, Ferraro, Paul, "Can Encouraging Voluntary Development of Environmental Management Systems Augment Existing Regulations? Evidence from Japan", 2005, pp. 24.

[2]   Pritchard, Paul, *Environmental Risk Management*, Earthscan Publications Ltd, London and Sterling, VA, 2001, pp.