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Fostering Pollution Prevention in Mid-Sized Firms: Strategies for More Effective Technology Transfer

Introduction

Pollution prevention is an important economic and environmental concern for all industries. However, the level of concern varies greatly depending on the size of the company. Larger companies have their own in-house experts, and small companies rely on external sources for information. Only the mid-sized industries are largely unassisted; yet, their participation is necessary if America is to meet its pollution-prevention goals.

Georgia Tech researchers, led by Michael Elliott and Carol Foley, have studied how mid-sized companies perceive waste generation issues and how they make decisions for technological or operational changes to reduce pollution and comply with environmental regulations. This important information will assist researchers in identifying and implementing the most effective methods for promoting pollution prevention among mid-sized businesses.

Survey Design and Implementation

To gather the necessary data, the Georgia Tech researchers sent questionnaires to more than 1,500 firms ranging in size from 100 to 1,000 employees per facility with two to 30 total facilities. The study focused on firms from six states (North Carolina, Tennessee, Georgia, Florida, Louisiana, and Texas). All were eligible for participation in the Environmental Protection Agency's (EPA) 33/50 program (an effort to reduce the release of 17 toxic chemicals by 33 percent in 1992 and 50 percent by 1995). More than 600 companies responded, and of

these four were selected for more detailed case studies, including on-site interviews by team members. The results of the study are presented in a final report entitled *Fostering Pollution Prevention in Mid-Sized Firms: Strategies for More Effective Technology Transfer*.

The report "explores how pollution prevention decisions are made in mid-sized corporations, who sets environmental policy, and what type of policy interventions motivate corporate decision makers to adopt preventive strategies." Three main aspects are examined: environmental decision making; successful adoption of innovative pollution-prevention technology; and the impact of public policy interventions to promote pollution prevention within corporations.

The type of information sought in the surveys included current and past pollution prevention activity; personnel involved in such projects; interaction with regulatory and technical assistance programs; incentives; company structure; ranking of reasons for implementing pollution prevention projects; and ranking of impediments to pollution prevention.

Survey Findings

Firms with the highest levels of pollution prevention activity are located in states with mandatory reduction goals and/or fees and taxes on pollution; have a history of interaction with environmental experts; have managers interested in innovation; and have organizational structures open to information flow.

In looking at organization dynamics and decision making for pollution prevention, the Georgia Tech researchers found that corporate culture and

Summary of the Problem

Recognizing that assistance for implementing pollution-prevention programs in mid-sized firms (100 to 1000 employees and 3 to 30 facilities total) was limited, but that these firms collectively have a significant effect on the environment, researchers Michael Elliott from Georgia Tech's School of Architecture and Carol Foley from the Georgia Tech Research Institute embarked on a research program designed to understand how companies undertake pollution prevention projects and activities. The researchers sent surveys to 1,500 such firms in six Southern states in order to gain information about mid-sized firms' perceptions and implementations of pollution-prevention strategies and their special needs for technical assistance.

The resulting report is based on the responses of 600 mid-sized firms and four in-depth case analyses. The report not only reveals decision-making processes affecting pollution prevention in mid-sized firms but also suggests ways to structure and transform traditional technical assistance programs to better suit the needs of such companies. The report examines who sets environmental policy (both formally and in fact) and what types of policy interventions (i.e., on-site technical assistance, seminars, incentives, or regulations) motivate corporate decision makers to adopt prevention strategies. The research project also examined environmental decision making, successful adoption of innovative pollution-prevention technology, and the impact of public policy interventions on promoting pollution prevention within corporations.

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the characteristics of the company's communication and decision-making styles are important factors in a company's ability to make efficient and systemic decisions. Firms with a commitment to Total Quality Management (TQM) do best in pollution prevention: multiple departments are involved in decision making; customer feedback and participatory management are used; and responsibility and authority are evident at all levels of the organization.

Survey findings show that nearly all facilities in the study are involved in pollution prevention, with most initiating projects in 1989. These pollution prevention activities include process modifications, good operating practices, and recycling.

The most implemented actions were: modifying equipment, layout, or piping; substituting less hazardous materials; segregating wastes for recycling; implementing better controls on operating conditions; promoting in-process recycling; recycling off-site; and improving maintenance procedures. The least implemented actions included: increasing purity of raw materials; using better labeling procedures; testing outdated materials; and modifying containment procedures for cleaning.

Companies suggested several important reasons for implementing pollution prevention programs, such as: regulatory compliance requirements; worker safety and health liability; waste management costs; regulatory compliance costs; process cost reductions; community relations; permit limits; public image; and mandatory reductions. Companies also offered the following reasons for not implementing such projects: not economically feasible as capital investment is often not recovered; lack of capital to invest; process technical limitations; product quality uncertainty; lack of information on options; changes may require modifying existing permits; changes require new permits; difficulty in initiating change in the corporation; existing permit rules required

investment in end-of-pipe pollution control technologies; and technical capabilities of staff to operate new equipment.

Future Research

The survey results offer a number of challenges and opportunities for government policy makers and technical assistance providers. Much of the resistance to pollution prevention programs is associated with costs. Financial incentives that encourage companies to initiate pollution prevention projects are needed. Companies also need assistance determining their options. Finally, ways to make the permitting process less cumbersome and discouraging are needed.

A major theme that emerges from the survey results is the importance of TQM, which provides "the organizational infrastructure that allows a firm to integrate environmental quality as an element of quality necessary to maintain the survival of the corporation in the marketplace." TQM helps maintain a high level of product and service quality and recognizes that improving the quality of a product requires improvements in how generated waste is handled during product manufacturing. Pollution prevention is one way to improve financial profitability for a company, while adding to worker satisfaction and customer perceptions that the company is environmentally responsible.

Using the information gathered, researchers will seek to transform technology transfer programs for pollution prevention to consider the organizational capacity of the companies involved, so that decisions about environmental management can be achieved systemically. The goal is to attack the pollution problem at its root and provide a solution that involves design, production, and waste management concurrently. By making these changes, technical assistance programs can become significant instruments for promoting pollution prevention in mid-sized firms.



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