Student Assignment #1
Reducing Resource Use and Waste Per Unit of Production: Comparing Pollution Prevention at 3M, Dow, and Polaroid

The natural environment is both a supplier of resources and an absorber of emissions. Resources from nature are needed for businesses to make the goods and provide the services that people need. However, in the process of extracting raw materials from nature, transforming the raw materials into useful products, and transporting the finished products to markets, businesses produce waste. Thus, the physical environment not only provides goods and materials to the economy. Goods and materials flow back again as wastes or residuals (Marcus, p. 410).

In making business decisions, managers need to keep the costs and risks associated with resource use and waste generation in mind. They need to be aware that in minimizing resource use and in preventing and managing wastes they can find opportunities for business gain. They are in a position to profit.

Adding Value Through Waste Minimization

It makes sense for a business to avoid waste rather than develop expensive end-of-pipe treatment mechanisms. Before recycling, treatment, or disposal, a company should reduce wastes at the source (Freeman, p. 5).

A waste minimization program starts with the following:

1. **Top management support.** Top management must make it company policy: set specific goals for pollution prevention, commit to implementing recommendations, assign responsibility, publicize successes, and reward and train employees.

2. **The formation of teams.** These teams should involve people from nearly all the company’s functional areas.

3. **Characterization of waste generation.** An accounting system is needed to track waste types and amounts.

   Then it is necessary to identify, analyze, and implement the opportunities for minimizing wastes.

**IDENTIFYING WASTE MINIMIZATION OPTIONS**

To identify opportunities where material use and wastes can be reduced, managers must carefully examine processes and product design, fabrication, and formulation. Potential sources of material loss occur in loading, storage, and processing (Freeman, p. 30); typically, wastes also are generated in operations (Freeman, p. 11).

**REDUCING THE WASTES**

A wide variety of operational, material, and production process changes can be made to reduce the wastes generated (Freeman, pp. 33, 36, 39). Waste reduction also can be accomplished by source segregation (Freeman, p. 41) and through recovery and reuse (Freeman, p. 45; see also U.S. EPA, pp. 84–96).

**ANALYZING THE OPTIONS**

When the options for preventing pollution have been identified, they have to be analyzed based on their technical and economic feasibility.
IMPLEMENTING THE OPTIONS

Once the best options have been chosen, objections are likely to be raised. Barriers to implementation will arise. Some of the most common are listed below:

1. **Limited resources.** Funds, time, and personnel are in short supply.
2. **Inertia.** Efforts have to be made to combat a “business-as-usual” mentality.
3. **Accounting system limitations.** Typically, the systems do not measure environmental costs or values in a useful way.
4. **Fear of compromising the product or the way it’s made.** Facility workers may be concerned that change will adversely affect product quality or production efficiency.
5. **Lack of proven technology.** Improvement may not be made because staff who have no experience with the alternative technology may not believe it will work.

Ultimately, the barriers must be overcome and the waste reduction options sold to the affected parties. This may be the most difficult challenge in introducing a waste minimization program.

**Advantages of Waste Minimization**

Waste minimization programs do yield many plusses:

1. **Potential cost savings.** For example, solid waste minimization at Procter and Gamble’s Mehoopany plant yields a total value of about $25 million a year.
2. **Technological innovation.** Some companies realize increased profits by selling technologies developed during the implementation of a waste minimization program.
3. **Increased public acceptance.** This is especially important for companies in hazardous industries.
4. **Better relations with government.** Companies that implement waste minimization programs may be able to work with government regulators more effectively.
5. **Employee morale and motivation.** If the program empowers and rewards employees and relies on cross-functional teams to build skills, it can motivate employees to perform better.
6. **Safer working conditions.** With less hazardous waste present, the need for personal protection equipment, industrial hygiene monitoring, and various engineering controls is reduced.
7. **Increased knowledge and control of production.** A waste minimization program subjects the production process to intense scrutiny, which can lead to better understanding of, and increased control of, raw materials and feedstocks, manufacturing processes, production distribution and use, and product design.

**Life-Cycle Analysis**

Life-cycle analysis records and assesses a company or product’s ecological impacts so as to reduce the raw materials the company uses and minimize its wastes.

The boundary of an analysis has to be defined. For instance, paint is made of oil. The oil is extracted with the aid of machines. The machines are made using other machines, and so on. Pollution added is the sum of all the emissions during the product life-cycle.

Based on the physical law of the preservation of mass and energy, the input and output streams of material and energy should match. It is not enough, however, to measure the physical volume of emissions. Emissions have to be weighted according to their harmfulness to the environment. Since there are no objective, uncontested and scientifically proven statement on ecological harmfulness, the measurement must be in relation to socio-political quality standards, such as those standards established in countries throughout the world. In doing this type of analysis, it is better to be approximately right and to do something than to risk doing nothing and putting your company at risk.

**Assigned Reading**

Questions

Compare the waste reduction programs of these three companies:

1. How do they differ?
2. Which is most successful? Why?
3. Which is least successful? Why?
4. What lessons can be learned from a comparison of these three companies’ experiences?

Sources

