Pollution Prevention and Accounting

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Introduction to the Accounting Compendium

The accounting compendium in pollution prevention provides resources to those who wish to introduce environmental topics into their accounting curricula. It consists of several types of resources: case studies, problem sets, course syllabi, selected readings, and an annotated bibliography. The collection of materials will always be incomplete and we encourage you to send in articles, cases, problems, and other material you may have or to let us know about other sources available so that this information can be included.

Introduction to the Literature

Overview

Accounting is the discipline of providing information to decision-makers. Traditionally, this information has been couched in financial terms and with a fairly narrow focus on the measures of interest. As environmental impacts of activities gain greater attention, whether from increasing government regulation of production activities, consumer demand for “green” products, or concern on the part of business about the interaction of their activities and the environment, we can expect additional demands being placed on the accounting systems, both internal and external, to provide information about the effect of a firm’s activities on the environment. The purpose of this introduction is to discuss how environmental activities, including pollution prevention, are related to the accounting system and identify resources available through the NPPC for use in courses.

For the purpose of both curricula and research, accounting is often divided into categories. In this introduction, I will use two: external reporting and internal reporting. Although many of the issues related to environmental accounting are not so easily characterized, I make use of this division in this discussion of the literature. I include as “external reporting” reports that provide information to external users, such as investors, creditors, and government agencies (e.g., tax authorities). Because these external users are interested in many companies, it is important that the accounting reports be comparable, at least to some extent. This implies that some external body be established to set rules for reporting results so that users have a consistent basis on which to evaluate the results of many entities. For this reason, it is often convenient to think of an external reporting system as a set of rules, or standards, which all enterprises follow.

I use the term “internal reporting” to include data intended for decision-makers internal to the enterprise. These data must be relevant for the decisions being evaluated and, for that reason, the techniques used in compiling and reporting the data vary from enterprise to enterprise. While certain practices are common, there is no external requirement that firms produce internal reporting data in specified ways or at specified intervals. In other words, in an internal reporting system there are no rules or standards that must be followed.
Classifying accounting into external and internal components is useful for the discussion of accounting and the environment because it allows us to distinguish between the required reporting of results related to environmental actions and the use of the accounting system to manage the business with an understanding of the impact of these decisions have on the environment.

The discussion in this introduction is intended to provide a general introduction to the area of accounting and the environment, but it is not comprehensive. I focus, for the most part, on articles in journals intended for professional accountants and others interested in the application of accounting principles to environmental issues. This is done for two reasons. First, the intent of the compendium is to integrate environmental issues into curricula and, in a professional school setting, discussion and illustration of existing practice is important. Second, there is a relative dearth of articles on environmental issues in academic accounting journals, with some exceptions I discuss below. There is also an emphasis here on articles in U.S. periodicals simply because of availability. I hope to lessen this geographic bias in the future.

In this section, I will discuss external reporting and environmental issues and then the role of internal accounting in environmental management, where the emphasis is on using the accounting system to evaluate performance and, perhaps, encourage certain activities. The final section summarizes some current work and opportunities in environmental accounting.

Pollution Prevention and External Reporting

As noted above, external reporting is concerned with reporting results to external users of financial statements. I discuss four basic topics here: accounting for environmental liabilities and pollution prevention costs; pollution prevention and taxes; environmental audits; and ecological accounting. All are related in the sense that they are attempts to report to firm outsiders the impact of environmental activities on the firm and the firm on the environment.

ACCOUNTING FOR ENVIRONMENTAL LIABILITIES AND POLLUTION PREVENTION COSTS

As Johnson (1993) points out, external reporting for environmental activities involves issues of both recognition and disclosure. As he notes, the inherent uncertainties in environmental activities lead to difficult recognition issues; often, disclosure is the focus of environmental reporting. Legislation is the source of some of the uncertainty associated with environmental accounting. Since the early 1970’s, firms have been subject to various environmental laws and regulations that held the potential for substantial liabilities. For example, in 1976, Congress passed the Resource Conservation and Recovery Act (RCRA), which requires companies to monitor materials potentially harmful to the environment. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or Superfund, passed in 1980; amended by the Superfund Amendments and Reauthorization Act (SARA) in 1986, it imposes responsibility for toxic site cleanup on firms. Thus RCRA focuses on preventing future waste sites while CERCLA is concerned with cleanup at existing sites.

With this legislative trend, environmental impacts of operations became important to managers not only for reasons of social concern but because they came to represent very real liabilities faced by corporations. Financial accountants have long been guided on dealing with contingent liabilities such as these by Financial Accounting Standards Board (FASB) Statement #5 (SFAS #5), Accounting for Contingencies. SFAS #5 requires firms to recognize a liability when a loss is both reasonably probable and estimable; environmental liabilities often satisfy both conditions.

Measuring and reporting liabilities associated with environmental claims have been the focus of much of the writing and analysis on accounting and the environment. This is not surprising given the magnitude of the potential liabilities and the likelihood that these environmental laws and regulations will, if anything, become more stringent. Many articles this compendium’s Resource List, especially those from the Journal of Accountancy, focus on the impact of environmental activities on financial reporting. In addition, Johnson (1993) discusses many of the recognition issues facing FASB.
A related issue that has arisen with the Clean Air Act of 1990 is the accounting treatment of “certificates to pollute.” These certificates were originally issued to electric utility generating plants authorizing the release of a fixed amount of sulfur dioxide (SO\(_2\)) into the atmosphere. These certificates may be traded or sold, and the Chicago Board of Trade has requested permission to open trade in these certificates. A related reporting issue concerns whether to record the value of these certificates at cost or market, especially when the acquisition cost is zero for many firms. See the article by Ewer, Nance, and Hamlin (1992) for a review of some the issues involved.

While the accounting for environmental liabilities may be relatively new, the issues faced by accountants are common to many recent concerns about unrecorded liabilities: recognition and measurement. As technology changes and more is learned about the impact of hazardous discharges on the environment, we can expect more articles, especially in the practitioner literature, on ways to estimate the liability.

An issue that has received much less attention is how the financial markets assess the information on environmental impacts. Because of the uncertainty and the measurement error associated with this information, it is unclear whether and how financial market participants value these liabilities relative to those on the financial statements. That is, do investors view a dollar of reported environmental liabilities as the same as a dollar of long-term debt (or a dollar of other post-employment benefits)? One study that addresses this is by Barth and McNichols (1993), who find that various proxies for environmental liabilities provide incremental explanatory power with respect to market valuation over assets and liabilities reported on the financial statements. They also provide a useful discussion of disclosure requirements and an analysis of the factors affecting clean-up costs.

**ENVIRONMENTAL AUDITS**

Environmental auditing appears to be a relatively new term in the literature and is not easily classified as external or internal reporting. Rather, the few discussions of it fall into two groups: a rather narrow focus on auditing financial statement items related to environmental liabilities and more common management-type audits of existing procedures and practices. Discussions about the former issue focus on measurability and probability assessments while discussions about the latter more commonly discuss environmental practices in general, for example hazardous waste disposal practices. The monograph on environmental auditing by the Canadian Institute of Chartered Accountants (CICA [1992]) has a thorough discussion of the different types of environmental audits and the issues.

**ECOLOGICAL ACCOUNTING**

A final topic that I have included under external reporting is ecological accounting, which attempts to mimic, or complement, a external reporting system expressed in monetary terms with one expressed in physical flows. This means that the firm would report its impact on the environment in terms of emissions and discharges. Instead of assessing the value-added associated with products and processes, an ecological accounting system attempts to measure the pollution generated by individual products, processes, etc. My limited reading of this area suggests that there is much more work being done in Europe using this approach. See Schaltegger and Stinson (1993a) for a discussion and review of the literature in this area.
Pollution Prevention and Internal Reporting

I use the term internal reporting to describe systems providing information to managers that allow those managers to make better decisions. As such, there are no “rules” concerning how costs should be computed or reported. I consider three topics in this section: product costing, planning, and performance measurement.

POLLUTION PREVENTION AND PRODUCT COSTING

New approaches to manufacturing have caused accountants to reconsider some of the methods of product costing as applied in practice. There has been increasing concern that traditional methods of costing have resulted in distorted product costs that have misled managers making product mix, pricing, and sourcing decisions. There have been several discussions about the adequacy of traditional costing and the extent to which some of the new methods are really “new” or appropriate for certain situations. I do not want to focus on those issues here. Instead, I want to discuss some of the new methods in the context of internal reporting and the environment.

By traditional product costing, I refer to the approach of allocating total overhead to products using relatively few volume-related drivers such as direct labor. In certain cases, this approach can be shown to lead to distorted product costs, although whether this is true in practice is still open to question. The basic point, though, is that when, say, one driver is used, there is the potential for product costs to be distorted if the products are diverse in some other way (e.g., requiring more machine change-overs, etc.).

One approach to dealing with this problem is Activity-Based Costing (ABC) where the manufacturing activities are identified. The costs associated with these activities are collected along with a measure of activity. Overhead rates are then calculated by activity and assigned to the products (or product categories) based on the use of the various activities. The link to environmental issues comes when we realize that most environmentally related activities in manufacturing are included in overhead costs. Examples of these costs include depreciation on treatment equipment, environmental compliance staff, and tipping (landfill) fees. As overhead, these costs are applied to all products manufactured in the plant, although some products may use processes that require more treatment of air or water discharges or generate more waste sent to a landfill. Included in the compendium is a simple problem that illustrates the potential information about relative product costs obscured by use of a labor-related driver when two products have different environmental impacts. Krueze and Newell (1994) also discuss and illustrate the use of ABC for environmental costs.

POLLUTION PREVENTION AND PLANNING

A fundamental economic problem associated with incorporating environmental costs into a firm’s accounting system, whether financial or managerial, is that many of the costs are not borne by the firm. Responsibility for disposal of products, for example, is almost always that of the purchaser. Therefore, firms do not generally include in their cost calculations the environmental costs associated with disposal. (Presumably, purchasers included this cost in their decisions; the question remains whether they paid the full costs of disposal.)

Recycling requirements have been enacted in Europe for certain products, and managers in many U.S. industries, such as automobile manufacturing, expect them here. Under this approach, the manufacturer is responsible for the product after the useful life of the product. This has increased the interest of firms potentially affected by these new regulations in “life-cycle costing” or “life-cycle analysis.” Originally a technique used primarily by the Department of Defense (to analyze weapons systems), life-cycle costing attempts to measure costs associated with a product through the various stages of its life: development, raw materials acquisition, manufacturing, transport, use, and disposal. The major point of life-cycle costing is that there are many costs incurred before or after manufacturing that do not get charged to the product using conventional product costing systems. Advocates of life-cycle costing argue that all costs associated with the product be included in the analysis. Thus, in addition to the usual material and labor costs, a life-cycle analysis will also include costs associated with future liabilities and disposal. See the articles by Keoleian, et al. (1993), and Krueze and Newell (1994) for more discussion.

There are two other terms that are common in literature relating costing and the environment. These are “full cost accounting” and “total cost assessment” (TCA). As in life-cycle costing, these methods are
designed to make managers aware of all the costs, including intangible costs (and benefits), associated with different products or processes. As I read some of the literature, it appears that full cost accounting is designed to assign to products their full costs and, as such, may be more related to product costing than planning. TCA has more of a capital budgeting notion and, thus, is related to planning. See White (1993) for a discussion of TCA.

There appear to be two distinct issues in this literature, which I will state as normative propositions. First, firms should assign all the costs, tangible and intangible, borne by the firm and associated with a product to the product and use this “full cost” in decisions concerning this product, e.g., pricing decisions. Advocates of this approach generally talk about the hidden benefits to environmentally friendly products and that with proper accounting and cost analysis, firms will find costs decreasing as they produce products with less environmental impact. It seems to me that this stand would not be controversial, at least in theory, and it is only an issue of the cost of collecting better information that would keep firms from taking this approach. Arguments that many of these costs are very uncertain and therefore should not be included are based on external reporting considerations and are less important in the decision-making context of planning and product costing.

A second proposition, and one where there is legitimate disagreement even in theory, is that firms should consider all costs associated with a product, including those externalities where the existing structure of property rights does not assign responsibility for certain costs (e.g., health effects associated with poor air quality related to emitted pollutants) to the firm. Here, corporate strategy issues become paramount as managers and shareholders determine the firm’s position regarding environmental issues.

**POLLUTION PREVENTION AND PERFORMANCE MEASUREMENT**

Many firms have begun to include environmental performance measures in their control and evaluation systems. Examples include both 3M Corporation and Dow Chemical Company. Like other performance measurement systems, these attempt to provide incentives to managers to include for environmental impacts in their decision-making, either by making the costs of the impacts explicit (e.g., through transfer prices) or by including environmental impacts as part of a general performance measurement program. Dow Chemical and other firms use a transfer price for their landfills; Bringer and Benforado (1994) discuss various performance measurement programs at 3M. These programs include both voluntary programs, where employees submit suggestions on methods to reduce environmental impacts, and corporate-wide programs that consist of formal, periodic reporting of environmental performance at the plant and division level. The 3M case included in this compendium illustrates the use of a performance measure based on reducing waste. Bringer and Benforado (1994) also list pollution prevention programs in place at 25 other companies.

As with programs that focus on performance to improve quality, performance measurement programs to improve environmental performance face many trade-offs including the issue of measuring environmental performance. Steelman, et al. (undated) discuss many of these issues in the context of environmental performance measurement at Ciba-Geigy.

**Summary**

This overview of the literature has provided only a brief sketch of the readings available relating environmental issues to accounting. As noted in the introduction, there are many apparent selective biases. These will be corrected as the literature search continues and readers help us update the materials available.

The interest and activity in the area of environmental accounting is increasing as environmental issues take on an increasingly important role in our society. Many projects are near completion and will be included in future compendia. For example, several World Resources Institute case studies on cost accounting and the environment are scheduled to be released before the end of 1994. These case studies should provide us with new knowledge of how firms are addressing environmental issues in their internal reporting systems. We can also expect that as the magnitude of environmental liabilities become larger, there will be an increasing interest in the external reporting area on disclosure issues. As that occurs, we can expect to see more academic studies using traditional capital market techniques for assessing the role these liabilities play in market valuation and the effect of different disclosure policies.
An indicator of the increased academic accounting interest in the area is the notice that a special issue of the Journal of Accounting and Public Policy will be published in 1995 with David Shields (University of Houston) and Germain Boer (Vanderbilt University) as Special Associate Editors. This issue should provide a useful forum for a variety of analyses of accounting for the environment.

Finally, the Office of Pollution Prevention and Toxics at the U.S. EPA’s Pollution Prevention Division has a program that brings together academics, practitioners, and organizations to address many of the issues in the area. For example, they sponsored a two-day workshop on Accounting and Capital Budgeting for Environmental Costs in December 1993 that led to many proposals for future research. Those interested in this program should contact either Martin A. Spitzer or Holly Elwood at:

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ENDNOTES

1 Many of the articles listed in the compendium also review all or part of the literature. See, for example, the working papers by Stinson and Schaltegger (1993b) and Sefcik, Soderstrom, and Stinson (August 1993).

2 An issue that arises is the definition of what actually constitutes “environmental accounting.” For example, is a study on the market effects of disclosures about environmental liabilities environmental accounting or simply a disclosure study applied to an environmental issue? In this introduction, I take the more comprehensive view.

3 For a useful summary of relevant legislation, see “A Pollution Prevention Primer for Law Teachers,” included in the Business Law Compendium available from the NPPC.

4 This assumes, of course, that these costs are not going to be used directly in the financial statements, e.g., as measures of inventory value. In this case, the firm is constrained to use those methods considered generally accepted. I classify these issues as external reporting and the remarks in the previous section apply to this case.
REFERENCES


Canadian Institute of Chartered Accountants (CICA), (1992), Environmental Auditing and the Role of the Accounting Profession.


