

ENVIRONMENTAL ACCOUNTING: AN ESSENTIAL COMPONENT OF BUSINESS STRATEGY



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Environmental accounting is on an expansion path. With increasing social focus on the environment, accounting fills an expectation role, to measure environmental performance. The status of environmental awareness provides a dynamic for business reporting its environmental performance. Examining the integration of environmental policy with business policy is the focus of this research. The business firm's strategy includes responding to capital and operating costs of pollution control equipment. This is caused by increasing public concerns over environmental issues, and by a recent government-led trend to incentive-based regulation. This paper describes the environmental component of the business strategy, producing the required performance reports and recognizing the multiple skills required to measure, compile and analyze the requisite data. Special

emphasis of the research is on generation of reports and their standards, for the range of business and regulatory purposes. Copyright © 2004 John Wiley & Sons, Ltd and ERP Environment.

Received 18 October 2002

Revised 12 May 2003

Accepted 9 July 2003

INTRODUCTION

Environmental accounting is an inclusive field of accounting. It provides reports for both internal use, generating environmental information to help make management decisions on pricing, controlling overhead and capital budgeting, and external use, disclosing environmental information of interest to the public and to the financial community. Internal use is better termed environmental management accounting (Bartolomeo *et al.*, 2000).

For the purpose of this research, both internal and external uses are considered. The contribution of multiple disciplines provides a base for determination of environmental impacts and related costs. Specific details of that determination serve one or both of the uses.

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Impact of business activity on the environment is found in several forms.

- *Media*: air, water, underground pollution.
- *Targets*: drinking water, land and habitat for endangered and threatened species.
- *Global sites*: oceans, atmosphere, land mass.

An array of pollutants, including toxic, hazardous and 'warming', is accountable to business activities. From this range of environmental impacts, multiple disciplines are needed for analysis of effects, and for integration into management decisions and accounting reporting.

Non-accounting disciplines needed include

- (i) environmental science,
- (ii) environmental law and regulation,
- (iii) finance and risk management and
- (iv) management policies and control systems.

The range of environmental costs, energy and material use and waste disposal, insurance and fines and penalties, shows participation of multiple disciplines, along with accounting sub-disciplines. The yield of this effort is the decision support system, in which environmental impact can be determined specifically in the following terms:

- FCA, full cost accounting,
- TCA, total cost assessment,
- LCC, life-cycle costs,
- LCCA, life-cycle cost analysis, and
- TQEM, total quality environmental management.

Results of environmental reporting include full-cost pricing and 'eco-accounting'. Also, an environmental management system, EMS, provides a databank of environmental performance data, from which environmental cost accounting, ECA, relating all environmental costs, can be directly produced (Lally, 1998).

Cross-functional goals and procedures indicate that business policy and environmental policy are intertwined (Dorweiler and Yakhou, 2002); see Figure 1.

- Senior managers at the institutional level establish environmental policy and assess environmental performance.
- Environmental managers at the operational level implement environmental policy.
- Environmental staff is involved in capital decision-making for environmental control equipment.

So multiple functional activities are included: capital budgeting and expense budgeting; financial and non-financial performance measurements; budget control and product costing. Multi-disciplinary teams have a clear distribution of tasks and functions, at institutional levels and at operational levels.

Note that relationships in environmental reporting are integrated. The data sources are based in design, engineering and operations records, rather than broad areas such as energy costs and waste minimization. The extensive data are converted as input to the accounting system.

A side benefit is the decreased need for allocation of environmental costs to products and processes. Also, the nature of environmental costs determines the capital investment assessment method. Discounted-cash flow is preferred, rather than payback period, given the longer time horizon for benefits from environmental capital investment (Grinnell and Hunt, 2000).

ENVIRONMENTAL ACCOUNTING

Before tracing the role of business strategy and environmental accounting, a base understanding of environmental accounting is useful. This is the purpose of the following.

At the outset, environmental accounting has proceeded through a period of uncertain status. Mathews (1997) describes the development in four phases:

1970s	descriptive, with normative models of conduct;
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<u>BUSINESS POLICY</u>	and	<u>ENVIRONMENTAL POLICY</u>
	MISSION	
Boards of Directors and Institutional Investors		Constitution Environmental policy Corporate sustainability
	STATUS-ANALYSIS	
Business purpose		Environmental protection
	GOALS	
Use of resources		Responsibility to environmental principles*
Capital		NEPA prevent environmental degradation
Workforce		Media, location
Markets		
	OBJECTIVES	
Performance targets by location, market		Statutory policy Statutory standards
	STRATEGY	
Compliance at maximum cost effectiveness		Compliance within standards and preserving the environment
	IMPLEMENTATION	
Supply chain		Neighbors, community sustainability of resource use
Manufacturing		
Distribution system		
	TACTICS	
Set mode of operations for maximum productivity		Use of resources material, energy, other natural resource 'greening' product, process
	OPERATIONS	
Optimize production		Avoid violations
Minimize waste within operating guidelines		Emissions, discharges of pollutants
Operate within permit		
	MONITOR & CONTROL	
Financial statements		Environmental impacts 'Voluntary Environmental Reporting Initiative'
Operations reports		
Financial and Management Accounting	comparability transparency	Environmental Accounting
	STRATEGIC ADJUSTMENTS	
Redeploy resources		Volunteerism**
Correction tactics		Agreement with agency
Implementation		

*environmental principles: Valdez principles.

**Voluntary Environmental Reporting Initiative – VERI.

Figure 1. Integrating business policy and environmental policy (Dorweiler and Yakhou, 2002)

1981–1990	debate on the role of accounting in disclosing information on environmental activities;	now	the role of environmental accounting is viewed as measuring environmental performance exceeding regulatory standards. This role was initiated in about 1996.
1991–1995	maturing of environmental accounting, in making environmental disclosures, and in launching environmental auditing;		



An environmental accounting framework is yet to develop; such a framework would contribute standards for reporting, and standards for accounting. The state of the regulatory framework is given by Mathews (1997). The emphasis of a framework is to provide a general fit over the area regulated:

- (i) raise awareness of environmental issues;
- (ii) develop guidelines to assist identification of environmental issues and evaluation and reporting of those issues;
- (iii) provide education programs across disciplines focused on environmental issues and their accounting treatment and
- (iv) develop practices of environmental accounting, with recommendations on best practices.

A fifth direction is to link teaching with developments and practices in business.

Such a framework is to demonstrate that the accounting profession is accepting the challenge of a contemporary issue: environmental impact of business activity (Medley, 1997). Accounting professionals appear to focus on the role of environmental accounting, under consideration that environmental issues are fundamental to human survival. The nature of environmental accounting practice is considered next.

Environmental management accounting

Environmental management accounting (EMA) is defined as the generation, analysis and use of financial and related non-financial information, to support management within a company or business (Bartolomeo *et al.*, 2000). EMA integrates corporate environmental and business policies, and thereby provides guidance on building a sustainable business.

EMA analyzes environmentally related financial costs and benefits, contributing to recognition of the high and increasing levels of capital and operating expenses, for pollution control equipment, and environmental taxes. Also, possible environmental initiatives, for

example, incentive-based regulation, are incorporated in analysis and reporting (Fryxell and Vryza, 1999).

Environmental cost accounting

An advanced step of development of environmental accounting is development of environmental cost accounting (ECA). Cost accounting is defined as use of the accounting record to directly assess costs to products and processes (Lally, 1998). In this approach, costs are accounted for by their specific causes.

Environmental cost accounting directly places a cost on every environmental aspect, and determines the cost of all types of related action. Environmental actions include pollution prevention, environmental design and environmental management. Past approaches on environmental impacts were based mainly on environmental cleanup costs and past product disposal.

The contribution of ECA is to account for a way of doing business; see Box 1. Arbitrary allocation of environmental overhead is eliminated or reduced, and true costs of products are determined. Environmental cost accounting in producing environmental costs is described in two ways (Grinnell and Hunt, 2000).

- One is the A–B–C framework, looking for ‘cost drivers’ at organizational levels: unit, batch, product-sustaining and facility.
- The other is a cost-of-quality framework, which defines environmental costs in prevention, appraisal and internal and external failure. This cost-of-quality approach supports pollution prevention as an appropriate management strategy.

Another significant contribution of ECA is its linkage to ISO 14000. The environmental data in an environmental management system (EMS) based on ISO 14000 standards is consistent with environmental cost accounting. Where a company adopts ISO 14000 standards,



Box 1. Environmental accounting practice in Europe (Bartolomeo *et al.*, 2000). Environmental management accounting practice in Europe is compared with practice in the United States.

Environmental management is based on management accounting with activity-based costing as a main analytical approach to determining environmental costs and to quantify cost savings due to environmental performance.

Environmental effects are established by setting hypotheses for whether or not to adopt proactive practices: pollution prevention and accounting for environmental costs-to-causes.

Environmental policy can be compared between the US and Europe. Environmental management is found to be involved in the same activities with a substantial difference in regulatory enforcement: the US uses liabilities and penalties while the European Union does not. Equivalence is shown by the prominent role of environmental management in European business organizations and business strategies. European companies are adopting ISO 14001 standards at a faster rate than US companies.

As noted in the body of the paper, the International Standards Organisation develops standards for use independently or for use within an EMS by an organization.

ECA is a tool, part of a process for treating the environment as integrated with (i) business strategy and (ii) decision-making (Lally, 1998).

INTEGRATING ENVIRONMENTAL POLICY IN BUSINESS STRATEGY

Development and implementation of new business strategies for meeting environmental challenges will be a central issue for companies in the years ahead. Accounting for environmental costs, and associated accounting education, will play critical supporting roles.

The adoption of environmental policy as a component of business policy is currently considered voluntary (Gallhofer and Haslam, 1997). The term adoption implies that business policy was without express concern for the environment, and since the mid-1990s

environmental policy has become a proactive decision of business organizations.

An alternative view is given as business's response to a threat of interventionist regulation. An organized lobbying effort, to forestall additional, more interventionist regulation, has been unsuccessful through the history of environmental protection since the 1970s (Mathews, 1997). Further, the cost of response to increasing regulation provides a real incentive to adopt a proactive approach to the environment.

The proactive approach is not only more cost-effective, but it also opens new business avenues; see Table 1. For new business, worldwide and in 'green' markets (eco-labeling and recycling), opportunities are open to a company that is expressly environmental, not necessarily an extreme 'green' company.

From new avenues, cost savings are achieved through energy conservation and waste minimization. These savings, which increase profitability, are generated by production and engineering disciplines. For example, the contribution from strategic management specialists and the technical expertise required to address product problems of recycling and re-engineering will be jointly necessary in the development of strategies of reducing impacts on the environment. In both approaches, the company's competitive advantage is improved.

The interdisciplinary approach to environmental accounting

An inescapable feature of environmental accounting is the need for multiple disciplines. Inescapability is found in several dimensions of environmental accounting (Grinnell and Hunt, 2000).

- First is the need to position environmental policy in the overall business policy and strategy.
- Second are the disciplines involved in producing environmental accounts and their reporting.



Table 1. Business uses of environmental accounting data (Gallhofer and Haslam, 1997). The integration of environmental policy with business policy has been adopted by enterprising business companies; see Figure 1. This action provides costs savings, avoiding regulatory processes, and finding new business opportunities. Business uses are described in program terms and the targets for the programs.

Program	Target
<i>Government directed</i>	
Common sense initiatives	Pollution control
Transportation partners	Use of vehicles
Green Lights Program	Energy efficiency
Waste Wise Program	Recycling
Climate Wise Program	Emissions control
<i>Corporate sponsored</i>	
Proactive environmental policies	EMS, ISO 14001
Environmental accounting and auditing	Performance
Environmental life-cycle and supply chain management	Products and suppliers
Integrated environmental program	EMS and full-cost accounting

- Third is the audit requirement to assure compliance with environmental regulation and appropriate reporting by environmental accounting.
- Fourth is education of students, future practitioners, to provide technical and legal bases in academic preparation and to avoid 'discipline insularity'.

Possible reasons for multiple disciplines given by Mathews (1997) include organizational legitimacy and the need to influence the capital markets. There are other motivating factors, whose relative importance of any particular influence is not known in general.

The contribution of other disciplines must be recognized. Accounting research will need to be interdisciplinary in nature. Development will provide challenges and opportunities different from those of the past, but, also, will lead to a much richer set of data, or more comprehensive set of models for the solution of problems of environmental disclosures (Bebbington, 1997).

Producing environmental accounts

A concise way to view the disciplines involved in producing environmental accounts is to

consider users of the accounting reports. An array of goals for users is aligned as follows (Bebbington, 1997):

- to assure compliance with regulations;
- to increase efficiency of resource use energy and material, and to decrease waste;
- to reduce or minimize damage to the environment over the life-cycle of products and processes and
- to continually improve environmental performance in the above areas.

These goals are direct goals for operational managers, and are integrated goals for general management and for environmental managers; see Figure 1.

Training environmental auditors

Environmental auditing is a determinative function (Medley, 1997). Credibility of the environmental audit is crucial. From a discipline point of view, environmental scientists initially performed the audit. That audit was to determine compliance with regulation. It has since advanced to determine compliance with management's environmental controls, noted above to be higher requirements than statutory.



A discipline development is to train environmental auditors separately from financial auditors (Medley, 1997). This development again places impetus on standards in environmental accounting; these are reliable measures of environmental impact, assets and liabilities. The audit is thereby based on reliable environmental representation in the accounting record and performance. The environmental scientists have reduced their knowledge into the accounting records, along with non-environmental accounts (financial accounts), to the performance analysis. In this way, accountants are offered environmental opportunity and are prepared to deal with those demands.

It is recognized that the enabling potential of environmental accounting arises from its *engagement* with practice (Bebbington, 1997). There are clear examples of business and environmental accounting having beneficial impacts on the environment within business activity. These areas, and users, identify data gathered for accounting purposes. Specifically regarding environmental accounting, quantifying environmental costs is a target within accounting. The extent of disciplines needed is seen from generating environmental cost and cost savings within complex, interdependent processes and facility locations.

The weight of non-accounting disciplines is shown in education of accountants on environmental activities (Gibson, 1997). The multi-discipline approach is useful as it involves potential users in the same education effort. The operational managers are shown the need for data and the nature of environmental reports. General management is shown potential for improvement in environmental performance.

Educating environmental managers representing the multiple disciplines is important for base line reasons (Wycherley, 1997). Operational managers consider that accounting systems are created for financial purposes and not for the operational needs in their managing and controlling environmental impacts of

products and processes. (See below 'Environmental management'.)

INTEGRATING THE ENVIRONMENTAL DEPARTMENT WITH BUSINESS FUNCTIONS

An objective of integration of the environmental management department with operational functions is to enhance environmental performance of the organization (Fryxell and Vryza, 1999). So the levels and the mechanisms of integration, to achieve improved environmental performance, are of organizational interest.

One level of integration is aimed at involving environmental considerations in every day decisions. That integration is based at the level of adopting a corporate culture into environmental awareness. This crucial approach puts the impetus for considering environmental impacts into business strategy and decisions.

The other level of integration is organizational, deciding which business functions are to be integrated. As functions have a conventional purpose in the hierarchy of the organization, integration takes the form of coordination. Organization theorists identify such mechanisms as conventional and as non-conventional. Non-conventional is in the context where the environment exerts direct influences on the organization through regulations, international standards and shareholders.

The two sets of integration mechanisms are the following (Fryxell and Vryza, 1999):

<i>conventional</i>	<i>non-conventional</i>
department schemes	cross-departmental relations
central decision-making	management information systems
written policies and procedures	<i>ad hoc</i> group mechanisms
formal planning	integrator roles
output and behavior control	socialization



It is recognized that conventional mechanisms exist, and are displaced by non-conventional ones to cope with time-oriented changes; these changes are in the environment or are required environmental performance.

Environmental management

From these needs and mechanisms, the function of an environmental management department is to facilitate integrative development. To achieve this integration, the department is responsible for the following (Wycherley, 1997):

- scanning and monitoring the changing environmental context of the business;
- identifying critical information;
- requiring change to environmental practice and performance;
- validating and channeling the information to ensure compliance with regulatory mandates.

Note that these functions may constitute both direct influences and contextual change.

Each function represents a discipline specialization, and hence makes a unique contribution to environmental performance (Fryxell and Vryza, 1999). Resolution of differences is the clearest for technical functions (production and legal), and is most complex for non-technical functions (marketing and public relations). The long-run environmental goal brings a balanced, optimal level among the functions.

The environmental management system

A useful vehicle for integration is the environmental management system (EMS), with ISO 14001 standards; see Box 2. The EMS integrates functions through each function's interfacing with input and output of that system.

The means toward activating an EMS are found in outcomes from the EMS:

- reduction of emissions and waste,
- product design for the environment

Box 2. A business environmental management system (Sutherland, 2002).

Goal: Shaping environmental success Setting and attaining goals for sustainable future responsibility shared by all sectors: government, industry, environmental groups and citizens
Goals for 2010 Fully implement globally environmental policy Promote environmental ethics Implement principles of sustainable development and eco-efficiency into business strategies
Guiding principles and environmental code Community awareness and emergency response Process safety code Employee health and safety code Product stewardship code Distribution code Pollution prevention code
Business principles Company values Re: people, customers, products and services, conduct code and guiding Principles
Auditing performance management Auditing program Business standards Government regulation Industry initiative Environmental health and safety auditing plan Frequency and level

- energy efficiency and conservation and
- opportunities to enhance environmental impacts.

The EMS provides control and coordination by the environmental management department. The reason is to cover gaps due to functional differences in departmental roles (Fryxell and Vryza, 1999):

- (i) bridge differences in basic values, due to specialized training;
- (ii) communicate, avoiding technical jargon;



- (iii) recognize separations in organization and location;
- (iv) resolve expectations on rewards and conflicts on reward criteria.

These differences are viewed as conflicts. In the conflict situation, integration is viewed as a resolution by alignment of the organization with the firm's environmental goal.

The corporate EMS is identified as based in surpassing environmental obligation under regulation. The EMS is said to provide specific tools (including life cycle accounting and environmental cost accounting), and, also, general practices to evaluate environmental performance. Environmental auditing is a main evaluation mean.

Rondinelli and Vastag (2000) suggest that a voluntary, above-regulatory-standard approach is needed to advance national environmental policy. Interdependent principles of economic viability, energy conservation and environmental quality constitute a comprehensive environmental policy, and are given as the needed impetus. Basing the EMS on ISO 14001 standards puts the corporation in global markets and provides a competitive advantage (Owen and Lehman, 2000).

The corporate environmental policy

Rondinelli and Vastag (2000) make the case for a corporate environmental management policy. After reviewing the present status of US environmental regulation, as command and control, Rondinelli and Vastag show that the proactive approach to environmental management consists of

- life-cycle analysis of products and processes,
- environmental policies of companies in the supply chain,
- recycle, remanufacture and redesign of products,
- monitoring and auditing environmental performance and
- accounting for environmental costs and savings.

Environmental management should be part of every corporate business strategy. Not only are there specific environmental effects in strategies and plans, but there are also environmental programs to reduce and prevent environmental impact.

Corporate environmental policy and the environmental management system

Benefits of an EMS, utilizing ISO 14000 (see Table 1), provide a competitive advantage on a worldwide basis. Competitive advantage is over companies that do not have a high level of environment performance from such an EMS.

From this integrative view of an EMS, major components of an EMS are described as an operational approach to its implementation (Rondinelli and Vastag, 2000):

- a senior management commitment to an environmental policy;
- a planning process that identifies all environmental aspects of operations, sets objectives for environmental improvement and outlines effective environmental management programs;
- a structure of responsibility for environmental management, training, awareness and competence, documentation and communication, procedures for control of environmental impacts and preparation for emergency preparedness and response;
- a system for monitoring and measurement, for reporting non-conformance and for taking preventative and corrective actions and
- a management review process, to assess the effectiveness and adequacy of the EMS.

The design of the EMS is to provide assurance of continuous improvement of performance.

Development of environmental standards

A main premise of the EMS is use of standards of an international nature (ISO 14000); see



Box 3. This use of internationally based standards provides a comparison to ascertain whether companies are complying with expected environmental performance.

There are dual problems with this approach. One is the assumption that the company is using the standards to go above legal

compliance with their environmental performance. The other potential problem is responding to inquiries based on these enhanced measures of environmental performance by government agencies, financial institutions and shareholders.

Box 3. ISO development of environmental standards (Lally, 1998).

The international environmental management standards are set in the ISO 14000 process. The resulting standards are voluntary for a company and are higher standards of performance than from regulation. The standard-setting process was set as part of the Global Environmental Initiative in 1992 in connection with the UN Conference on Environment and Development.

Key advantages of ISO 14000 are

- (i) to set environmental performance standards above regulation and
- (ii) to set the company as environmentally alert.

The first advantage moves the company above an increasingly complex set of regulations, yet in full compliance. The second advantage puts the company into an internationally competitive position in markets. Both are achieved by incentives to adopt pollution prevention practices.

The following are components of the ISO 14000 standard-setting process:

- ISO 14001 – the basic framework of an EMS; implements corporate environmental policy
- ISO 14004 – a checklist to implement ISO 14001 and method to assess environmental impacts
- ISO 14031 – setting objectives and targets of EMS
- ISO 14010 – guidelines for environmental auditing
- ISO 14011 – guidance for audit procedures
- ISO 14012 – qualification criteria for environmental auditors
- ISO 14020 – standards on environmental labeling
- ISO 14040 – guidance for assessment of product life-cycle environmental impact

Environmental cost accounting (ECA) is the integrating feature of an EMS. All elements of environmental measures are brought together in the ECA calculation. By recognizing the complete set of environmental costs, the company can be both environmentally responsible (for example, Responsible Care program) and cost-effective in recouping its costs.

Role of environmental manager

The environmental manager is a central focus of environmental management in the company. Key roles of this management function are (Wycherley, 1997) to

- assess, review and monitor the environmental performance of the company,
- monitor legal requirements,
- implement and manage the EMS and
- promote better environmental awareness in the company.

The function has a wide range of responsibilities. The more direct are

- at the base level, systems to ensure compliance with environmental standards (regulatory and EMS),
- at an on-going level, increasing efficiency in use of resources and reduce waste, and
- at an overall level, avoiding risks of damage to the environment.

An integrative view of these responsibilities includes involvement in new product and process development, capital project authorization and an environmental stance with shareholders, consumers and employees.

From this pivotal location in the organization, the environmental manager's view of environmental accounting is somewhat determinative of effect. Environmental managers view environmental accounting as providing the financial data with the technical-functional improvements required by the role of the environmental manager. Areas of conflict are identified as accountants' concern over their own costs to the detriment of needs in measuring performance.



A survey of environmental managers (Wycherley, 1997) shows that environmental accounting is considered primarily for providing measures of key environmental data. These costs are used in measuring use and waste, and also as criteria in capital investment projects and targets for efficiency setting. These costs are also used in management control systems to improve operational efficiency, and in EMS to monitor environmental policy.

BUSINESS USES OF ENVIRONMENTAL ACCOUNTING COSTS

A broad view of environmental accounting, and the EMS, includes application of techniques and procedures to support management decision making, performance measurement, recognition and reporting of liabilities and contingencies, capital market reactions to accounting disclosures and taxes (Bebbington, 1997). Tax implications include

- specific environmental taxes,
- appropriate treatment of environmental expenditures,
- pollution allowances as tradable permits and
- general Federal income tax issues.

An example is Superfund surcharge taxes for EPA environmental cleanup.

A construction industry illustration

An illustration of environmental accounting and environmental cost determination shows how 'costs of environmental errors' (CEEs) are treated (Gulch, 2000). In an accounting context, this is an illustration of managerial accounting applied to environmental impacts. Managerial accounting and CEE both provide the full range of accounting treatment; see the introduction.

CEE is designed to determine

- (i) the financial burden of environmental regulation,
- (ii) the impacts on environment and society and
- (iii) the costs of measuring environmental impacts.

CEE is for internal use as managerial accounting providing a business perspective.

From a control perspective, four types of environmental cost need to be recognized: prevention, internal failures, external failures and appraisal. These costs reflect

- costs for prevention or correction of environmental impact in facility construction or use of facility,
- prevention costs related to correction of defects and
- cost of end-of-the-pipe control, preventing repetitive error.

CEE is applicable due to complexity of regulation in the construction industry as reflected by multiple environmental standards and ambiguous formulation of standards. This is likely due to poor knowledge in the content of environmental and other standards in multiple materials.

CEE is indeed a managerial tool with real project uses in the construction industry (Gulch, 2000). The overall effects on the firm include legitimacy, responsibility allocation, creating consensus, facilitation of communication and keeping score. Probably the most significant use is relating costs to causes of errors, more specifically, environmental costs to errors.

ENVIRONMENTAL POLICY VERSUS ENVIRONMENTAL REGULATION

There is a growing understanding that environmental policy must fit within the company's business strategy (Gallhofer and Haslam, 1997). Companies do adopt an environmental policy. The question is whether a voluntary policy should forestall regulation



(interventionist regulation). As environmental policy and environmental performance are expected to be above legal regulation, there is interest to change from regulatory policy to voluntarism; see Figure 1.

An intermittent ground is to avoid regulation of environmental accounting. Environmental accounting is parallel to financial (business) accounting: an environmental plan is developed and budget control established to the plan. Following environmental performance based on the plan, an environmental audit for the environmental impact is performed. By imposing standards on environmental accounting and environmental auditing, the company is left to set standards for performance without regulatory intervention (Reynolds and Reynolds, 2001).

Bebbington (1997) recognizes the realism of actuating impacts on society. The business organization has impact through capital, ownership and societal uses of products and services, with impact on the environment: resources, sinks and habitat. Environmental accounting translates into how environmental management practice adapts to beneficial impact on the environment. From environmental accounting comes accountability for effects on and uses of the environment.

So then, environmental accounting is the enabling vehicle to form a common basis for users of the environment:

- internal (capital, ownership, consumers) and
- external (social-political) controls.

The effective vehicle is environmental reporting (Dorweiler and Yakhou, 2002). Reporting portrays accountability to outside interests. These interests may require openness and transparency regarding the environment, and require change in the organization, changes in business products and processes and change in organization structure. While such changes are early in developing, a projection is for change to occur in other business areas (Bebbington, 1997; Reynolds and Reynolds, 2001).

EDUCATION FOR THE MULTIDISCIPLINE TEAM

Courses provide environmental education across the interdisciplinary range (Gibson, 1997): economics and commerce, environmental sciences, environmental law and environmental accounting.

Business strategy requires environmental planning with measurement and environmental management issues included. This strategic approach requires understanding of environmental law and regulations and integrated decision-making. Consideration of several business areas, financial results and tax effects presents complete effects on a business.

An extended view of accounting and environmental accounting is shared with all disciplines (Grinnell and Hunt, 2000). The objectives of this education are

- (i) environmental protection and
- (ii) sustainable use of resources.

The issues affect disciplines in the operating sphere and in financial effects. Addressing these issues only on the accounting sphere recognizes the contribution of accounting to achieve business goals of profitability and survivability.

Several areas have identified shortcomings in accounting education related to environmental accounting (Gibson, 1997). The range of broad education should be viewed functionally, making the environmental accountant a member of the business team. This business range starts with profit and profitability and covers environmental impact and sustainable use of resources.

CONCLUSION

A contextual view of the need for integration of an environmental policy with business policy, and for a multidisciplinary team, is given from a business perspective:



- the role of accounting in supporting both corporate environmental strategy and corporate business strategy and
- the several accounting sub-disciplines related to environmental issues.

Emphasis on the multi-discipline team is to support a top-level strategy and to achieve the benefits from directing a company in an environmentally sound manner.

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