

# **THE ROLE OF ACCOUNTING IN HANDLING AND REPORTING ENVIRONMENTAL EFFECTS**

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## DECLARATION

This is to certify that the work submitted in this thesis under the title: The Role of Accounting in Handling and Reporting Environmental Effects, is the result of original research. It has not already been accepted in substance for any degree and is not currently submitted in candidature for any degree. All authors and works to which reference has been made are fully acknowledged.

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## ABSTRACT

The thesis investigates the broad areas of accounting's adaptability in handling and reporting environmental effects. The main purposes of the study are: firstly, to draw together the literature of environmental concern and accounting; secondly to establish whether the use of environmental accounting is practised, to ascertain whether there is a suitable medium for environmental reporting and lastly to formulate a theoretical environmental performance model. The overall orientation of the research was to consider whether accounting should break away from its traditional economic and financial principles and broaden its scope to embrace a system that echoes with "environmental concern".

In order to address these issues, the methods of evaluating environmental effects are looked at, together with the methods for accounting and reporting them.

For these purposes, data were collected using a cross-sectional corporate methodology. The instrument used for the survey was the postal questionnaire. The construction and content of the questionnaire were influenced by the information gleaned from the literature review and, in the main, it covered qualitative, quantitative and financial information.

The evidence gathered from the research has shown that environmental accounting and reporting are being practised by a variety of companies and are also becoming more widespread, which demonstrates that accounting is playing an important role in handling environmental transactions. The research has also shown that environmental accounting and reporting are gaining a broader perspective and now embrace environmental management systems, resource efficiency, and general environmental stewardship.

Overall, the study recognises and concludes that environmental accounting and reporting, although spreading, should now be supported by environmental accounting and reporting guidelines from the accountancy profession, and in time, by legislation. Also environmental reports should be verified by external auditors in order to improve their integrity and prevent them from being used as a public relations exercise.

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# CHAPTER 1

## INTRODUCTION

### 1.1 BACKGROUND TO THE RESEARCH THEME

#### 1.1.1 Emerging needs and changes in accounting and reporting

A basic objective of accounting is the need to satisfy the users' needs, for without this objective, the development and evolution of accounting would not have taken place. When accounting was originally developed it could have been defined as a process of recording the financial activities of business. As industry and commerce developed and the mass production of commodities emerged, accounting also had to deal with costing and quantitative data but, although in the process "the social has been brought into contact with accounting...the intermingling of the two has not been explored" (Burchell, S. *et al.*, 1994).<sup>1</sup>

Although, in essence, accounting is nothing more than a technical phenomenon, recent "proposals have been made for [it] to embrace the realm of the social as well as the economic, to objectify, quantify, and thereby give a particular insight into the social functioning of organisations." (Burchell S. *et al.*, 1994).<sup>2</sup> The social function of accounting began in the early 1970s with the emergence of Corporate Social Reporting (CSR) which covered mainly employee-related information, community involvement and to a lesser extent, energy and the environment. The process was not, however, covered by regulation and no systematic/uniform reporting model emerged. Although CSR declined by 1976 (Gray, R. *et al.*, 1987)<sup>3</sup>, environmental disclosure has increased considerably in the last ten years (see Owen, D. 1996 (forthcoming);<sup>4</sup> Gray, R. 1993<sup>5</sup>; Gray, R. 1995;<sup>6</sup> Adams, C. *et al.*, 1995<sup>7</sup>).

At the present time, accounting is called upon to provide users of accounting information with unbiased information (Solomons, D. 1991a<sup>8</sup>, 1991b<sup>9</sup>). Indeed,

"accounting's apparent effectiveness in the business world legitimates its transfer to new domains that are in need of greater efficiency and rationalisation" (Johnson, P. 1995).<sup>10</sup>

### **1.1.2 Demands/expectations from accounting**

Environmental accounting and reporting emerged from a number of other methodologies (for example, financial, social and ecological) and have not yet entirely divorced themselves from them. In particular, environmental data appear in a variety of formats and places in the annual reports of companies. Although the segregation of environmental information may be advisable, the relationship between the different disciplines (e.g. scientific, financial and social) will remain, because of the interlinkages between them. For instance, environmental information may be qualitative, quantitative or financial, and corporate activities may interact with the physical environment and cause damage to natural resources, property and health. In effect, environmental accounting does not fit into the traditional financial sphere of accounting, as it embraces a combination of methodologies.

To fulfil that role, accounting would have to be involved both with the identification and the evaluation of environmental effects. Although this may appear to be a simple task, it represents the biggest challenge that accounting has ever faced, because both (i.e. the effects and their evaluation) have in the past been ignored by industry and the market, and they fall outside accounting's traditional financial domain. Since the economic and ecological systems are interlocked, it is important that their interactions should be evaluated and accounted for. The "increasing environmental awareness on the part of society as a whole has, in recent years, led to increased scrutiny of the impact of industrial and commercial activities upon the environment" (Dennis, J. 1995).<sup>11</sup> There is a need for accounting to "become more

forward looking and, in the present context, to be more aware of potential issues arising from the rapidly changing environmental agenda" (Gray *et al.*, 1993).<sup>12</sup>

In fact, a "more pro-active role and contribution of accounting and accountants to environmental protection is called for...[but] the accounting profession's response is at a surprisingly early and undeveloped stage" (Stone, D. 1994).<sup>13</sup> Accounting's involvement in environmental issues is required both before and after the event, i.e. to establish and verify the effects at the product development stage and at the production and consumption stage. David Collison (1995), reporting on the proceedings of the FEE (Fédération des Experts Comptables Européens) Workshop states that the "discussions were targeted on :- strategic issues of positioning the profession in the environmental field, i.e. environmental reporting and auditing".<sup>14</sup> Although the need for and awareness of accounting's contribution to environmental issues have become more pronounced since the 1970s, when some environmental aspects first appeared in corporate reports, the debate over them is still continuing. One should not underestimate "the immense task inherent in attempting to develop a comprehensive green reporting system encompassing the issues of renewable resource use, pollution control and pro-environmental activities." (Owen, D. (ed), 1992).<sup>15</sup>

In conjunction with the problems arising from environmental degradation, accounting has to deal with the accounting aspects arising from the concept of sustainable development which has been popularised by the publication of the Brundtland Report (WCED, 1987)<sup>16</sup>. Also, the European Commission's Fifth Action Plan<sup>17</sup> on the environment, "Towards Sustainability" sees "accounting mechanisms [having] a pivotal role to play in the achievement of sustainable development" (Stone, D., 1994).<sup>18</sup> But although environmental accounting is seen as capable and is expected to play a major role in corporate environmental performance, it "is one

of the least developed areas of companies' responses to the sustainability agenda" (Gray, R. and Bebbington, J., 1994).<sup>19</sup> Quite apart from the beneficial aspects for the environment that accounting can help achieve, the "simple fact that environmental issues now clearly affect the "bottom line" for many companies and are reflected in asset values and liability provisions figures" (Owen, D., forthcoming)<sup>20</sup>, make it necessary for management to develop and implement environmental accounting systems in order to manage and control environmental effects, and to provide the relevant information for environmental reporting purposes.

### **1.1.3 The challenge to accounting and reporting**

Obviously, there is a need for environmental accounting and reporting which has not, so far, been fulfilled. According to Ullman, A.(1976) "accounting no longer serves its purpose of providing the information necessary for an effective allocation of scarce resources and for the fulfilment of the organizational goals".<sup>21</sup> It would seem that the gap between the corporations' accounting "needs" and "accounting technology" has not been narrowed over the last twenty years.

Although there are a number of definitions of environmental accounting, no standard definition exists. Simon Gao (1995) believes that "the term "environmental accounting" could be used, for example, in the general sense of "taking account of the environment" or in the much more specific sense of setting up some sort of double-entry bookkeeping of environmental activity....[and] will cover: accounting for contingent liabilities/risks; accounting for asset valuation and capital projections; cost analysis in key areas such as energy, waste and environmental protection; investment appraisal to include environmental factors; development of new accounting and information systems; assessing the costs and benefits of environmental improvement programmes; developing accounting techniques which express assets and liabilities and costs in ecological (non-financial) terms"<sup>22</sup> In brief,

the major function of environmental accounting (and reporting) is to provide *any* environmental information which might satisfy the users' needs.

It would follow from the above developments, or rather lack of them, that accounting has been procrastinating in its environmental response and as a result, it has been criticized by a number of writers (see, for example, Gray *et al.* 1993<sup>23</sup>, Rubenstein, D.B., 1992<sup>24</sup>; Maunders, K.T. and Burritt, R., 1991<sup>25</sup>). Although there are no easy environmental accounting answers or quick solutions to environmental problems, it is unlikely that it will be necessary for "the very framework of conventional accounting.....to be rebuilt from scratch" (Gray *et al.*, 1993).<sup>26</sup> Although this lack of faith in the ability of traditional accounting to deal with environmental issues may be overpessimistic, it demonstrates the magnitude of the problems involved as the consequences of environmental degradation increase. However, this research demonstrates that it is the complexities and magnitude of the environmental problems which hinder progress. In this research, the efficacy of traditional accounting is used to examine its ability to transform environmental data into meaningful accounting records and reports.

## **1.2 PURPOSE OF THE STUDY**

The above background to the study reveals that there is an urgent need for the development of environmental accounting and reporting systems. As the research shows, a number of approaches/methods are being used/developed, but none has emerged as a uniform standard or model for a wider and general use. Traditional accounting is facing a challenge which has not yet been resolved. In view of the nature of environmental problems and the demands on accounting (discussed briefly in the previous section), the research investigates a number of methodologies which aim to demonstrate that accounting can play a major role in environmental concern.



The purpose of the research is first of all to examine and understand the causes, effects and influences of environmental degradation, and secondly, to consider and assess the methods used to conduct environmental evaluation and to control, record and report environmental effects. This work will demonstrate the feasibility of traditional accounting to develop/evolve in such a way as to fulfil the needs of organizations with regard to environmental effects. Such a system would serve as an instrument for management to fight, control, evaluate and manage the consequences of environmental effects and resource efficiency and to demonstrate their accountability.

The literature review, which is reflected throughout the thesis, is used to assess *inter alia* the adaptability of accounting, in order to determine and develop the methodological framework which guides the direction of the study. The empirical study was thus extended by the development and use of a questionnaire survey, which was directed towards those who are directly affected by/involved with the problem (i.e. large industrial and commercial organisations). The outcome of the questionnaire survey is used to extend, reinforce or refute the environmental accounting and reporting practices (or lack of them) which were evidenced from the literature review.

The study adopts a positivist methodology as regards the feasibility of traditional accounting's capacity to expand and embrace qualitative, quantitative and scientific data in order to facilitate the process of recording, controlling and reporting environmental effects. Its ultimate aim is not prescriptive but demonstrative; it shows that although accounting can be developed into an instrument for environmental control and management purposes, it cannot enforce its functionality on management because corporations react to their own order of values. Indeed, any attempt to generalize its acceptability would be conditional on society having

to also accept other sets of values, such as the efficient use of resources and the protection of non-renewable natural resources. Environmental accounting and reporting are shown to be merely instruments for pursuing such values.

### **1.3 STRUCTURE OF THE THESIS**

In addition to this introduction, the study comprises five further chapters; details of their organisation are given below. As already mentioned, the literature review is reflected throughout the thesis, and no separate chapter is used for that work.

Chapter two presents the environmental debate in relation to the causes and influences of environmental effects. This chapter identifies the root of environmental problems and the societal influences which reveal that they are indeed endemic. It is shown here that the entire fabric of Western standards and way of life depends on an ever spiralling exploitation and consumption of resources, the corollary of which is the manifestation of environmental degradation and resource depletions. The second part of this chapter deals with the social, institutional and governmental implications with regard to environmental issues.

Chapter three analyses the problems of monetization of environmental effects and the consequences of discounting on resource depletion. In the second part of this chapter, the methods of accounting and reporting environmental impacts are considered. The work and ideas emerging from this chapter are used to formulate the questionnaire survey which is used later in the research. The last section of this chapter deals with the evolution of environmental accounting and demonstrates some insights into a number of accounting roles. The accounting craft is also examined in relation to its ability to evolve and adapt with regard to the environmental dimension. It is argued that accounting can be a social tool which is now called upon to deal with environmental issues. The picture presented in this

chapter clearly demonstrates the constraints arising from the problems of environmental evaluations and the sluggishness of accounting developments.

Chapter four demonstrates the conceptual framework used and the methodology and design are explained, together with the aims of the study.

Chapter five deals with the collection, analysis and evaluation of the results of the survey. The questionnaire survey was developed and carried out after the literature review and the work of previous chapters and was used to solicit information from UK companies about their actual environmental policies and reporting practices. In the last section of this chapter, a theoretical Environmental Reporting Model is developed.

The concluding chapter reviews the research carried out and evaluates the insights gained and achieved. The purpose of this chapter is to assess whether the questions posed have been answered. Finally, it provides a discussion of the main findings of the research, and the conclusions drawn from it.

Each chapter begins with an introduction which puts the contents of the relevant subject within the context of the various themes of the thesis and ends with a conclusion.

A number of appendices are included at the end of the thesis. In particular, a copy of the questionnaire survey is included as appendix B and appendix F includes a number of published articles which have arisen directly from this research.

#### **1.4 SCOPE AND LIMITATIONS OF THE STUDY**

The main emphasis in the research has been concentrated on the identification of the obvious environmental effects and their external reporting. Thus, the scope of the research is primarily concerned with the accounting and reporting issues which underlie the environmental dynamic of the performance and reports of companies.

Because of time constraints the questionnaire survey was restricted to UK companies only, and the literature review covered mainly UK and North American literature. Although references were made to the environmental accounting and reporting developments of Western Europe, it must be recognised that the results are confined to the UK.

Also, although the subject of environmental evaluations was considered, the actual segregation of a great deal of environmental costs (most of which are embedded in normal costs, or are hidden in externalities) has not been examined. In addition, the identification of the various types of expenditure which could be classified as environmental has not been investigated.

Therefore, in order to obtain a clear and more comprehensive picture of environmental accounting and reporting, it would be helpful if further research were undertaken in order to identify all possible types of environmental costs (and there must be a great number of them) and to segregate the environmental costs which are embedded in normal costs.

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## **CHAPTER 2**

### **THE ENVIRONMENTAL DEBATE**

#### **2.1 INTRODUCTION**

Accounting's involvement in handling and reporting on the effects of environmental degradation requires first a detailed understanding of the problem. This chapter examines the extent to which the state of the environment bears evidence of environmental degradation.

In order to put the problem into perspective, it is necessary to investigate firstly its existence and secondly its causes and influences. Without a thorough understanding of the subject, it would not be possible to identify the means of addressing it, and whether accounting can handle the relevant effects.

The debate about the causes of environmental problems and the state of the environment centres around the human malpractices in the exploitation of resources. In particular, the problems caused by pollution and population are examined in relation to eco-efficiency and eco-justice.

The environmental influences which are being exerted by various national and international institutions, pressure groups and governments on the environmental behaviour of people, industry and the financial markets are also examined, in particular how environmental law is being introduced as a result of EC and international pressure and how green consumer pressure forces producers to convert to environmentally friendly processes and products.



## **2.2 ENVIRONMENTAL ISSUES**

### **2.2.1 Manifestations of environmental degradation and accounting**

"To defend and improve the environment for present and future generations has become an imperative goal for mankind"

(The Declaration of the U.N. Conference on Human  
Environment, Stockholm, 1972)<sup>1</sup>

For such a declaration to be made by the U.N., it must have been considered absolutely necessary. The declaration implies that the environment might have already been damaged or is likely to be damaged in the future; that the environment is under threat and it is the responsibility of humankind to protect it by adopting environmentally friendly production methods and better environmental management and accounting techniques.

As it will be shown in the next chapter, accounting in the last two decades has also been portrayed as a window of the social functioning of organizations and society. Therefore, the "imperative goal of humankind" (considered necessary by the U.N.) to deal with environmental problems must encompass the help of the expanded role of accounting.

An environmental problem can be "defined as a degradation of natural capital and consequent decrease or loss of its service flows" (Markandya A. and Richardson J.,(eds.) 1992)<sup>2</sup>. Environmental problems therefore include: soil erosion; desertification; deforestation; water shortage; loss of biodiversity; urban congestion, noise; over-fishing; over-grazing; air, water and land pollution. The environmental debate covers not only the quantity but also the quality of natural resources, both renewable and non-renewable. The state and quantity of environmental resources affect the existence, quality and continuity of life. It would follow that

environmental degradation " is the diminution of the environment in quantity and its deterioration in quality" (Markandya, A. and Richardson, J. (eds) 1992)<sup>3</sup>. For example, the following environmental resources and their problems, which have been extracted/deduced from Panayotou, T. (1992)<sup>4</sup>, demonstrate clearly the two types of deterioration.

<b>Resource</b>	<b>Quantitative problems</b>	<b>Qualitative problems</b>
Land	Shortage/scarcity	Soil erosion, waterlogging, salinization, contamination
Water	Shortage	Pollution, contamination
Forests	Loss of size/area	Deforestation, loss of diversity and usefulness
Fishing	Over-fishing	Quality of catch, contamination
Diversity & Biodiversity	Reductions/extinctions	Poor/loss of substitutability, loss of option value
Ozone	Depletion	Loss of protective/assimilative capacity.

The significance of diversity and biodiversity is best put in perspective in relation to the future. In particular, they allow substitutability, which strikes a balance in resource use, thus reducing the risk of scarcity and providing security for the future. Biodiversity covers the vast variety in species, many of which are threatened with extinction. Obviously, the value of biodiversity lies in its large range in the pool of genes and its continuity would keep open future options to ensure the richness and wonder of life on the planet for the benefit of future generations. There are no "compelling economic reasons to counter the irreversible loss of uniqueness, diversity and future options". (Markandya, A. and Richardson, J. (eds), 1992).<sup>5</sup>

Since the assessment of environmental problems is expressed in terms of

environmental quality and quantity, any accounting for the environment would have to take account of, or begin with, qualitative and quantitative terms. In order for them to be brought within the financial domain of the market, they need to be ascribed monetary values as well, wherever practical. Many environmental resources, for example, the atmosphere and the oceans, are common property and as such, are not owned, and not priced, and are left out of the market. This renders them vulnerable to excessive use and misuse at the expense of the present and future generations.

Environmental degradation creates a multitude of problems which manifest themselves in qualitative and quantitative terms. For accounting to play an effective role in "defending and improving" the environment, it must be able to handle qualitative and quantitative environmental data and apply financial values as far as possible to them. These three modes of expressing environmental information, (i.e. quantitative, qualitative and financial) are pursued throughout the thesis as the means for accounting to play a role in the environmental dimension.

### **2.2.2 Sustainable development and accounting**

In 1988, Mrs Thatcher proclaimed that "The Government espouses the concept of sustainable economic development. Stable prosperity can be achieved throughout the world provided the environment is nurtured and safeguarded. Protecting the balance of nature is therefore one of the great challenges of the twentieth century...."<sup>6</sup>

Mrs Thatcher's espousal to sustainable development came soon after the publication of the Brundtland Report (WCED, 1987) which defined it "as development that meets the needs of the present without compromising the ability of future generations to meet their own needs".<sup>7</sup> This has attracted considerable political

interest and academic research, but so far, the actual operationalization of the principle remains superficial and a task for further research. (see, for example, Drummond, I. and Marsden, T.K., 1995<sup>8</sup>; Gore, A., 1993<sup>9</sup>; Hawken, P., 1993<sup>10</sup>; Sachs, W., (ed), 1992<sup>11</sup>).

However, the concepts, implications and means of achieving sustainable development have opened up a lively economic and social debate. According to MacNeill, J. *et al.*, 1991 "the obstacles to sustainability are not technical; they are social, institutional and political".<sup>12</sup> For sustainable development to be achieved, there must be: a reduction in the population (Angell, D.J.R. *et al.*, (eds), (1990)<sup>13</sup>; in consumption (Meadows, D.H., *et al.*, 1992)<sup>14</sup>; a change in current economic/production methods (Gray, R. and Bebbington, J., 1994)<sup>15</sup>; and in general an improvement in eco-efficiency and eco-justice (Stone, D., 1994).<sup>16</sup>

These two concepts of sustainability, although intertwined, are in fact distinguishable. Eco-efficiency deals with the continuing improvement in the wise and efficient use of resources and is well integrated into Western modes of production and free market systems (see, for example, Gray, R. and Bebbington, J., 1994<sup>17</sup>; Gore, A., 1993<sup>18</sup>; Stone, D., 1994<sup>19</sup>). In particular, eco-efficiency practices include improvements in: waste reductions, recycling, pollution control, conservation and environmental protection. In other words, it is the continuous process of reducing inputs/costs and increasing outputs/revenues, thus improving efficiency, competitiveness and protecting the environment. As such, eco-efficiency does not conflict with existing standards and the Western way of life; it does not require any sacrifices to be made for future generations and does not deal with any current social issues. No matter how successful eco-efficiency is, it cannot alone achieve sustainable development and "it is misguided or even deceitful to equate sustainable development with efforts to improve eco-efficiency."(Stone, D., 1994)<sup>20</sup>.

Eco-justice. on the other hand, provides the social dimension to sustainable development and as such it is "concerned with:

1. inter-generational equity (holding the scale of the economy consistent with the regenerative and assimilative capacities of global life support systems.)
2. intra-generational equity (redistribution of throughput and wealth to alleviate poverty.)
3. protecting the biosphere; preserving natural, social and cultural capital (earth stewardship).

Eco-justice is environment-centred and life (especially future generations)centred, not business-centred" (Stone, D., 1994)<sup>21</sup>.

Sustainable development means that economies may continue to develop in order to improve living standards, provided that the necessary resources (natural and man-made) are not damaged or depleted. These are awesome requirements because it is unlikely that any "businesses, especially in the developed economies, come anywhere near to anything that looks remotely like sustainability"(Gray R. and Bebbington, J., 1994)<sup>22</sup>. However, despite the difficulties, governments and international institutions have been busy preparing sustainable programmes and plans, e.g. the EC's Fifth Action Programme entitled "Towards Sustainability"<sup>23</sup>; The International Chamber of Commerce Business Charter for Sustainable Development<sup>24</sup>; and The International Institute of Sustainable Development<sup>25</sup>, offer advice on the subject.

Although there is an abundance of theorizing and rhetoric on the subject by those wishing to legitimize policy, no practical methodologies have emerged concerning its operationalization (Drummond, I. and Marsden, T.K., 1995)<sup>26</sup>. To a great extent, the difficulties stem from "the influence of capitalist forms on the alienation of

humanity from "the natural world." (O'Riordan, T., 1991)<sup>27</sup>. It is therefore doubtful whether under the existing economic and social conditions any company would embark on resource conservation to the extent of encouraging reduction in consumption (of its own products and services) and survive. Companies, though, can currently survive and improve their competitiveness by trying to minimize and control their environmental impacts by adopting new environmentally sensitive processes and environmental accounting and management methods through EMAS<sup>28</sup> and other means. It is here that accounting can play an important part. It may, for example, help towards:

1. The development of environmental policies
2. Environmental accounting, costing and budgeting
3. Environmental data collection systems
4. Financial evaluation of environmental effects
5. Eco-efficiency
6. Eco-justice, through social reporting
7. Environmental auditing
8. Environmental reporting.

The prognosis is that since eco-efficiency is currently feasible and practised (although not to a great extent) and compatible with the capitalist system, it will prevail and continue to spread voluntarily, as proposed by the UK government, The Confederation of British Industry and the Chamber of Commerce (see Brophy *et al*, 1995)<sup>29</sup>. Although eco-efficiency is currently in its infancy (as compared to eco-justice, which is probably in the embryonic stage), nevertheless, the emphasis in this research in relation to accounting's contribution to sustainable development, is focused mainly on it (i.e. eco-efficiency).

### 2.2.3 Pollution

One of the most serious ecological problems created by humankind is pollution. According to Barry Commoner "environmental degradation is built into the technical design of the modern instruments of production."<sup>30</sup> This is not intended to be a study of pollution *per se*, but a consideration of the social, economic and financial contexts in which it arises.

As a result of the continuing increase in industrialisation "the environment is used beyond its assimilative capacity to dispose of the byproducts of economic activity, and, as a consequence, environmental quality deteriorates" (Panayotou, T., 1992)<sup>31</sup>. Drawing from Carson, R., (1962)<sup>32</sup>; Commoner, B., (1971)<sup>33</sup> and (1990)<sup>34</sup>; Markandya and Richardson, J., (eds) (1992)<sup>35</sup>; Pearce, D., *et al.*, (1989)<sup>36</sup>; and the WCED (1987)<sup>37</sup>, one can put in perspective, not only the exploitation and misuse of environmental resources, but also their significance. Since the industrial revolution, agricultural, industrial and commercial activities have been expanding without taking into account their effects on the environment. This is particularly evident from the continuous and vast amounts of waste emissions into the environment. In effect, "we are locked into a system of fouling our own nest" Hardin, G. (1992)<sup>38</sup>. The environment not only provides all non human-made resources, but it also receives all human-made residuals. Environmental resources have been used as a vessel for discharging by-products and wastes free of charge. This is because the environment is treated as though it has no value in our economic activities, although it does have a price which is simply not "valued" by the market. (See Pearce, D., *et al.* (1989)<sup>39</sup>. Clearly, the problem with the environment is that it is not a marketable commodity; its price is *ipso facto* zero, although in reality, it is not.

It is clear from the above that businesses do not take into consideration the externalities created by their processes and products. However, in the last few

years, anti-pollution campaigns and green issues in general, have been gathering momentum and are having a noticeable effect on manufacturing processes and products. Also, as shown in the next chapter, some companies are beginning to demonstrate their concern for the environment by publishing their environmental policies and other environmental information. They demonstrate the fact that although pollution cannot be eliminated, it can be monitored and controlled.

Emissions into the atmosphere are generally detrimental both on a national and international scale. Local pollution becomes international pollution via crossnational air, land and seas and by the transportation of hazardous wastes to other countries. In particular, "with the increased use of coal, oil and natural gas, the concentration of carbon dioxide (CO<sub>2</sub>) in the earth's atmosphere has risen steadily since the Industrial Revolution. Acting like a greenhouse, this CO<sub>2</sub> has been trapping solar radiation in the earth's atmosphere." McCormick, J. (1989)<sup>40</sup> Carbon dioxide, which is blamed for the greenhouse effect, represents 61% of the total greenhouse gases (see Table 2.1).

**Table 2.1 Global warming**

<b><i>Relative Contributions of Gases to Global Warming.</i></b>	
<i>Carbon dioxide</i>	<i>61%</i>
<i>Methane</i>	<i>20%</i>
<i>Chlorofluorocarbons</i>	<i>9%</i>
<i>Nitrous oxide</i>	<i>4%</i>
<i>Ozone</i>	<i>4%</i>
<i>Others</i>	<i>2%</i>

*Source: Directors' Guide To Energy Management  
The Times, Monday 20/1/92.<sup>41</sup>*



Global pollution presents a more serious threat because of its spread and life-threatening properties. It is believed that the depletion of the ozone layer is causing skin cancer, and greenhouse gases, alleged global warming, possibly resulting in droughts in some parts of the world, and sea flooding in others, to name but two of the potential effects. (See Cairncross, F. (1991)<sup>42</sup>

#### **2.2.4 The economics of pollution**

Whilst there is no unanimity, it is now generally recognised that there is a need to protect the environment. People's perceptions of the environment have changed because of the effects of the increase in pollution arising from manufacturing methods and the increased production of goods and services which are required by the vast increase in population. As Hardin, G puts it "the pollution problem is a consequence of population" (Hardin, G., 1992).<sup>43</sup> (See also Angell, D.J.R., *et al* (eds.) 1990).<sup>44</sup>

As the earth's resources are not unlimited, "the growth required over the next few decades to meet human needs and aspirations translates into a colossal new burden" (MacNeill, J. *et al.*, 1991).<sup>45</sup> In the meantime "companies do not bear the full cost of their environmental activities" (Brophy, M., *et al.*, 1995)<sup>46</sup> and the environment does not feature as an ingredient in their economic activities; it is either a passive party to the economic activities, or it is irrelevant. In either case, it is the economy that dominates the environment and not conversely.

##### **2.2.4.1 Externalities**

The problems of externalities have been gathering momentum for about twenty years now, mainly because the spillover effects of pollution have become more widespread and better understood. Externalities occur when the environmental effects of the activities of one producer unintentionally harm (or benefit) others.

For example air emissions (i.e. particulates) from a cement factory may cause damage to houses and crops in the area but those who suffer can not recover their losses from the cement factory, although it derives a benefit by saving in clean-up costs and low factory overheads (by not buying emission reduction equipment). This arises through the interconnectedness of systems within a common and finite environment. The issues posed by externalities were described concisely by Baumol, W.J. and Oates, W.E., (1979) when they stated that they "pervade virtually every sector of our economy; they are an unavoidable element of the production process; and their consequences tend to grow disproportionately with increasing population and the expansion of the economy's activities."<sup>47</sup>

Just as public "goods and bads"<sup>48</sup> provide respectively, uncontrolled benefits and costs to others, so do the externalities which can be attributed to environmental degradation. The crux of the matter then is the undesirable relationship created between the parties, whereby, for example, one benefits from the other through the inability of the other to charge for that benefit. Therefore it can be argued that there is a flaw in the economic system, simply because the costs and benefits created by pollution are not accounted for. The stumbling block here is the common "carrier", the environment, which belongs to no-one; once the spillover effects are "carried" they are nobody's responsibility. "This reveals in exemplary fashion the ethical significance of the system concept: *one can do something and continue doing it without having to take personal responsibility for it.*" (Beck, U., 1994)<sup>49</sup>

The continuing degradation of the environment also creates intergenerational problems. The environment will remain polluted for generations. These generations will be paying for the externalities which originated a long time earlier, and for a long time after the benefits from the creation of the relevant products have been

consumed (by the earlier generation). The existence of externalities prevents not only current, but also future economic efficiency and the optimum use of resources.

#### **2.2.4.2 Pareto optimality**

Pareto optimality is reached when it is not possible to increase some people's welfare without decreasing that of others, and Pareto improvement arises when the excess welfare of some people exceeds the loss suffered by others. (See Pearce, D., 1978).<sup>50</sup>

The Pareto principle can be applied to resource allocations between different types of production, pollution and environmental projects. The concept is part of Cost Benefit Analysis which is used in evaluating economic welfare. In the case of the allocation of resources, Pareto optimality is achieved when their use is such that if they are diverted to an alternative use, society loses more than it gains. In the same way, if a production process causes pollution to the extent that when it is taken into account, the process still leaves a net gain, then the pollution it creates is also optimal. Similarly, Pareto optimality may be achieved where the benefit derived from resources used to fight pollution (to an acceptable level) is equal to the benefit lost from their alternative use.

Similar evaluations can be made for marginal cost. If the marginal cost of producing an additional unit is equal to the value (to society) of that unit, then the relevant output will be optimal. Any production over and above that level will be counterproductive, since the cost will exceed the value gained by society, resulting in a Pareto deterioration situation.

The Pareto concept may also be used in considering intergenerational justice, because it is possible for earlier generations to deprive subsequent generations of

welfare. The obvious example here would be a legacy of a polluted environment. Intergenerational optimality requires that the lot of the present generation should not be improved at the expense of following generations. It can also be argued that pollution affects international justice: the wealthy industrialized countries are causing most of the global pollution but they reap most of the rewards of their outputs and enjoy a Pareto Optimal position by externalizing their global pollution effects, whilst the underdeveloped countries of the Third World are in a Pareto deterioration situation because they suffer from the effects of global pollution but derive little benefit (see Pearce, D., 1995).<sup>51</sup> Thus, at the Rio Earth Summit in June 1992, the underdeveloped countries expected substantial aid from the rich countries with regard to global warming, biodiversity and other environmental disbenefits.

#### **2.2.4.3 The economy and the environment**

Economic activities are, in general, polluting the environment and further economic growth will inevitably exacerbate the pollution problem. On this basis, unless certain types of pollution are controlled it is likely that their cumulative effects will bring about an environmental catastrophe through, for example, global warming and ozone depletion.

In general, the environment is not taken into account in manufacturing and cost benefit calculations. The use of the environment is not like a supply which has to be acquired. Pollution control costs money and represents a drain on society's resources. The more efforts and resources society puts into fighting/controlling pollution, the less will be available for social benefits. Since some pollution is inevitable, because every "production activity must generate some minimal quantity of waste, and that waste must be disposed of somewhere, somehow - if not into our waters then into the earth or atmosphere" (Baumol, W.J. and Oates, W.E., 1979),<sup>52</sup> the choices are: either pollution is controlled at all costs or a compromise is reached

by tolerating a certain amount of it. The latter seems the only viable solution. It is absurd and unrealistic to imagine that all pollution can and should be eliminated (see, for example, Baumol, W.J. and Oates, W.E., 1979).<sup>53</sup> A Pareto optimal solution points to the control of pollution only to the extent that the benefit derived from the goods/process which created it does not outweigh the loss suffered by society from it.

#### **2.2.4.4 Optimal pollution**

Small amounts of some types of pollution present no problem, because they can either be tolerated or absorbed by the environment. Biodegradable waste, for instance, which is dumped into rivers, lakes or the sea, can be assimilated or dispersed and gradually transformed into harmless substances. Similarly, small amounts of air pollution can be diluted and rendered harmless by wind and air currents. Since a certain amount of pollution can be tolerated or rendered harmless by the environment, the emphasis should be to reduce it to tolerable levels.

Efforts towards pollution control naturally depend on the type of pollution. The cleaning up of pollution which may cause serious harm to human life (e.g. lung disorders and skin cancer) takes priority over pollution which is less harmful. The magnitude of risk to human, and other forms of life should determine the extent of pollution control/cleaning. The aim is not the total elimination of all pollution at all costs, but its reduction (depending on its harmfulness) to tolerable levels; there must be a matching of achievable benefits, both present and future, with affordable costs.

A good pollution policy would seek to quantify the damage costs and the costs of control and adopt "the pollution control option(s) which minimize(s) the sum of pollution damage and pollution control costs" (Elsom, D.M., 1992).<sup>54</sup> Incentives for

achieving optimum pollution and the use of a number of methods to control emissions are desirable for better results (see, for example, Magat, W.A. 1982;<sup>55</sup> Rosencranz, A., 1981<sup>56</sup>). But there seems to be no fixed relationship between the amount spent and the amount of pollution control achieved. In fact, there is an inverse relationship which suddenly deteriorates; the cost of clearing the last vestiges of pollution becomes excessive (Kneese, A.V. and Schultz, C.L., 1975).<sup>57</sup>

Obviously, the notion of zero pollution is *ipso facto* utopian. If society opts for zero pollution for certain types of pollution which are impossible to clear (like the pollution from CFCs), then the production of the relevant goods is effectively prohibited. Elimination of the source is the only cure for such pollution hazards.

Although the theory of optimal pollution is very simple, its application is rather difficult, because the evaluation of the costs and benefits is not easy to establish. These difficulties become more complex where pollution control policies involve a number of options.

#### **2.2.4.5 The market solution and the discount rate**

It has been shown that the environment has a strong influence on the economy and since pollution is the "product" of the economy, the environment will always be at the receiving end. Because environmental resources are unpriced commodities, they are unaffected by the price mechanism. As a result, the depletion and pollution of environmental resources are exacerbated because they are not underpinned by the price system; their exploitation circumvents market forces. This, together with a lack of property rights, allows producers to pass on pollution costs to outsiders by way of air and water pollution. Thus, the nature of the environmental resources (i.e. common property with open access and no property rights) and the partial "failure of the government to (a) establish the fundamental

conditions (secure property rights, enforcement contracts, etc.) for markets to function efficiently; and to (b) use instruments at its disposal (e.g. taxation [and] regulation...) to bring into the domain of markets inputs and outputs (costs and benefits) that the institutional framework fails to internalize" (Panayotou, T., 1992)<sup>58</sup>, are major causes of the problem.

A lack of official environmental policies and strategies leads to ignorance and uncertainty, and the market's solution to uncertainty is to discount it progressively; the bigger the uncertainty the bigger the discount rate. Also, as far as the effect of time on uncertainty is concerned, "the positive discounting of the uncertainty of the future can lead only to greater uncertainty. The market solution exaggerates the very problem it is designed to remedy." (Perrings, C., 1987)<sup>59</sup> Both uncertainty and time are at the heart of the environmental debate, but both cause obscurity of vision and direction. Therefore the market's response to the depletion and degradation of environmental resources (which is the dominance of the present over the future, the private/market rate of discount over the social rate of discount) is ineffectual.

Since uncertainty and time are interconnected, the increase of either increases the discount rate, and the higher the discount rate, the greater the rate of exploitation, resulting in greater depletion of environmental resources. The lower the discount rate, the lower the amount of exploitation and pollution. Thus, social rates of discount which are lower than market rates are better for the environment, as they slow down current exploitation and pollution. In effect, the market solution worsens the problems of environmental resource, depletion and pollution.

#### **2.2.4.6 Pollution control policies**

As explained above, the exploitation of environmental resources is not underpinned by the price mechanism and the level of the discount rate determines the rate of

exploitation of resources which, in turn affects the level of pollution. The control of pollution rests with government policies, which will now be considered.

Although every country in the world is facing some pollution problems, no general policies have emerged for tackling them, either on a national or international level. Obviously, environmental pollution has to be addressed on a national and international plane. Global pollution cannot be contained by one country acting alone, when others continue to pollute the atmosphere and the seas.

A number of tools have been developed and used in order to implement some environmental policies. These include standards, taxes, subsidies and rights. The traditional and most common tool used is direct control through standards. Standards are used for fixing the quality or quantity of allowed emissions. They are simple to administer but do not match costs with benefits. If the standards are not complied with, fines are imposed, or they may involve criminal prosecution. Standards do not raise revenue, but they are popular with industry because they apply uniformly to all, e.g. emissions into a water course can be restricted to a fixed level of dissolved oxygen i.e. chemical oxygen demand, and car exhaust fumes controlled with catalytic converters.

In recent years, the idea of controlling pollution through the introduction of charges/taxes has gained popularity. Table 2.2 shows that by 1/1/95 most of the countries of the organisation for Economic Corporation and Development (OECD) had introduced numerous environmental tax measures.



Table 2.2 Ranking of environmental tax measures introduced by OECD countries by 1/1/95

Country	Ranking	No. of tax measures
Norway	1	22
Denmark	2	20
Sweden	3	18
Finland	4	17
Australia	5	15
United States	6	14
Netherlands	7	13
Iceland	8	9
Belgium	9	12
France	9	12
Germany	9	12
Switzerland	9	12
United Kingdom	9	12
Canada	14	7
Mexico	14	7
Ireland	16	6
Italy	16	6
Turkey	16	6
Austria	19	3
Greece	19	3
Japan	19	3
Luxembourg	19	3
New Zealand	23	2

Source: Ascertained from Barde, J.P. and Owens, J. "The Evolution of Eco-taxes The OECD Observer, No.198, 1996."<sup>60</sup>

In fact, a pollution tax "is the least cost method of achieving a given standard of environmental quality", (Pearce, D., 1978)<sup>61</sup> because the standard can be fixed in advance and the relevant polluters are obliged to adhere to it. Further details on

the subject of environmental taxation can be found in "Environmental Taxation" (Makris, P.H., 1992).<sup>62</sup> In order to avoid the tax, a polluter is pressurised to look for cleaner production methods. Another method of pollution control is the use of subsidies (the converse of taxes). Subsidising a polluter may appear, at first sight, perverse, but if the polluters are helped to convert to cleaner methods, then both the polluter and those who suffer from their actions will be better off.

A more effective method of controlling pollution is found in tradeable quotas or permits. These are permits to pollute, albeit up to a quota. The government controls pollution by fixing the total amount of emissions and then distributes/sells them to the producers. This method of charging the polluter internalises and reinforces the principle of "polluter pays".

These are some of the environmental pollution control methods which can be very effective. However, governments have been slow to adopt them, because of lack of commitment or conviction, or both, and fear of losing competitiveness on an international level. The difficulties inherent in establishing global policies and controls cannot be overestimated. Firstly, the rich industrialised countries would have to undertake to control their own pollution problems and secondly, the poor, Third World countries, would have to be helped by the rich countries to prevent them from making the same mistakes; the latter may then have to be compensated for halting the destruction of environmental resources, such as the rainforests. Of course the Third World does not see this as destruction, but as exploitation of its natural resources.

On an international level, "at present there are three very serious cases of global pollution affecting many nations, namely, acid rain, the Greenhouse Effect of atmospheric pollution, and the destruction of the ozone layer, all resulting from

gaseous emissions into the atmosphere" (Kula, E., 1992)<sup>63</sup>. Although progress on the international front is difficult and slow, some agreements have been reached in the last few years. In particular, after the discovery of the ozone hole in 1985, the Montreal Protocol was established in 1987, followed by the London Agreement in 1990. More recently (June 1992), at the Earth Summit in Rio, agreement was reached with regard to climate change, sustainable development, biological diversity and on a number of other plans, called Agenda 21. Agenda 21 represents "an attempt at environmental planning on the Grand Scale". (Freestone, D., 1994)<sup>64</sup> It was described by Boutros Boutros-Ghali, the UN Secretary General, as "A comprehensive and far-reaching programme for sustainable development...which constitutes the centrepiece of international cooperation and coordination..." (1992).<sup>65</sup> The successful implementation of Agenda 21 rests with individual governments and "in the UK, good progress has been made in setting up a coordinated *Local Agenda 21* programme. (Harvey, T., 1995)<sup>66</sup> Since Agenda 21 is a long term action plan stretching into the 21st Century it is too early to say whether it is a success (see Freestone, D., 1994).<sup>67</sup>

Furthermore, in order to protect the environment the "precautionary principle/approach" was included in the Rio Declaration. Specifically, Principle 15 of the 1992 Rio Declaration on Environment and Development stipulates that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation". (O'Riordan, T. and Cameron, J., 1994)<sup>68</sup> The significance of the precautionary principle is that it "changes the role of scientific data [and] thus represents an important tool for decision making in a situation of scientific uncertainty," (Freestone, D., 1994).<sup>69</sup> This is particularly relevant to activities/emissions which (may) affect, for example, the climate and the ozone layer. Obviously, concern for the adoption of environmental protection policies

has, since the Rio summit, taken on a new dimension.

### **2.2.5 Environmental ethics**

The problems arising from pollution and environmental degradation raise fundamental ethical issues which affect business, economics and accounting. The dominant economic, social and scientific practices make it difficult for the Western world to accommodate environmental concern. It can be argued that our Judaeo-Christian traditions ascribe only "instrumental value"<sup>70</sup> to nature and all non-human creatures. (See, for example, White, L.Jnr, 1967<sup>71</sup>; Passmore, J., 1980)<sup>72</sup> Pollution, resource depletion and ecological changes are causing particular concern. These problems have brought into focus the need to reassess humankind's business activities in relation to the environment. A new "ethos" may be needed "to designate the all-embracing field within which different types of values (religious, ethical, socio-economic, and cultural) are found" (Walton, C.C., 1969).<sup>73</sup>

As a result of this debate, the idea of the interconnectedness of all things was developed. The intellectual thinking about the holistic theory, to which this refers, has been developed over a long period (see, for example, Carson, R. 1962<sup>74</sup>; Commoner, B. 1971<sup>75</sup>; Schumacher, A. 1973<sup>76</sup>; Lovelock, J. 1982<sup>77</sup>, 1988<sup>78</sup>; WCED, 1987<sup>79</sup>). The human race has been treating the ecosystems as though they were not vulnerable to the effects of its malpractices, such as pollution which becomes global through the atmosphere.

The vulnerability of environmental resources and their valuable but unpriced nature was brought to the fore with the publication of Garrett Hardin's article "The Tragedy of the Commons" (1992)<sup>80</sup>. Hardin demonstrates how a herdsman (who is sharing a commons) seeks to maximize his gain. He "concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and

another...But this is the conclusion reached by each and every herdsman sharing the common. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit - in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all." Although Hardin's article was published twenty-five years ago, it is still debated and used to support arguments for better environmental management (see, for example, Nisbet, E.G., 1991<sup>81</sup>; Newson, M., (ed), 1992<sup>82</sup>; Brown, L.R. *et al.*, 1992<sup>83</sup>). "Costing the commons", the "polluter pays" and even "sustainability" are policies which have their origins in the concept of the "tragedy of the commons".

Environmental ethics deal with the relationship of humankind with animals, plants and the life support systems. "The environmental ethic simply broadens the *moral community* to include not only people but *all of nature*" (Vesilind, P.A. *et al.*, 1990)<sup>84</sup>. Humankind does not stand alone in its concern, but all other life forms, present and future, are also involved. Although future generations stand to gain from the wealth and knowledge they will inherit, they also stand to suffer if they are left behind a poisoned or impoverished environment.

Although it can be argued that one's moral obligations towards the present generation supersede one's obligations towards future generations, non-humans and nature, they do not, however, nullify them. (See Attfield, R., 1983)<sup>85</sup> But safeguarding nature should not only be for the sake of future generations; but also for the protection of nature in its own right. (See, for example, Leopold, A., 1966<sup>86</sup> and Routley, R. and Routley, V., 1974<sup>87</sup>).

These values and ethical principles segregate one's responsibilities for nature from

one's own interests, and manifest nature's own value. Environmental ethics make it possible to appreciate and preserve nature without having to venerate it. Environmental concern arose after the manifestation of environmental degradation and the realization that unless humankind's attitudes are changed the situation would gradually get worse. Environmental concern is not a fad, and now that the need for environmental ethics has been established, they should be practised. The accounting profession is in a position to make a contribution by developing accounting and reporting systems for better environmental management and control.

### **2.2.6 Conservation**

Conservation is about saving for future use or benefit. This is especially important where the subject matter is scarce, or is likely to be exhausted or destroyed at some point in the future, and therefore needs to be protected and economised. The concern of accounting in this matter is primarily functional, since it can provide the tools for measurement, evaluation and control and thereby assist in the management of conservation. Conservation merely takes a long-term view of the management of resources, be they renewable or non-renewable. For example, the over-exploitation of renewable resources will, in time, be rendered non-renewable and eventually exhausted. The environmental policies surrounding the issues of conservation take into account both ecological and economic considerations. Ecological problems, as a rule, follow the damaging of the environment by production and exploitation of resources, and from an economic point of view these are the problems of over-exploitation, inefficiencies and wastes.

Conservation is, therefore, against over-exploitation and over-consumption. By reducing or preventing current consumption, conservation in fact, favours future generations, and since there is a demand for resources now, the moral question to consider is whether conservation policies are at all desirable. The problem with

current consumption is that it is unfairly distributed: the needy have less, whilst the rich overconsume and over-exploit and in the process destroy the environment through pollution and the mismanagement of environmental resources. (See McCloskey, H.J., 1983)<sup>88</sup> Conservation prevents wasteful use and early exhaustion of non-renewable resources. A reduction in use and consumption also reduces pollution which, in turn reduces the damage done to renewable resources. Ironically, those who clamour for conservation live in countries which are high users of resources such as energy and scarce raw materials. It therefore follows, that since conservation depends on the wise use of resources and the prevention of their destruction through overexploitation and pollution, it is also concerned with eco-efficiency.

Naturally, the best conservation policies are those which provide double benefits e.g. clean processes (less harmful) and efficient processes (less waste). These are important aspects of sustainable development and quite apart from the economic aspects of conservation, "the importance of nature far transcends a narrowly economic definition of utility, and among many the utilitarian arguments are used as a mere disguise for deeper, less well-articulated feelings," (Warren, A. and Goldsmith, F.B., 1983).<sup>89</sup> Obviously, the interests of conservationists in the long-run are the same as those of the preservationists.

### **2.2.7 Preservation**

The preservation of resources, biodiversity and ecosystems can be defined as an attempt to maintain them in their existing condition i.e. to prevent them from the risk of damage or extinction. This does not mean that humankind should be prevented from benefiting from their existence; but the benefits should not erode the capital base of resources. In other words, preservation is about stewardship,

and the issues that concern accounting are the methods of stewardship and the effects human activities have on the relevant resources. The effects of humankind's economic activities manifest themselves in the damaging and destruction of resources and ecosystems.

It can be argued that the supply of global resources, such as fossil fuels and minerals is being threatened by human activities. This is especially evident in the West. Western societies' desire for happiness and self-realisation is channelled through the satisfaction of its escalating needs. The fulfilment of these needs, in turn, manifests itself in prosperity and further extravagant consumption of resources. The preservation of natural resources depends on reduced exploitation (since they are not infinite) and better methods of production. The introduction of environmental accounting and management systems can have an important role to play in this process (i.e. in eco-efficiency.)

Over the last few hundred years, humankind has managed to exterminate species at an alarming rate and to bring many others to near extinction. Furthermore, "unless appropriate management measures are taken over the longer term; at least one quarter, possibly one third and conceivably a still larger share of species to-day could be lost" (WCED, 1987).<sup>90</sup> The destruction of species is irreversible. Resources, ecosystems, species, wilderness and biodiversity are all under threat. Preservation of these rests on the principle that it is unwise and morally wrong to permanently destroy species and resources, thereby preventing future generations from enjoying them. (See, for example, Passmore, J., 1980;<sup>91</sup> Attfield, R., 1983<sup>92</sup>)

### **2.2.8 Population**

The relevance of population to the thesis arises from the ecological consequences it creates. There is nothing intrinsically wrong with large populations, but their



increasing size in the late Twentieth Century has led to renewable resources being exploited at a faster rate than they can be renewed, and non-renewable resources being driven to the verge of exhaustion. It is expected that the world population will double in 35 years, and by the end of the next century "many experts expect a world-wide ecological-resource-population disaster, unless major changes occur in patterns of industrial production, consumption or population growth." (Bayles, M.D., (ed), 1976)<sup>93</sup>

There is considerable agreement in the scientific community that if no effective measures are taken to tackle environmental degradation "beginning some 40 years from now humankind will have reached the point of no return" (Rothkrug, P. and Olson, R.L., (eds), 1991)<sup>94</sup>. A population of 8/12 billion, using Western-type technology and lifestyle will cause unimaginable ecological problems (Rothkrug, P. and Olson, R.L., (eds), 1991)<sup>95</sup>. Yet an increase in the standard of living is required in order to reduce birth rates.

The problems of over population, with the consequent effects of depletion or destruction of resources through over-consumption and pollution, come more into focus when viewed from the point of view of future generations. The population policies which are adopted by Governments are for the benefit of those who are affected by them and are not for those who may exist at some time in the future. It is the present generations who elect Governments; future generations do not vote. The link between the present and the future generations is in procreation. All people have parents, grandparents, and in general children and grandchildren. Therefore, humankind is committed to ensuring that it leaves behind a healthy environment to meet the needs of future generations.

Each generation has, therefore, a moral obligation not to leave the environment in

a worse state than it found it. The arguments rest not only on the control of pollution and resource preservation, but also on the integrity and stability of entire ecosystems, whose contribution to the richness of the planet will be enjoyed by future generations as well. (Attfield, R., 1983)<sup>96</sup>

Admittedly, the intergenerational code of justice cannot be easily applied. After all, no accounting system can share out for instance, non-renewable resources equally between generations. But a more equitable use of renewable resources can be achieved by better stewardship through sustainable development. A viable approach to this problem is the use of renewable resources and a less wasteful use of those which are non-renewable. Thus, as humankind moves across time, it will deplete some of the non-renewable resources, but at a reducing rate.

## **2.3 ENVIRONMENTAL INFLUENCES**

### **2.3.1 Legislation**

The protection of the environment has been considered necessary since the early 1960s (see Carson, R., 1962)<sup>97</sup>. Concern for the conflict between economic growth and the environment has grown since then and many laws and regulations have had to be introduced. Environmental protection began in the US in the late 1960s when the Environmental Protection Agency was set up. By the early 1970s environmental audits and control regulations were established in the US and Canada, but it was the EC environmental measures which "played a key role in shaping UK law." (Wolf, S. and White, A., 1995)<sup>98</sup>

After an initial cool response, the EC embarked on a rapid development of environmental law and regulation. The Single European Act of 1987 identifies environmental problems which Member States can address by adopting their own measures, as long as they are more stringent than those of the Act. Since then, the

EC has become more and more active. By 1991 there were more than 80 Directives on environmental regulation and now there are some 300 items (ENDS Report 239 1994)<sup>99</sup>. EC Directives are binding on the Member States with regard to the end results, but States are free to adopt their own laws and regulations.

The UK, in complying with the EC's integrated environmental protection approach introduced the Environmental Protection Act (EPA) of 1990 and the Water Resources Act of 1991 (WRA). The EPA introduced the two key principles of integrated pollution control (IPC): Best Practical Environmental Option (BPEO) and Best Available Techniques Not Entailing Excessive Cost (BATNEEC).

However, as stated in Appendix E. "three years after its introduction [1/4/91] the EPA has failed to make an impact" (Makris, P.H., 1994)<sup>100</sup>, although David Slater, the Director and Chief Inspector of Her Majesty's Inspectorate of Pollution, in replying to the criticism stated that " ... as IPC develops - there are two years to go before the initial set of authorizations are complete - industry is coming under a much tighter, better regulated, regime"<sup>101</sup>. These two Acts form the UK's major forms of environmental legislation. They have introduced personal criminal liability (S.157 of the EPA and S.217 of the WRA) on the persons responsible for the pollution caused by companies. Also, the National Rivers Authority (NRA) has been given powers (S.161 of the WRA) to carry out clean ups and prosecute the offenders. Even more powers have been given to the Environment Agency which has been set up under the Environmental Act 1995. Pressure for environmental law and regulation is emanating from various sources. The EC and the United Nations (UN) are constantly promoting better environmental guidelines and practices. Governmental and other regulatory bodies are being set up to deal with a variety of environmental problems.

### **2.3.2 Environmental pressure groups**

The pressure groups which are of particular relevance here are those which do not just cater for the interests of their members. The actions of the groups in question benefit the public at large; even people and life in general around the world. The most prominent groups are Greenpeace (GP); Friends of the Earth (FOE) and the World Wide Fund For Nature (WWF).

In Britain and all the Western democratic states "interest groups" have been very successful in furthering their aims. The most spectacular groups in the last 25 years have been the environmentalist and women's groups, but it should be noted that environmental groups are not a Twentieth Century phenomenon. One of the earliest pressure groups against air pollution was the Manchester Association for the Prevention of Smoke which was formed in 1843 (Ashby, E. and Anderson, M., 1981)<sup>102</sup>. In Britain there is a wide range of institutionalized interest groups and the government consults them before policy decisions are formulated.

Because some groups (such as FOE and GP) carry out independent research into products, pressure is put on producers to ensure their products and processes are not environmentally unfriendly, otherwise any adverse publicity and moral public persuasion could have severe consequences on their business. For example, in June 1995 Greenpeace claimed a major victory over Shell, which wanted to dispose of the Brent Spar oil rig at sea. Its petrol stations in Europe, in particular in Germany were boycotted by motorists.

Pressure groups not only disseminate a great deal of information about environmental performance to the public, they also take legal action against companies which breach relevant regulations. For example, Greenpeace "brought a successful private prosecution against a company for breaches of its discharges

consent". and "Friends of the Earth led a campaign against a company's range of ...cleaners which failed to take account of the environmental impact of the manufacturing processes involved" (Macve, R. and Carey, A., (ed), 1992).<sup>103</sup>

Concern about the environment is no longer limited to a few activists. A proportion of the population, local and national governments, and many organisations are actively involved in the process of environmental protection. Pressure to increase protection of the environment is being exerted from various quarters. For example, the Trade Union Congress (TUC) has thrown its weight behind environmental protection; it "accepts the challenge to play a leading part in raising alarm about the present situation and turning a general commitment to the environment into practical and urgent action" (Owen, D., (ed), 1992)<sup>104</sup>. In 1989, the TUC adopted a statement "Towards a Charter for the Environment" which involved setting up an Environmental Action Group which has since established a clear policy framework and taken on the responsibility of representing all Trade Unions in Britain in the international arena, (Owen, D. (ed), 1992).<sup>105</sup> Other prominent institutions, such as the Confederation of British Industry, the British Institute of Management and the Institute of Directors have set up environmental initiatives.

The pressure which is being exerted on industry by these groups and organisations is directed towards the adoption of responsible attitudes for the environment. All, either individually, or as a whole, can exert considerable and effective influence and direction on the environmental practices of businesses.

### **2.3.3 International pressures**

The nature of a great deal of environmental degradation makes it a matter of international concern. Environmental issues have been on the international agenda for some thirty years. In 1968 the Club of Rome commissioned the "Limits to

Growth"<sup>106</sup> study and, four years later, the UN Conference on the Human Environment was held in Stockholm. More recently, in 1987, the European Year of the Environment, the UN's Brundtland Report: Our Common Future (WCED)<sup>107</sup> was published. International concern has been fuelled in the last ten years by the scale of some disasters, such as Bhopal (1984), Chernobyl (1986) and the Exxon Valdez (1989). The international dimension of some environmental problems makes concerted action an absolute necessity. A typical problem is the damage to the ozone layer. This cannot be tackled by any single country. The Montreal Agreement of 1987 set the agenda for protecting the ozone layer.

The spread and growth of international trade and commerce is one of the reasons for global pollution. Transnational corporations create similar pollution problems, wherever they operate, e.g. emissions and packaging, and they "must not be permitted to be predators of the world's environment" (Owen, D., (ed), 1992).<sup>108</sup> Environmental issues are influencing trade agreements, in particular the General Agreement on Tariffs and Trade (GATT). The potential problem with international trade is "the emergence of controversy concerning environmental regulations which [are] seen as preventing free competition among the trading enterprises of different nations" (Ledgerwood, G. *et al.* 1992).<sup>109</sup> On the face of it, GATT practices have priority over environmental legislation, but recently there were moves to change this by the introduction of an environmental code.

The environment is, and will remain, an important topic for discussion on the international arena, as evidenced by the Earth Summit in June, 1992, which marked the twentieth anniversary of the UN Conference held in Stockholm in 1972. The Stockholm Conference produced an action plan which has been used as the basis for developments by the UN and other international bodies, such as the World Commission on Environment and Development, the International Monetary Fund

and the World Bank. Probably the most publicised international agreement was the agreement in 1987 (The Montreal Protocol) to reduce the production of CFCs by 50%. Three years later, because of stronger evidence of environmental damage by CFCs, 93 countries agreed to phase out CFCs completely by the year 2000 in industrialised countries, and in developing countries, ten years later.

Environmental degradation is a global phenomenon and certain problems, in particular, acid rain, toxic waste, alleged global warming and the depletion of the ozone layer require an international response.

#### **2.3.4 Consumerism**

The green consumer concept first emerged in the late 1970s and the increase in environmental awareness played a major part in directing consumer tastes and preferences. For example, aerosols which used CFCs as propellants were (the first products to be) boycotted on environmental grounds. The last three decades have seen a major shift in the West towards healthy eating. The publication of *The Green Consumer Guide*<sup>110</sup> by John Elkington and Julia Hailes in September, 1988 was an instant success. In a market economy with multiple choices, some product lines can be very vulnerable to consumer preferences.

The significant thing "about green consumerism is that it has demonstrated how everyday shoppers can, through their own choices, force through change at a rapid pace" (Owen, D., (ed), 1992).<sup>111</sup> By expressing their tastes and preferences, consumers send strong signals to the producers through the market so "that not only does their purchasing power secure the product of their choice through the market but also that it acts as an economic vote, encouraging producers to produce more of the same" (Adams, R., 1990).<sup>112</sup> Supermarkets and retailers in general were quick to respond to the green consumer revolution. According to Frances Cairncross

(1991) the "retailers and manufacturers were knocked sideways by the most dramatic change in customers' tastes that they had ever experienced"<sup>113</sup>. The buying power of millions of people which is controlled by changing preferences can make or break businesses. Green consumerism brought new products on to the market to the detriment of others. People do not have to be militant environmentalists to defend the environment; they can contribute to the cause with their purchasing power.

According to a 1989 New York Times/CBS News poll<sup>114</sup>, people are prepared to pay extra for environmentally friendly products in order to protect the environment. Obviously, the increase in environmental awareness and the availability of more and more environmentally related information from dedicated journals, such as *The Ethical Consumer*, *The Green Consumer* and *New Consumer*, permanently raise people's environmental consciousness and direct their preferences towards environmentally friendly products. According to a recent survey (see ENDS Report No. 239. Dec. 1994), "consumers remain as willing to make an effort to buy environmentally friendly products and services as they were in 1990 - and more are prepared to pay higher prices ...".<sup>115</sup>

The influence of the green consumer on the organisation and practices of companies cannot be overemphasised. The consumer expects more information and the press and the campaigning organisations (such as the Consumers' Association, the National Consumer Council and various consumer watchdog bodies) are most willing to provide this. It makes environmental sense to be a green consumer, and producers should realise that "a product will be able to hold its market position only if it is compatible with the needs of the environment" (Koechlin, D. and Muller, K. (eds.), 1992).<sup>116</sup>



#### 2.3.4.1 The social meaning of goods

No discussion about the environment could be complete without considering the social aspects of human consumption. The great avarice of man, coupled with the finite state of the earth's resources demonstrates the significance of consumption. Eco-efficiency and eco-justice alone cannot resolve the issues of environmental concern. Consumption is another means of examining the phenomenon of environmental transformation and/or degradation, for it is in the name of consumption that prosperity is aspired to. The *per capita* consumption demonstrates a nation's level of prosperity, be it in units of, for example, energy, housing, cars, food and leisure activities.

Goods and services which are produced and exchanged for profit become commodities at the time of exchange. According to Marx "The wealth of societies in which the capitalist mode of production prevails appears as an immense collection of commodities" (Marx, K., 1976)<sup>117</sup>. The importance and influence of commodities on humankind's way of life have become very great in the late 20th century. The significance of commodities, which has spread from production to consumption, has now engulfed some areas of social life, such as the diversity in culture and social activities. The types of goods people buy, consume or possess reveal a level of affluence and social standing, but, over time, affluence and needs change, so that goods and services which were once luxuries become necessities and their absence a sign of poverty (e.g. televisions). This extension of necessities can be seen as a burden or dependency. Herbert Marcuse (1986)<sup>118</sup>, argues that the working class have become not the living evidence of a new social utopia, but rather, clear proof of capitalism's strengthened control over greater areas of working-class life.

#### 2.3.4.2 The consumerist stratagem of capitalism

The capitalist system has exploited the human desire for goods and services by mystifying the process of economic domination. "Capitalism had constructed the individual by first undermining traditional cultural forms and then offering the diverse consumption of mass culture. On this view, individual identity is an artefact of ideological processes which mystify the true economic process of domination. The individual is distracted from the realities of their domination in the class system by the illusory freedoms of personal choice". (Lunt, P.K. and Livingstone, S.M., 1992)<sup>119</sup>. Capitalism and the market through which it thrives have developed into a global phenomenon, changing tastes, fashions and cultures, and spreading and expanding consumerism. Besides the growth in the acquisition of goods for housing (and for the house), transport, clothing and foodstuffs, consumption led to the commercialisation of leisure through holidays, sport, fashions, books and music on an indoor and outdoor basis.

The market system depends on a supply of mass-produced goods which are equally disposed of on a massive scale. The desire to acquire, possess and consume gradually develops into a culture which is dependent on an evolving mass-production of commodities by the capitalist system, which it manipulates towards an escalating recursive process. The "key feature of an industrial system based on ever-expanding levels of production is the way in which people identify the satisfaction of need with the *consumption* of commodities."(Jones, A.K., 1994).<sup>120</sup> Either because of a pre-existing tendency of people to pursue wealth and happiness through various means ( in this context the acquisition of goods and services), or through their conditioning by the influences of capitalism, they become supportive of the system which exploits them, consequently, the "manipulation of needs.....has made the consumer little other than a hollow shell into which the system of commodity production may deposit whichever needs are required for a given

moment". (Lee, M.J., 1993).<sup>121</sup>

This malleable and interactive state between capitalism and people facilitates the gradual creation of wealth, the satisfaction of needs and an improvement (in general) in the *material* and leisure conditions of people. As the élite groups move up the ladder of affluence, they adopt new tastes and acquire new luxuries, while the lower classes adopt the previous tastes of the élite. (See Lunt, P. and Livingstone, S., 1992)<sup>122</sup> This upgrading of consumption results in better standards of material living. In this context, capitalism and consumerism have clearly developed into a state of symbiosis.

#### **2.3.4.3 Consumerism in the name of affluence**

The creation of economic wealth which stems from the products of institutions/corporations is dependent upon their exchange and consumption. People and governments are committed to ever-increasing affluent living standards, but the emphasis in the quality of life is shifting from being one of quality to one of quantity. In the circumstances, "we will have to go far beyond 'green consumerism',...Unfortunately many people assume that it will be enough if we all make more effort to conserve resources while we go on living more or less as we do now in a socio-economic system based on growth and affluence".(Trainer T., 1995).<sup>123</sup> Through the examination of consumerism, the relevance and significance of eco-efficiency and eco-justice have also been tacitly demonstrated. To imagine that the consequences of improvements in lifestyle are not without cost would be unrealistic and evasive and a failure to address the issues.

#### **2.3.5 Organisations**

The growth and spread of a great number of international conglomerates could be held responsible for spreading environmental problems. They pollute the

environment, firstly, through their manufacturing processes and, secondly, through the use of their products, not to mention the use of non-biodegradable packaging materials. These are frequently used products, such as detergents, cereals, drinks, petrol and oil, cars, televisions; and almost all have come to symbolize a desirable standard of living around the world. Peoples' desires and abilities to possess and consume more and more goods are realisable via the abundance and availability of such goods on an international scale. It is, therefore, understandable that "Not only does the standard of living become almost entirely defined in material terms, but consumption becomes an end in itself, with the result that consumers are tied to their possessions, and to a consumerist ideology upon which the expansion of industrial society depends" (Jones, A.K., 1994).<sup>124</sup> This is the vicious circle of capitalism/consumerism.

However, businesses now realise that they need a "healthy" physical environment and a sustainable supply of resources in order to continue to trade and grow. New, environmentally friendly production methods and processes require considerable research and investment and the large conglomerates are well placed to do this. Also, transnational corporations, in adopting environmental policies and practices (and they are morally obliged to do this on an international level) should, in theory, automatically raise their standard of environmental performance worldwide.

The question of the environment "is now at the heart of corporate strategy" (Ledgerwood, G. *et al.*, 1992).<sup>125</sup> Companies have been forced to recognise the need for change by public opinion, green consumers and pressure groups and, more recently, by investors in particular, environmental funds which are attracting support from pension funds (Gray, R. *et al.*, 1996).<sup>126</sup> The pressure for change is unlikely to ease off and many corporations which have not yet responded to the environmental agenda will, in the long run, be overtaken by events. After the

Exxon Valdez disaster, a number of environmentalists and investors drew up a code of good practice called the Valdez Principles (see Table 3.4 in Section 3.3). Their relevance here is to show that environmental problems are now being taken seriously by large organisations. Although some of these principles are vague and general, such as: "to use natural resources sustainably, energy wisely, and to minimize waste, "the final four made the corporation lawyers gulp. They committed signatories to make compensation for environmental damage; to disclose incidents of such damage; to have at least one environmentalist on the board; and annually to carry out and publish an independent environmental audit" (Cairncross, F., 1991).<sup>127</sup>

While environmental excellence is currently "desirable" rather than "a reality" for a great number of companies, it is likely that the situation will eventually change. Indeed pressures for change are mounting; they emanate from consumers, the law, employees and enlightened management. External pressures on corporations can be most effective, and because they are external, corporations will have to demonstrate their compliance with transparency and accountability. In this respect environmental accounting can provide some of the means.

### **2.3.6 Business**

In the 1970s, the debate over "the limits to growth" was gathering momentum. The Club of Rome's book *The Limits to Growth* (see Meadows, D.H. *et al.*, 1972)<sup>128</sup> painted a gloomy picture of the future. It was thought that growth and the state of the environment were interrelated; more growth meant more environmental degradation. Business saw environmentalists as the enemy, and *vice versa*. This hypothesis is now considered to be false because after the publication of the Brundtland Report in 1987 (Our Common Future) and the Pearce Report in 1989 (Blueprint for a Green Economy), the concept of sustainable development has

been, in general, acclaimed as a compatible business and environmental principle for the future.

The interests of the environment *vis-a-vis* those of business, come into conflict, especially from a time perspective. This conflict hinders environmental protection because, primarily, capitalist markets are geared to short-term profit (Mellor, M., 1992).<sup>129</sup> The concept of the "free" market has developed into economic domination and has become "a dogma of near-religious proportions, particularly in Britain and the US" (Mellor, M., 1992).<sup>130</sup> Some writers believe that the market-based solution is king (see, for example, Thomas, V., 1980;<sup>131</sup> Peskin, H.M. *et al* (eds), 1981;<sup>132</sup> Baumol, W.J. and Oates, W.E., 1979<sup>133</sup>). This view is not shared by the Brundtland Report (WCED, 1987)<sup>134</sup> which states that "the compatibility of environmental and economic objectives is often lost in the pursuit of individual or group gains, with little regard for the impacts on others, with a blind faith in science's ability to find solutions and in ignorance of the distant consequences of today's decisions". The market draws its own boundaries to costs it will recognize, and environmental costs are kept outside the market and for us "to rely exclusively on the force of the market, however ingeniously harnessed, to clean the environment is as naive as relying on government intervention" (Cairncross, F., 1991).<sup>135</sup> In such circumstances a sustainable economy cannot subsist, especially "if the profit indicator is the supreme arbiter" (Cooper, D.J. and Hopper, T.M., (eds.), 1990).<sup>136</sup>

Research suggests that wherever there is a conflict between profit and environmental protection, profit wins (see, for example, Jones, C., 1990;<sup>137</sup> Isabella, L.A., 1986<sup>138</sup>) but, Gray, R. (1990)<sup>139</sup> believes that "being relatively environmentally sensitive [is] unlikely to do irreparable damage to one's income number". In any event, marketplace values expressed in balance sheet terms are no guide to environmental costs (Thomas, H., 1986).<sup>140</sup> Unfortunately, some companies

continue to make profits at the expense of the environment, but some are taking advantage of the new markets which are opening up as a result of "green" consumer goods and environmentally oriented technologies which offer considerable opportunities in the 1990s and beyond (see, for example, Rothkrug, P. and Olso, R.L. (eds.) 1991;<sup>141</sup> Elkington, J. and Burke, J. 1987<sup>142</sup>).

The possibility of "green capitalism" has been demonstrated by the unparalleled growth of The Body Shop company which is considered to be a pioneer in environmental practices. This is a young company whose environmental and social ideals have paid off. But other long established businesses will have to invest in environmental improvements when their factories and equipment have to be renewed and in order to comply with more stringent environmental laws. For example, "according to the UK Chemical Industries Association (CIA), UK chemical companies have spent over £4.5bn since 1990 on environmental improvements." (Adams, R., 1996)<sup>143</sup> Although the large enterprises are better placed to accommodate these changes, the need to convert is not dependent on size and the "whole of the business community in the United Kingdom, from the smallest enterprise to the largest multinational corporation, needs to place improvement of its environmental performance high on its agenda" (Macve, R. and Carey, A. (eds.), 1992).<sup>144</sup> As the process is voluntary and there are no time limits, the penalty that businesses will pay if they fail to improve their environmental performance will not be imposed on them by the government, but by the market, where the "green" dynamic will play its part. The strength of green ideology is in its pervasiveness and future potential.

### **2.3.7 Financial institutions**

The achievement of environmental objectives may be influenced by financial quantification (see Pearce *et al*, 1989<sup>145</sup>; Owen, D. (ed), 1992)<sup>146</sup> but because there

are no professional or legal requirements to do this, the costs incurred in going green and evaluating any environmental damage, need to be justified. This can be done on the grounds that better environmental management and control will reduce accidents, damages and may improve turnover and profits. So, converting to green products and processes may have financial advantages. The Exxon corporation had to pay over \$2 billion dollars in damages (Koeplin, D. & Muller, K., 1992)<sup>147</sup> after the Exxon Valdez disaster, and the insurers of Shell would not pay for pollution damage which did not result from an accident (see Owen, D. (ed), 1992).<sup>148</sup> There are good reasons for shareholders and investors in general to know: (i) the potential environmental risks that their companies could incur; (ii) the extent to which they are covered by insurance; (iii) the amounts provided in the accounts; and (iv) the amounts which remain as contingent liabilities. Investors need such information in order to assess the risks involved.

Environmental concern has heightened awareness concerning ethical investments. Of course, the concept of ethical investment is not new. Socially Responsible Investment (SRI) as it is sometimes called, focuses on investing in peaceful or environmentally friendly companies and, conversely, avoids investing in companies involved in armaments or unfriendly environmental processes. Ethical environmental investments, in the form of Unit Trusts, have enjoyed great success since the first Stewardship Fund was set up in 1984. (See Gray, R., *et al.*, 1996)<sup>149</sup>

The adoption of environmental policies/ethical principles by financial institutions can have considerable impact on the composition of their investment portfolios. For example, some investment funds will not invest in companies whose activities are environmentally harmful. The problem with investment selection is that not all companies publicise relevant information. There are no Stock Exchange or Government regulations requiring the disclosure of environmental data and



shareholders cannot know whether a company really is environmentally friendly. It may simply be doing a good or bad PR job, with regard to its environmental processes and practices. However, investors need solid, reliable and relevant environmental information from all companies whose shares may be freely bought and sold by financial institutions and the public, in order to be able to make an informed choice. Although the financial institutions are now playing their part with regard to the environmental dimension, their progress is limited by the lack of relevant, universal and uniform information.

#### **2.4 CONSEQUENCES OF ENVIRONMENTAL DEGRADATION**

No examination of environmental effects can be complete without a study of the environmental consequences of humankind's activities. Economic pressures are forcing businesses to externalise the effects of their activities, which emanate through the medium of the environment. Both production methods, and the market system, have been blamed for this. At the same time, it is argued that these can be powerful allies in addressing the effects of environmental degradation.

The lack of property rights on environmental goods means that they are "common property" and, as such, are over-exploited. For example, the atmosphere is treated as a dump for vast amounts of substances which are either already harmful or have the potential for becoming harmful, over time, or by gradual accumulation, or through interaction with other substances. The consequences of pollution can be local, global, or both. The ongoing concentrations of atmospheric pollution brought about by CFCs, carbon dioxide, methane, and other greenhouse gases are suspected of increasing the earth's mean temperature which probably lead to changes in weather cycles and a rise in sea level. In addition to routine emissions, there are the exceptional and catastrophic chemical releases from accidents and fires. Such major incidents are no longer rare. According to Tolba, K.M. (1992)<sup>150</sup>

the disaster at Bhopal, India, in 1984 killed more than 2,500 people and harmed the health of two hundred thousand more and the incident at Seveso, Italy in 1976, released dioxin (a poisonous and carcinogenic substance) into the atmosphere and caused direct costs of about \$250 million.

Some industries cause more environmental damage than others. In particular, "the petrochemical industry is unique. Not only are its wastes dangerous, but its very products degrade the environment much more than they displace. The petrochemical industry is inherently inimical to environmental quality." (Commoner, B., 1990)<sup>151</sup> The consequences of the pollution of air, land and water may not be just momentary; they may have a cumulative and lasting effect. The effects of pollution are spread over wide areas and can cause global problems, such as acid rain, ozone depletion, radiation and the contamination of oceans. The result is widespread damage to agriculture, forests, fisheries, wildlife, buildings and other property and, above all, to people's health and well-being.

Atmospheric pollution is probably the worst offender. Its global nature makes it easier for polluters to externalise their social costs by "exporting", instead of internalising them. Emissions from hazardous processes are carried to other countries and cause damage to health and property. This shifting of harmful effects makes international pollution more dangerous. For example, the damage to the ozone layer and alleged global warming which is caused by global pollution may have catastrophic consequences for some countries. Major pollution incidents have heightened world-wide awareness, but the scale of global pollution requires the cooperation of all or most of the countries of the world because one country acting alone can do nothing to contain or prevent the consequences. A coalition of all or most governments of the world is essential for effective control. Although international cooperation would bring about considerable benefits, it is not

forthcoming. An international pollution control body would need huge resources and would incur immense administrative and monitoring costs. Also, some countries would opt out, uncertain as to whether they stood to gain or lose from the effects of global pollution.

In general, "industrialisation leads to...the generation of air, water and noise pollution and hazardous wastes" (Panayotou, T., 1992)<sup>152</sup>. Modern production techniques are the main cause of environmental damage. The desire of other countries to adopt western style technologies and to grow economically, will only exacerbate the situation. According to Commoner, B. (1990) "the pollution-generating tendency of a technology can be expressed numerically as the amount of pollution generated in producing a unit amount of economic good".<sup>153</sup>

## **2.5 CONCLUSION**

In the last few decades it has been recognised that pollution is causing serious problems and has to be controlled. Because the problems caused by some pollution are not localized, the risks are universal. Even countries with hardly any pollutant industries "have to settle up the pollution accounts of other highly industrialized countries with dying trees, plants and animal species" (Beck, U., 1994).<sup>154</sup> The burgeoning population numbers and the consequent demand for more resources are exacerbating the situation.

The range of influences on the environment is large but those mentioned above have the greatest potential for making an impact. The most effective influences will be those which (i) force producers to switch to sustainable manufacturing products and processes or to those which are the least environmentally harmful and (ii) bring about a lasting cultural and social change in people's attitudes and habits towards environmental issues. In the long term, this is the only safe option since the

alternative is the doomsday scenario, whereby environmental degradation is allowed to get worse and worse until the planet can no longer support life.

However, there is now a growing awareness, both on a national and international scale, and a willingness by Governments to introduce measures to curb the damage. There is also a large number of bodies which are exerting considerable influence on people's attitudes towards the environment and on industry. These influences have brought about significant changes in the UK's environmental concern: more environmental law; change in consumer and employee habits and making profits from environmentally friendly products. In this changing state of affairs, organisations will have to adopt better environmental management methods, and accounting is in a position to contribute to the whole issue of environmental protection.

Some companies are beginning to demonstrate through their various reports that they are making an effort to economise in their use of non-renewable materials and switch wherever possible to renewable materials; for example: The environmental policy of The Body Shop PLC states: "we will use renewable resources wherever possible, and we will conserve natural resources where renewable options are not available."<sup>155</sup> Also, the environmental report of Thorn EMI states that "...it is the broader issues surrounding sustainable developments that need to be addressed to secure the future for generations yet to come. We have identified the concepts of eco-efficiency and social sustainability as key routes in our drive towards sustainable development".<sup>156</sup> In relation to sustainable development, the market, and environmental accounting, the President of BSO/Origin wrote in the company's Annual Report for 1993 that "If we imagine the planet's natural resources as our collective inheritance, we should ideally be striving to live from the planet's interest and not to recklessly squander its capital. We must therefore learn to effectively

manage the environment just as we would any other business. But just as no business can be successfully run without precise accounting practices, environmental resources cannot be sustained without accurate ecological bookkeeping".<sup>157</sup> Accounting is well placed for providing companies with mechanisms for eco-efficiency and sustainable development and, therefore, it has an important role to play. The demands and problems created by production processes and large populations, such as resource depletion, consumption and pollution need accounting to establish relevant recording systems, and to control, evaluate and verify the data which flow from them.

This chapter has considered the environmental debate and therefore, focused on the environmental problem by examining the evidence of environmental degradation and resource depletion/destruction. The problem was put in perspective by investigating its existence, causes and influences, as well as the responses/reactions of society, business and the government. This was necessary because, without a thorough understanding of the subject, it could not be possible to identify the appropriate accounting methods for addressing the problem.

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## **CHAPTER 3**

### **ENVIRONMENTAL ACCOUNTING AND REPORTING**

#### **3.1 INTRODUCTION**

The purpose of this chapter is firstly, to demonstrate that environmental evaluations are possible, so that it can be shown that accounting can deal with environmental effects in monetary terms. Therefore, the first section considers the consequences of environmental degradation and the various methods used to establish money values. Environmental evaluations can be used to facilitate the monitoring and control of environmental effects and resources. Environmental discounting is also, considered because the size of the discount rate influences resource use and depletions which in turn affect pollution and the welfare of future generations.

The second part investigates the accounting and reporting issues arising from environmental degradation and resource depletions. Accounting has come under considerable criticism for failing to address the problems arising from environmental effects. Because there are no environmental accounting and reporting guidelines there is a lack of uniformity and direction. Various aspects of environmental accounting and reporting are examined, in order to ascertain and demonstrate that accounting can play a "functional" role in the accounting and reporting of environmental effects. Also in order to test/demonstrate the adaptability of accounting, some specimen environmental accounts are developed in the form of double entry book-keeping. In addition various aspects of environmental reporting are considered. In particular, current developments in environmental disclosures are examined and a number of examples from actual UK and European reports are provided and discussed.

The final topic which is examined in this chapter is the evolution of environmental

accounting. This includes the emergence, in the 1970's, of Corporate Social Reporting, which included environmental pollution. By examining the evaluation and versatility of environmental accounting, it is demonstrated that accounting has a function to perform and that it can fulfil that role.

### **3.2 ENVIRONMENTAL EVALUATIONS**

The identification and evaluation of environmental effects are becoming more and more important, not only for environmental management purposes, but also for business and sustainable development. Probably the biggest problem in evaluating environmental effects is that market conditions do not apply to them. Clean air, peace and quiet are not traded. Consequently, "values for environmental resources beyond those that arise from commercial transactions are excluded from the decision tools advocated within conventional management accounting" (Milne, M.J.,1996).<sup>1</sup>

This Section considers the various techniques which have been developed for establishing values for environmental effects. Although it seems obvious that this is a prerequisite for an assessment of costs and benefits, the practice is not without its critics. It is recognised that there are problems of quantification and measurement. However, the complexities and difficulties encountered in solving problems should not be used as an excuse for ignoring or abandoning them altogether. Monetary values have "been proposed as the most appropriate index or yardstick for the measurement of the benefits that are foregone as a consequence of damage to environment" (Sterling, A., 1993)<sup>2</sup>. After all, since money values are used to establish the costs of pollution control and other environmental costs, meaningful comparisons can only be made by using a common denominator. This is a subject which offers both an opportunity and a challenge to the accountancy



profession for contributing and influencing developments.

A number of methods have so far been developed for valuing environmental effects. A practical way of doing this is to assume that the costs of pollution control represent the environmental damage thereby avoided. Another approach is the establishment, empirically, of the total costs of environmental damage.

The valuation of environmental goods, such as the natural environment, air and water, is important because only then can a comparison be made and social benefits weighted. If they are not valued specifically, they will be valued arbitrarily in policy decisions. It is obviously better to use explicit valuations (even though they may be approximate), rather than arbitrary prices.

### **3.2.1 Monetization of environmental effects**

As already intimated, putting money values on environmental effects derived from the externalities opens up a way of bringing them within the sphere of economics and accounting. In this way, it is possible to reveal and measure people's interest in environmental concern. It is from this concept that the principles of "willingness to pay" and "polluter pays" were derived. Monetization quite simply transforms environmental effects into matters which one is forced to recognise. Both principles can be applied to either the cause of the damage or the prevention of it. In both cases, they put in perspective the depth of people's feelings towards environmental concern, enable comparisons of social benefits to be made and strengthen the case for environmental quality. It would not be possible to carry out such techniques as cost-benefit analysis and environmental impact analysis, without monetization.

However, the practice of assigning values to environmental effects is not generally recognised. It is argued, for instance, that it is "no more than a rationalization of

political decisions ..." (Cairncross, F., 1991)<sup>3</sup>. Also, that the loss or damage to biodiversity, rare species, Antarctica and public health, may be, for example, unquantifiable. Whilst, not all environmental effects can be evaluated, not accounting for them will not prevent their loss or damage. Although monetization makes quantification and environmental management more effective, this should be without prejudice to other forms of evaluation.

In a world which is dominated by money, attaching money values to environmental assets and effects is a practical way of putting them in perspective. In fact "the conventional approach to environmental resources is one which gives pre-eminence to economic value" (Milne, M.J., 1991).<sup>4</sup> Early cost-benefit analysis (CBA) studies were based mainly on commercial considerations (see Pearce, D., 1971),<sup>5</sup> but their scope has been extended to include other benefits of environmental resources (such as amenities). "This has led to the notion of the total economic value of environmental resources as comprising the sum of use, option and existence value. Consequently, to the extent that individuals express a preference for them, social and ecological values will be incorporated in the decision analysis." (Milne, M.J., 1991).<sup>6</sup>

### **3.2.1.1 Existence value**

In relation to environmental resources a number of different notions of value exist (see for example Rolston, H., 1986;<sup>7</sup> Pearce, D., *et al.*, 1989.<sup>8</sup>) Existence value can be attributed to environmental assets which is unrelated to their present or future usefulness. This is an oddity in economic theory, since "the definition of value implies only the existence of some basis for the weights commanded by resources in exchange" (Perrings, C., 1987)<sup>9</sup>. In other words, value, in classical terms, is allied to the market.

A possible explanation for this is that it arises from altruistic motives, i.e. caring for things or other people. Such care is not derived from benefit or kinship. This is evidenced by the increasing number of people who belong to nature and conservation groups. The interests of some groups may be on the other side of the globe and may never be seen by their members. This detachment of value from usefulness demonstrates the existence of "value in things rather than value of things" (Pearce, D. *et al.* 1991).<sup>10</sup>

### **3.2.1.2 Option value**

Option value is another value concept which also features in environmental considerations. This is a subtle concept of value, as it is attributed to potential future use, as opposed to existing and current use. It is value for which one is prepared to pay to forego the enjoyment of the environmental asset, so that it may be enjoyed in the future. Option value has been defined as "a willingness to pay, for the preservation of an environment against some probability that the individual will make use of it at a later date" (Pearce, D. *et al.*, 1989)<sup>11</sup>. When an area is being considered for development it should also be recognised that its development forecloses all future options. The value of the lost options must also be taken into account when evaluating the development. The loss of its alternative uses reduces the options for possible future uses.

Environmental developments may cause irreversible processes and foreclose future options. Therefore, in evaluating the costs from such developments, a premium should be taken into account, over and above the actual costs. The premium should reflect the capitalized value of the option values lost for ever.

### **3.2.1.3 Valuation techniques**

A number of environmental evaluation techniques are considered briefly in

"Environmental Project Evaluations" (which is included in the thesis - see Makris, P.H., 1991b<sup>12</sup>, Appendix F) in conjunction with environmental discounting. The more important evaluation techniques are examined in the following sections.

Valuations for environmental goods and services can be ascertained directly or indirectly. Direct methods elicit values by asking people about their willingness to pay in hypothetical situations, whilst the indirect methods derive values from people's actual consumer behaviour in the real world. The indirect approaches, known as hedonistic or surrogate methods, can only value "existing use", whereas the direct methods, such as the contingent valuation methods, are more flexible, and as a result have become very popular and are used widely.

#### **3.2.1.3.1 The hedonistic (surrogate) price methods**

The usefulness of land is generally related either to its agricultural output, the amenities it provides, or its commercial uses. The value of these benefits determines the value of the property. As the benefits vary from property to property so do their values. So, the location of property is a determining value factor, and the environmental conditions of each location also play a part in the variations in values. (See Markandya, A. and Richardson, J., (eds), 1992).<sup>13</sup>

The hedonistic approach seeks to identify the variations arising from environmental differences. As people are willing to pay more for the improvement in environmental quality, the excess can be ascertained by comparing identical properties. The value of a house, say, in a polluted area would be less than the value of an identical house in a clean and peaceful area. This method of ascertaining the value of environmental quality is known as the property price method.

This method was developed further by Walters (1975)<sup>14</sup> to include noise. His method involves the actual valuation of noise. A value per unit of noise is worked out, which is then applied to the affected property. An obvious application of the Walters method is in the cost-benefit analysis exercise for the construction of an airport.

Another method which falls into this category is the Travel Cost Method (TCM), both in its basic forms "zonal" and "individual". The method is based on the principle of willingness to pay and there are many variations to this technique. Basically, it evaluates the costs involved in visiting a site for amenity purposes. A visitor may, for instance, have the choice of working on that day or going to the site. The visit will also cost him the entrance fee, plus the cost of travel. This method was developed by Marion Clawson (1959)<sup>15</sup>. It converts the benefits provided by a recreational site into its value. It uses the direct cost (the entrance fee, if any) and the indirect cost (the travelling cost, and loss of earnings if applicable). The total social benefit is directly influenced by distance and population (the further the site, the fewer the visitors, and the greater the population, the larger number of the visitors).

These factors are taken into account in order to determine the costs and the optimum number of visitors for calculating the value of the site. The Clawson technique is simple but it has its drawbacks; for instance, the journey to the site may have a value in itself, and also the time involved may carry a value. An alternative method for ascertaining the value of a site is the "compensating variation" technique, i.e. the value of a site simply equals the cost of the provision of an alternative site with the same utility. The problem with hedonist price methods is that they can only be applied to environmental situations which already exist. Any potential environmental effects "are not able to be valued *ex-ante*...The best that

they can offer is a before and after analysis" (Milne, M.J., 1991).<sup>16</sup>

#### **3.2.1.3.2 Contingent valuation methods**

The contingent valuation method creates an artificial market in place of a real market and thus gets round the lack of market data. A definite "advantage of contingent valuation is the method's potential ability to capture non-use existence values. The application of contingent valuation techniques has been widespread" (Milne, M.J., 1991).<sup>17</sup> Under this method people are asked directly what they would pay for a given environmental benefit. Answers are obtained verbally, through surveys. This method is based on the concept of "willingness-to-pay" (for retaining the benefit) and "willingness-to-accept" (compensation for the damage to the benefit). The answers represent the personal hypothetical valuations of the participants, which should be close to those which would exist under market conditions. It provides a pragmatic approach to the monetization of an elusive value. The method is also flexible and is now used for evaluating a variety of environmental benefits, such as amenity parks; wild-life, air and water quality.

However, it must be said that the problem with this method is the discrepancy in answers to questions of willingness-to-pay and willingness-to-accept. The respondents tend to give low values for the first and high for the second. It also assumes that all the respondents are equally aware of the relevant environmental effects. (See Winpenny, J., 1991).<sup>18</sup>

#### **3.2.1.3.3 Cost-benefit analysis**

Cost-benefit analysis (CBA) is a method which was developed for making government decisions. It is a tool for calculating costs and benefits, some of which are environmental and as such have no market values. Although CBA is an excellent technique for establishing monetary values, it is not ideal for evaluating

the wider environmental effects. As a result, an alternative method was developed in the 1970s, namely, Environmental Impact Assessment (EIA) to supplement CBA. As a rule, CBA is used for major public works projects and it takes into account the wider implications of the project. By putting economic values on environmental costs and benefits, it incorporates environmental effects into the decision-making process and thereby avoids damage to critical natural capital, biodiversity and sustainability. In effect, environmental evaluations emerge from cost-benefit analysis.

Because of the difficulties in evaluating projects, it is thought by Lowe, J. and Lewis, D., (1980) that CBA "cannot account for everything in quantifiable terms"<sup>19</sup>. When the CBA evaluation is supported by an EIA it is possible to arrive at an informed position. One of the rules of CBA is that a project should be undertaken if the net benefits arising from the project exceed those which existed before it was carried out. This means that only projects with positive net social benefits should be carried out. In order to establish the net benefits of a project it is necessary to calculate both the benefits and the costs in terms of their net present values (NPV). To arrive at NPV, CBA uses discounting, which is considered in section 3.2.2. Because projects have very long lives, discounting plays an important part in assessing their social benefits. This is particularly so where benefits from a project are high during the early part of a project's life and the costs are high towards the end of its life.

CBA is not without its critics; for example, Jonathan Porritt (1984) has described CBA as "shortsighted ... with its emphasis on present value and instant reward ..."<sup>20</sup>. In this instance CBA is cited as contributing to industrialization and the exploitation of resources. It does this by identifying projects which create wealth here and now, irrespective of the adverse effects which may be created for future generations.

CBA on its own has a myopic view, but when supported by EIA it can take on a wider perspective.

#### **3.2.1.3.4 Environmental impact analysis**

EIA was developed for assessing the environmental impacts and effects of CBA projects. It evaluates the nature and distribution of impacts arising from the project, including those which cannot be converted into monetary values but will have to be taken into consideration. The two methods complement each other.

One aspect that EIA highlights is the identification of costs and benefits which should not be discounted in the same way as other costs and benefits. Whereas CBA hides long-term environmental problems, EIA highlights them.

The importance of EIA is in its systematic identification of effects, their interlinkages, their order of significance and the evaluation of outcomes. In the summing up, it is not only the economic improvements that count. Economic improvement may have to be restricted so that an ecological balance is maintained. EIA evaluates environmental effects in ways which enable projects to be assessed within the ambit of cost-benefit analysis.

#### **3.2.1.3.5 Comprehensive Weighing**

Comprehensive Weighing (CW) is a method which has been developed at the theoretical level, by the Working Party on Environmental Ethics at the Ian Ramsey Centre, St Cross College, Oxford. (See Attfield, R. and Dell, K., (eds), 1989).<sup>21</sup>

The method introduces into the subject of environmental evaluations the concept of "informed preferences". It emphasises the fact that people's preferences are likely to be more accurate when they are based on expert and up-to-date knowledge.



The term CBA no longer encompasses the wider range of values which are required nowadays in environmental evaluations; hence the title "Comprehensive Weighing".

As already stated, the problem with CBA lies with environmental effects; some defy evaluation in monetary terms. CW's answer is to expand our concepts of cost and benefit. For example, during the construction of major projects, like a tunnel or a dam, there will be accidental deaths. But even if the outcome were known in advance, the decision to carry out those projects would still be taken. According to CW "The true value of the life appears only when we imagine weighing its loss ... against other things ... that does not mean the value of a human life is infinite" (Attfield, R. and Dell, K., (eds), 1989)<sup>22</sup>. It would follow that when people's informed preferences and priorities are studied, it is possible to reach a value for even something as irreplaceable as human life.

CW goes a long way towards highlighting the problems of evaluating some things, whilst at the same time it emphasises the need to weigh values against one another and strives for an expansion of our conceptions of costs and benefits.

### **3.2.1.3.6 Commercial and industrial environmental evaluations**

Finally, there is the question of evaluation of pollution abatement costs incurred by commerce, industry and other bodies. Capital, land and materials are needed, not only for environmental projects, but also for pollution control. The identification and evaluation of these costs should, in general, be easier to establish. Pollution abatement costs may be incurred both before and after the environmental damage, e.g. costs for pollution control and environmental remediation costs. These costs may be incurred voluntarily or they may be imposed on companies by law.

In the UK, Integrated Pollution Control (IPC) was introduced in April, 1991, when

the Environmental Protection Act, 1990 (EPA) came into force. The Act was designed to introduce the integration of pollution into prescribed processes through the concept of BATNEEC (best available techniques not entailing excessive cost) and BPEO (best practicable environmental option). Pollution control benefits are weighed against their introduction costs, so that society retains the optimum social benefit.

New processes are required to comply with rigid pollution standards. In this way, pollution control becomes an integral part of factory planning, product development, production and distribution. Industry will effectively pay for new developments. These costs, including the costs of fines and licences (from the relevant Authority), qualify as environmental costs for disclosure purposes. As the EPA covers 5,000 polluting processes and all new or major modifications to existing prescribed processes must comply with IPC requirements, there will be a continuing and expanding scope for the identification and disclosure of environmental costs, both of a capital and revenue nature.

The EPA recognises, in fact incorporates into its concepts, that for every development there are limits to environmental protection. The principle of BATNEEC is flexible, in the sense that although BAT is construed as an objective standard, it is subordinated to NEEC, because even if the best technology is available, it will not be imposed on the producer if it is unnecessarily expensive.

"Not entailing excessive cost" refers to both existing processes (i.e. in relation to their possible replacement) and newly developed processes. There is no rigid definition of "excessive cost"; it can vary over time. The identification of BATNEEC costs will be very important to companies. The importance of BATNEEC to accountants is evidenced by the fact that it is one of the subjects listed for research

in "Business, Accountancy and the Environment: A Policy and Research Agenda" (Macve, R. and Carey, A., (eds), 1992).<sup>23</sup>

Although the application of BATNEEC has not been very successful as discussed in the article on "Integrated Pollution Control" (see Appendix F, Makris, P.H., 1994<sup>24</sup> and Slater, D., 1994<sup>25</sup>) the relevant BATNEEC costs qualify as environmental costs, and so do remediation costs. Any costs incurred because of environmental damage or in order to provide or improve environmental protection should be identified in the normal way for business management purposes. These costs would normally include those required by law for environmental protection and any other costs incurred voluntarily. Clean up, remediation, spill over, and other externality costs incurred by the companies' production processes, for example, will form the bulk of environmental costs for internal management control and disclosure purposes.

#### **3.2.1.4 Gross National Product and environmental effects**

The Gross National Product (GNP), as currently measured, includes all production, irrespective of costs and benefits. It includes as national income the creation of goods and services required to clean up environmental pollution and soil erosion, but it does not include the contribution made by natural capital. As a result, the natural resources are depleted without reinvestment. Harvested timber, for example, represents production and is included in the GNP as income and although it represents the consumption of a natural resource it is not treated as a deduction in the National Accounts. Equally contradictory is the treatment of the billions of dollars spent on the clean-up of environmental damage, such as the Exxon Valdez oil spill and water purification. They are treated as national income, although their real contribution to wealth and social benefit is zero. Therefore, GNP is not a measure of the standard of living, primarily because it excludes the consumption of natural resources and the national costs of pollution. (See, for example, Tolba,

M.K., 1992).<sup>26</sup>

The national costs of pollution include all the costs incurred as a result of environmental effects. e.g. ill health, damage to crops, animals, property, soil, forests, rivers, seas and all environmental improvement expenditure incurred by businesses and the public. According to Paul Harrison (1992),<sup>27</sup> the seminal work in this field was done by US environmentalist Barry Commoner. He measured the environmental impact of some pollutants and came up with the following formula:

$$\textit{pollutant} = \textit{population} \times \frac{\textit{good}}{\textit{population}} \times \frac{\textit{pollutant}}{\textit{good}}$$

(*good* ÷ *population* being individual consumption and *pollutant* ÷ *good* being amount of pollution emitted per unit good)

Commoner came to the conclusion that it was the nature of our production technologies which was principally to blame for environmental degradation. However, arguably a modified interpretation would point to population; the larger the population the higher the consumption of resources and the creation of waste. In any event, total pollution can be equated according to Barry Commoner (1990)<sup>28</sup> to:

$$= \textit{pollution per unit good} \times \textit{good per capita} \times \textit{population}$$

There is no unique and easy method for calculating pollution. It is being argued here that it should be possible to establish that the major contributing factors to environmental degradation are made by technology, consumption and population. It is appreciated that there can be no precision or finality about such calculations; but any results, when suitably presented, would be a useful starting point for environmental evaluations.

The system of national accounts does not include environmental costs. At a time when they are rising at a fast rate, their incorporation is pressing. Without the inclusion of environmental costs there can be no environmental indicators or links between the economy and the environment. The damage done by environmental pollution is real and should not be treated as a notional or shadow cost, but as an actual cost to the economy. Activities causing a reduction in wealth and welfare must be evaluated and charged to the activity responsible for them. Any accounts which exclude material or essential information are incomplete and misleading and, therefore, unreliable.

It can be concluded from the above analysis and the methods of environmental evaluation techniques, that the subject is young and still evolving. There are still conceptual and quantification problems and they are facing resistance even from "environmental lobby groups [who] have rejected completely the principle of valuing the environment using dollars as a numeraire" (Navrud, S. (ed.) 1992).<sup>29</sup> The practice of environmental valuation which has grown in the US during the last ten years has now spread worldwide, and in particular to the UK and other European countries.

The need for such valuations is becoming more and more pressing, as it is necessary to have relevant and reliable information in order to focus attention on the damage done to the environment and on shaping environmental policy. Governments need such information to implement the "polluter pays" principle. The valuation of the environment is an essential component of the strategy for sustainable development, as it demonstrates the value of the environment and the costs and benefits in cost-benefit analysis exercises. This instils a sense of value in decisions which would otherwise be purely judgemental.

Environmental evaluation techniques evolved only recently and they may continue to evolve. Capturing and converting all the environmental effects into economic values may be a practical impossibility, but the methods developed to address specific topics produce acceptable results; they do not have to be precise. Environmental valuation techniques take environmental effects and transform them into useable numeric values for use by governments, industrialists, economists and accountants.

The magnitude of the damage done by environmental degradation is immense. It is estimated by the US Environmental Protection Agency "that by the end of this decade, almost 3% of the GNP will be spent on pollution control" (Navrud, S., (ed) 1992).<sup>30</sup> Environmental valuation and accounting techniques must be developed now and put into place to fulfil the rapidly emerging demand.

### **3.2.2 Environmental discounting**

#### **3.2.2.1 The meaning of discounting**

If interest on capital is growth over time, then discounting represents the loss in value when time is "reversed". For example, if £100 were invested in a 10% bond which would mature in one year's time, the investment would then be worth £110. Conversely, the holder of such a bond could, on day one, discount it for £100. So, one reason for discounting is because in capital there is growth. Another reason is "time preference". People prefer the present to the future, and discounting enables the benefits (from capital growth) to be enjoyed at present. Effectively, the present generation can take advantage of their antecedent position. Other reasons for discounting are: the risk of death (arising from the uncertainty of the future); and the reduction in the marginal utility of capital. (See Pearce, D., *et al.*, 1989).<sup>31</sup>

### **3.2.2.2 Opportunity cost**

The investment of capital is more attractive when the "gestation" period is shorter rather than longer, because the benefits can be reinvested. This is the opportunity cost of capital, and in classical economics, discounting is grounded in opportunity cost. The opportunity cost argument effectively states that future benefits and costs can be represented by discounted values at the present. One could, therefore, invest the discounted value of the amount which would be required at a specific time in the future, to deal with an environmental harm which would occur then. This seems to imply that causing harm to future people can be justified on the grounds that their treatment, will be provided for. This may sound uncanny, but it is prescribed by the "polluter pays" principle. According to Attfield, R. (1983), "the cost and benefits of deferment should be reckoned only where they will exist: they do not justify a diminished weighting of future interests in general"<sup>32</sup>. The justification of the opportunity cost argument for discounting succeeds only if the investment for the future benefits represents foregone benefits now.

### **3.2.2.3 The discount rates**

The application of the discount rate (DR) has been the subject of controversy. There is no consensus about the level of the DR which should be applied to environmental investments or indeed any investments. Although there is an understanding that the DR lies in the social rate of time preference and in the opportunity cost of capital, its application is not so clearly defined. The social discount rate (SDR) is the rate at which the present generation devalues the future. "The debate here concerns how to discount (and whether or not to discount) the utilities of future generations" (Fisher, C.A., 1981)<sup>33</sup>. Future generations have no say in the way natural resources are consumed by the present generations.

Private discount rates (PDR) which are determined by the market establish a

relationship between a resource and the rate of its consumption. The higher the rate, the quicker the rate of exploitation/consumption of a resource. A high risk investment would normally require a high DR and since public projects have low risk they should have a low DR. For this reason it is desirable to adopt social DR for public/social projects, because they have low risks and very long lives. Otherwise, by discounting the net present values (NPV) of such projects at high DR, their benefits become negligible and unattractive for development. The discounting of distant future events should not reduce their significance; in other words, the temporal location of a bad or good event should not make it worse or better.

However, there is a body of opinion which advocates a uniform rate of discount being applied to all investment opportunities, both public and private. It is argued in the Pearce Report (Pearce, D., *et al.*, 1989)<sup>34</sup> that (i) it is difficult to establish different DRs; (ii) lower rates attract more investment which is counter-productive; (iii) there are alternative methods for dealing with environmental concerns; and (iv) lower rates for environmental projects are administratively difficult.

Obviously, to do otherwise would effectively be bending the rules in favour of future generations and "future interests should be treated as equal to equivalent present interests" (Attfield, R. and Dell, K., (eds), 1988).<sup>35</sup>

#### **3.2.2.4 Discounting and future generations**

Because of the effects that discounting has on the consumption of natural resources, the interest of future generations comes into focus. Moral considerations stretch easily into the next few decades but almost no weight is attributed to the lives and well being of people born a few hundreds of years from now, let alone thousands of years. The cumulative effect of the damage done to the environment may be the cause of death and misery for possibly hundreds of thousands of years, if



humankind still exists. The general feeling is that the weight of moral issues diminishes with time and space, although discounting the well-being of future generations is *prima facie* evidence of intergenerational injustice (see, for example, Winpenny, J., 1991<sup>36</sup> and Pearce, D.W., *et al*, 1989<sup>37</sup>.) Even events due to start in 1,000 years time and continuing in perpetuity may warrant greater moral impact (even when discounted with the SDR) than other current harmful events.

On the other hand, obligations to future generations (which [generations] are endless) have to be discounted in order to make them manageable; otherwise they would be too burdensome. It is also argued that future generations will be wealthier and better equipped to handle unfavourable legacies, in which case one would discount their interests, and thereby bring about "reverse inheritance" (from the future to the present). The problem with this argument is that future growth is not guaranteed; the "limits to growth" will be inevitable, unless 100 per cent recycling of all residuals is achieved. (See Pearce, D.W., 1978<sup>38</sup> and Perrings, C., 1987<sup>39</sup>.)

In general, discounting is at variance with environmental considerations. Lowe, J. and Lewis, D., (1980) sum up this aspect of discounting very aptly: "It is not an exaggeration to say that the use of discounting in this context [that of environmental destruction] is inconsistent with the survival of mankind"<sup>40</sup>. Discounting future people's livelihood on unsound assumptions would be tantamount to intergenerational injustice and it would be difficult to find an ethical justification for such a practice. Some actions of the present generation may be alleviated by the actions of future generations, but other "actions engender ... harms to future generations whatever anyone else does henceforth" (Attfield, R., 1983).<sup>41</sup> At the same time, it can be argued that the present generation is not the only one which is contributing to the depletion of natural resources and undesirable effects and the

blame should be shared.

Although intergenerational fairness is important, it must be put in perspective. It is a salutary fact that "the present generation is the last one which can help those now alive, whereas people in the distant future can be assisted by a number of succeeding generations as well as the present one" (Attfield, R., 1983).<sup>42</sup> Nevertheless, it would be irresponsible to continue with injudicious practices and imagine that the prevention of harm will rest with the last generation which has the last chance to do so.

### **3.2.2.5 Discounting and natural resources**

The DR when applied to natural resources will also determine their rate of exploitation and consumption. The choice of the DR will also determine the speed of consumption. So, the higher the rate, the lower the amount of the natural resource left for future generations; such a policy will exhaust natural resources and leave nothing for the future. Resource depletion policies can also be implemented through the medium of discounting.

The determination of the discount rate for a natural resource is determined by the market, and because market rates are high, they encourage high current consumption. The SDR, on the other hand, lies at the other end of the scale and the wider the gap between the two, the more rapid is likely to be the depletion of the resource. High DRs also cause the costs and benefits of current projects to shrink. For example, if £10 million is required to deal with the effects of a major catastrophe, then when discounted at 10% for 100 years it becomes only £725. The distortions created by discounting can be amplified by comparing the above with another situation, whereby £725 is needed to deal with the effects of a minor event in the immediate future. The choice would be to deal with the effects of the minor

event. The moral significance of the major catastrophe would be reduced by discounting to a level below that of the minor event, although the "moral importance of future events does not decline at  $n$  per cent per year" (Parfit, D., 1983a)<sup>43</sup>. The fact remains that when costs can be externalised they can be transferred into the future through the process of discounting without any sense of moral indignation. Therefore, the practice of discounting natural resources at high DRs can create undesirable consequences.

Yet another problematic aspect of discounting is the determination of NPVs which arise from irreversible activities. The loss of benefits (both known and those not yet discovered) from a resource which has been irreversibly utilized, will be experienced in perpetuity. It is this "blanket" treatment of flows of benefits and costs which is questionable in environmental discounting, because even the application of the SDR to a minor resource which is lost in perpetuity, makes that resource "untouchable".

### **3.2.2.6 Discounting and the natural environment**

The application of the DR to projects involving the natural environment has different effects from those of natural resources. The high DR makes their development less attractive. Because environmental projects have long lives, their attraction diminishes when high rates are used for discounting. Their long-term net benefits are so reduced, they make the project unattractive. The strength of such projects lies in their "longevity" and that is detrimental in discounting. So the higher the DR the less likely will be their development, which is good from a preservation point of view.

The only projects which are attractive at high DR are those which have high short-term yields and long-term costs. Projects with potentially catastrophic

consequences or huge costs at the end of their lives (like the nuclear power stations with their inherent risks and decommission costs) pass the cost-benefit analysis test only by means of discounting. This is because discounting causes long-term costs to shrink to insignificance, in relation to the benefits of the project which arise early in its life. High DRs postpone costs to future generations.

In view of the effects that discounting has on the environmental dimension, its use has been questioned by environmentalists. In particular, the objections revolve around (i) time-preference and (ii) risk and uncertainty. The discounting of "future benefits and costs of a proposed investment to "net present value" has long been considered a weakness of standard systems of economic analysis" (MacNeill, J. *et al.* 1991)<sup>44</sup>. Although some discounting is justified (where there is uncertainty) time-geometric discounting towards zero is unjustified. Therefore, the complete removal of the future from our considerations, be they financial or moral, cannot be justified.

Discounting heavily on the grounds of uncertainty redeems one of the moral guilt for the harmful legacies to future generations. The benefits can be reaped now, and the costs and hazards left to posterity. Also, although uncertainty about the future justifies some discounting "we cannot be certain that posterity will need what we save" (Passmore, J., 1980)<sup>45</sup>. But no one can deny that the most fair mode is the one which matches benefits and costs for all the affected generations, even though in order to achieve this the rules of discounting may have to be bent.

### **3.2.2.7 Accounting considerations**

Finally, having seen the financial and moral significance of the DR it is now necessary to consider its accounting implications. The importance of discounting has in fact been recognised by the accounting profession, as evidenced by

Statement of Standard Accounting Practice No. 21<sup>46</sup> of the Accounting Standards Board. It recognises the time value of money (i.e. time preference) in particular in setting up assets and liabilities arising from future lease payments.

The application of the SDR represents a deviation from the norm. In a capitalist society, discount rates are determined by free market forces. The application of the SDR can only be justified on social grounds (as opposed to commercial grounds). In accounting and financial terms, what this means is that the difference between the PDR and the SDR represents an amount which has been sacrificed or invested by the present generation for posterity. This is a true cost to the present generation and it should be evaluated and reported. The arguing here is not against the adoption of SDR, but for the recognition and quantification of variations arising from deviations from normal investment patterns. These deviations may be the result of social or environmental considerations or both (see Pearce, D.W., *et al.*, 1989)<sup>47</sup>. Their quantification and disclosure in accounts (whether national or private) will, in addition to giving a fair view, reflect the sacrifices made by the present generations for social and environmental purposes. Environmental discounting lies at the heart of the environmental debate. Its application and effects are both complex and subtle and offer an opportunity for accountants to unravel its effects and report accordingly.

### **3.3 ACCOUNTING AND REPORTING ISSUES**

#### **3.3.1 Accounting and the environment**

It is not only industry which has failed to address the environmental dimension but as shown below, accounting, is similarly implicated. Although it is in an ideal position to influence developments in environmental policies and management, by sticking to its functional and symbiotic relationship with industry, (its *raison d'être*), accounting is arguably procrastinating and neglecting its obligations to society. The

perceived need for proper environmental management provides accounting with the opportunity to contribute and influence developments. New recording and reporting techniques are needed in order to capture and incorporate environmental effects in annual reports and accounts.

Capturing and reporting environmental effects may be a difficult exercise but it is a task which has to be undertaken; as Gray puts it "any system - such as accounting - which reflects an economic theory which is so fundamentally socially and environmentally malign cannot itself lay legitimate claim to being environmentally benign" (Gray, R. *et al.*, 1993).<sup>48</sup>

Pressure for change is mounting. Gray reinforces his argument for change by referring to the EC 1992 plan "Towards Sustainability" which suggests that "for any really significant environmental response from business, it will be necessary to redefine "accounting concepts, rules, conventions and methodology" in order to permit accounting to internalize all external environmental costs" (Gray, R. *et al.*, 1993).<sup>49</sup> The need for change was imposed on accounting by the environmental dimension; the willingness for change must be forthcoming from within accounting, and there are signs that it is, because "the professional accountancy bodies around the world have taken initiatives in response to the developing environmental agenda" (Gray, R. *et al.*, 1993).<sup>50</sup>

It is likely that developments will take the form of the expansion of conventional accounting practice to encompass the environmental dimension. The stumbling blocks will be, firstly, the elusive costs arising from externalities and, secondly, the integration of scientific and quantitative data into the domain of what has so far been mainly a financial sphere. Admittedly, some of this information will fall outside the current scope of the Annual Report and Accounts but the attraction of

using this high profile vehicle for disseminating information about the company's commitment to environmental concern must not be overlooked.

The System of National Accounts (SNA) has also come under criticism because it does not account for natural resources and environmental effects. The SNA was standardized by the UN and has been used by a number of countries around the world. The national accounts reflect the goods and services produced in a year, but because they do not incorporate natural resources and environmental effects, they are deficient in their representation of the real increase/decrease of resources. Although "man-made assets - buildings and equipment, ...are valued as productive capital, and are written off against the value of production as they depreciate ...[the] natural resources are not so valued, and their loss entails no debit charge against current income" (Repetto, R. *et al* 1989).<sup>51</sup>

A country's stock of natural resources, such as minerals, forests, soils and fisheries can be consumed without their evaluation and reflection in the SNA. Any accounting system which does not reflect the gradual loss of income as a consequence of the consumption (or destruction through pollution) of its natural resources must be deficient; this is crucial, especially when a country's rate of consumption is on an unsustainable course. It is, therefore, "in the name of Net Profit, Budget Surplus and Gross Domestic Product that the natural environment in which we all co-exist is being destroyed" (Hines, R., 1991).<sup>52</sup> For further information in respect of environmental costs and the SNA see "Environmental Accounting - A natural Response to Finance" (Appendix F, Makris, P.H., 1991a).<sup>53</sup>

It should be apparent by now that the need and scope for environmental accounting is immense. Although accounting is not celebrated for its versatility, it excels in the art of recording and reporting economic transactions. Embracing the

environmental dynamic should be within the scope of accounting. In order to fulfil this responsibility, accounting needs to evolve. According to Gray, R., *et al.*, (1993)<sup>54</sup> it can do this through: i) internal modification; ii) shedding any environmentally negative elements; iii) embracing potential issues from the environmental agenda; iv) ensuring that the non-financial element in reports is more substantive, rather than self-congratulatory publicity; v) developing new accounting information systems.

It should be noted that so far, very little has been written on environmental accounting and for this reason, references to relevant literature are scant. In any event, there is adequate evidence to demonstrate that the existing accounting systems are outdated, as they do not reflect the financial and other consequences of environmental effects. "There is a need to develop meaningful ways of integrating scientific and technical environmental information with financial information" (Macve, R. and Carey, A., (eds.), 1992).<sup>55</sup>

### **3.3.2 Environmental financial impacts**

Having considered the evaluation of environmental effects and the relevance of accounting, the next step is to consider their possible inclusion in financial statements.

The damage done to the environment can be either direct, i.e. from the company's own activities and the consumption of its products (downstream), or indirect (upstream), i.e. caused by the company's suppliers from the production of goods and services purchased by the company. It would seem appropriate that only the direct costs should be included in the financial statements. Obviously, if all companies did this, all the costs, both downstream and upstream, would be accounted for. It may, on the other hand, upon further consideration, be more



appropriate to include some, if not all, indirect costs, such as energy generation. It should be emphasised that there are currently no rules or guidelines as to whether or what should be included in financial statements. The UN report on Accounting for Environmental Protection (1991)<sup>56</sup>, recommends further investigation of the methodology for including the impairment of natural and environmental resources in the financial statements.

Basically, the debate revolves around the evaluation in money terms of the consequences of damage done to the environment and their inclusion in financial statements, in order to assess, firstly, their magnitude and, secondly, their effect on the results of the company. The financial statements are an excellent vehicle for disseminating information about the company's environmental policies, activities and financial effects. Because environmental issues are becoming so important, their disclosure, in a variety of forms (for example, qualitative, quantitative and financial) is gradually becoming more and more common.

### **3.3.2.1 Financial consequences**

As already demonstrated, environmental evaluations are possible and, therefore, it should be possible to determine their financial effect on the bottom line.

Environmental costs would include the following:

- |                         |   |  |
|-------------------------|---|--|
| Revenue                 | - | Environmental protection arising from externalities; special needs for manufacturing and trading, e.g. compliance, legal and insurance; clean-up costs; recycling; waste treatment and disposal; depreciation on special fixed assets; fines; environmental taxes. |
| Capital                 | - | New or major modifications and enhancement to comply with BATNEEC.   |
| Provisions and Reserves | - | Clean-up; remediation; decommission; and externalities; possible major disaster.   |
| Contingent              | - | Claims for damages; litigation for damage to liabilities, health and property through spill-overs, emissions, contaminations and other externalities.  |

There are no rules or standards concerning environmental expenditure and as the subject is only now evolving, it is inevitably flexible. For this reason, companies may need to broaden the scope of environmental expenditure. There might, for instance, be emissions which, although they were harmless in the past, could become harmful over time, due to, for example, accumulations and interactions. Environmental expenditure may be voluntary, compulsory or anticipatory (incurred because of existing or possible future legislation). In addition, some revenue expenditure (which would benefit future accounting periods), such as successful research and development may be written off outright. Until an Environmental Accounting Standard is developed, companies will have to develop their own practices and in borderline cases they should absorb and disclose more rather than less.

It is appreciated that because of lack of uniformity and general compliance, problems will arise. For example, why should an environmentally friendly company, which incurs (voluntarily), say, environmental clean-up costs, evaluate and disclose them? By doing so, it derives no benefit and will be financially worse off, in any case. Whereas another company, whose business is harmful to the environment, will not suffer in this way and will be comparatively better off by continuing to treat these problems as externalities (see Gray, R., 1990;<sup>57</sup> Gray, R., *et al.*, 1993<sup>58</sup>). In contrast, if a company incurs the clean-up costs because of its careless attitude towards the environment, should it then disclose them as environmental costs and thus project a caring image whereas, in fact, the opposite is true, as it had failed to protect the environment in the first place? Such misrepresentations can be avoided if companies have to comply with environmental accounting and reporting standards which require costs to be classified into defensive (anticipatory), remedial, or compulsory.

### **3.3.2.2 Environmental accounting**

#### **3.3.2.2.1 General considerations**

The increase in public environmental awareness, despite the recent recession, (ENDS Report 232)<sup>59</sup>, together with an overwhelming increase in national and international legislation (F.T. Survey 1994)<sup>60</sup>, is forcing companies to make environmental management an everyday task. Pressure groups and shareholders expect environmental disclosures in order to allay their fears or to assess their companies' environmental performance (see, for instance, Hunt, J., 1990<sup>61</sup> and ENDS Report 230, March 1994<sup>62</sup>).

The demand for environmental accounting disclosures does exist, but the part which accounting should play in the matter has not yet been clearly established. Although environmental accounting literature has increased in the last few years (as pointed out by: Mathews, M.R., (1993)<sup>63</sup>; Mathews, M.R. and Perera, M.H.B., 1991)<sup>64</sup>, only fractions of environmental accounting models have been developed, mostly in the 1970s and early 1980s, and they were in conjunction with, and formed part of, social accounting models. It can be argued that accountants have a responsibility for finding ways and means of using their specialized knowledge and skills to help organizations at each stage in their efforts to achieve better environmental performance. According to Elkington, J. and Burke, T. (1987)<sup>65</sup> the "key to environmental excellence is to identify priority targets and get people moving towards them, however slowly they may start." Obviously environmental excellence cannot be achieved overnight; it is a gradual and lengthy process.

In order to incorporate environmental information into traditional accounting, new approaches and concepts have to be explored and developed, because "the way traditional accounting is focused, it cannot possibly take account of environmental issues" (Gray, R., 1990).<sup>66</sup> Concern is also expressed by Rubenstein, D.B. (1991),

who believes that "one of the key problems here is that we, the accountants of the world, don't yet really know how to account for clean up costs and the related liabilities in a reasonable way"<sup>67</sup>. And, according to Owen, D. (ed) (1992) the developments from green issues have "actual and potential repercussions upon the accounting function"<sup>68</sup>. Also the stance of accounting on these issues is compromised because, its association with business "serves an ideological function; one which has a vested interest in down-playing ecological impact" (Maunder, K.T. and Burritt, R., 1991).<sup>69</sup>

From a practical point of view the implementation of an environmental accounting system and policies would require the introduction of accounting and monitoring techniques. It is here that the accounting profession is ideally placed to play a part. For instance, "to conduct research into all aspects of the environmental interface with business finance and corporate accountability" and "to assist in the development of environmental auditing and methodologies" (Owen, D. (ed), 1992).<sup>70</sup> Also the accounting profession can establish performance measurement systems "which entail the setting up of mechanisms for collecting, collating and transmitting quantitative data" (Owen, D., (ed), 1992).<sup>71</sup> The implication here is that accounting is involved, and necessary, at each and every stage of the process towards environmental protection.

These views should throw some light on the challenge faced by accounting in developing the necessary tools to deal with the environmental issues. It would seem that these problems have at last been recognised, because the "Professional accountancy bodies around the world have taken initiatives in response to the developing environmental agenda in recognition of the need for a reaction - perhaps even a lead - from the accountancy profession" (Gray, R. *et al.* 1993).<sup>72</sup>

### **3.3.2.2.2 Environmental accounting developments**

Environmental effects are inherently difficult to quantify and evaluate because of their very nature. The traditional accounting and recording systems of companies do not include such information and, in order to deal with environmental issues effectively, companies must develop and implement systems which can capture the relevant information. One would expect that since the perception of environmental problems emerged some twenty years ago, any well organized company would have developed and installed such systems by now for management purposes. And yet, such a conclusion cannot be inferred from published annual reports. One would assume that if they had such systems and obtained environmental data they would publish it in order to demonstrate their environmental commitment, transparency and accountability. Also because of the lack of regulation and standards companies are not compelled to develop such systems.

Environmental effects may be related to assets, liabilities, inputs and outputs. For example, they could be the construction of environmental plants or their modification, remediation costs, contingent liabilities, fines, pollution damage to health or property and resource efficiency. Some of these costs may be difficult but not impossible to determine. But, even the easily ascertainable costs (such as fines, clean ups and research and development) are not generally recognised and reported in annual reports or other published information.

Admittedly, some of the environmental costs are very difficult to identify and evaluate. The costs which are the most difficult to identify and evaluate are those arising from externalities. This is because they are borne by the public and traditional accounting only recognises them when they become private costs; this may happen through fines, damage claims or contingent liabilities. The difficulties and complexities of evaluating externalities should not preclude individuals or

groups placing their own subjective valuations on them (as "shadow" or "accounting" prices) as is done in cost-benefit analysis" (Gray, R. *et al.*, 1987).<sup>73</sup> The essence of environmental accounting does not lie with accuracy and precision, but in transparency and accountability. It is not important that environmental accounting is precise, but it is important that it be implemented. According to Schreuder, H. and Ramathan, K.V. (1984a)<sup>74</sup> it is not necessary to have precise measures for externalities; subjective and imprecise indicators are acceptable provided they improve the current situation.

At this juncture, one should pause and reflect on how uniform and precise some aspects of traditional accounting are. For example, varying evaluations may be acceptable for inventories, depreciation and goodwill. Furthermore, since environmental accounting is not exclusive of non-financial data (such as quantitative and qualitative), the emphasis should not be restricted to financial measurement but to an all embracing spectrum of accounting and reporting in whatever form or state is feasible. These views should dispel any reservations accountants may have in achieving what is currently possible. A pragmatic approach to environmental accounting is necessary, and any necessary measurements and financial evaluations should be kept within the bounds of practicality and reason.

#### **3.3.2.2.3 Problems with environmental accounting developments**

Recent publications on environmental accounting are replete with adverse comments concerning the problems faced by accounting. For example, Gray *et al.* (1992) say that "the accounting system needs to become more forward looking" and "new accounting and information systems will need to be developed"<sup>75</sup>. The 1992 EC Plan (Towards Sustainability) suggests that "for any really significant environmental response from business, it will be necessary to redefine "accounting concepts, rules, conventions and methodology" in order to permit accounting "to

internalize all external environmental costs"<sup>76</sup>, whilst Mathews, M.R. (1993) points out that "it is not difficult to see that further development is needed before environmental accounting can be applied..."<sup>77</sup>.

As shown above, both long established accounting and economic concepts are being questioned and reconsidered in order to accommodate the new illusive costs and problems arising from environmental issues. Further doubts about accounting's ability to deal with the environmental dimension in its present form were raised by Rubenstein, D.B. (1992): "the basic accounting concepts, such as matching, conservatism, even the notion of equal and opposite double entries, can be modified to reflect the unique interests of environmental stakeholders"<sup>78</sup>. Undoubtedly, these criticisms do not imply that nothing should be done about environmental accounting and reporting until such time as the problems with accounting have been resolved. After all, if "our methods of accounting are implicated in the present environmental crisis it is no less than our duty in the public interest to attempt to contribute to the reversal of that crisis". (Owen, D., (ed), 1992).<sup>79</sup> To postpone all action until then would prevent experimentation and, would be self-defeating.

The problems facing environmental accounting are threefold. Firstly, accounting is not evolving fast enough to provide the necessary "tools" to facilitate the shaping and development of environmental accounting "craft". Secondly, just as Company Law introduced financial reporting, so environmental law should introduce environmental reporting, which will necessitate environmental accounting: but if regulation is introduced too soon it will frustrate developments. Thirdly, the accounting profession has not shown much enthusiasm over the whole issue of environmental accounting. On this basis, the achievement of transparency and accountability in environmental issues is going to be neither quick nor easy.

#### **3.3.2.2.4 A double-entry environmental accounting system**

The evaluation of environmental effects was considered in Section 3.2.1. In this section an attempt is made to develop a stand-alone, double-entry environmental accounting system. The environmental accounts mentioned below are, therefore, not an integral part of the company's accounting system, although most of the entries are derived from it.

The accounting entries for the values of environmental effects will follow the normal rules of accounting. The descriptions of accounts evolve naturally from their source and they will be classified in ways which best convey their significance. Macve, R. and Carey, A. (eds.), (1992),<sup>80</sup> identify a number of topics for research; in particular, the types of expenditure and content of corporate environmental reports. The scope and classification of environmental cost, revenue and capital have not yet been clearly defined. Subject to this, the proposed double-entry accounting system could take the following form.

##### **Environmental damage account**

An Environmental Damage Account will be opened which will include the amounts of all the operating environmental activities of the enterprise for the period. It is appreciated that it may not be practicable to even attempt to capture all the environmental costs and benefits, as some cannot be identified or valued. Some environmental costs form an integral part of the activity and it would be futile to try and unscramble the various elements involved. The resources allocated by a concern towards the establishment of environmental accounts are not unlimited and the whole exercise must be kept within the bounds of reason.

Within the heading "environmental costs", there may be costs incurred specifically for environmental improvements. The term "environmental costs" should not be



misconstrued. Some environmental costs may cause environmental damage whilst others may bring about environmental benefit. The costs incurred for improvements must be deducted from the other non-beneficial costs in order to arrive at the net environmental damage caused by the company's operations. If this method were adopted, companies would have to classify all their environmental costs between beneficial and non-beneficial. Although it would be more difficult to arrive at an accurate evaluation of "beneficial" environmental costs, this method lends itself to the concept of sustainable development. Sustainable development can only be maintained, in theory at least, where the beneficial costs are not less than the non-beneficial environmental costs. That is how the damage to the environmental resource base will be halted. Macve, R. and Carey, A. (eds.), (1992)<sup>81</sup> suspect that environmental accounting will develop towards a "bottom line" measure of environmental impact, i.e. a net environment cost. In any event, whichever method is used it should be made clear in the accounts. The specimen environmental accounts in Table 3.1 comply with the above requirements.

Once the environmental costs and benefits have been identified, a net environmental result for the year can be struck and carried forward to arrive at a cumulative position. One may well ask: what should the opening balance be? - as there would have been environment costs and benefits prior to the implementation of environmental accounting. In the absence of environmental evaluations the opening position would have to be nil.

The ascertainment and evaluation of internal environmental effects and costs will be more precise in comparison with the evaluation of external costs, which arise from externalities. The latter do not, as a rule, create a genuine cost to the enterprise, as the costs are borne by outsiders. This is another reason why the classification of environmental costs is very important.

Some of the amounts featuring in the environmental accounts will not be material for separate disclosure. However, the essence of environmental accounting does not rest on materiality but on the distinctive nature, purpose and content of those costs. So, although some information does not have to be disclosed by law or existing accounting standards, it should be disclosed because of its nature.

Another class of environmental expenditure which requires consideration is environmental capital. The question arises as to how such costs should feature in the environmental accounts. The answer must be in the treatment of normal capital expenditure, i.e. it is capitalized and written off over its expected useful life. The same thing should be done in environmental accounts.

The majority of the entries in this account would be created through contra entries to the company's Environmental Current Account (see Table 3.1). They would include:

- a) payments for environmental damage and protection;
- b) external costs for externalities, which are not actually incurred;
- c) outstanding environmental liabilities, e.g. for clean-up costs;
- d) miscellaneous accruals and prepayments for environmental costs for the year.

It should perhaps be emphasized that not all costs will be debits in the Environmental Damage Account; beneficial costs should appear as credits (the corresponding debit being in the company's Environmental Current Account).

### **Environmental protection fund**

This fund could be viewed as the company's investment in the environment. It takes the place of issued share capital in the Environmental Balance Sheet. As such, it can be created only through major long-term environmental protection

projects/investments by the company, which would be capitalized in the financial accounting system.

The combined total of the balance carried forward in the Environmental Damage Account and the Environmental Protection Fund may be a guide as to how close to or how far from environmentally sustainable development the enterprise has been operating. The specimen Balance Sheet in Table 3.1 shows that the company's position at the end of the year was on a sustainable level as it has a positive balance of £55K.

### **Environmental balance sheet**

The accounts appearing in the Environmental Balance Sheet have already been mentioned.

This section has demonstrated that the accounting craft *can* provide the methodology for *accounting* for environmental effects. Of course a comprehensive accounting system would include a considerable amount of quantitative and qualitative information. Such information would cover *inter alia*, energy, emissions, recycling, various input and output data, the company's environmental policies and practices; product stewardship (i.e. life-cycle assessments, resource procurement), efforts towards sustainable development, employee involvement and training.

Table 3.1 Specimen environmental accounts

<b>XYZ PLC - y/e 31/12/94</b>			
<b>Environmental Damage Account</b>			
<i>Costs incurred:</i>	<i>£000</i>	<i>Remediation costs incurred:</i>	<i>£000</i>
<i>Emissions</i>	20	<i>Emissions</i>	5
<i>Water treatment</i>	10	<i>Externalities</i>	1
<i>Fines</i>	5		
<i>Externalities (notional costs)</i>			
<i>Nox</i>	2	<i>Balance - Net Environmental Damage for year</i>	45
<i>CO<sub>2</sub></i>	4		
<i>Depreciation of Environmental F/Assets</i>	10		
	<u>51</u>		<u>51</u>
<b>Environmental Protection Fund Account</b>			
		<i>Cost of new sewerage plant</i>	100
<b>Environmental Fixed Asset - Sewerage Plant</b>			
<i>Cost</i>	100	<i>Depreciation for year</i>	10
		<i>Balance c/d - 31/12/94</i>	90
	<u>100</u>		<u>100</u>
<b>Company Environmental Current Account</b>			
<i>Remediation costs incurred:</i>		<i>Costs incurred for:</i>	
<i>Emissions</i>	5	<i>Emissions</i>	20
<i>Externalities</i>	1	<i>Water Treatment</i>	10
		<i>Fines</i>	5
<i>Balance c/d - 31/12/94</i>	35	<i>Externalities (notional borne by outsiders) for:</i>	
		<i>Nox</i>	2
		<i>CO<sub>2</sub></i>	4
	<u>41</u>		<u>41</u>
<b>Environmental Balance Sheet</b>			
<i>Environmental Protection Fund</i>	100	<i>Environmental Fixed Assets</i>	
<i>Environmental Damage Account</i>	<u>(45)</u>	<i>Sewerage Plant</i>	100
		<i>Less: Depreciation</i>	10
<i>Environmental Sustainability level</i>	55		
<i>Co. Environmental Current A/C</i>	<u>35</u>		
	<u>90</u>		<u>90</u>

### **3.3.2.2.5 Environmental accounting developments and types of disclosures**

Actual developments in environmental accounting can be ascertained by examining published environmental reports; many companies have in fact been developing their own systems. In the U.K. (and North America) the emphasis is usually on "compliance with applicable laws and regulations, and reporting performance achieved against environmental targets established (and published) in previous years". (Environmental Accounting and Auditing Reporter, November 1995)<sup>82</sup>. In general, the environmental accounting of these companies deals with:

- Targets which they have set for a fixed term of years (in relation to relevant activities), e.g.:
  - Hazardous and non-hazardous wastes,
  - Emissions from various sources to air, land and sea,
  - Energy consumption,
  - Wastes,
  - Recycling.
- A comparison of actual with targets
- Environmental capital expenditure
- Other environmental financial costs/liabilities, such as fines, pollution control, remediation and contingent liabilities.
- Compliance with law and regulatory standards.

Environmental effects are many and varied. Because of this diversity the content of environmental reports may vary from industry to industry e.g. types of emissions, but the types of information may be the same i.e. qualitative, quantitative and financial, as demonstrated below:

#### **a) Qualitative information**

Qualitative data is information which cannot be expressed in numbers. Therefore, qualitative disclosures are descriptive and represent either desired environmental objectives or judgemental views of situations. Statements such as "our emissions in CO<sub>2</sub> have been reduced considerably during the year following factory changes, to

comply with BATNEEC", cannot be effective. Although it may be true, such a declaration cannot, on the face of it, be substantiated without the support of published quantitative emissions data, both prior to and after the factory modifications. Or, as a minimum, the word "considerably" should be replaced by the actual percentage by which the emissions were reduced.

Qualitative information normally covers the company's plans, policies and practices. The environmental policies of The Body Shop (see Table 3.2) are a good example of qualitative information. Some of the Body Shop's policies are very ambitious. In particular, the one dealing with sustainability states that the company will use renewable resources whenever possible and "will conserve natural resources where renewable options are not available", but no details of how the company will achieve this policy are provided. Because this policy is very demanding, it would have been more credible if supported by identified, substitutable (renewable) materials, introduced over a predetermined period of time, so that progress and achievement could be assessed over time. However, some evidence of the company's commitment to this policy can be found in its investment in a wind farm. According to the article by Burritt, R.L. and Lehman, G., (1995) on The Body Shop's wind farm, the "investment decision draws attention to a range of novel ethical problems resulting from the search to source electric power in an ecologically benign manner".<sup>83</sup>

Table 3.2 Environmental policy of The Body Shop

**thinking globally**

The Body Shop's international business is the manufacture and retailing of skin and hair preparations and cosmetics. Our business policies are defined by our core values: care for the environment, concern for human rights and opposition to the exploitation of animals.

We have developed this policy as a constant reminder of our responsibilities to act in order to protect the environment both globally and locally. We want to do things better than they have been done before, and we want to include our staff, franchisees, subsidiaries and suppliers in making that happen.

**achieving excellence**

Sound environmental management makes good housekeeping sense. Through regular reviews and assessments of our operations around the world, we will set ourselves clear targets and timescales within which to meet those targets. These will provide us with positive incentives to achieve best environmental practice because each target we hit will be proof of progress.

**searching for sustainability**

Sustainable development is about achieving a fairer and safer world for future generations. At all levels of operation - in our head office, in our manufacturing facilities, in our subsidiaries and franchises, and in our retail outlets around the world - we will use renewable resources wherever possible, and we will conserve natural resources where renewable options are not available. This will apply in particular to our purchasing which will be supported by a comprehensive system of product stewardship including life cycle assessments of our products and packaging.

**operating safely**

The reputation of a service-based business rests on safety - for staff, for customers and for the community in which the business operates. We will minimise risks in every one of our operations - from ensuring the safety and quality of our products to good neighbour policies in the communities where we work. We will be on constant alert for the unexpected and will maintain emergency plans to safeguard the environment in the event of fires, floods or other natural disasters.

**obeying the law**

The minimum requirement for any responsible business is to observe legal requirements and regulations wherever the company operates. We will ensure that environmental laws are complied with at all times and in the event of difficulties these will be reported to the regulatory authorities without delay.

**raising awareness**

Our mission is nothing less than to forge a new and more sustainable ethic for business. We want our efforts to set a precedent for others. We are committed to continuous education for our staff on environmental issues. We are committed to freedom of information and full and honest public disclosure of the results of our environmental assessments.

**managing growth**

The quest for economic growth, as demanded by national and international financial institutions, is the cause of much environmental and human exploitation. Our future planning will be guided as much by the environmental implication of our business decisions as by economics. We will devote increasing efforts to establishing non-exploitive trading arrangements with communities in less developed countries as a means to protecting their cultures and their environments.

The relationship between our commercial success and our principles got us where we are - it will take us where we're going.

**managing energy**

Global warming, acid rain, nuclear waste - problems caused by the misuse and abuse of energy resources provide urgent reasons to achieve the highest possible energy efficiency in our operations. We will use the absolute minimum, and work towards replacing what we must use with renewable resources.

**managing waste**

We believe that wealthy societies have an urgent and overwhelming moral obligation to avoid waste. As a responsible business, we will adopt a four-tier approach: first, reduce; next, reuse; then, recycle; and finally, as a last resort we will dispose of waste using the safest and most responsible means available.

**controlling pollution**

Pollution is a special form of environmental abuse - it is more than exploitation, it involves degradation and despoilation. Environmental damage is an inevitability of much business practice, but we are committed to protecting the quality of the land, air and water on which we depend. We will avoid contamination and reduce polluting emissions to negligible levels. We will adopt a precautionary approach to all processes and products which might involve environmental damage.

Source: *The Green Book 3 - The Body Shop 1993/94 Environmental Statement*

A further example of qualitative information is provided in Table 3.3 which was taken from the National Westminster Bank's 1993 Environmental Report. The reason for selecting an extract from NatWest is because it is not a manufacturing organisation and its environmental concern arises from the administrative aspects of a business. The bank carried out an environmental audit which took two years to complete. The extract relates to NatWest's Market sector. As stated under the heading "Targets" the bank will move on to the next stage in 1994 by setting and monitoring targets, thus, moving from policies to objectives.

### **b) Quantitative data**

With regard to environmental accounting issues, quantitative data would be ascertained after the implementation of the environmental policies and would typically cover quantities of inputs (e.g. raw materials in kg; energy in KWh; water in m<sup>3</sup> and air in m<sup>3</sup>) and outputs (e.g. finished products in kg; waste heat in KWh; waste water in m<sup>3</sup> and air emissions in kg). The actual quantities could then be compared with the targets previously set by the company.





**Table 3.3 Extract from National Westminster Bank's Environmental Report relating to paper, printing and plastic**

### **Paper, Printing and Plastic**

#### **Sample findings of audit**

- In the UK most marketing papers are printed double sided on chlorine-free paper and distribution lists are regularly reviewed.
- The use of environmentally-friendlier paper products could be increased. The creation of NatWest Markets led to the adoption of new style stationery and business cards which are made from recycled materials.
- In 135 Bishopsgate, approximately 50 large refuse sacks of paper waste are produced and collected for recycling per day.
- Most offices have photocopiers capable of taking double-sided (duplex) photocopies.
- Extensive photocopying was evident, particularly in London where the Central Print Room at 135 Bishopsgate took approximately 13.5 million photocopies in 1992, of which half were marketing and research publications.

#### **Examples of progress to date**

- All photocopy paper in 135 Bishopsgate is produced by a mill which uses environmentally-friendlier processes. Lower quality or partially used paper is widely used for scrap, and central control of stationery in some offices has also helped to control excessive paper usage.

#### **Targets**

*By December 1993 the usage of photocopiers across the Sector will be monitored and further measures formulated to reduce the level of comparable paper usage by five per cent per capita on the audit findings. Targets will be set annually thereafter.*

*A review of both archival resources and stationery services and duplication within the sector is being conducted and will be completed by the end of 1993.*

*Source: The National Westminster Bank's Environmental Report for 1993, pp.15-16.*

The following extract was taken from BP's New Horizons - Health, Safety and Environment Report for 1994. This report covers the three topics but the example provided below relates to environmental aspects. It deals with emissions to the three media (i.e. air, water and land) under the US Toxic Release Inventory (TRI) programme in respect of oil refining. The TRI programme requires the disclosure of releases of listed substances. The emissions are disclosed yearly by the receiving

medium and in total. Table 3.4 below covers only a part of BP's reported emissions from its US refineries. An annual cumulative percentage of reductions is also given; it shows that since 1988 there was an annual reduction which by 1995 amounted to 71% of the 1988 emissions. Of course the most important aspect of such data is that it must be credible and as explained later (see Section 3.3.3.6) some of BP's data were "less than frank".

**Table 3.4 BP's toxic release inventory from 1988 to 1995 for oil refining**

<i>Toxic release inventory (TRI)</i>					
<i>Tonnes</i>					
	<i>Air</i>	<i>Water</i>	<i>Land</i>	<i>Total</i>	<i>% Reduction from 1988</i>
<i>1988</i>	<i>2234</i>	<i>50</i>	<i>58</i>	<i>2342</i>	<i>0%</i>
<i>1989</i>	<i>1888</i>	<i>22</i>	<i>63</i>	<i>1973</i>	<i>16%</i>
<i>1990</i>	<i>1636</i>	<i>133</i>	<i>50</i>	<i>1819</i>	<i>22%</i>
<i>1991</i>	<i>1658</i>	<i>100</i>	<i>15</i>	<i>1773</i>	<i>24%</i>
<i>1992</i>	<i>1557</i>	<i>148</i>	<i>6</i>	<i>1711</i>	<i>27%</i>
<i>1993</i>	<i>1133</i>	<i>163</i>	<i>16</i>	<i>1312</i>	<i>44%</i>
<i>1994</i>	<i>757</i>	<i>153</i>	<i>51</i>	<i>961</i>	<i>59%</i>
<i>1995 target</i>	<i>540</i>	<i>131</i>	<i>4</i>	<i>675</i>	<i>71%</i>

*Source: BP's New Horizons - Health, Safety and Environment Report 1994, p.17.*

The development of environmental accounting has moved from the qualitative stage to the quantitative and financial. Although UK companies may have led the development of descriptive and performance-related environmental accounting, Western Europe is beginning to adopt the quantitative methodologies which were developed by German, Austrian and Swiss companies (see Gray, R. *et al.* 1996)<sup>84</sup>.

In particular, the eco-balance (öko-bilanz), or eco-balance sheet, or mass balance is largely prevalent in Germany. The "öko-bilanz methodology involves the

identification and measurement of all firm or entity inputs (materials, water, air, land, capital assets, etc.) and the similar identification of the process outputs - goods produced, waste/emissions, changes in land/capital assets. This data is normally depicted on an input/output analysis schedule or 'eco-balance sheet'. (Environmental Accounting and Auditing Reporter, November 1995).<sup>85</sup>

The first company to use it was Kunert AG. Kunert's eco-balances as presented in their 1994/95 Environmental Report, (see Table 3.5) show the Input, Stock and Output of major aspects, such as goods, energy, water, air, and uses a variety of units of measurement. In this way, it can demonstrate the use of materials and emissions of either a product, a department or the company. (see White, M.A., 1996)<sup>86</sup>.

The Danish Steel Works Ltd (DSW) was also one of the first companies to adopt an eco-balance accounting system and published their "Green Account" in 1991. Through the Green Account, DSW "wanted to show 'a true and fair view' of the company's production and production conditions. One way to do this was to complete a 'mass balance sheet' (or eco-balance) showing the materials supplied and how this supply ended up, for example as finished goods, emission, waste products which are recycled and as ordinary waste". (Jorgensen, H.B., 1993)<sup>87</sup>. Although informative, the Green Account lacked "goals" for improvements and had no stock movements.

Table 3.5 Extracts from 1994/95 Eco-balances of Kunert AG

	INPUT				Stock		OUTPUT		
	1991	--	1994	1993	1994	1991	--	1994	
Circulating goods (kg):-									
Raw materials	5,311,896	--	3,558,124	697,183	2,786,664	5,786,896	--	5,199,188	Hosiery
Energy (KWb):-									
Fuel oil	97,754,180	--	47,262,590	497,616	6,052	843,697	--	349,652	Residual waste
Water (m³):-									
Tap water	451,936	--	281,275	N/A	N/A	487,770	--	339,277	Waste water (m³)
Air(m³)	-	--	-	N/A	N/A	163,521	--	100548	Air emission - NO <sub>x</sub> (kg)

Source: Environmental Report of Kunert AG for 1994/95, p. 14/15

A similar European environmental accounting innovation came from the Eni Enrico Mattei Foundation of Italy. In addition to the movements of physical inputs and outputs, it provides information about the level of environmental capital expenditure required to achieve a sustainable position. More importantly, the balance sheet "provides a link between micro and macro levels in that balance sheets of different companies could be consolidated to provide regional or national data on environmental impact". (Owen D. forthcoming 1996)<sup>88</sup>.

Although the eco-balance environmental accounting system captures the movement and transformation of materials into goods, emissions and wastes (and thereby becomes a powerful eco-efficiency tool), it has its drawbacks. It has no targets and no goals to strive for, and there are no links to financial information. Also there is no uniform methodology or standard eco-balance and, it does not really balance as it contains many types of quantitative measurements.

### **c) Financial data**

Environmental financial data would, in general, arise from the three categories mentioned under the first paragraph of this section (3.3.2.2.5). Financial information is not, in general, segregated and presented in a way which would reflect the total amount for environmental concern. For example, in the environmental performance report of ICI for 1994, the *little* environmental financial information which is provided is dispersed throughout the report under various headings; as partly evidenced by Table 3.6. Also, although the comments in the report (not reproduced here) for the various types of products are frank and impressive, they are unrelated to the emissions data, which is all printed on one page towards the end of the report.

Table 3.6 Extracts from ICI's environmental performance report for 1994

**Complying with the law**

We carry out hundreds of thousands of tests on our emissions throughout ICI every year to determine that our operations are in compliance with local regulations. Environmental laws around the world are strict and becoming stricter, as a reflection of the increased concern for the environment. Our aim is to comply with the law as a minimum standard, but we sometimes fail. Nevertheless our compliance continues to improve.

**Compliance with regulatory standards**

1990		90%
1991		90%
1992	Air	96%
	Water	94%
1993	Air	98%
	Water	95%
1994	Air	99%
	Water	98%

**Prosecutions, penalties 1994**

**In the UK**

- Fined £2,000 for release of ammonia from fertilizer manufacture.
- Fined £15,000 for over-filling a storage tank of potassium hydroxide.

**In North America**

- Fined US\$25,000 for an administration violation for failing to register three vents.
- Fined US\$1,000 on six occasions for out-of-consent discharges following heavy rain

**In South America**

- Notice of fine issued for exceeding permissible emission of sulphur dioxide. The size of the fine is pending.

**In Australia**

- Fined A\$500 for release of PVC/VCM after the rupture of a bursting disc.
- Fined A\$500 for over-filling an ethylene oxide storage tank.
- Fined A\$2,500 for release of liquid to a surface-water pond.

Source: *ICI environmental performance 1994, p.18.*

The gradual development and improvement of techniques for evaluating environmental effects make it increasingly possible to quantify in financial terms the

consequences which environmental issues have on the "bottom line", i.e. net profit/loss. One of the aims of environmental accounting is therefore to produce "a net environmental cost/benefit" and disclose it in monetary values. The types of environmental costs, their identification, segregation and calculation are admittedly difficult tasks, but not impossible. The report of the Dutch company BSO/ORIGIN demonstrates one solution to the problem, as shown by Table 3.7 which was prepared from the report which was reproduced in the Institute Report (Macve, R. and Carey, A, (eds.), 1992).<sup>89</sup>

Table 3.7 **Pollution costs**

<i>Pollutant</i>	<i>Unit</i>	<i>Cost per Unit</i>	
		<i>In NLG</i>	<i>In £</i>
<i>NOx - stationary sources</i>	<i>1 Kg</i>	<i>10.00</i>	<i>3.10</i>
<i>- air traffic</i>	<i>1 Kg</i>	<i>10.00</i>	<i>3.10</i>
<i>- cars</i>	<i>1 Kg</i>	<i>20.00</i>	<i>6.19</i>
<i>SOx</i>	<i>1 Kg</i>	<i>14.00</i>	<i>4.33</i>
<i>CO<sub>2</sub></i>	<i>1 ton</i>	<i>100.00</i>	<i>30.96</i>
<i>Waste removal</i>	<i>1 ton</i>	<i>80.00</i>	<i>24.77</i>
<i>Waste incineration</i>	<i>1 ton</i>	<i>100.00</i>	<i>30.96</i>
<i>Heavy ash - dry matter</i>	<i>1 ton</i>	<i>100.00</i>	<i>30.96</i>
<i>Fly ash - dry matter</i>	<i>1 ton</i>	<i>200.00</i>	<i>61.92</i>
<i>Waste treatment sludge - dry matter</i>	<i>1 ton</i>	<i>500.00</i>	<i>154.80</i>

*Source: Extracted from information in the 1991 Report of BSO/ORIGIN. The translation into sterling was done by using the rate of 3.23 NLG to £1.*

BSO/ORIGIN converts all its environmental effects, including externalities, into monetary values. However, it has been criticised by Gray, *et al.* (1993) because "the accounts are partial, subjective and, in effect, add possible apples to approximate pears and subtract the result from hypothetical oranges."<sup>90</sup>

One wonders whether the damage done to the environment, which does not belong

to anyone, should be accounted for in this way. However, if everyone had to account for the damage in this way, then the national damage could be ascertained through aggregation. It could then be incorporated into the SNA.

Probably the most important area of financial environmental disclosures has, so far, been that of contingent liabilities (i.e. there is a possibility that costs will be incurred for environmental losses or measures). The reason for this is because they tend to be material, long-term, and difficult to evaluate and as such they remain contingent for long periods before they become real liabilities. The dilemma companies have is whether they should value environmental damage, which has such inherent valuation difficulties, and then disclose it. However, unless they do so, the accounts cannot show a true and fair view as required by company law, Stock Exchange regulations, and SSAP18. Also, the UN (UNCTAD/DTCI/1, 1994 p.32) states, in connection with environmental contingent liabilities that "If the possible loss cannot be reasonably calculated, a description of the contingent liability could continue to be furnished and the reason could be given why an estimate of the amount of the loss cannot be made."<sup>91</sup>

Another class of environmental financial expenditure which could involve material expenditure is Research and Development for the control and improvement of environmental practices. It may be incurred because of specific projects requiring new ways in order to comply with BATNEEC, or because of routine research into environmental protection.

Until recently, company environmental disclosures were limited to environmental policies (albeit not a widespread practice) and some financial information. In the last few years, as a result of the increasing emphasis on the environmental dimension, more quantitative data has also been published. In fact, there appears



to be more quantitative environmental data published than financial information. This may be because it is easier to ascertain but "it is desirable that this reporting should include, as far as possible, quantification of environmental targets and performance in technical terms ..." (Macve, R. and Carey, A., (eds.), 1992).<sup>92</sup> The disclosure of non-financial environmental information could be equally, or even more effective and informative, with regard to the physical environment. Unfortunately, "much of this "disclosure" is largely empty of content" (Gray, R. *et al.*, 1993).<sup>93</sup> What is required is systematic reporting with comparative figures over time, so that it may become more meaningful in content, direction and purpose. In addition, a better balance between qualitative and financial information is required.

Quantitative environmental disclosures, indeed all environmental disclosures, should avoid being "image promotion" and "public relations" exercises, otherwise they may be treated as such. This state of affairs demonstrates that the voluntary approach will not bring about the necessary improvement in environmental reporting. In order to improve the situation and maintain the momentum, environmental reporting may have to become mandatory.

It is not only the content of environmental disclosures which is important but also their relevance, reliability, completeness and comparability. The Accounting Standards Board's (ASB) exposure draft (July 1991) places particular importance on relevance and reliability: The relevant information must "represent faithfully the effect of the transactions and other events it either purports to represent or could reasonably be expected to represent" (as quoted by Macve, R. and Carey, A., (eds.), 1992).<sup>94</sup> For environmental disclosures to be complete they must address all the company's activities which impact on the environment and in order to assess trends and improvements, comparatives should be given.

The above discussion and examples covered qualitative, quantitative and financial environmental accounting developments. The emerging methods demonstrate a pro-active approach towards the control of environmental protection "rather than an 'end of pipe' preoccupation with liability for past environmental sins". (Stone, D. 1994).<sup>95</sup> In order to be pro-active, companies must have environmental management systems and since environmental accounting would be an integral part of such systems, it follows that accounting is playing an important role in handling and reporting environmental effects.

### **3.3.2.3 Defining environmental expenditure**

A proper analysis of environmental costs is necessary, not only for preventing misrepresentations, but also for a better understanding of them by facilitating their assessment and significance. Environmental expenditure is broadly defined in the report of The Environmental Research Group of the Institute of Chartered Accountants in England and Wales (Macve, R. and Carey, A. (eds.), 1992) "as expenditure incurred solely or primarily for the protection or enhancement of the environment".<sup>96</sup> It is not clear from this definition whether after-the-event environmental costs, such as remediation and restoration, are included, since "protection" can only include expenditure incurred before the event and "enhancement" implies improvement, whereas remediation and restoration costs merely restore the environment to its former state. A better definition would be "expenditure incurred for the current or future protection, remediation, and enhancement of the environment".

The accounts of BSO/ORIGIN for 1991 state that they "tried to quantify the damage to the environment in 1991, in financial terms, based on a theoretical calculation of the costs which would be incurred in repairing the damage back to a level where the natural ecosystem is able to eliminate the residual effects" (Macve, R. and Carey,

A. (eds.), 1992).<sup>97</sup> It would seem that effective environmental expenditure must correspond to the benefit derived from the environment. Because environmental services are kept outside the market "the economic value of the environment remains a parameter which is not easily quantifiable, giving rise to endless discussions and conflicting conclusions" (BSO/ORIGIN Annual Report 1991)<sup>98</sup>.

However, for accounts purposes, the best approximations currently available and understood are the economic values arrived at when the established environmental evaluation techniques are applied. According to a survey of German and Swiss company practice forming part of the UN (1991)<sup>99</sup> report, values can be established for environmental expenditure both of a revenue and capital nature through the use of industry guidelines; use of enterprises' own guidelines; and cost accounting data. But, the Institute report, (Macve, R. and Carey, A (eds), 1992), goes on to say that "clearly much remains to be done in the UK on developing guidelines for identifying environmental expenditures ...".<sup>100</sup>

#### **3.3.2.4 Environmental effects and the Annual Report and Accounts**

Having considered the accounting aspects of environmental data, the next stage is to consider how, and where, it can best be summarised and presented. The obvious choice is to integrate it into the Annual Report and Accounts. Although the environmental financial data may be integrated easily into the Profit and Loss Account and Balance Sheet, other equally vital data, such as scientific and quantitative data cannot be consolidated. To exclude it altogether would be unwarranted and to disclose it elsewhere would fragment the presentation of environmental information, which is undesirable. Any environmental reporting formats which exclude one type or another would be lacking in material respects. The inclusion of quantitative data such as emission levels, energy consumption or recycling is necessary for a complete picture of a company's environmental

performance. Some enterprises may wish to provide only a "compliance report", i.e. report only what is required by accounting or industry standards or Government regulations, whilst others may be more forthcoming. As far as Accounting Standards Board (ASB) is concerned, regrettably, "the development of the ... frame of principles is still at a high level of generality, [and] it is an open issue how far environmental information is most usefully incorporated within the profit and loss account or balance sheet ...".<sup>101</sup>

The attraction of the medium of the Annual Report and Accounts is that it is widely circulated and has the "aura" of credibility. Any research into the medium for environmental reporting would have to include the integration of qualitative, quantitative and financial data. The starting point would appear to be the Annual Report and Accounts for the private sector and the National Accounts for the public sector.

The same arguments apply to the incorporation of national effects into the National Accounts. For the sake of emphasis, it can be stated that it does not require an economist to appreciate the fact that the expenditure incurred for the Valdez clean-up did not improve economic performance, and it should not be included in the SNA as production of goods and services. Such expenditure is clearly for environmental remediation and should be reflected in the SNA. The incorporation of environmental effects into the SNA was first proposed by Nordhaus, D.W. and Tobin, J. (1972)<sup>102</sup>. According to Newson, M. (1992) the UN has made pertinent suggestions or alterations but, "it has not as yet grasped this nettle".<sup>103</sup>

All financial transactions are linked to the financial statements and "environmental financial impacts" are no exception. In this respect, there is nothing new, just another type of expenditure. If so, why should this new category be of such

concern? The reasons are many and varied and it should by now be clear that they are grounded in environmental concern. Humankind's uses and abuses of environmental resources result in externalities and over-exploitation and have given rise to the concern for sustainability, and even the future of life on earth. In a way, environmental costs represent the value of "poaching" from a common and finite resource. The spoils from "poaching" must be declared, through an effective medium.

The Institute Report concludes that "in so far as environmental regulation (actual and potential) impacts on a business's costs and future profitability by internalising what have previously been "externalities", there is a need for the financial impact to be taken into account within the existing conventional accounting and reporting framework". The report goes on to say that "whether this impact needs to be separately disclosed is ... a question of its materiality" (Macve, R and Carey, A. (eds.), 1992).<sup>104</sup> Astonishingly, these two statements appear to frustrate every effort being made for the development of environmental accounting, because it is urged to stick to conventionality and materiality, neither of which should be relevant to environmental effects. Conventionality hinders progress and materiality creates anomalies. For example, an environmental damage of say £100K would be material to a small company but not to a large company. Does size make a "wrong" (the environmental damage) "right" (nil disclosure would imply a clean slate)?

Environmental financial impacts should not be tied to existing standards and conventions. The monetization of environmental effects, the assimilation of scientific and other quantitative data and the method of representation of such information should be allowed to evolve without pre-determined criteria. In any event, materiality should not be a factor in assessing and reporting environmental financial impacts.

### **3.3.3 Environmental reporting**

In this section, various aspects of environmental disclosures and the development of environmental reports are considered. Also, some specimens of actual environment reports are presented. Until recently, the adoption and disclosure of even environmental policies was "almost entirely absent from UK companies" (Gray, R., 1990)<sup>105</sup>. Similar conclusions were drawn from the Pilot Study for this research which was carried out in the last quarter of 1992 (See Chapter 4). Although the adoption and publication of environmental policies are spreading, the quantification and disclosure of environmental effects and the preparation of Environmental Accounts is proving more difficult. The new orthodoxy requires companies to adopt environmental policies and publish them (Forrester, S., 1990)<sup>106</sup>. Because there are no legal or accounting standards requiring disclosure, "simple corporate self-interest represents the most immediate pressure for change". (Owen, D., (ed), 1992)<sup>107</sup>. Public opinion, reinforced by pressure group activity, also exerts pressure on companies to be more open about their processes, emissions and externalities.

Because environmental effects have financial consequences, in order to respond to this pressure for openness, companies should endeavour to disclose as much as possible. The need for disclosure stems from their potential significance, both from the point of view of emissions and costs. Their disclosure, under regulated conditions and accounting standards, can serve as a "barometer" for environmental performance. Because of this, some companies pre-empt compulsory disclosure in order to project a favourable image, and possibly to forestall regulation. Willingness to disclose appears to be determined by the culture of the company, which in turn may be dictated by the nature of its activities. The Pilot Study demonstrated that companies which are prone to environmental hazards, like the oil and chemical industries, are the leaders in voluntary environmental disclosure. Other reasons for voluntary disclosure include financial gain, political and market advantage, and

allaying fears about the company's activities and products. The major reasons for non disclosure are fear of financial cost/damage, although this may be a misconception (see Gray *et al.*, 1990)<sup>108</sup>, and lack of legal or other requirement.

### **3.3.3.1 Conventional and environmental reporting**

The debate about environmental reporting should take into consideration the possibility that it can be covered by existing conventional accounting and reporting practice. Indeed, in the absence of an environmental accounting and reporting model, one would expect the scope of conventional accounting to automatically expand and encompass what is emerging. The evidence, though, points to the contrary. According to Gray, R. *et al.*, (1993) "it is rare to find consistent, systematic reporting of much that could be construed as other than public relations puff"<sup>109</sup>. This is probably because the first initiatives for environmental disclosures came from industry and not accountancy. Although industry may have a genuine desire to disclose environmental matters, its motives and practice are dictated by the need to protect and improve its image. Seen from this perspective, the development of environmental accounting and reporting is tantamount to a publicity scheme. Be that as it may, industry should not be discouraged for leading the environmental "agenda" since it fills the void left by accounting. Industry has to react to the demands of its investors, the whims of its customers and the public.

The pressure for environmental disclosures came from the public, and industry responded in its own way. Now it is up to accounting to step in and maintain the momentum, either through the expansion of the conventional reporting framework or the development of a new, distinct, environmental reporting model. The first proposition appears to be the best option, although it has its drawbacks; it is best suited for reporting monetary values and not all environmental effects can be ascribed values. However, the demand for better environmental controls by

Government, investors and the public will bring further pressure to bear on businesses to evaluate more of their environmental effects and disclose them, together with qualitative, quantitative and scientific information. The financial aspect of environmental reporting can be easily accommodated by traditional financial reporting. For example, by extending the scope of the Statement of Standard Accounting Practice (SSAP) 18, accounting for contingencies can cover remediation costs, as they tend to remain contingent liabilities for long periods before, if ever, they become real liabilities. In its accounts to 30/3/91 BET stated that "Environmental protection costs are not provided for until the costs can be reasonably ascertained".<sup>110</sup> According to Macve, R. and Carey, A., (eds.), 1992<sup>111</sup>, recent proposals by the Accounting Standards Board could encourage disclosure of environmental expenditure, and expand the role of financial statements to provide useful and reliable information to a variety of users. The proposals are not compulsory, but they cover expenditure written off, which could benefit future periods.

Conventional accounting has to evolve in order to accommodate environmental reporting. In the meantime, environmental reporting will continue to appear in a variety of formats, either within the Annual Report and Accounts or independently: "there is little consensus as yet on either of these approaches" (Macve, R. and Carey, A. (eds.), 1992)<sup>112</sup>. Obviously, the accounting profession is in an ideal position to lead the way and demonstrate how to encompass environmental disclosures in Annual Reports. Understandably, experimentation will originate from those who created the problem in the first place, i.e. industry. But there is now an abundance of environmental data available, which accountants may use to formulate a comprehensive environmental report, within the ambit of the Annual Report.



### 3.3.3.2 Environmental reporting *per se*

Environmental reporting is the natural consequence of environmental accounting. for without environmental accounting there can be no environmental reporting. Some aspects of environmental reporting have, of course, been already considered during the examination of environmental accounting. Environmental reporting provides the means by which companies can demonstrate to their shareholders how they discharge their environmental obligations.

According to Gray, R. (1990) the reasons for developing environmental reporting are: accountability; a requirement to report [which] will influence actions; and information [which] influences perceptions<sup>113</sup>. For a company "to make public any negative impact its activities have on the environment can predictably force that company to improve its record" (Derwent, R., 1989).<sup>114</sup> The resistance of companies to making environmental disclosures centres on the risk of releasing confidential and sensitive information and on incurring extra costs. Mathews, M.R. (1993) thinks that this argument is weak "since the disclosures are of material which would be known to most competitors if the market place is working efficiently"<sup>115</sup>. As for the extra costs argument, they should be weighed against any benefits which may accrue.

Environmental reporting in the UK is entirely voluntary. There are no legal, industrial, accounting or other compliance requirements at present. Consequently, no general standard for disclosures has been established yet, neither in format nor in content. The UN issued recommendations for a voluntary initiative within the financial reporting system. The main recommendations are summarised in Table 3.8 which were extracted from the United Nations UNCTAD/DTCI/1 report, 1994 p. 31/32. This information was obtained direct from the United Nations as shown by Appendix D. However, "it is widely recognised in the UN CTC ISAR that the

leading industrial companies *do not want any imposition of environmental disclosure*" (Gray, R. *et al.*, 1993).<sup>116</sup> These guidelines are mainly for financial information, whereas a comprehensive environmental reporting system would inevitably include non-financial information and it is doubtful whether the two types can be so finely segregated. Without a comprehensive reporting model, voluntary disclosures would be suspected of being selective and self-congratulatory. Also, since "disclosure is central to accounting....a compliance-with-standard approach....seems quite appropriate, even though the data are likely to include non-financial material" (Mathews, M.R., 1993).<sup>117</sup>

The overall impression is that there is "very little detail on environmental performance, particularly regarding the matter of quality" (Harte, G. and Owen, D. 1991)<sup>118</sup> and, according to Gray, R. *et al.* (1993), "until minimum standards are set and agreed, environmental reporting will remain experimental".<sup>119</sup> However, more recent evidence indicates that "a clearly discernible best reporting practice is beginning to emerge, which provides valuable pointers towards possible future developments in the area" (Owen, D., forthcoming 1996).<sup>120</sup>

**Table 3.8 Main recommendations for environmental disclosures by Transnational Corporations from the United Nations conference on Trade and Development**

- Policy and programmes adopted; if none, that fact should be stated.
- Improvements made in key areas since the introduction of the policy or over the past five years, if shorter.
- Emission targets and comparison with actual emissions.
- Actual amounts charged to operations, if material, in the current period for items such as: effluent, waste and air treatment; remediation; recycling; and control and compliance. Where it is not possible to segregate the amount relating to environmental protection, that fact should be stated.
- The amount capitalized, if material, during the period, the cumulative amount and method of amortisation.
- Details of environmental contingent liabilities, provisions and reserves for the period and cumulative amounts.

*Source: The above information has been extracted from the Conclusions on Accounting and Reporting by Transnational Corporations of the United Nations Conference on Trade and Development by The Intergovernmental Working Group of Experts on International Standards of Accounting and Reporting. (UNCTAD/DTCI/1 - 1994), p. 31/32.*

As far as non-financial reporting is concerned even "on a worldwide basis, the majority of such "disclosures" can be categorized as statements of good intentions and selective self-congratulatory assertions owing more to image and advertising than to information communication, accountability and transparency" (Gray, R. *et al.* 1993).<sup>121</sup> For Gray, environmental reporting is therefore patchy and vague, lacking uniformity and commitment to green issues. Because of continuing developments, environmental reporting is improving and becoming more widespread according to the report of Professor David Owen, Professor Rob Gray

and Roger Adams on the "Environmental Reporting Awards Scheme" for the fifth year of the Chartered Association of Certified Accountants. They conclude that Environmental performance disclosure has now become part of the established reporting package of a significant number of leading UK and European companies. Their published environmental reports represent serious attempts to address the major environmental ramifications of corporate activity." (See Certified Accountant/March 1996).<sup>122</sup>

### **3.3.3.3 The environmental reporting medium**

So far, no unique environmental reporting medium has emerged. If the disclosure of environmental information were only for financial matters, then the reporting medium would inevitably be the Annual Report and Accounts. The environmental information would naturally become an integral part of it. But the demand for environmental information goes beyond monetary values and it may not be possible to integrate it entirely in the Annual Report. The variety of environmental information could cause environmental reporting to be fragmented, with the environmental costs being included in the Annual Report and the qualitative and quantitative data in some other report or reports. If this were to happen, then the effectiveness of environmental reporting would suffer. A comprehensive report would have a bigger impact than the combined total of all the relevant separate reports. Where only a limited amount of information is published, then it can be conveniently included in the Annual Report.

It is appreciated that by including the financial information in the Annual Report it is automatically supplied to all the shareholders and although a great number of them may be interested in knowing how their company is dealing with environmental effects, sustainability, energy efficiency and wastes, some may feel that their company is not spending enough to protect the environment. On this

basis, they would expect that information to be included in an annual report with which they are familiar (i.e. the Annual Report and Accounts). The advantages gained by adopting this method are:

- i) The report is issued to interested parties;
- ii) The report would, in any case, include the costs of environmental effects, so it is more practicable to simply incorporate the environmental data there;
- iii) The report has an "aura" of respectability because most of its contents are audited and have to comply with company law and accounting standards. It has a high profile and wide circulation for publicity.

It may suit some companies to disclose environmental information earlier and more often than once a year, especially where the local community is concerned. But such piecemeal disclosures would not constitute in total an environmental report, and a comprehensive annual report would still be expected from those companies. Some "companies feel that environmental data should not be treated any differently to other information and should therefore be presented in another chapter in their annual report" (ENDS - 227 Dec. 93)<sup>123</sup>.

Although the Annual Report has certain merits for disclosing environmental data, the diversity of its contents is a serious drawback in comparison with the totality of a dedicated, stand alone, environmental report. Companies should accord environmental data such a high level of prominence in order to demonstrate that they are committed to environmental concern.

#### **3.3.3.4 Voluntary or regulated disclosures?**

Environmental impacts are so diverse it is difficult without guidance to know what should be disclosed. This diversity of environmental effects makes it necessary for

standards and guidelines to be developed. otherwise disclosures would be so complex they would be impossible to assess and use comparatively. Some industries, according to the ENDS Report (227 - Dec. 1993), mindful of this and the possibility of having to comply with rigid legal disclosure formats, are "understood to have been conducting formal and informal negotiations with other industry sectors... to persuade them of the importance of being seen to be doing something voluntarily in order to stave off mandatory action"<sup>124</sup>.

The chemical, gas, oil, pharmaceutical and water industries as shown by the Pilot Study (see Chapter 4) lead the way in environmental concern. The extent of information disclosed by these industries tends to be greater in volume, diversity and importance. The nature of their business makes this necessary. It is more practicable for industries to develop their own "technical" disclosures which can be combined with the environmental financial data to form the standard environmental report for those industries. The International Institute for Sustainable Development also concurs with voluntary regulation as it calls for the development of environmental reporting standards by financial reporting standard-setting bodies (1991)<sup>125</sup>. In this way, each industry can have its own format for technical information, developed and combined with the financial reporting standard to create a unique environmental report for the industry. The alternative would be for Governments to impose rigid disclosure standards which could prove impracticable, unenforceable and costly to monitor. One way or another guidance and standards are becoming a pressing matter, as evidenced by the Conclusions on Accounting and Reporting by Transnational Corporations of the Intergovernmental Working Group of Experts on International Standards of Accounting and Reporting of the United Nations Conference on Trade and Development.<sup>126</sup>

Recent developments indicate that environmental reporting may have to be enforced

by law. In the US, for example, environmental law requires the publication of annual emissions data for certain toxic chemicals.<sup>127</sup> In Denmark from 1996 some 3,000 to 4,000 companies will have to issue a green report, but its contents and format have not been stipulated, which means that there will be diversity in reporting, and in Sweden some environmental reporting is required under the Swedish Environmental Protection Act 1994 (see Vedso, L., 1996).<sup>128</sup>

### **3.3.3.5 Credibility**

The publication of environmental information, whether it is qualitative, quantitative or financial, should depict a high standard of professionalism. To be credible, the information must be verifiable, audited and consistent. The credibility of published environmental information may be questioned if it is not audited and supported by an audit report. It would take a company a number of years to develop and implement the necessary environmental management systems in order to generate and publish such data. It is, therefore, advisable to have it audited and thus ensure the full benefits of the process. Further information about environmental audits is provided in "Environmental Audits - Spreading Like Wild-Fire" (Makris, P.H., 1994b)<sup>129</sup> which is included in Appendix F.

Amounts expressed in monetary units should comply with accounting standards, where relevant, and be analysed in meaningful categories, irrespective of materiality in relation to the "bottom line". Qualitative and judgemental statements should be avoided, unless they are supported by evidence. The consistent disclosure of information deprives the company of the right to choose what to publish; not only good, but also bad information must be published. The scope and format of environmental disclosures should not be designed merely to project a better image but should include good and bad news.

In addition, the techniques used for quantitative measurement and financial evaluation should be applied consistently. Any necessary changes in the methods used should be explained and, where possible, previous years' figures should be restated by using the new methods to make them comparable. According to ENDS Report (249, 1995) there are no generally accepted guidelines for environmental reporting and the approach of the reports published by BP Chemicals, Dow Europe, ICI and Monsanto (which were scrutinized by ENDS) is less than frank. The report goes on to add that better measurements are needed and the method of dealing with acquisitions and divestments should be considered; for example, "where a company sells a plant, it could reasonably be argued that it should not claim credit for the consequent 'reduction' in emissions because this has not resulted from genuine waste minimisation efforts and the environment does not benefit from the transaction. Again, a more honest course would be for firms to revise their data annually back to the baseline to reflect their true emission trends without the sold plant."<sup>130</sup>

The importance of publishing reliable information cannot be overestimated. "The process of accountability is seen from this perspective as more important than the precise interpretation of the resulting numbers" (Macve, R. and Carey, A., (eds.), 1992)<sup>131</sup>. If environmental disclosures fall short of such standards of evaluation and presentation, they run the risk of not being credible.

### **3.3.3.6 Other reporting considerations**

The demand for environmental disclosures is growing. There is pressure on industry, by industry itself, to be more accountable for its environmental practices. This pressure emanates from a desire to pre-empt compulsory regulation. Voluntary regulation is now facilitated by "codes of conduct, charters, BS7750, eco-labelling, eco-audit, the Freedom of Access to Information Directive, etc." (Gray, R. *et al.*,



1993)<sup>132</sup>.

The "fact that many firms are already providing environmental reports on their activities and the rapid development of...environmental management system standards reveals something of the pressure to improve industrial environmental performance" (Birkin, F., 1996).<sup>133</sup>

Companies which are ahead in environmental practices and disclosures know that they are actually making things easier for themselves. Companies should therefore, publish their environmental policies; the principles they have adopted or aim for, like the Valdez Principles (see Table 3.9), the steps they have taken to monitor these policies (such as environmental audits, environmental impact assessments and the outcome of such compliance procedures). The Valdez Principles are included here as they put in perspective the actual development of environmental accounting and reporting which have been examined here (in Section 3.3.3).

**Table 3.9 The Valdez Principles**

**The Valdez Principles**

We adopt, support and will implement the principles of:

1. *Protection of the Biosphere* We will minimize and strive to eliminate the release of any pollutant that may cause environmental damage to the air, water, or earth or its inhabitants. We will safeguard habitats in rivers, lakes, wetlands, coastal zones and oceans and will minimize contributing to the greenhouse effect, depletion of the ozone layer, acid rain or smog.
2. *Sustainable Use of Natural Resources* We will make sustainable use of renewable natural resources such as water, soils and forests. We will conserve non-renewable natural resources through efficient use and careful planning. We will protect wildlife habitat, open spaces and wilderness while preserving biodiversity.
3. *Reduction and Disposal of Waste* We will minimize the creation of waste, especially hazardous waste, and wherever possible recycle materials. We will dispose of all wastes through safe and responsible methods.
4. *Wise Use of Energy* We will make every effort to use environmentally safe and sustainable energy sources to meet our needs. We will invest in improved energy efficiency and conservation in our operations. We will maximize the energy efficiency of products we produce or sell.
5. *Risk Reduction* We will minimize the environmental, health and safety risks to our employees and the communities in which we operate by employing safe technologies and operating procedures and by being constantly prepared for emergencies.
6. *Marketing of Safe Products and Services* We will sell products or services that minimize adverse environmental impacts and that are safe as consumers commonly use them. We will inform consumers of the environmental impacts of our products and services.
7. *Damage Compensation* We will take responsibility for any harm we cause to the environment by making every effort to fully restore the environment and to compensate those persons who are adversely affected.
8. *Disclosure* We will disclose to our employees and to the public incidents relating to our operations that cause environmental harm or pose health or safety hazards. We will disclose potential environmental, health or safety hazards posed by our operations, and we will not take any action against employees who report any condition that creates a danger to the environment or poses a health and safety hazard.
9. *Environmental Directors and Managers* At least one member of the Board of Directors will be a person qualified to represent environmental interests. We will commit management resources to implement these Principles, including the funding of an office of vice president for environmental affairs or equivalent executive position, reporting directly to the CEO, to monitor and report upon our implementation efforts.
10. *Assessment and Annual Audit* We will conduct and make public an annual self-evaluation of our progress in implementing these Principles and in complying with all applicable laws and regulations throughout our worldwide operations. We will work toward the timely creation of independent environmental audit procedures which we will complete annually and make available to the public.

*The Valdez Principles were drawn up in 1989 by a group of US environmentalists and investors after the supertanker "Exxon Valdez" ran aground on Bligh Reef, Alaska, on 24th March 1989.*

Quantitative and monetary information should form a major part of environmental disclosures, to provide the evidence and prove the reliability and consistency of the company's adopted environmental standards. Needless to say, the negative aspects of environmental performance, such as excess emissions, clean-up costs and fines, should also be disclosed. The content of environmental disclosures should not be limited to "good news" only.

Because of the lack of environmental reporting standards, the scope and medium of reporting varies. With the improvement in the methods of evaluating environmental effects and the need to quantify the cost of the environmental dimension for management purposes, it should become common practice to disclose details of environmental financial impacts, along with quantitative data. The Annual Report would seem to be the most appropriate medium, as it offers consistency and a high standard of credibility.

#### **3.3.4 Environmental accounting controls**

The information required for environmental accounting and reporting is not available from a single source or central point. It emanates from a variety of sources within the organisation and it would not be possible for one person to gather it all. In order to capture the required information it would be necessary to design and implement an environmental accounting system and environmental policies. Once implemented, the system would have to be monitored to ensure that it functions in accordance with the plan and it actually generates the required output. Obviously, some of the work involved may require special skills and training may be required for any other staff involved. The accounting profession is in a position to develop and implement "tailor-made" accounting systems and to train staff, so that the process of maintaining and controlling the data can be streamlined.

It is not intended to set out here an environmental accounting system with its inherent internal accounting controls, but merely to point out the need for professional expertise to develop systems which are simple to work with and yet provide the complex and varied data required. The ideal system would have internal checks built into it to ensure the continuity of work and proof of its accuracy. Also, independently ascertained totals could be used to prove the integrity of the data.

The BS7750 of the British Standards Institute on conventional management systems relies on the development and implementation of systems and the auditability of such systems. In cases where the environmental accounts and disclosures are actually audited, auditors will first of all assess the effectiveness of the systems of internal control, in order to establish the extent and depth of their tests. A well designed accounting system can play an active part by subjecting the data to automatic checks, as opposed to merely holding the data passively.

Also the EC eco-management audit scheme (EMAS) which was launched in the UK in April 1995 (it came into force under EC law on 10 April 1995) provides the facility for companies to apply for certification on a site by site basis. The scheme, which is designed to encourage manufacturing companies to adopt proper environmental management systems requires an initial site review and subsequent periodic audits.

Although fraud may not be relevant to environmental reports (except for falsifying data to project a better image) it is important to ensure that accurate data is automatically generated by the system, and that it is easily ascertainable. The environmental accounting controls built into the system, and the system as a whole, should provide an audit trail, irrespective of whether or not an audit will have to be carried out. The reliability of any accounting information rests, to a great extent, on

the effectiveness of the internal controls built into the accounting system. The same applies to "environmental" information.

### **3.3.5 Verification of environmental disclosures**

Before carrying out a financial audit, an auditor has to understand the business. This need to understand the business is the same for environmental audits. The auditor/verifier should familiarise her/himself with the company's manufacturing and trading activities, and even that of its major suppliers and customers, in order to understand the company's upstream and downstream environmental effects. The methodology for the verification of the environmental accounts and disclosures is the same as that for financial audits; it relies to a great extent on the effectiveness of environmental management systems. The auditor should also be able to verify the validity of the disclosed data and the integrity of any assertions.

The audit of environmental accounts and disclosures should provide the company with some internal and external benefits. The internal benefits revolve around the assurance that management information systems are effective and provide management with reliable information. On this basis the verification may be done for the following reasons:

- i) To provide assurance that the environmental management and accounting systems in force are effective;
- ii) To demonstrate management's commitment to the company's environmental philosophy;
- iii) To provide assurance that environmental legal requirements are complied with;
- iv) To obtain a reliable environmental report.

The external benefits from such an audit/certification would include the following:

- i) Some of the financial information disclosed in the environmental report might have been audited already through the statutory audit and the audit of the environmental accounts may not involve excess costs;
- ii) The verification serves as a public relations exercise by demonstrating the company's commitment to environmental concern;
- iii) The verification provides an assurance that the published information is reliable. The verification would ensure that not only favourable news is published but also unfavourable news. Independent audit verification would provide comprehensive credibility. A "true and fair" view expression is appropriate to environmental accounts and disclosures as well.
- iv) The verification demonstrates the importance of environmental reporting *per se* by showing that externalities and other environmental effects are quantifiable, measurable and priceable and that they form an emerging and important class of data.

The verification of the environmental report would entail, firstly, an evaluation of the company's environmental management systems in force and, secondly, the examination of the relevant data and assertions by carrying out the necessary tests. The extent of the work will depend on the strengths and weaknesses of the system in force. In this respect, the verification of environmental accounts and disclosures is essentially the same as the audit of financial statements. It should be emphasised that the conduct of an effective environmental audit would require in most cases, not only auditing and financial expertise, but also specialised environmental and possibly scientific knowledge and skills. However, since there are no legal or other requirements for verifying environmental reports, the scope and extent of an audit/verification will depend entirely on the terms laid down by the company.

By way of example, the Report by Touche Ross & Co of BT's Environmental

Performance for 1994/95 is included here (see Table 3.10). It is noted that Touche Ross & Co have carried out a "review" which enabled them to express an opinion on BT's "endeavours...". Obviously, the report falls short of a proper audit/examination as advocated above. A full examination is necessary in order to express an opinion as to whether the environmental report shows a true and fair view. Also, more details of the methodology and procedures used by the auditors/verifiers should be included in their report. This is necessary because of the peculiarities of environmental activities/effects.

**Table 3.10 Report by Touche Ross & Co to British Telecommunications plc**

**We have reviewed the Environmental Performance Report for the year ended 31 March 1995 set out on pages 3 to 35. The report is the responsibility of, and has been approved by, the Directors.**

**The report has been prepared on the basis described under "BT's Environmental Report In Context" on page 3. The inherent limitations in completeness and accuracy of data are set out therein.**

**The report contains:**

- (i) key data, highlighted at the start of most chapters in respect of BT's significant environmental impacts; and**
- (ii) other data included to indicate the scale of BT's environmental issues.**

**In respect of (i), our review consisted of making enquiries of management responsible for compiling the data, an examination of relevant supporting schedules, and a review of the work performed and enquiries made by BT's internal audit division. In respect of (ii), our review was limited to enquires made of BT's internal auditors.**

**On the basis of our review, in our opinion BT has made reasonable endeavours to:**

- identify its significant environmental impacts;**
- give a fair and balanced disclosure of all available information relevant to those impacts, where material.**

*Touche Ross & Co.*

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*Source: The Report on BT's Environmental Performance 1994/95, p. 36.*



### 3.3.6 The process towards environmental excellence

It should be evident by now that the road towards environment perfection is long and arduous. For example, it may be necessary to change manufacturing processes and practices, which will require new investment, new or modified management methods and accounting and recording systems, and staff training. All these take time, and one should not underestimate the impact they have on the running of an organisation.

Elkington, J. and Burke, T. (1987)<sup>134</sup> have identified the stages which enterprises have to go through in their efforts to achieve environmental perfection. They called them "ten steps to environmental excellence". They are summarised in Table 3.11 and were taken into account in formulating the theoretical environmental performance model in Chapter 5.

Table 3.11 **Ten steps to environmental excellence**

1. Develop and publish an environmental policy.
2. Prepare an action programme.
3. Establish organisational responsibilities and consider staffing.
4. Allocate adequate resources.
5. Invest in environmental science and technology.
6. Educate and train.
7. Monitor, audit and report.
8. Monitor the evaluation of the green agenda.
9. Contribute to environmental programmes.
10. Help build bridges between the various interests.

*Source: Summarised from Elkington, J. and Burke, T. (1987) The Green Capitalists, London, Victor Gollancz Ltd., pp. 229-237.*

## 3.4 CORPORATE SOCIAL REPORTING

This section looks at the emergence, demise and re-emergence of social reporting.

### 3.4.1 Facing the problem

The incorporation of environmental effects into the sphere of accounting and reporting represents the biggest challenge to accounting since its inception 500/700 years ago, because they fall outside the traditional axioms of accounting (such as the duality of transactions, monetary values and homogeneity). In the late 20th Century society expects a great deal of social and environmental information. Although attempts by the profession to develop social accounting and reporting began in the early 1970s by the end of the decade they were abandoned (see Gray, *et al.*, 1987).<sup>135</sup> The reason for considering Corporate Social Reporting (CSR) which, in a wider context is referred to as Social Reporting, is because environmental accounting and reporting have their origin in CSR. The relevant accounting and environmental issues are complex, urgent and persistent and lie at the doorstep of accounting; "unlike the problem of inflation accounting, these new problems are not a transient phenomenon." (Makris, P.H., 1994c).<sup>136</sup>

Environmental effects are now considered to be the responsibility of companies, in accordance with the "polluter pays" principle, and since they affect the assets, liabilities and earnings of companies, "environmental information, both financial and non-financial [falls] squarely within the realm of the accounting function" (Chastain, C.E., 1973).<sup>137</sup> Even twenty years ago, the environmental pollution costs which were published by some companies were staggering, according to Chastain, C.E., 1973.<sup>138</sup> The onus is on accounting to provide the tools for controlling these costs. In order to fulfil this role, accounting has to evolve and expand beyond its traditional financial domain. Gray, R., (1990) believes that it is essential that new ways of thinking should "be explored and incorporated into the accounting orthodoxy".<sup>139</sup>

Accounting practice, according to Mathews, M.R., (1993) is "affecting, and being affected by economic exchange transactions"<sup>140</sup>. Environmental effects are now

exerting the same, two-way influences. Accounting practice is defined by Tinker, T., (1985) as "a means of resolving social conflict, a device for appraising the terms of exchange between social constituencies, and an institutional mechanism for arbitrating, evaluating, and adjudicating social choices"<sup>141</sup>. The anti-social activities of companies (e.g. those affecting the health and safety of employees and ecological damage) are increasingly opposed by the public, (e.g. by boycotting their products) and the quality of life is gradually being viewed as equally important as the standard of living.

### **3.4.2 Social accounting and reporting**

In recent years, the belief that the responsibility of companies spills over to other groups, besides investors, has gained strength. These other groups include employees, customers, suppliers, the communities and the entire country in which a company operates as well as the international arena. They, together with the investors, make up what is known as the company's stakeholders. Social accounting is, broadly, an attempt to demonstrate how the company has discharged its responsibilities towards its stakeholders. According to Gray, R., (1995) "social accounting refers, principally, to the practice of collating and reporting information about an organisation's activities on such matters as employment conditions, social and sexual equality, health and safety, relations with local and international communities, protection of consumers and impact on the natural environment."<sup>142</sup> Obviously, corporate social reporting encompasses a wide range of topics and "can be constructed around almost any type of information or with almost any sort of focus. It is not a systematic, regulated or well-established activity" (Gray, R., *et al.*, 1996).<sup>143</sup>

Social responsibility is concerned with the quality of life and includes environmental concern. However, in recent years "academic and professional interest in social

and environmental reporting has focused exclusively on environmental reporting. Social reporting has been neglected" (Adams, C.A. *et al.*, 1995).<sup>144</sup> Social accounting and reporting is the function that accounting performs in the conflict between maximizing profit and fulfilling social obligations. It does not arbitrate between these conflicts; it merely calculates and reflects the position. In doing so, though, it influences the parties through the awareness it creates. The "growth in awareness of corporate social responsibility has been added to the criticisms of the use of profit as an all-inclusive measure of corporate performance." (Hackson, D. and Milne, M.J., 1996).<sup>145</sup>

Social accounting and reporting is not a substitute for historical accounting and reporting but a complementary extension of it. It addresses issues which traditional accounting practice has ignored in the past. It is, therefore, "an essentially *evolutionary* mechanism designed to develop and enhance the current process of accountability" (Gray, R., *et al.*, 1996).<sup>146</sup>

### **3.4.3 Social accounting and the accountancy profession**

Social accounting has only a short history but it had the potential of developing into a new branch of accounting, thus providing an additional source of work and influence for the accountancy profession. Mathews, M.R., (1993) sees social accounting "as a natural extension of the existing discipline in line with changes in societal conditions and expectations"<sup>147</sup> However, although social accounting and reporting emerged in the 1970s and "despite a proliferation of pleas, suggestions and possibilities for different accountings, very few attempts were made to explicate and develop any general description and characterization of the process involved in the interaction of accounting with its social context."<sup>148</sup> (Parker, R.H. and Yamey, B.S., 1994) Obviously, "the failures of the profession to grasp the social opportunities in the 1970s was a tragedy that the profession had, in the early 1990s

an opportunity of redressing." (Gray, R., *et al.*, 1996).<sup>149</sup>

In a wider context, the scope of social accounting takes on a national or global perspective. "This wider view is termed "societal accounting " as it takes a "global" view of the relationship of society and accounting, tempered by the recognition that any accounting system must be related to the society in which it exists and is, therefore, nationally and culturally dependent"<sup>150</sup> (Mathews, M.R., 1993).

#### **3.4.4 History of social accounting and reporting**

Although social accounting and reporting emerged in the early 1970s, "there still exists no universally accepted theoretical framework of corporate social accounting" (Hackson, D. and Milne, M.J., 1996;<sup>151</sup> see also Belkaoui, A. and Karpik, P.G., 1989;<sup>152</sup> and Gray, R., *et al.*, 1995a<sup>153</sup>). After an initial outburst of activity in the debate for the development of social accounting and reporting the impetus only lasted until 1976 (Gray, R. *et al.*, 1987)<sup>154</sup>. With the onset of the world recession in the mid 1970s, whatever interest and enthusiasm existed was wiped out before any definite concepts of measurement and accounting and reporting emerged (see Gray, R., *et al.*, 1987).<sup>155</sup> Social accounting and reporting reached its peak in the early 1970s with a great deal of experimentation and academic publications (see Gray, R., *et al.*, 1995;<sup>156</sup> Gray, R., *et al.*, 1987;<sup>157</sup> Gray, R., *et al.*, 1996<sup>158</sup>.) Since the early 1970s, the greatest volume of social information related largely to employee issues but gradually, environmental issues became more predominant. In fact, after the mid 1980s environmental issues "divorced" themselves from social reporting; they emerged as a possible new hegemony (Gray, R., *et al.*, 1995).<sup>159</sup> The 1980's saw little social reporting in the UK. "Such evidence as is available (Gray, R. *et al.*, 1987<sup>160</sup>; Gray, R., 1990b<sup>161</sup>; and Guthrie, J. and Parker, L.D., 1989<sup>162</sup>) indicates that companies tended to report little..." (Harte, G. and Owen, D., 1991).<sup>163</sup> The revival of interest in the subject may be due to the improvement in the economy and the

increased interest in environmental concern.

### **3.4.5 Divisions of social accounting and reporting**

Social reporting deals with the disclosure of information which demonstrates how companies discharge their responsibilities. Until recently, it has been argued "that social disclosures should be provided because the corporation impacts numerous stakeholders who are not investors and these various groups have the right to know the extent of the impact." (Epstein, M.J. and Freedman M., 1994).<sup>164</sup> These aspects normally fall outside the traditional reporting matters, as they are not covered by law. The information in question can be financial, non-financial, quantitative or qualitative. As explained in the next paragraph, the progress to full disclosure begins with stage 1 which provides only qualitative information, followed by stage 2 which includes quantities and finishes with stage 3 which includes evaluations in monetary terms. So far, such "disclosures are voluntary, unaudited and unregulated" (Mathews, M. R. and Perera, M.H.B., 1991).<sup>165</sup> There are, therefore, no generally accepted standards or formats of reporting. The various divisions of social accounting are shown in Table 3.12. The table distinguishes between the private and public sector, and shows the time-scale involved and the levels of measurement used. It also shows that the "area of social responsibility is predominantly a private-sector, short-term reporting system, using mainly non-financial quantitative and qualitative data." (Mathews, M.R., 1993).<sup>166</sup> The more important divisions of social accounting are considered below.

Table 3.12 The characteristics of the various components of social accounting

<b>Division</b>	<b>Purpose</b>	<b>Area of main use</b>	<b>Time-scale</b>	<b>Measurements used</b>	<b>Associated areas</b>
1 Social responsibility accounting (SRA)	Disclosure of individual items having a social impact	Private sector	Short term	Mainly non-financial and qualitative	Employee reports; human resource accounting; industrial democracy
2 Total impact accounting (TIA)	Measures the total cost (both public and private) of running an organisation	Private sector	Medium and long term	Financial AAA Level III	Strategic planning; cost-benefit analysis
3 Socio-economic accounting (SEA)	Evaluation of publicly funded projects involving both financial and non-financial data	Public sector	Short and medium term	Financial, non-financial Levels II and III	Cost benefit analysis; planned programmed budgeting systems; zero-based budgeting; institutional performance indicators; value for money audit
4 Social indicators accounting (SIA)	Long term non-financial quantification of societal statistics	Public sector	Long term	Non-financial Quantitative AAA Level III	National income accounts; consensus statistics
5 Societal accounting (SA)	Attempts to portray accounting in global terms - overreaching theories	Both All-embracing	All	Financial aggregates	Systems theory; mega accountancy trends

Source: Mathews, M.R., (1993)

### 3.4.5.1 Social responsibility accounting (SRA)

SRA is the area which has received the most attention and is defined by Mathews and Perera (1991) as "Voluntary disclosure of information, both qualitative and quantitative, made by organisations to inform or influence a range of audiences. The quantitative disclosures may be in financial or non-financial terms".<sup>167</sup> The areas covered are: employees, products, energy, pollution and community support. This category lacks depth in financial evaluations. It deals only with levels I and II of the levels of measurement of The American Accounting Association (AAA) of the report of the Committee of Social Costs (1975).<sup>168</sup> The areas each level covers are:

- Level I - the relevant activity is only identified and explained.
- Level II - the relevant activity is measured in non-monetary terms.
- Level III - the relevant activity is measured and evaluated (as far as possible) in financial terms.

SRA is a short-term, private sector reporting method covering employee reports, human resources and industrial democracy in qualitative and non-financial terms.

According to Mathews, M.R. (1993) a "comprehensive analysis of annual reports of UK companies covering all categories does not seem to be very common".<sup>169</sup> However, Gray, R., *et al.*, (1987)<sup>170</sup> have produced such an analysis which is reproduced here as Table 3.13, which shows that after a lapse of 5 years the frequency of social disclosures in the UK is dramatically less than in the US. Also, a further comparison covering three years in the UK (see Table 3.14) shows that "for all but one item (human resources) there appears to have been a peak of disclosure in 1981/82" (Gray, R., *et al.*, 1987).<sup>171</sup> Both tables show that CSR varies over time and between countries. Although the data in question is now over ten years old, this conclusion is still valid (see, for example, Gray, R., *et al.*, 1995).<sup>172</sup>



Table 3.13 Frequency of publication of social reporting information.

	UK 1982/83	USA 1978
<b>A. Environment</b>		
1. Pollution Control	10	133
2. Prevention or repair of environmental damage	7	15
3. Conservation of natural resources	-	39
4. Other environmental disclosures	-	46
<b>B. Energy</b>		
5. Conservation	16	126
6. Energy efficiency of products	10	45
7. Other energy related disclosures	2	29
<b>C. Fair business practices</b>		
8. Employment of minorities	1	52
9. Advancement of minorities	26	47
10. Employment of women	6	49
11. Advancement of women	-	142
12. Employment of other special interest groups	11	18
13. Support for minority businesses	-	18
14. Socially responsible practices abroad	15	43
15. Other statements on fair business practices	1	104
<b>D. Human resources</b>		
16. Employee health and safety	46	69
17. Employee training	53	80
18. Other human resource disclosures	75	32
<b>E. Community involvement</b>		
19. Community activities	13	56
20. Health and related activities	5	35
21. Education and the arts	11	70
22. Other community activity disclosures	7	56
<b>F. Products</b>		
23. Safety	11	42
24. Reducing pollution from product use	-	22
25. Other product related disclosures	14	46
<b>G. Other social responsibilities disclosed</b>		
26. Other disclosures	11	56
27. Additional information	49	16

Source: Gray, R., Owen, D., and Maunders, K., (1987) whose sources were: UK data - analysis of sample of 300 reports used for Financial Reporting 1983-84. USA data - Ernst & Ernst (1978) adjusted from sample size of 500 pro rata to 300 to provide comparison with UK, p. 60.

**Table 3.14 Three year comparison of social reporting information**

<i>Category of Information</i>	<i>Number of Companies</i>		
	<i>1980/81</i>	<i>1981/82</i>	<i>1982/83</i>
<i>Human resources</i>	<i>115</i>	<i>119</i>	<i>120</i>
<i>Other social responsibility disclosures</i>	<i>65</i>	<i>65</i>	<i>55</i>
<i>Fair business practice</i>	<i>48</i>	<i>58</i>	<i>47</i>
<i>Energy</i>	<i>29</i>	<i>46</i>	<i>27</i>
<i>Community involvement</i>	<i>28</i>	<i>37</i>	<i>25</i>
<i>Product related</i>	<i>18</i>	<i>30</i>	<i>21</i>
<i>Environmental</i>	<i>23</i>	<i>27</i>	<i>16</i>
<i>Total companies disclosing at least one item</i>	<i>134</i>	<i>183</i>	<i>160</i>

*Three hundred companies were sampled in each year.*

*Source: Gray, R., Owen, D., and Maunders, K., (1987) whose sources were: Financial Reporting 1982-83. Analysis of sample used in Financial Reporting 1983-84, p. 61.*

### **3.4.5.2 Total impact accounting (TIA)**

This division includes both internal and external costs and as such it can also be described as social responsibility accounting. Internal costs are the company's own private costs, such as materials, labour, and overheads. External costs arise from the company's activities, but are borne by the public; they are the company's externalities and typically they arise from pollution. Clearly, this division of social accounting and reporting incorporates the environmental accounting aspects of pollution.

TIA "refers to attempts at measuring, in monetary terms, the total cost of running an organisation in its existing form" (Mathews, M.R., 1993).<sup>173</sup> It is appreciated that there are inherent difficulties in ascertaining and evaluating externalities, but such difficulties should not be misconstrued as nullifying or diminishing their magnitude in any way.

The costs of smoke pollution were extrapolated by Mathews, M.R., (1993) from Estes, R.W., (1973)<sup>174</sup> valuation for Pittsburgh, and for the entire US they would be \$11 billion p.a.; the 1993 cost would be much higher (Mathews, M.R., 1993).<sup>175</sup> The size of environmental damage of a single type of pollution puts into perspective the significance of capturing and reporting these costs. This is why this aspect of social accounting is continuing to have the support of society. The May 1994 ENDS Report (No. 232) points out that "concern about the environment has survived four years of recession and may well be poised to pick up again as the economy recovers"<sup>176</sup>. The Report also states that the percentage of population showing concern for the environment increased from 8% in 1986 to 22% in 1993 and is ranked as the third most important problem with which the Government should be dealing.

Finally, in 1974 Trevor Gambling stated that "It is only in recent years that society has turned its attention to social betterment as an independent goal from purely economic advance," (Gambling, T., 1974).<sup>177</sup> Although society's interest in social betterment has continued, accounting's interest in the subject had decreased significantly by 1976. And yet the social problems which created the interest in the subject in the first place, not only still persist, but have also become more acute and prominent. Although accounting "is and certainly should be a reflective phenomenon" (Parker, R.H. and Yamey, B.S., 1994)<sup>178</sup> as far as social accounting is concerned, it remained unaffected.

The little interest in social accounting and reporting that still exists is seen by Mathews, M.R., and Perera, M.H.B., (1991) "as public relations puff"<sup>179</sup>. However, more recently, with the growing interest in environmental accounting, there has been a revival in CSR and according to Gray, R., *et al.*, (1996) "we do not come to CSR *ab initio*; there is a wealth of experience out there that has been hard won..."<sup>180</sup>

Also, "now that corporate environmental and social excesses have become more transparent" (Lehman, G., 1995)<sup>181</sup> corporations should be more inclined to be accountable to society and provide more social information despite the lack of a legal requirement to do so.

### **3.5 RECENT ACCOUNTING THOUGHT**

This section considers, briefly, recent developments in accounting thought and systems theory. The roles of accounting, with regard to organizations and society, provide some insights into the functioning of accounting and demonstrate how it fulfils the needs of the society it serves.

#### **3.5.1 Accounting thought**

The roles played by accounting may be passive, influential or even dominant in influencing decisions and in distributing resources between classes of society. In effect, accounting "has gained, and is continuing to gain, prominence as a warranted means of regulating many aspects of our lives" (Johnson, P., 1995;<sup>182</sup> see also Rose, N. and Miller, P., 1992.<sup>183</sup> Accounting measures and records economic activities and, in so doing, narrows uncertainties, contributes to business success and to the creation and distribution of wealth.

The institutionalization of accounting has been twofold; on an organizational and a social level. Accounting "now functions as a cohesive and influential mechanism for economic and social management" (Burchell, S., *et al.* 1980).<sup>184</sup> On this basis, accounting has achieved a position of organizational and social significance. It is no longer merely a technique for recording economic transactions. Its success and "apparent effectiveness in the business world legitimates its transfer to new domains" (Johnson, P., 1995).<sup>185</sup>

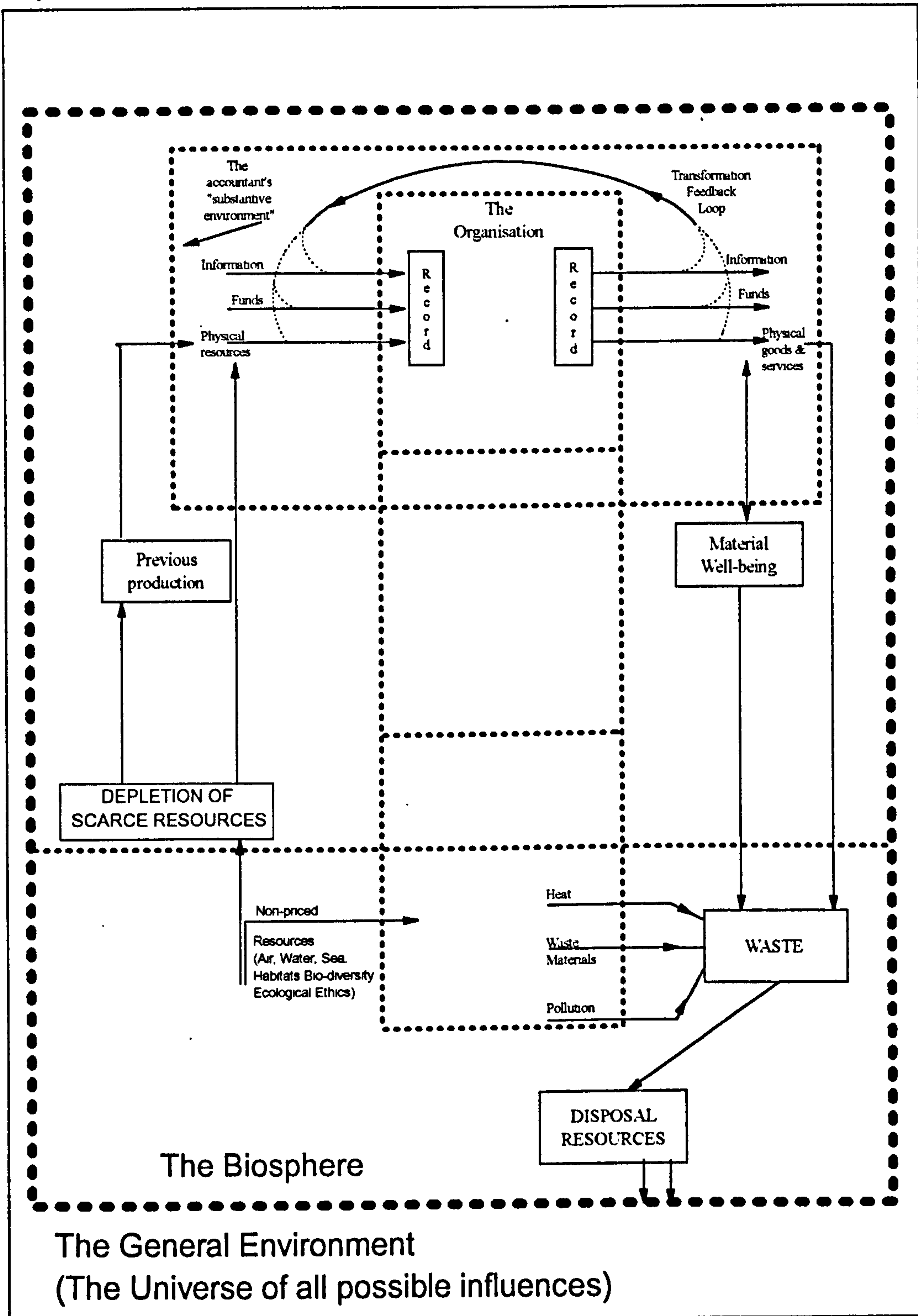
### 3.5.2 A systems view of accounting

This section considers the place of accounting within the concept of organisations as systems. A system can be "any group of entities which are functionally interdependent" (Salaman, G. and Thompson, K.(eds) 1980)<sup>186</sup>. Systems can be large and contain sub-systems which work together towards a common goal (Burrell, G. and Morgan, G., 1994)<sup>187</sup>. Thus, the accounting function can be seen as a system which reacts to the activities (the inputs) of organisations. and provides financial data (the outputs). Trading organisations have, in general, "profit making" as their major goal, and other, less important goals, such as "fair business practices" and "protecting the environment" (see chapter 5 of the thesis for a detailed evaluation of company objectives).

In order to demonstrate the interrelationship of accounting with other systems within the organization, Gray, *et al.*(1993) developed a model (reproduced as Chart 3.1) which introduces a systems view of accounting. It shows how accounting interacts with the social and physical world and is therefore "implicated in the construction of a "social reality"....with regard to (for example) the environment it is obvious that the accounting picture is one from which essential elements are missing".<sup>188</sup> (See also Hines, R.D.,(1988)<sup>189</sup>,(1989)<sup>190</sup>; Salaman,G. and Thompson, K.(eds)(1980)<sup>191</sup>.

The model also shows the use of unpriced environmental resources and their transformation (into, for example, energy, pollution and waste) and subsequent discharge into the environment. By-passing the pricing system, these interactions are not captured by accounting, and therefore the accounting information is incomplete and as such can be misleading.

Chart 3.1: A systems view of accounting, organizations and the environment



Source: Gray et al., (1993), *Accounting for the Environment*, p. 20.

In order to demonstrate the function of environmental accounting within a system it is necessary to look at the two types of systems: open and closed. Katz, D. and Kahn, R.L., (1970)<sup>192</sup> pioneered the open system approach to organisations, unlike Mayo, E., (1977)<sup>193</sup>, who viewed systems as closed. Closed systems are "isolated groups of interacting subunits ignoring any inputs that might come from outside the systems boundary"(Salaman, G. and Thompson, K., (eds), 1980)<sup>194</sup>. Closed systems are, effectively, rigid, resisting change and in a constant state of equilibrium (of course, in the long run, this state is impossible). On the other hand, an open system evolves by absorbing external influences, thereby achieving a new equilibrium and maintaining its continuity. If a system does not interact with its environment (not necessarily ecological) it cannot survive. It can, therefore, be argued that organisations which adopt a closed system towards environmental accounting and reporting demonstrate their "failure to develop and understand the processes of *feedback* which are essential to *survival*"(Silverman, D., 1984)<sup>195</sup>. Such organisations could eventually be overtaken by events, given that, as has already been established, the environmental problems will prevail.

As shown by Gray *et al.*'s model (Chart 3.1), accounting is entrenched in the heart of organisations. It has to deal with the organisation's deeds and misdeeds (in an accounting sense). It is evident that "organisations can, as it were, create reality, and define the nature of the world for us with reference to particular activities or areas" (Salaman, G. and Thompson, K., (eds), 1980).<sup>196</sup> In particular, as Hines, R.D., (1988) puts it: "social reality exists tangibly, and accounting practices *communicate* that reality, but in so doing, such practices play a part in creating, shaping and changing, that is, in *constructing* reality"<sup>197</sup>.

The open systems provide the opportunity for environmental accounting to penetrate and change the accounting techniques of organisations and facilitate their

accountability. System theory strikes an optimistic note for environmental accounting because it shows how systems react to forces of change in an adaptive manner. (See Silverman, D., 1984<sup>198</sup>, and Katz D., *et al.*, (eds), 1980.)<sup>199</sup>

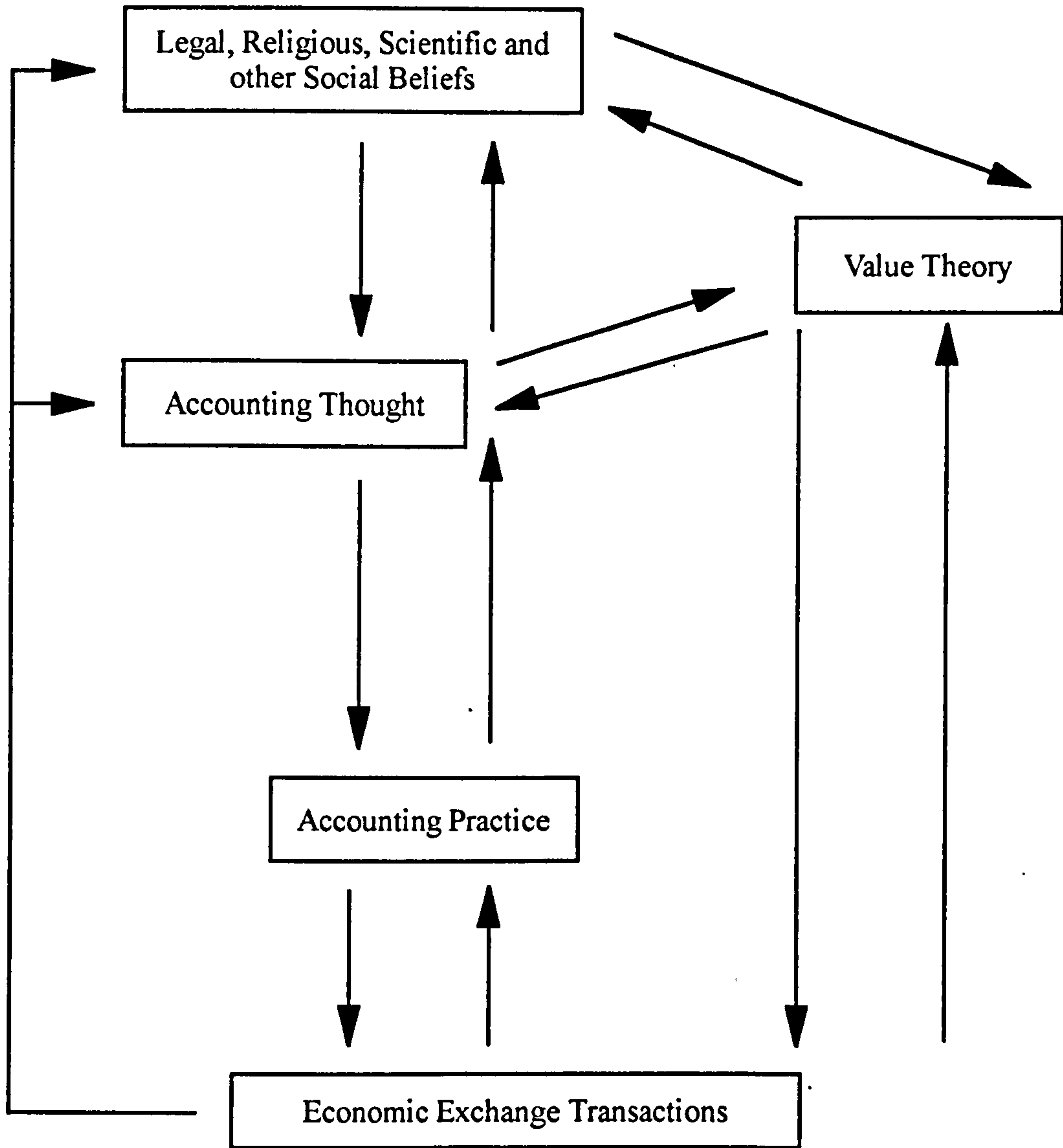
### **3.5.3 Value theory**

Value theory demonstrates how economic exchange transactions are influenced and determined by different social systems. Chart 3.2 (taken from Tinker, T., 1985)<sup>200</sup> shows the relationship between value theory and accounting thought and practice. The effect of legal, religious, scientific and other social beliefs is also influential. According to Mathews, M.R., (1993) the "effect of culture on accounting appears to be considerable and a force for stability and against revolutionary change"<sup>201</sup>.

This model shows that the effects and influences of accounting are prevalent in many aspects of our daily lives. Tinker believes that when accounting is "cast in the light of the history of value [it] assumes special social significance, not just as a mechanical book-keeping of events and transactions, but as a logic appropriating material production through economic exchanges. As such, accounting is reflective of the ideology prevailing in each historical period" (Tinker, T., 1985).<sup>202</sup> Obviously, accounting is in the midst of social conflict and exchange transactions, and plays a number of roles in organizations and society. The importance of accounting practice becomes obvious when viewed through the theory of value; for example, "how the terms of economic exchange are determined in different social systems", (Tinker, T., 1985).<sup>203</sup> Because of the central role it plays, it has to provide the means for establishing the terms of exchange and allocation of resources. The role of accounting is not only economic but also social.



Chart 3.2: The relationship between value theory and accounting



Source: Tinker, T., *Paper Prophets - A Social Critique of Accounting* (Praeger Publishers, 1985), p. 83.

### **3.5.4 Accounting, organizations and society**

The institutionalization of accounting placed it in a position where it could play a part in every function of organizations. By being entrenched there, accounting holds an influential position with regard to the functioning and management of organizations. It is influential and pervasive and "at the societal level, this has involved seeing accounting as essentially reflective of the organization of social relationships" (Burchell, S. *et al.*, 1980).<sup>204</sup>

All sections of an organization rely on accounting systems in some way or other for their management and functioning. Within the organization "accounting systems function in a diversity of ways, intertwined with institutional political processes and the operation of other forms of organizational and calculative practice" (Burchell, S. *et al.*, 1980).<sup>205</sup> In turn, the organizational processes give special meaning and significance to accounting systems and, in doing so, the consequences arising from the accounting systems are ascribed different significances (e.g. in their involvement in decision processes) as opposed to their traditional function.

Once implemented, accounting systems are there to be used for a variety of ends. The roles they adopt are shaped and moulded by the pressures exerted on them by the human and social processes within and without the organization. According to Gray, R., *et al.* (1993) "accounting helps define and measure the "success" of actions and, ultimately, helps construct our concepts of organization and of the world itself"<sup>206</sup>. This is particularly evident with environmental accounting and reporting as they demonstrate to the outside world the environmental ethos of the organisation.

### **3.5.5 Roles of accounting**

The roles of accounting may be identified by studying its actual use in practice.

Similarly, any conclusions concerning the roles played by accounting should also be derived from its actual application. Although accounting practices which have failed (such as inflation accounting) may provide inside knowledge of the workings of accounting, they are irrelevant to prevailing practice. The roles of accounting must, therefore, vary with its uses. Since the roles of accounting are not pre-determined it is possible for accounting to be manipulated for organizational and social ends.

The study of the roles of accounting demonstrates its potential as a social and organizational management tool. Through this process, accounting is shown to take on a new perspective, such as the facility of corporate accountability and the rationalization process for making decisions. Furthermore, through its measuring and calculative attributes, accounting can define and reduce uncertainty in economic transactions and thus provide a reliable environment for business. Accounting "serves the social purpose of abating and objectifying anxiety.... In sum, the role of the accounting profession in society is to absorb uncertainty and to abate social anxiety" (Mason, R.O., 1980).<sup>207</sup> In the case of environmental accounting the uncertainty is dealt with by monitoring and measuring/evaluating (the emissions/damage) and anxiety is abated with transparency.

The roles accounting plays do not arise from its inherent attributes, but from its functionality at organizational and societal level. Accounting responds to social demands for the creation of order within which social and business interactions can be played out. According to Chua, F.C., (1986) "accounting is claimed to be a service activity which is 'neutral as between ends', when in fact the goals of the owners of capital are implicitly given priority."<sup>208</sup> On that basis, environmental concern will only be addressed if it serves the benefits of investors and not out of genuine environmental concern.

The following roles of accounting provide some of the more important aspects of accounting "in action" and will be considered further below:

- 1) The provision of information
- 2) The functional theory
- 3) The radical view

### **3.5.5.1 The provision of information**

Accounting may be seen as the provider of information for potential users, such as managers and investors. According to Most, K.S., (1977)<sup>209</sup> this makes accounting information selective and purpose-oriented which presupposes the availability of surplus accounting data. Accounting must therefore be concerned with accounting data first and, secondly, with information. This means "that the relevancy of information is determined within the context in which it is used rather than by the foresight of those who determine the form which it should take" (Burchell, S., *et al.*, 1980).<sup>210</sup>

The next stage to consider is the end result of the use of accounting information. Is it, for instance, provided passively, in order to establish the facts of the case or does it actively determine the outcome of the case? In other words, is accounting information used to "mediate between the divergent interests in an organized endeavour, to legitimize and justify particular stances"? (Burchell, S., *et al.*, 1980).<sup>211</sup> In fact, they (Burchell, S., *et al.*, 1980) maintain that complex accounting developments arise just to do that, e.g. cost-benefit analysis, and the development of inflation accounting<sup>212</sup>. In such cases, the selection and design of accounting information is purposeful and destined to corroborate the outcome, rather than contribute impartially to the subject matter (e.g. a project involving cost-benefit analysis).

Many users of accounting information (such as investors, managers or creditors) do

not treat it as infallible evidence. They have other means of determining the strength of their investment or interests (e.g. by the time the results of public companies are announced, the stock market will already have established the market value of their shares). Although accounting information, in its "raw" state, is important, its significance varies through timing, manipulation and development.

### **3.5.5.2 The functional theory**

The functional theory views accounting as neutral in all its facets and, as such, it "seeks to avoid dominance by any one section of society" (Den Uyl, D.J., 1984).<sup>213</sup> Its neutral stance restricts the role of accounting information to its provision for organizational decision processes. This is a pragmatic and appealing theory and strives for a rational approach in decisions, such as resource allocation, accountability and stewardship by organizations. These "functional attributes are seen as being fundamental to the accounting endeavour. Justifying the existence of the craft, they provide rationales for continued accounting action" (Burchell, S., *et al.*, 1980).<sup>214</sup>

The functional accounting view "is characterized by a concern for providing explanations of the *status quo* [and] social order" (Burrell, G. and Morgan, G., 1994)<sup>215</sup> as opposed to the radical view which "is committed to a view of [accounting] which emphasises the importance of overthrowing or transcending the limitations of existing [accounting] arrangements."<sup>216</sup> (Burrell, G. and Morgan, G., 1994). The functional theory offers a moral interpretation of the mission of accounting which is a powerful force for ensuring the emergence and prevalence of environmental accounting.

This subject will be considered further in Chapter 4 in relation to the conceptual framework of the research.

### 3.5.5.3 The radical view

In contrast to the functional theory, the radical view depicts the attitudes of organizations as being inclined towards the manipulation and "massaging" of accounting information, including disclosures in Annual Reports. Under this scenario, accounting does not favour environmental disclosures. The radical theory is diametrically opposed to the *prima facie* use of accounting information. Instead, courses of action and accounting developments may be directed or "called upon to legitimize particular stances and proposals" (Burchell, S., *et al.*, 1980).<sup>217</sup> On this basis accounting is depicted as an ally of business.

The critical perspective does not view accounting as being neutral and responding to rational demands for accounting information. Instead, it is seen as "an aspiring occupational monopoly that seeks to further its own social and economic self-interests" (Chua, W.F., 1986).<sup>218</sup> This radical perspective challenges the received wisdoms of the mainstream/functionalist paradigm (Johnson, P., 1995)<sup>219</sup> and "concludes that accounting has supported and continues to support, a particular view of society" (Mathews, R., 1993).<sup>220</sup> The supported view in question, i.e. the capitalist view, is held to the exclusion of social relationships. On this basis, when social accounting is "viewed from a radical perspective, [it] is considered inadequate and obstructionist" (Mathews, R., 1993).<sup>221</sup> The radical view which exposes what must be called the "hidden agenda" is unsympathetic to social and environmental accounting. Nevertheless, in connection with environmental accounting it can be argued that its successful implementation is designed to bring about a common good, through better environmental management and control systems, without changing the status quo. Admittedly, proponents of the radical view would not accept this. Nevertheless, it is not considered necessary for the purpose of the thesis to defend the philosophical arguments of the radical view of working towards overthrowing existing social arrangements.

Recent developments in accounting thought have provided a new perspective for the traditional understanding of accounting. They demonstrate the integration and active participation of accounting in organizational management and social practices. The study of accounting thought and the functioning of accounting broadens one's understanding of the workings of the accounting craft. Here, it has been shown that accounting information can be manipulated and used to demonstrate or support particular stances. Furthermore, it has also been shown that the radical view is hostile towards traditional accounting and towards current developments in social and environmental developments. In contrast, the functionalist view accepts the underlying social and organisational structures within which it operates as a sub-system, and contributes to the aims of the organisation.

It is against this background, that the struggle for establishing environmental accounting should be viewed. Accounting thought suggests that accounting is implicated in environmental degradation. According to Gray *et al.* (1993) "the environmental crisis is an inevitable result of the way we accountants do what we do. Accounting bears a serious responsibility for the growing level of environmental devastation"<sup>222</sup>. Accounting is now engulfed by environmental problems which it has to address.

### **3.6 CONCLUSION**

The pressures on industry by pressure groups, the public and the government are gradually forcing companies to adopt clean technologies and processes. As a result of these developments, there is "a wind of change" in management's concern for the environment, which is manifested by the introduction of such technologies and the adoption of environmental management systems, policies and practices. Since these developments are only beginning, they provide accounting with an opportunity to contribute to and influence such developments and avoid repetition of its

performance in respect of social reporting. In order to do this accounting has to move away from its traditional *ex post facto* involvement with accounting transactions, take the initiative, and determine the shape and direction of developments.

This chapter focused on environmental effects, accounting and reporting issues and accounting thought. Because of the extent and diversity of the damage being done to the environment, the need for evaluation is becoming more and more important for managing, planning and reporting purposes. Environmental evaluations are an important aspect of environmental accounting and although there are difficulties in segregating some environmental costs from the normal costs of companies (since they are embedded in them) it does not mean that efforts should be abandoned, or that the insistence on perfection should be allowed to frustrate progress. It has been demonstrated that environmental evaluations are possible, and accounting and reporting can deal with them in monetary terms. All three methods (i.e. quantitative, qualitative and financial) required for environmental accounting and reporting were examined. Different sections were dedicated to various aspects of environmental accounting and reporting both in the UK and Western Europe, which demonstrated that accounting could handle the issues and play a "functional" role with regard to environmental effects. This had to be demonstrated first, before the research could move on to the next stage, i.e. the gathering of actual data through a questionnaire survey. It is not the birth of environmental accounting and reporting which is at stake here, but its evolution. In this respect, a pessimistic attitude is unwarranted; was it not Frey who said that such pessimism amounts to saying: "why let things be difficult when with just a little more effort, we can make them seem impossible?" (Frey, F.W., 1971).<sup>223</sup>

This chapter has also provided an insight into the relationship of accounting with



organizations and society, with particular reference to social and environmental accounting issues. Despite its long history accounting has come under considerable criticism in the last twenty years. These criticisms centre around accounting's apparent apathy and inability to resolve social accounting and reporting. Although social accounting and reporting started in the 1970s, twenty years later, there is still no systematic method or standard for dealing with them. The time is right for accountants to grasp the initiative and break away from their traditional role. If accounting does not expand and embrace the environmental dimension, other professional bodies or legislators will deal with the problem which may, in the long run, be to the detriment of the accountancy profession. Obviously "so far, accounting establishments have not led the charge in the quest for green accounting" (Rubenstein, D.B., 1992).<sup>224</sup>

Social and environmental accounting offer a great opportunity to accountants for new developments, new sources of revenue and influence. As professionals we "have a mountain to climb to put our house in order and to restore public trust and credibility, and that any new development should be appraised in that context"<sup>225</sup> (The Chartered Institute of Public Finance and Accountancy, 1978). The factors which have contributed to the environmental crisis are not likely to disappear and, sooner or later, accounting will have to face up to its responsibilities.

The development of social and environmental accounting, which began about twenty years ago, will continue because the forces which induced the process have become endemic to the production and distribution process and they will continue to cause environmental problems. The imminent evolution of accounting will widen the scope of accounting. As Mathews, M.R., (1993) says in the preface to his book, "Socially Responsible Accounting", "Proponents of social and environmental accounting argue that eventually conventional financial and management accounting

will be perceived as a subdivision of a wider approach to accounting; whereas the present position is that of social and environmental accounting being attached as an appendage to conventional accounting"<sup>226</sup>. Environmental accounting may turn out to be more than just another chapter in the history of accounting.

In the last few years the question of social accounting has been revived as a result of the aggravating problems of environmental degradation. A revitalised debate has therefore begun in the 1990's to address the problems accounting is faced with in respect of environmental accounting and reporting issues.

It would be logical to assume that the unique position, skills and the roles of accounting would enable it to embrace the challenge and resolve the environmental accounting and reporting problems, no matter how daunting the task. However, despite this privileged position, accounting has not addressed these issues adequately yet, and the effects and problems are generally ignored by organisations. Both accounting and the accountancy profession are blamed for this state of affairs.

The study of the roles that accounting can play has shown that in addition to providing information (in a passive way) accounting can be manipulative by taking an unsympathetic and obstructionist stance. This latter, radical view of accounting has been depicted as an ally to business and is therefore inclined towards the manipulation of accounting information and disclosures. Such an accounting role would be hostile to environmental accounting and reporting and one must turn to the functional role of accounting for support and innovation in this respect. The functionalist paradigm, which is considered in the next chapter, offers a rational approach to problems for dealing with, for instance, accountability and the stewardship of organisations. However, no matter which role accounting is involved with, the solution to environmental accounting and reporting must be

addressed from a practical perspective first, for without a solution there can be no information to be used or manipulated.

The persistence of environmental problems and the introduction of environmental legislation are making environmental management a daily task. There is, therefore, continuing and increasing demand for the development of environmental accounting and reporting and despite the difficulties and complexities of the problem, solutions will have to be developed sooner or later; the task is not insurmountable. The approach to the solution of the problem must be to start from the beginning and not the end. A certain amount of tolerance should be allowed for any new system e.g. the emphasis should not be on accuracy, perfection and comprehensiveness, but on what is feasible at the time. Most of the criticisms against environmental accounting stem from the fact that they ignore the time required for innovation and experimentation. Accounting can easily handle the "accounting entries"; it is the quantities and values attaching to those entries which are difficult. Nevertheless, this chapter has demonstrated that they are feasible. The fact that environmental accounting and reporting are not more widespread may be due to other factors, such as lack of legal requirements, which are considered later in the thesis.

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## **CHAPTER 4**

### **RESEARCH DESIGN AND METHODOLOGY**

#### **4.1 INTRODUCTION**

The preceding chapters dealt with various aspects of environmental accounting and reporting: the causes and effects of environmental problems and accounting's evolution and ability to deal with those problems. This chapter considers a conceptual framework and discusses the methods used to carry out the empirical studies, the operation of the studies, as well as the research instrument used and the procedures followed. The aim of the research is to examine the role of accounting in providing the required methodologies for accounting and reporting on the environment. In order to do this, the research was firstly focused on the identification of environmental effects and their evaluation. Environmental degradation is an elusive term but it does convey the reality of the problem: it is awesome, pervasive, undefined and to a great extent immeasurable. In view of this, the study focuses on what can be achieved and not what could be achieved, in a utopian world.

#### **4.2 A CONCEPTUAL FRAMEWORK**

One of the main factors influencing the design of an accounting and reporting system is whether accounting is flexible enough to accommodate the required expansion or modification. Over the years, accountancy has restricted itself to the needs of the market, industry and finance, and neglected a wide range of social and environmental factors. A secondary influence on the design of such a framework is the adaptability of the factors it aims to accommodate: in this instance, the environmental effects, which were examined in the previous chapter. This involved the identification and evaluation of various approaches in order to demonstrate the objectives of environmental accounting and reporting (e.g. measurement, recording



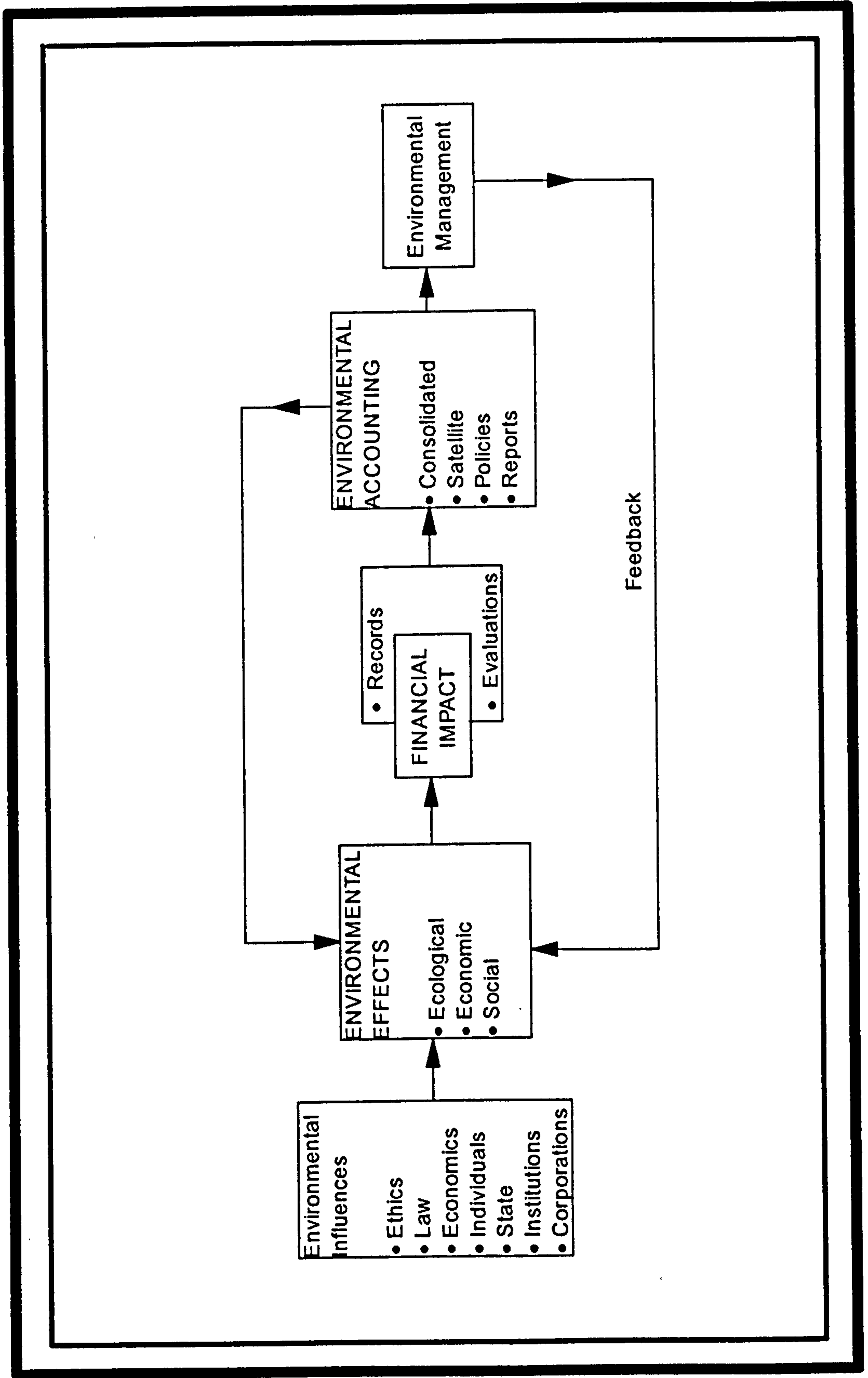
and reporting) and their characteristics (such as relevance, usefulness, reliability, neutrality and auditability.) This evaluation led to the development of the conceptual framework, which is demonstrated in Chart 4.1. It illustrates the incorporation of environmental effects, and the functionalist classification schema. Environmental accounting is integrated within the sphere of: principles, law, institutions, ecological sciences, economics, industry, finance and management. The conceptual framework reflects broadly, "the process of choosing techniques of measurement, evaluation and communication." (Belkaoui, A., 1984)<sup>1</sup>

#### **4.2.1 A functionalist conceptual framework**

The reason for positioning environmental accounting in a particular paradigm is to view it in a particular way. The paradigm is like a tool or map which can establish the origins, direction and destination of events (see Burrell, B. and Morgan, G., 1994)<sup>2</sup>. It has already been explained in section 3.5.2, that environmental accounting is more akin to open systems and that environmental change has a disequilibrium effect because it "may influence the very structure and essential nature of the system [but that] is negated to some extent by assumptions that equilibrium will eventually be restored" (Burrell, G. and Morgan, G., 1994)<sup>3</sup>. The conceptual framework as presented here reflects a system in a state of moving equilibrium

The process can be seen "in terms of a basic model which focuses upon *input, throughput, output and feedback*" (Burrell, G. and Morgan, G., 1994)<sup>4</sup>, thereby providing the system's needs and thus ensuring its survival. It is this interrelationship of organization and environment (not necessarily ecological) that functionalism is concerned with. As shown by the conceptual framework (see chart 4.1), environmental accounting is entrenched in the heart of the system providing the input, output and feedback.

Chart 4.1 The environment and accounting - A conceptual framework



Functionalism and open systems are interrelated, as both are concerned with "the relationship of the parts to the whole" (Silverman, D., 1984)<sup>5</sup>. The whole system may be comprised of systems, subsystems and a supersystem. The question about the effectiveness of a system then is "How well does it perform that role, what contribution does it make to the whole, are its actions well coordinated towards achieving the supersystem's objectives and so on? Such analysis is called *functionalist*, because it focuses on the function the main system plays within its supersystem" (Kuhn, A. and Beam, R.D., 1982)<sup>6</sup>. This demonstrates how well environmental accounting fits within the functionalist paradigm; it provides the services and direction that the supersystem needs in order to survive, given that it has already been established that there is a need for environmental accounting, management and reporting systems. Environmental accounting is concerned with the survival of the whole in a rational, pragmatic and non-partisan fashion. Also, because the functionalist paradigm is allied to open systems, it allows change without being radical/revolutionary. The "first functional pre-requisite [is] 'adaptation'" (Haralambos, M. and Holborn, M., 1993)<sup>7</sup> and "the concept of 'function' in functionalist analysis refers to the contribution of the part to the whole" (Haralambos, M. and Holborn, M., 1993)<sup>8</sup>.

It should also be explained that "conflict theories differ from functionalism in stressing the existence of competing groups while functionalists stress cooperation.." (Haralambos, M. and Holborn, M., 1993)<sup>9</sup>. In as much as environmental effects permeate many aspects of business, in order to establish an environmental accounting and reporting system, the cooperation of all systems/departments within the organisation is essential. Effectively, the functionalist paradigm "is a perspective which is highly pragmatic in orientation,...It is often problem-orientated in approach, concerned to provide practical solutions to practical problems" (Burrell, G. and Morgan, G., 1994)<sup>10</sup>. The functionalist paradigm offers a purposive rationale of how

organisations can best accommodate the inevitable march of the greening process.

### **4.3 METHODOLOGY**

The methods adopted for the research were based on both the statistical and qualitative methodologies. Although accounting aspects of the research were predominantly monetary and quantitative, some aspects of the environmental information, such as environmental policies, were qualitative and it was therefore necessary to use both methods.

The research involved a literature review and two studies. The literature review and the pilot study left a number of issues unresolved and established the direction the main study would follow. In particular, the following issues had to be investigated.

- 1) Whether environmental accounting and reporting are practised in depth (i.e. beyond the qualitative stage), in which case it can be shown that the accounting craft can handle environmental effects.
- 2) Whether there is a medium for publishing environmental information, which is commonly used.
- 3) Whether there are clear and definite reasons why companies publish or do not publish environmental information.
- 4) Whether companies attach any significance to environmental protection (in relation to other company objectives).

#### **4.3.1 Pilot study**

The pilot study comprised the examination of the Annual Reports and Accounts of exactly 100 UK companies, in order to ascertain how companies were responding to environmental concern. This work was carried out at the end of 1992 and, although the results now appear dated, at the time they were novel and pertinent.

There was not as much written then on the subject, as evidenced by the fact that experimentation and research was called for (see, for example, Owen, D. (ed) 1992<sup>11</sup> and Macve, R., and Carey, A. (eds), 1992<sup>12</sup>). The pilot study was, therefore, important from the point of view of the approach and process of the research.

#### **4.3.1.1 Method**

It is appreciated that the methodology used might not have captured the entire scope of developments in this area. It is also recognised that there were a number of limitations to the pilot study. Firstly, no statistical sampling techniques were used. However, the number of accounts examined was large and it facilitated the classification of the accounts by industry. Secondly, the periods covered by the accounts straddled more than one calendar year and the results from this analysis do not relate to a specific point in time. Since the aim of the pilot study was to discover what was done, irrespective of when, this limitation does not affect the outcome of the study. Thirdly, the extent of the companies' environmental policies/practices was not taken into consideration when classifying them between having and not having environmental policies. Therefore, any company which merely mentioned its concern for the environment was classified as a "Yes". As a consequence, the "Yes" result might have been exaggerated.

Despite the above limitations, the outcome from the examination of the accounts should give an approximation of the level of environmental concern by UK companies.

#### **4.3.1.2 Results**

As already intimated the disclosure of environmental policies and practices varied in length. Some comprised just a few words whilst others covered over 30 pages. In fact there were only a few which appeared to be comprehensive and well

presented. In particular, the following were among the best:

- a) Blue Circle: It covered four pages and dealt with various aspects separately, for example, legislation, emissions into the atmosphere, energy, waste management, and packaging.
- b) Beazer: It actually quantified and disclosed the amount spent (US \$23 million) on what it called "environmental remediation".
- c) Pilkington: The environment was not only covered in the Director's Report but it was also dealt with separately in a four page booklet with photographs.
- d) British Gas: Again this company provided a separate booklet of 32 pages, entitled: "Environmental Review 1991".

The information provided by companies was very selective and public-related. Companies are becoming aware of the advantages to be gained by projecting an environmentally friendly image.

The Annual Report and Accounts are summarised (see Appendix E) by category of trade/business. The "Yes" responses were evaluated in terms of turnover because size plays an important part in environmental concern. The larger the company, the more likely it is that it will establish and adopt environmental policies and practices. The summary below shows that companies in the Oil and Gas, Chemicals / Pharmaceuticals and Water industries are ahead in the league table with 100% compliance, followed by the Building/Construction industries with 97%. Their high compliance is evidence of the susceptibility of their business to suffer/cause environmental damage.

## Summary of Published Accounts

Category	Yes%	Turnover		Total
		Yes	No	
A.Oil and Gas	99.7	106,092	362	106,454
B.Chemicals/ Pharmaceuticals	100.0	53,741	-	53,741
C.Building/Construction	97.1	22,464	679	23,143
D.Food/Drink	71.5	43,551	17,366	60,917
E.Industrial/Engineering	58.6	30,643	21,609	52,252
F.Paper/Books	76.6	5,355	1,631	6,986
G.Water	100.0	1,573	-	1,573
H.Miscellaneous	52.1	44,551	41,024	85,575
	78.8%	307,970	82,671	390,641

The conclusions to be drawn from the pilot study are:

- i) There is no standard/uniform/recognisable method of disclosure.
- ii) As a result of (i) few companies disclose enough or the right information.
- iii) Companies whose businesses contribute most to environmental destruction respond better to calls for environmental concern.
- iv) Most of the companies have realized that environmental concern is a major issue.
- v) As a result of (iv) there is an element of public relations exercise involved.

### 4.3.2 Main study

The main study was carried out using a cross-sectional corporate survey methodology. The aim of the design was to establish and assess the need for, and level of use of, environmental accounting and disclosures. The variables used to test the hypothesis were of a qualitative and quantitative nature.

The survey instrument chosen for the study was the postal questionnaire. The organisation of this section follows the procedures used for the construction and use of the questionnaire. In particular, it deals with the design, the variables which

were used, and the safeguards for ensuring validity and reliability. The question of "demand effect bias" was also addressed before the questionnaire was pilot tested. Finally, the sampling rationale and administration are explained.

#### **4.3.2.1 Questionnaire and design**

The questionnaire, which is reproduced as Appendix B, was designed to establish how, and the extent to which, companies account for environmental concern, and to gather as much relevant information as possible. The construction and content of the questionnaire was influenced by the information gleaned from the research undertaken so far. In particular, it drew from the results of the pilot study, the literature on social accounting and the need to answer the research questions and test the research hypotheses. The questionnaire was based along these two themes, i.e. to elucidate information about the state of, and demand for, environmental accounting and the extent and method of disclosure.

##### **4.3.2.1.1 Questionnaire design**

The choice of postal questionnaire was made on economic and practical grounds. The postal questionnaire is a relatively cheap survey method for soliciting information. This was especially important because of the widely spread geographical location of the companies which were approached. The other reason why a mail questionnaire was chosen was that it is highly structured and each participant is asked identical questions which could be easily analysed. In addition, the respondents have time to deal with the answers and they can refer to their records if necessary. The inherent weakness of such a questionnaire (i.e. that it suffers from rigidity and lack of verbal explanation in the case of misunderstandings by respondents) was minimized at the design stage, through clarity and simplicity.

The questions were kept short and simple, and technical terms were kept to the



minimum. The appearance of the questionnaire was made as attractive as possible. Also, the flow and sequence of questions were designed both to be interesting and requiring the minimum of effort to complete. For example Likert scales were used, and predetermined sets of answers were provided which could be answered with a simple tick or a circle. Furthermore, the questionnaire was pilot tested thoroughly in order to discover any hidden weaknesses. To facilitate computer analysis the questions and responses were numbered and coded. The questionnaire was designed to capture accurate data and to facilitate its analysis.

#### **4.3.2.1.2 Variables, objectives and hypotheses**

The construction and content of the questionnaire were dictated by its objectives. In order to achieve these, the variables used were thoroughly researched and grouped together to create a picture of what and how environmental accounting and disclosures are undertaken (by companies) now, and will be in the near future. The evidence collected will be used to test the hypotheses and to construct a model for the reporting of environmental accounting data and other information.

On a theoretical level, the hypothesis asserts that there is a relationship between concepts (i.e. the formulation of abstract notions of the state of environmental accounting disclosures). And on an operational level the hypothesis asserts that there is a relationship between the variables and the amount of environmental accounting/disclosures. It would follow that the solution to questions of how to convey and measure concepts is found in variables; this stage is known as operationalization.

A variable is any phenomenon which is the subject of a study; it can vary in size, length, amount or any other quantity (see Tesch, R., 1990).<sup>13</sup> The questionnaire is made up of a series of questions or statements, and each one is a variable designed

to measure a concept. Variables may have attributes, e.g. a position on a Likert scale, or a description, such as "Group/parent company". Because variables are measurable they are an accepted method for testing hypotheses. Once the variables have been established the research moves from the theoretical stage to the empirical and measurable level (Dixon, B.R., *et al.*, 1987).<sup>14</sup> At the analysis stage, by grouping variables it is possible to obtain conclusions about sections or the whole theme.

#### **4.3.2.1.3 Validity and reliability**

The choice of variables has a bearing on the validity of the results and as such their selection was designed to fit the concepts accurately. For example, in order to test the hypothesis that environmental accounting disclosures are on the increase, question 11(b) was introduced into the questionnaire. Respondents were asked to assess their company's volume of disclosure "by the end of the next five years".

Once the variables were selected, an appropriate method of measuring them had to be found. The choices were by "interview", "observation" or "questionnaire". After considering the practical aspects of each method, it was decided that the most appropriate method was the questionnaire. A fundamental requirement of a measuring device is that it must be reliable to produce accurate results, and that when repeated it will produce the same results. Both the design and procedures relating to the questionnaire were designed to fulfil this.

#### **4.3.2.1.4 Qualitative and quantitative considerations**

Since environmental accounting and disclosures cover both qualitative and quantitative information it was important at the design stage to ensure that the questionnaire covered both types. "Qualitative data, for better or worse, now means any data that are not quantitative, i.e. qualitative data are all data that cannot be expressed in numbers" (Tesch, R., 1990).<sup>15</sup> Quantitative data lend themselves to a

great degree of precision and no deduction as to their meaning is required. In contrast, qualitative data can be manipulated in a variety of ways and "the procedures are neither scientific nor mechanistic; qualitative analysis is intellectual craftsmanship" (Mills, C.W., 1959).<sup>16</sup>

Knowing the characteristics of both types of data is very important, both at the design stage of the questionnaire (for capturing the data), and at the analysis stage. For example, where quantitative data is involved, a multivariate framework is required; this requirement was taken into account when preparing the questionnaire.

#### **4.3.2.1.5 Demand effect bias**

Concern about bias stems from the fact that the subject is aware that he/she is making a contribution to the research, and this knowledge may affect his/her response. For instance, he/she may treat the issue as mere research (detached from the real world) or may be inclined to help the researcher. The assumption is that "subjects may identify the hypothesis related to one or more factors and then respond cooperatively" (Knapp, M., 1987).<sup>17</sup>

According to A. Schepanski *et al.*, (1992) the "first to voice concern about within-subjects designs in behavioral accounting was Libby, R." (1979)<sup>18</sup> who stated that the "major cost ...is the sensitization of subject to the experimenters' manipulations...".<sup>19</sup> Schepanski *et al.* added that "this often results in what is called "experimental demand", where knowledge of the manipulation allows the subject to uncover the experimenter's hypothesis and to behave accordingly ..."<sup>20</sup>.

It was important to recognise and address this problem, firstly, at the questionnaire design stage and later, at the analysis stage. In addition, the possibility of a bias

which might be hidden by non-responses was considered at the analysis stage. At the questionnaire design stage the following safeguards were introduced:

- (1) To ensure that there were no ambiguities and that no artificial opinions could be created or implied by the questions. For instance, question 13 states clearly what it proposes to establish.
- (2) To avoid questions, which prevent the suggestion of desired answers and not make the respondents feel guilty by giving an unwanted answer.
- (3) To avoid forming a favourable or unfavourable answer, the options of "No such plans"; "Not applicable"; and "Other methods" were used in the questionnaire.
- (4) At the pilot testing stage to examine the possibility of "demand effect bias"

These aspects of the research method are mentioned in order to demonstrate that they were addressed at the design and analysis stage and that no problems should arise to invalidate the research. Although "demand effect bias" is an inherent risk in questionnaire research, it is not irremediable.

#### **4.3.2.1.6 Pilot testing**

Once the questionnaire was completed it was pilot tested in order to ensure it was working as planned. Twelve questionnaires were sent out and eleven completed replies received. The subjects were selected because of their accountancy or other relevant expertise. The majority were either qualified accountants or had university degrees in accounting. Their intellectual ability, training and familiarity with the topic was considered suitable for this research. Specifically, they can be categorised as follows:

Practising accountants	4
Accountants in industry and non-profit making organisations	3
Conductors of questionnaire surveys	2
Others (graduates)	2
	—
Total	<u>11</u>

All the replies were carefully examined and some were discussed personally with the respondents, where queries/problems were highlighted. The two subjects who conduct surveys provided valuable information and advice on design and presentation. The responses and problems relating to individual questions were considered and the questionnaire was assessed as a whole.

#### **4.3.2.1.7 Sampling rationale**

Sampling is one of the most important aspects of conducting questionnaire surveys. It would be reasonable to assume that if one had to guarantee the representative accuracy of a survey one would have to obtain responses from the entire population. Realistically, it is not possible to survey the entire population (unless a census is taken) and, therefore, it is necessary to resort to sampling. It is possible through sampling to draw conclusions, which represent as closely as possible those of the entire population. The term "population" is used to describe the total number of subjects which are being studied and a sample represents the actual number of subjects which have been chosen for examination.

The determination of the sample is crucial in surveys. There are no hard and fast rules for establishing sample size, but general guidelines, which are based on a number of factors as noted below. On the one hand, there is the risk that if the number of subjects selected is too small, it will not be possible to draw meaningful

conclusions and thus to support the hypothesis which may be true but unproven. On the other hand, there is the issue of cost, time and effort which dictate that the smallest sample which can generate acceptable results should be used.

Somewhere between these two extremes lies the ideal sample size, which is acceptable on both statistical and economic grounds. One must draw the line between absolute accuracy and unlimited cost. There are cases where a larger sample is necessary in order to detect any special effects in the population; for example, where the population is not homogeneous.

Dixon, B.R., *et al.*, (1987) suggest that the sample sizes for students can be subjected to several basic compromises because the important thing is to learn basic skills and a sample of "about thirty individuals [is] required in order to provide a pool large enough for ...analyses"<sup>21</sup>. However Rudestam, K.E. and Newton, R.R., (1992) state that "students and their committees frequently rely on general rules of thumb to determine the appropriate number of subjects"<sup>22</sup>.

In view of the above, in determining the sample size for this research it was essential to ensure that the total replies should not be less than 30. Because of the low response rates obtained by postal questionnaires (see Gadsden, R.J. and Quincey, R.W., 1989)<sup>23</sup> a sample of 225 was used. In the event, the actual useable responses received were 42, which comfortably exceeded the basic minimum of thirty.

The identification of the population from which the sample was drawn was based on the evidence found in relevant literature (see, for example, Belkaoui, A. and Karpik, P.G., 1989;<sup>24</sup> Cowen, S.S. *et al.*, 1987)<sup>25</sup> and the pilot study, which indicated that the size of the companies was a determining factor in adopting environmental

policies and practices. It was therefore decided to survey 100% of the top UK companies as listed in the official FT-SE 100 list, and 50% of the companies found in the FT-SE Mid 250 Constituent List. A systematic sampling procedure was used for the FT-SE Mid 250 population, which involved the selection of the first or second company by the toss of a coin, and then every other company thereafter.

#### **4.3.2.1.8 Administration**

In order to encourage subjects to respond, a business reply envelope was enclosed and as a further inducement, subjects were offered a copy of the summary of the results. A typed transmittal letter was issued on the University's headed paper and the addresses on the envelopes were also typed.

The names and addresses of the companies concerned were found in the "Stock Exchange Official Year Book" 1993/1994 and "Key British Enterprises", 1994, Volumes 1 to 3 were also used, in some cases. Where the names of the Finance Directors were shown in these two reference books, they were used, otherwise, the letters and envelopes were simply addressed to the Finance Director. Since this is in essence an accounting questionnaire, albeit environmental in outlook, it was felt that the Finance Director would be the most likely official of the company capable of dealing with it. In any event, the second paragraph of page one of the questionnaire stated that if the recipient thought that the questions could be better answered by someone else in the company, then he/she should pass it on to that person to deal with. The questionnaire was mailed in May 1994 and reminder letters were sent out four weeks later, in early June, 1994.

The various methods of collecting information were considered before concluding that the postal questionnaire was the most appropriate for this study. Each aspect of the questionnaire design was then examined in turn, paying particular attention

to clarity, content and completeness. This section dealt with the method of the main study and as such it was designed to produce information which is relevant, reliable and conducive to computer manipulation, interpretation and analysis.

Questionnaire design is probably the most important aspect of the main study, because the success of the analysis and conclusions that follow rests entirely on the outcome of the questionnaire.

#### **4.4 RESEARCH AIMS**

The literature review which was carried out focused firstly, on the problem itself (i.e. environmental degradation) and secondly, on its repercussions on accounting and reporting. Both aspects had to be examined in order to, *inter alia*, design the questionnaire for the main study. As shown, the causes of environmental degradation arise from the effects of manufacturing processes, over-consumption and over-exploitation of natural resources. These result in unsustainable use of resources and cause harmful externalities and wastes, which are dumped into the atmosphere, land and sea.

With regard to the effect on accounting, the literature review showed that accounting has so far failed to grapple with environmental accounting and reporting and it has come under severe criticism. This criticism is understandable because, despite the general increase in awareness in environmental problems, the influence exerted by various pressure groups, and the green investment movement, the accountancy profession has not yet demonstrated that it has grasped the significance of these developments. In particular, no environmental accounting and reporting standards or model has yet been developed. Because there are no standards and no audit is required the publication of environmental information is haphazard and manipulated (as postulated by the radical accounting paradigm) and used mainly



for public relation purposes. The literature review also identified the difficulties relating to environmental accounting problems, which relate mainly to quantification and evaluation. The information obtained from the literature review will be used in conjunction with the results of the studies to formulate a theoretical environmental reporting model.

This lack of clarity prompted the need and direction of this investigation i.e. to carry out a comprehensive examination of the role of accounting and its ability to handle environmental effects. Specifically, it embraces the identification, evaluation and recording of environmental effects for management and reporting purposes. In carrying out these tasks, accounting is providing information, in accordance with the functionalist paradigm, to enable management to make decisions, plan, control and evaluate their environmental performance and efficient use of resources.

Since the role of accounting in connection with environmental effects is new and still evolving, the identification of the issues, effects and accounting problems formed a major part of this investigation. Although this part of the research does not lend itself to testable hypotheses, other objectives of the research do and are dealt with below.

The information gleaned from the literature review was used to design the survey questionnaire for the main study of the research. The purpose of the questionnaire was to elucidate the role of accounting in handling environmental effects, the extent to which they are undertaken, and the method of their disclosure. In effect, the design and aim of the questionnaire was to obtain information in order to prove the testable research hypotheses. The more important research questions and hypotheses are noted/explained below; other, less important aspects are self evident from the questionnaire and the analyses of the results section of the thesis.

#### **4.4.1 Research questions**

It was stated in Chapter One that the purpose of the research is to identify ways of evaluating, recording and reporting the consequences of environmental effects. The questionnaire used in the survey required over 180 individual replies from the respondents. This section does not deal with individual questions but with the primary objectives of the questionnaire i.e. to provide answers to the main questions posed by the research. In addition to these main research questions, a number of sub-objectives were identified which are examined in the form of hypotheses in the next section.

Research question (1): What environmental accounting and recording techniques are being used?

The literature review provided a number of devices and methods which may be used. However, it was considered necessary to ascertain the latest techniques (since environmental accounting and reporting are still evolving) which are being used, and a number of relevant questions were included in the questionnaire.

Research question (2): Whether it is possible to integrate environmental data with financial information.

Since environmental information comprises a variety of data such as technical, scientific and financial, it was necessary to investigate whether such information can be integrated into a financial report, such as the Annual Report of companies, and if not, to develop a stand-alone environmental performance report in the form of a theoretical model.

Research question (3): Whether the pervasive and elusive effects of externalities can be evaluated and incorporated into the accounting and reporting system.

The general lack of concern by industry over its externalities is a major factor in

environmental problems and the study of the problem formed an important aspect/part of the research.

Research question (4): Whether it is possible for environmental accounting to provide information to facilitate the efficient use of environmental and other resources and thereby contribute to sustainability. Under this theme, environmental accounting, by providing the means for recording, measuring, analysing and reporting, can assist and enhance the efficient use of resources. The emphasis here is not on whether sustainability can be achieved but, on contributing towards management's efforts to achieve this.

#### **4.4.2 Research hypotheses**

General hypothesis (1): That environmental accounting is being undertaken.

According to the literature review, accounting has not yet grappled with environmental issues, and the manifestations of green accounting and reporting by corporations are nothing more than public relations "puffs". Therefore, in order to demonstrate that accounting can handle environmental effects it was assumed that environmental accounting is practised by some companies and there is a need for it. The hypothesis also implies that "time" is relevant to the subject. A question was, therefore, included in the questionnaire in order to establish when it was started or is likely to start. Time is relevant since environmental accounting and reporting involve a number of implementation stages, each of which takes considerable time. They begin with the adoption of environmental policies and end with the evaluation and publication of the relevant information. A number of variables were needed in order to test this hypothesis but the most relevant were in question 13 which dealt, specifically, with environmental accounting evaluations and disclosures. A comprehensive list of types of monetary evaluations was

included, in order to demonstrate whether environmental accounting *per se* was being carried out and the results disclosed. By identifying specific types of environmental costs/benefits the question of segregating environmental costs (which are as a rule embedded in normal costs) was addressed. Also question 13 dealt with environmental prudence and the reliability of the data by an audit.

General hypothesis (2): That accounting can be adapted to handle environmental accounting and the reporting of environmental effects.

This hypothesis could be inferred from number 1 but because it is central to the study it is stated separately. It assumes that if companies are already dealing with environmental accounting and reporting that would be *prima facie* evidence that accounting can be adapted to deal with environmental effects.

General hypothesis (3): The environmental accounting methods used by companies are: qualitative, quantitative and financial.

A comprehensive environmental accounting system would entail the use of all three methods. However, since some environmental effects do not lend themselves to all the evaluation methods the choice of method will depend on the type of effects e.g. some air emissions. Also the choice of the method will depend on whether the type of environmental problem in question is covered by regulation or law e.g. contingent liabilities.

General hypothesis (4): That environmental accounting information is published by some specific medium.

Questions 10 and 11 of the questionnaire were designed to demonstrate that only

certain mediums of disclosure are appropriate and possibly one would emerge as the preferred medium.

General hypothesis (5): The publication or lack of it is undertaken for specific reasons/audiences.

The reasons why companies do/do not publish their environmental information were listed in question 12. Although the prevailing view is that publication is undertaken for public relations reasons, there is in fact a genuine demand for environmental information by a number of interested parties e.g. investors, employees, customers and the public. This is why such information can be very sensitive to a company's trade and share prices. Also the influence that law and professional requirements have were considered important to this hypothesis and were therefore covered by question 12.

General hypothesis (6): Environmental accounting and reports are most likely undertaken by large companies.

Question 4 dealt with this hypothesis by requesting the amount of turnover.

General hypothesis (7): Environmental accounting and reporting are most likely undertaken by companies whose activities are environmentally sensitive.

Question 6 dealt with the industry sector of the respondents.

General hypothesis (8): Companies attach a level of importance to environmental protection which can be assessed and compared with other company objectives.

Question 7 was included in order to test this hypothesis.

#### **4.5 CONCLUSION**

This Chapter has set out the design and methods used to carry out the research. The conceptual framework which was developed highlighted the interactions of humankind's activities upon the environment and the inevitable need for environmental accounting and reporting system(s), which are required in order to firstly, enhance environmental management and secondly to provide information for other interested parties. The methods used were selected not only because they fit the studies, but also because they facilitate the aim of the studies. The conceptualization of accounting also demonstrated the functional role of accounting. It has been shown that accounting fits in well with the functionalist paradigm and it can influence developments in organizations through the interrelationship of systems and sub-systems.

The methods and procedures used to carry out the empirical studies were set out and their importance explained, because they can influence the validity and reliability of the results. Obviously, the planning, testing and the conduct of the studies were ascribed the same importance as the actual results of the studies.

In addition, the aims and objectives of the research were considered and the main research questions posed by the research were identified and explained. Similarly, a number of sub-objectives were identified and stated as general hypotheses for examination.

Finally, as pointed out in Section 1.4, certain limitations to the study have been acknowledged. In particular, because of time constraints the empirical studies were restricted to UK companies and the segregation and variety of environmental costs

were not investigated.

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## CHAPTER 5

### DATA ANALYSIS AND RESULTS OF THE SURVEY

#### 5.1 INTRODUCTION

This chapter considers the outcome of the questionnaire survey, firstly by analysing the data and secondly by evaluating the results. An environmental reporting model is also developed which brings together the findings from the survey and the results of the research in general. Section 5.2 deals with the analysis of the data which will form the basis for the evaluation of the validity and reliability of the questionnaire responses and the interpretation of the results. A number of tests and comparisons with other surveys were made and relevant statistical analyses carried out. The question of reliability of responses was considered at the questionnaire design stage and similar questions were included in the questionnaire to enable comparisons between the responses to be made.

The statistical analyses carried out include those which lead to the rejection of the null hypothesis. The null hypothesis states "that any statistical difference or association obtained will be the result of mere chance. If the result of an analysis falls outside the range which can reasonably be attributed to chance fluctuations then the result is said to be statistically significant and the null hypothesis is rejected. The conclusion in such a study would be that the effects are *not* merely the result of chance" (Neil Frude, 1987, p. 243/244)<sup>1</sup>. As a number of statistical terms are used in this analysis they have been conveniently summarised and listed in Table 5.1 for easy reference.

The salient features of the analysis are summarised in various charts and tables. The computer software used to analyse the questionnaire responses was the Statistical Package for Social Sciences (SPSS).

The analysis of the replies to the questions of the questionnaire is followed by the results. The purpose of the analysis was to convert 'raw' data into a meaningful state in order to test its reliability and to facilitate its interpretation so that conclusions may be drawn. Basically, the ultimate purpose of the analysis was to provide answers to the questions posed by this investigation. Namely, to discover the methods used and the extent to which environmental accounting is carried out; also to ascertain to what extent environmental accounting disclosures are made and the methods used for this. In brief, the results section looks at what corporations are doing, or not doing, as the case may be. For example, the methods of environmental accounting and reporting are evaluated and their effect on eco-efficiency is considered.

In section 5.4 a theoretical environmental reporting model is developed. The model demonstrates (i) that it is possible for accounting to handle environmental effects, and (ii) how a uniform method/standard could be achieved.

**Table 5.1 Statistical terms used**

ANOVA:	Analysis of variance (ANOVA) is an inferential statistical procedure which allows comparison of the means for a dependent variable of groups defined by the values of one or more independent variables.
Chi-squared test:	A statistical test which determines whether an observed pattern of results differs significantly from that which would be expected to occur merely by chance.
Correlation:	Correlation is the correspondence between two sets of paired measurements. The degree of correspondence between them is the correlation coefficient which varies from -1 for total negative correlation, 0 for no association and +1 for complete correspondence.
Degrees of freedom:	Degrees of freedom is the number of values within a data set which are free to vary e.g. if five items make a total of 30 and four are known, then the fifth can be calculated. The degrees of freedom in this case would be four. The "degrees of freedom" is shown in statistical data as its value influences/affects the value of the relevant statistic.
Dependent variable:	Dependent variable is a variable which is measured and an independent variable provides the conditions/states (e.g. levels of noise) by which the dependent variable is measured.
Eigenvalue:	Eigenvalue, used in factor analysis, is the standardised variance associated with a particular factor. The sum of the eigenvalues cannot exceed the number of variables in the analysis, since each variable contributes 1 to the sum of the variables. With factor analysis you can either retain all factors whose eigenvalues exceed a specified value (in this analysis 1), or retain a specific number of factors.
Factor analysis:	Factor analysis uses a correlation matrix to identify the underlying factors that explain the correlations among a set of variables. Its purpose is to summarise a large number of variables with a smaller number of factors.
Mean:	The arithmetic average. The sum of all scores divided by their number.
Median:	The mid score. The value which is midpoint, dividing the population into 50% below the median and 50% above the median.
Multivariate analysis:	The name given to any statistical technique which attempts to identify the component structure of complex data. An example of such analysis is factor analysis.
Null hypothesis:	The hypothesis that any statistical difference or association obtained will be the result of chance. If the result of an analysis falls outside the range which can reasonably be attributed to chance fluctuations, then that result is said to be statistically significant and the null hypothesis is therefore rejected. The conclusion in such a study would be that the effects are not merely the result of chance.
Standard deviation:	A measure of the spread or scatter of values around the mean. If the frequency of values for a variable conforms to a normal distribution then knowledge of the mean and standard deviation allows an estimate to be made of the percentage of cases whose values fall below or above any particular value for that variable.
Two-Tail Test:	A test for the significance of a difference between the means of two groups in a case in which the hypothesis has been cast in a non-directional form.

Source: *Neil Frude, A Guide to SPSS / PC+ (Macmillan Education Ltd) 1987 pp. 223-257*

## **5.2 DATA ANALYSIS**

### **5.2.1 Background information about the subjects**

Questions 1 to 6 of the questionnaire relate to background information about the subjects. All the replies received were from UK ultimate parent companies with a mean "age" of 67.9 years and 28% operated only in the U.K. Although "age" and "trade area" are not important they were included as easy questions to encourage response.

Because the size of companies is relevant for environmental practices and disclosures (see for example, Trotman, K.T. and Bradley, G.W., 1981<sup>2</sup>; Cowen, S.S., Ferreri, L.B. and Parker, L.D., 1987<sup>3</sup>; Gray, R., Owen, D. and Maunders, K.T., 1987<sup>4</sup>; Harte, G. and Owen, D., 1992<sup>5</sup>; Guthrie, J. and Parker, L.D., 1989<sup>6</sup>, 1990<sup>7</sup>; Gray, R., 1993<sup>8</sup>; Evans, D.E. and Warris, A-M., 1995<sup>9</sup>) it was also covered by question 4 in the questionnaire. This information was used to identify the largest companies for analysis purposes.

The other background information covered by the questionnaire was the "trading sector" of companies. As shown by the pilot study, and Deirkes, M. and Preston, L.R., 1977<sup>10</sup>, companies which are engaged in environmentally sensitive activities disclose more information and are more likely to respond to environmental pressures. Also, previous studies (see for example Belkaoui, A. and Karpik, P.G., 1989<sup>11</sup>; Cowen, S.S., Ferreri, L.B. and Parker, L.D., 1987<sup>3</sup>; Gray, R., 1994<sup>12</sup>) suggest that there is a link between socially responsible accounting and company size. In view of these considerations, the respondent companies were grouped by trade and size, in conducting some of the statistical analyses, as shown below. Group A includes the industries which are considered to be the most environmentally sensitive and Group B includes industries which are less environmentally sensitive.

<b>Group</b>	<b>Industry sector</b>
A	Chemicals / plastics Pharmaceuticals Oil and gas
B	Electricity Transport and distribution Water
C	All other
D	All with turnover > £4,000m

### **5.2.2 Non-response bias**

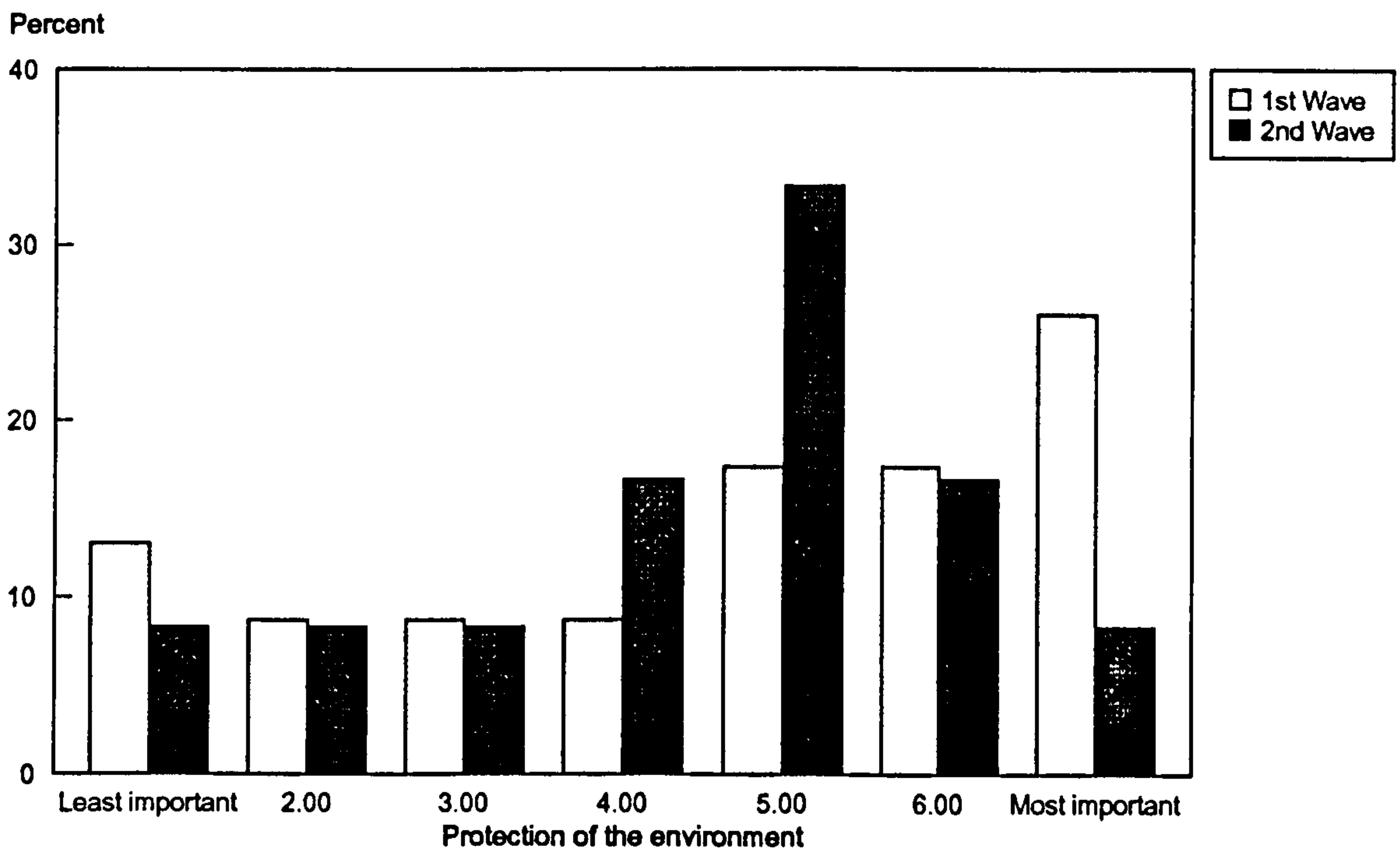
As mentioned in section 4.3.2.1.7 the response rate for postal questionnaires is low, but this is acceptable (see for example Bebbington, J. *et al.*, 1992,<sup>13</sup> De Villiers, C. *et al.*, 1995<sup>14</sup>). The actual response for this survey was 18.7% which is slightly better than the 18.1% response obtained by Bebbington, J. *et al.*, 1992. In view of the large number of unanswered questionnaires there was a need to consider the possibility of non-response bias. The method adopted for doing this was drawn from Wallace, R.S.O. and Cook, T.E., 1990<sup>15</sup>. Non-response bias arises where those who did not respond would have fallen into a different category (had they responded) than those who did respond.

The method of resolving this issue is to split responses into two (see, for example, Bebbington, J. *et al.*, 1992<sup>13</sup> and Helliard, C. *et al.*, 1996<sup>16</sup>) :the first "wave" of responses (i.e.. those who replied without a reminder) and the second "wave" (i.e.. those who replied to the reminder letter). The actual responses received were 26 for the first wave and 16 for the second. The argument for this method rests on the assumption that the second "wave" would have remained as non-responses if the reminder letters were not sent. Therefore, a comparison of the two "waves" of replies would reveal any non-response bias.

This test was applied to questions 7 and 8. Both questions were easy to respond to and more data was provided which made it possible to split the responses. Chi-square tests were carried out with the non-parametric and Pearson options of the relevant SPSS programme. Some of the chi-square results showed significant similarities between the two "waves" of responses but some did not.

Also Chart 5.1 shows considerable similarities between the responses of the two "waves" with regard to ranking of the Protection of the environment (question 7). A closer examination reveals that more of the "first wave" companies think that the protection of the environment is more important than the "second wave" companies and *vice versa*.

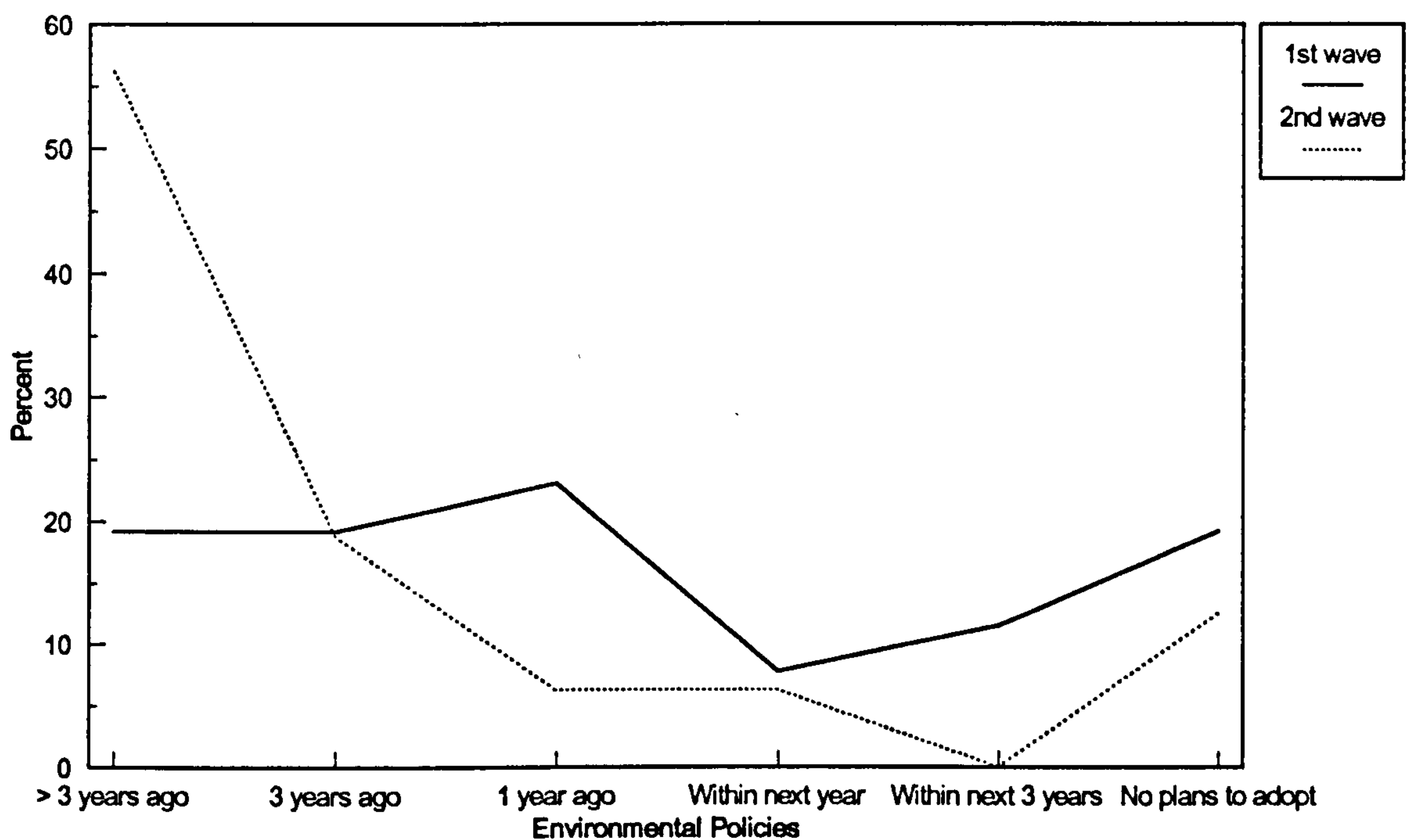
**Chart 5.1 First and second "wave" responses for the ranking of the protection of the environment**



The responses for the two waves in respect of environmental policies are depicted

in Chart 5.2. The responses show similar trends. But, at "over 3 years ago" the second wave companies were ahead in the adoption of environmental policies, and at the "3 years ago" stage they were identical. Since then the adoption of environmental policies by the "second wave" has been declining more than the first wave.

**Chart 5.2 First and second wave responses for the adoption of environmental policies**



The responses of the four Groups, mentioned earlier, were also compared. As shown in Chart 5.3, 57% of Group A (the sensitive companies) adopted environmental policies "over three years ago" whilst only 55% of Group B (the less sensitive companies) adopted them "over three years ago" and Group D (the largest companies) show 40% for the same period. Group C shows on average much lower percentages for adopting environmental policies and the highest percentage for "No plans to adopt". This demonstrates that both the sensitive and large companies were quick in responding to environmental concern. The graph also shows that after the initial enthusiasm the process has slowed down.



**Chart 5.3 Responses by the four Groups for the adoption of environmental policies**

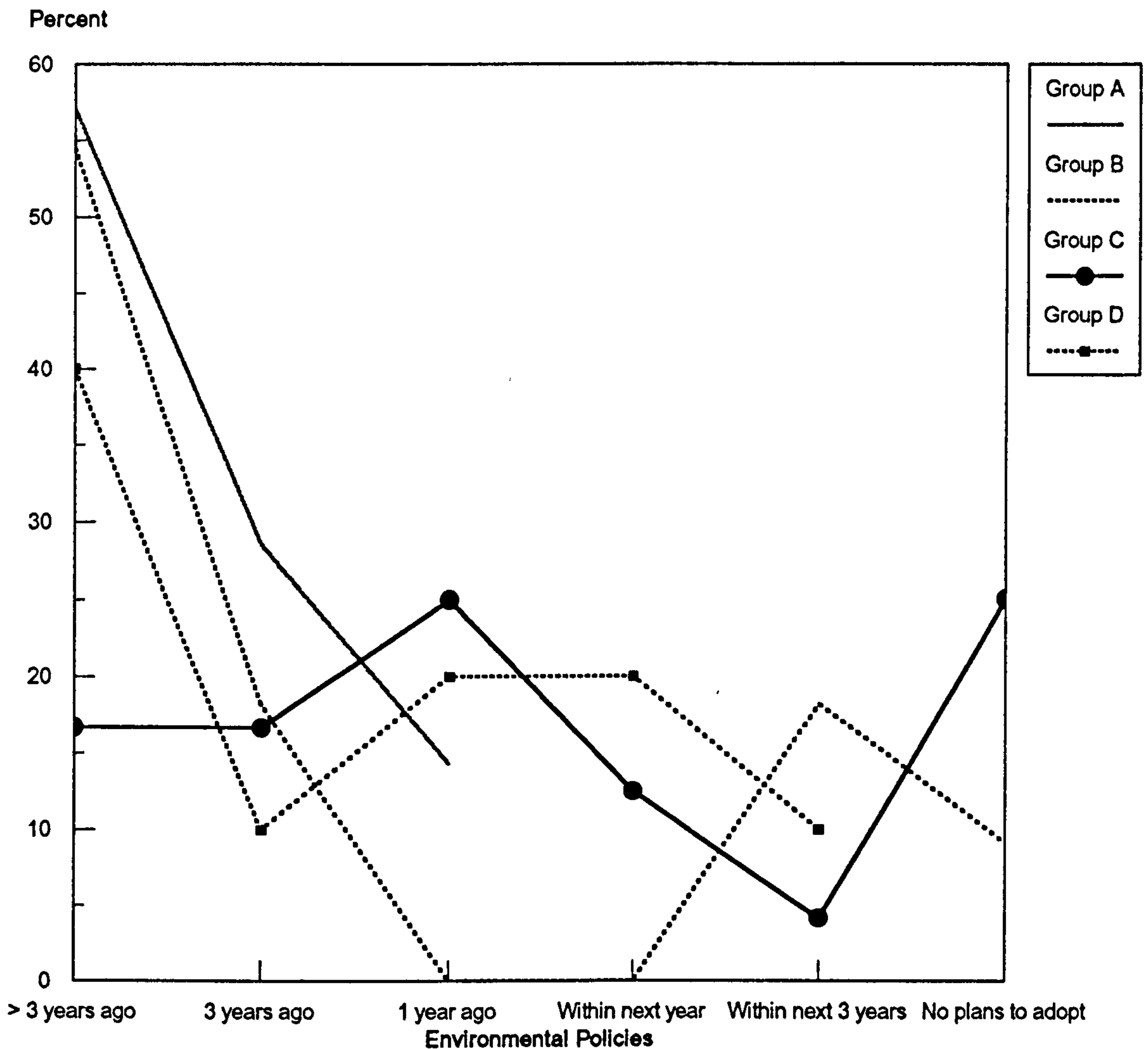
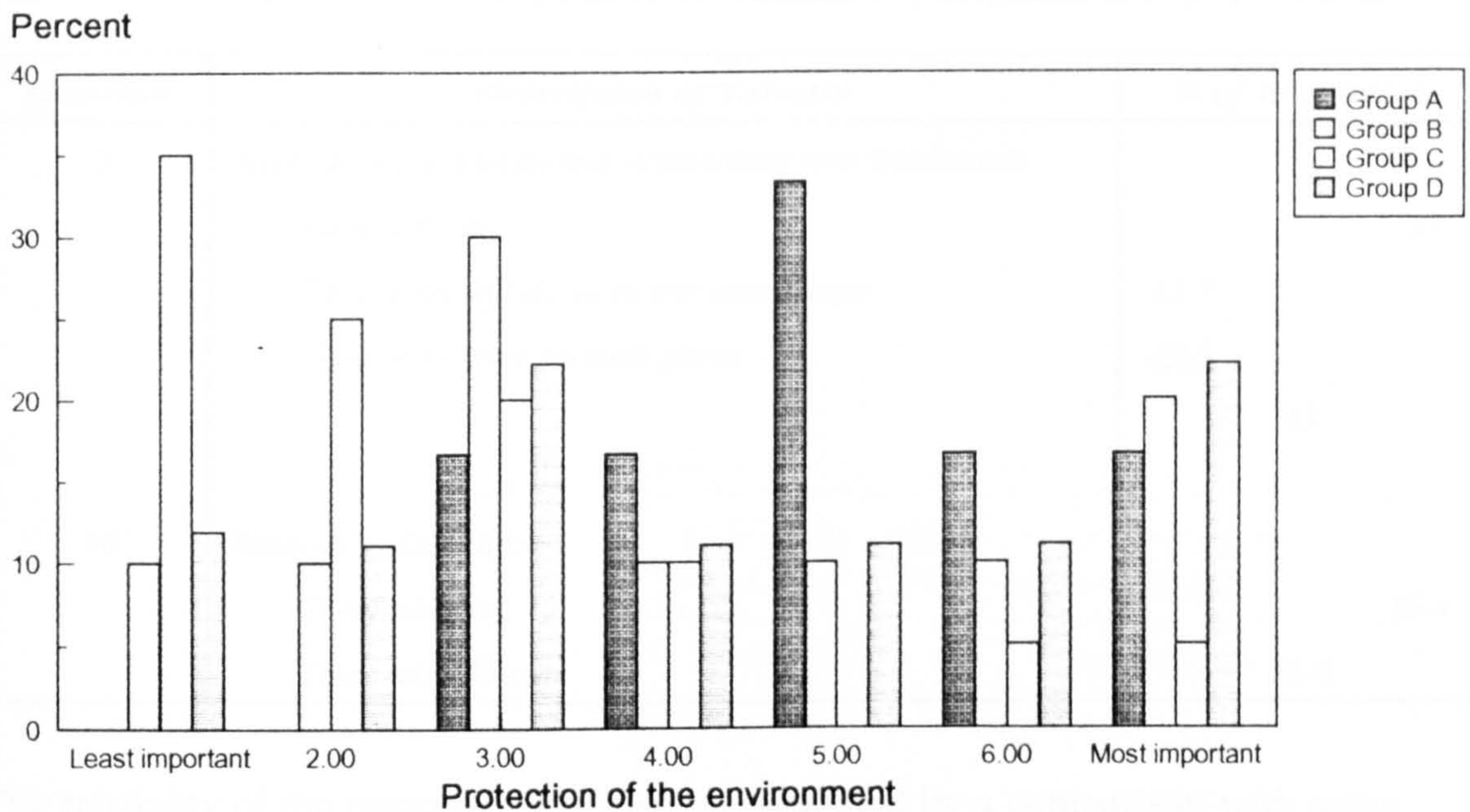


Chart 5.4 shows the ranking of the protection of the environment in relation to company objectives by the four groups. The graph shows some similarities between the groups, although the "level of importance" varies more significantly at the "least important" side of the scale and less at the other end of the scale. More significant is the fact that this chart shows the same trends as chart 5.3, i.e. the sensitive companies (Group A and B) and the large companies (Group D) are more prone to protecting the environment than the other companies (Group C).

Chart 5.4 Responses by the four Groups for the ranking of the protection of the environment



Also principal components factor analysis was carried out on the first and second wave of replies for the variable: the protection of the environment. In both cases three factors with eigenvalue greater than 1 were extracted, which accounted for 80.1% for the first wave and 72.7% for the second wave. This result reaffirms the outcome of the earlier analysis (see Chart 5.1) that the first wave had a higher "concern" for the protection of the environment which indicates a small amount of non-response bias.

### 5.2.3 Outside and within survey comparisons

Comparisons of responses between similar variables and comparisons with previous similar surveys will provide evidence that the responses, and therefore the results of the survey, are reliable. Table 5.2 shows the percentages of responses for two similar variables. It demonstrates that the responses to both parts of each question are very similar and therefore they generate a great deal of confidence in the

validity of the responses.

**Table 5.2 Comparison of responses to similar / complementary questions**

<i>Question</i>	<i>Description of Variable</i>	<i>% of Responses</i>
9	<i>Methods of Environmental Accounting and Disclosures:</i>	
	<i>Those who do</i>	57
	<i>Those who will do so in the near future</i>	13.7
	<i>Those who have no such plans</i>	<u>29.3</u>
		43
10	<i>Methods of Disclosure:</i>	
	<i>Those who do</i>	55.4
	<i>Those who do not</i>	44.6

The reliability of the responses was also strengthened by a comparison with some other surveys, in particular, the percentages of the responses to questions about environmental policy and disclosure in Annual Reports (see Chart 5.3a). Although there are variations between the percentage of this survey and those of other surveys they can be explained. The increase in the percentage for environmental policies reflects the cumulative effect of their adoption. This trend is supported by the continuing adoption of environmental policies shown by Chart 5.3. The reduction in the percentage for environmental disclosures in the Annual Reports is consistent with the results of this survey i.e. that the preferred medium of disclosure is now the separate booklet, as shown by Table 5.5 and Chart 5.5.

Table 5.3 Comparison with other surveys

a) Environmental policy and disclosure in Annual Report

<i>Survey</i>	<i>Year</i>	<i>Environmental Policy (%)</i>	<i>Disclosure in Annual Report (%)</i>
<i>Bain<sup>17</sup></i>	<i>1991</i>	<i>46</i>	<i>-</i>
<i>Bebbington et al<sup>13</sup></i>	<i>1992</i>	<i>56</i>	<i>39</i>
<i>This survey</i>	<i>1994</i>	<i>69</i>	<i>27</i>

b) Environmental accounting activity

<i>Environmental accounting activity</i>	<i>Currently doing (% of respondents) (Financial and non-financial)</i>	
	<i>This survey</i>	<i>Bebbington et al.</i>
<i>Energy use</i>	<i>38.3</i>	<i>51.0</i>
<i>Wastes</i>	<i>34.2</i>	<i>34.0</i>
<i>Land pollution</i>	<i>28.4</i>	<i>13.0</i>
<i>Regulation compliance</i>	<i>28.4</i>	<i>24.0</i>
<i>Contingent liabilities</i>	<i>26.3</i>	<i>15.0</i>
<i>Water pollution</i>	<i>23.7</i>	<i>18.0</i>
<i>Environmental cost budgeting</i>	<i>23.1</i>	<i>18.0</i>
<i>Recycling</i>	<i>21.1</i>	<i>17.0</i>
<i>Air pollution</i>	<i>20.5</i>	<i>15.0</i>
<i>Returnable containers</i>	<i>20.5</i>	<i>22.0</i>
<i>Remediation costs</i>	<i>19.7</i>	<i>13.0</i>
<i>Life-cycle analysis</i>	<i>8.1</i>	<i>8.0</i>
<i>Environmental sustainability</i>	<i>3.9</i>	<i>7.0</i>

With environmental accounting/reporting surveys it is inevitable that there would be some similarities with regard to content and source. The Bebbington, J. et al. questionnaire survey which was conducted in January/February 1992 (by Jan Bebbington, Rob Gray, Ian Thomson and Diane Walters, to be precise) sought to discover the views and involvement of accountants in environmental accounting.

Also the Bebbington questionnaire was issued to the top 1,000 companies (extracted from The Times) but this questionnaire survey was sent only to 225 (mainly top companies, as explained in Chapter 4 under "sampling rational"). The topics which were covered by both questionnaires were identified for comparison purposes and the relevant results are summarised in Table 5.3b.

With minor exceptions, the percentage of the responses of this survey are higher than those of Bebbington. This is consistent with firstly, the trend established by this survey i.e. that there is a continuing increase in the adoption and disclosure of environmental accounting policies and practices (see Chart 5.5 and 5.9) and secondly, the population used for this questionnaire was mainly large companies which are more likely to adopt environmental accounting than the smaller companies as evidenced by the literature review (see section 5.2.1).

Despite that, there were three topics which registered reductions. The smallest was in returnable containers. This function does not require any complex, sophisticated or new accounting techniques and therefore it is not the prerogative of large companies. More noticeable is the big drop in the accounting for "energy use". Again no sophisticated accounting techniques are needed for this and the above explanation would also apply to it.

The only other reduction relates to sustainable development and this does require a different (revolutionary, would probably be more precise) methodology. The reduction may be due to gradual and better understanding of the subject and the implications regarding its actual operationalization. Under this scenario companies would either abandon their attempts for sustainability or would reclassify them as not being strictly sustainable activities but merely resource efficient methods.

Because the questionnaires and the populations used were not identical, it is not possible to draw specific conclusions for each environmental accounting activity but the overall conclusion is that the evidence from Bebbington supports the relevant trends established by the survey.

Despite some similarities in the two questionnaires, the differences between them and the relevant works are far more pertinent. According to Gray, *et al.*, (1993)<sup>18</sup>, the Bebbington questionnaire was designed with a view to reaffirming their perceptions of a very low involvement of accountants and identify relevant reasons, whereas one of the aims of this questionnaire was to establish whether environmental accounting is done (and, consequently, prove that it can be done) irrespective of who does it.

The Bebbington questionnaire was used by Gray *et al.*, (1993)<sup>19</sup>. Major sections of that work elaborate on management information and accounting (on various aspects, such as, wastes, energy, investment budgeting and appraisal) and not on whether environmental accounting can be done or not. In fact, according to Gray *et al.*, (1993), environmental accounting is conditional on accounting changing "its most basic concepts and practices",<sup>20</sup> and towards the end of their book they state that "the very framework of conventional accounting will have to be rebuilt from scratch".<sup>21</sup>

This research focuses more on the use of accounting craft for the purpose of accounting and reporting environmental effects as opposed to: the areas to which it should be applied and the development of the accountants' role. This research demonstrates a more optimistic view regarding the application of the accounting craft to these issues and it does so *irrespective* of the areas to which it should be applied; in essence the areas of application are the means to the ends of this

research and not the other way around.

Finally, the question of bias in responses had to be taken into account "because of the tendency of individuals who are interested in a subject to respond to a questionnaire on that subject. Other individuals may be more inclined not to respond" (De Villiers, C., 1995).<sup>22</sup> After taking into account the outcome of other studies, and the analysis for non-response bias it can be concluded that the outcome of this study may overstate slightly the extent of environmental accounting and disclosures.

#### **5.2.4 Statistical analysis**

Before setting out the in-depth analyses of the data, it may be useful to explain some of the methods used in statistical analysis. Some statistics are merely summaries or descriptions of data. They may be, for example, means, medians or standard deviations. These types of statistics are known as "descriptive statistics". Other statistics make it possible for conclusions to be drawn, for example, whether there is an association between them. Because it is possible to draw inferences from such statistics, they are known as "inferential statistics". The Chi-square is such a statistic.

The criterion that a pattern or association exists is the 1 in 20 rule. Thus, if "the value obtained for the statistic is higher than would be expected to emerge by chance alone on 5 per cent (1 in 20) or fewer occasions then we infer that our value is not the result of chance but is likely to reflect a real effect (or pattern). We say that such a result is *significant*" (Frude, N., 1987).<sup>23</sup> The other inferential statistics which have been used in this analysis are: factor analyses, T tests, analysis of variance (ANOVA) and correlations.

#### **5.2.4.1 General analysis**

The main body of the questionnaire comprised questions 7 to 13 which dealt with environmental protection, accounting and disclosures. The first step in the analysis of these questions was their relative importance. This was done with non-parametric tests (which do not assume that data are distributed normally i.e. symmetrically) and the results (in the form of chi-square, degrees of freedom (DF) and level of significance) were shown in the computer printout but because it was eight pages long only a part is shown in Table 5.4. The chi-square was used to test the hypothesis that the variables (as categorised by their significance) are equally likely to arise in accordance with their level of probability. A probability represents the measure of uncertainty of the likely occurrence of an event/result. Probabilities can range from 0 to 1. A 0 probability indicates that the event/result is impossible to happen and a 1 indicates that the event is certain to happen. As explained in the preceding paragraph a chance of 5% or less (5% expressed as  $p < 0.05$ , 1% expressed as  $p < 0.01$  and so on) is treated as significant in statistical analysis. Because of the significance of probabilities of  $p < 0.05$ ,  $p < 0.01$  and  $p < 0.001$  they are marked with \*, \*\* and \*\*\* respectively in the following analyses for easy identification.



Table 5.4 Non-parametric test - relative significance of variables (Questions 7 to 13)

<b>Question Number</b>	<b>Variables -description</b>	<b>Cbl Square</b>	<b>D.F.</b>	<b>Significance</b>
<b>7</b>	<b>Company objectives</b>			
	<i>Fair business practices</i>	9.89	6	0.129
	<i>Human Resources</i>	13.67	5	0.017*
	<i>Protection of the Environment</i>	4.05	6	0.669
	<i>Profit Making</i>	41.38	6	0.000***
	<i>Energy Conservation/Efficiency</i>	21.94	6	0.001***
	<i>Community Involvement</i>	20.11	4	0.000***
	<i>Product Quality</i>	10.85	4	0.028*

\* significant  $p < .05$ ; \*\*\* significant  $p < .001$

### Publication/disclosure of environmental information (question 10)

The purpose of this question was to establish the most popular method and medium of disclosure. Table 5.5 shows the results of this analysis.

Table 5.5 Percentage of total responses for methods of disclosure

	<b>Qualitative / Unquantified</b>	<b>Quantified / Statistical</b>	<b>Financial</b>
<i>a) Dispersed in the Annual Report:</i>			
<i>% of total responses</i>	20.9%	3.3%	20.4%
<i>b) Special Chapter in Annual Report:</i>			
<i>% of total responses</i>	21.5%	3.3%	0.0%
<i>c) In special booklet:</i>			
<i>% of total responses</i>	31.6%	31.7%	20.4%
<i>d) None</i>			
<i>% of total responses</i>	21.5%	60.0%	59.2%
<i>e) Other method of disclosure</i>			
<i>% of total responses</i>	4.5%	1.7%	0.0%

Obviously the special booklet is the most popular method for disseminating environmental accounting information with respect to all types (i.e. qualitative / unquantified; quantified / statistical; financial). The second most popular method was the special chapter in Annual Reports. A number of "other" methods of disclosure were reported by some respondents and they are listed below:

<i>Qualitative/Unquantified</i>	<i>Quantified/Statistical</i>	<i>Financial</i>
<i>Presentations</i>	<i>Public registers</i>	-
<i>Progression given verbally at annual press lunch</i>	<i>Progression given verbally at annual press lunch</i>	<i>Progression given verbally at annual press lunch</i>
<i>Newsletter</i>	<i>Local site reporting</i>	-
<i>Employee review</i>	-	-

#### **Volume of disclosure (question 11)**

Chart 5.5 was prepared from the replies to question 11 and it also shows that the most popular method for disclosing environmental information is the "special booklet", followed by the "special chapter in Annual Reports". The result is the same for both with regard to the "latest financial year" and "by the end of the next five years." The only "other" method which was used/mentioned by the respondents was:

**Qualitative / Unquantified**

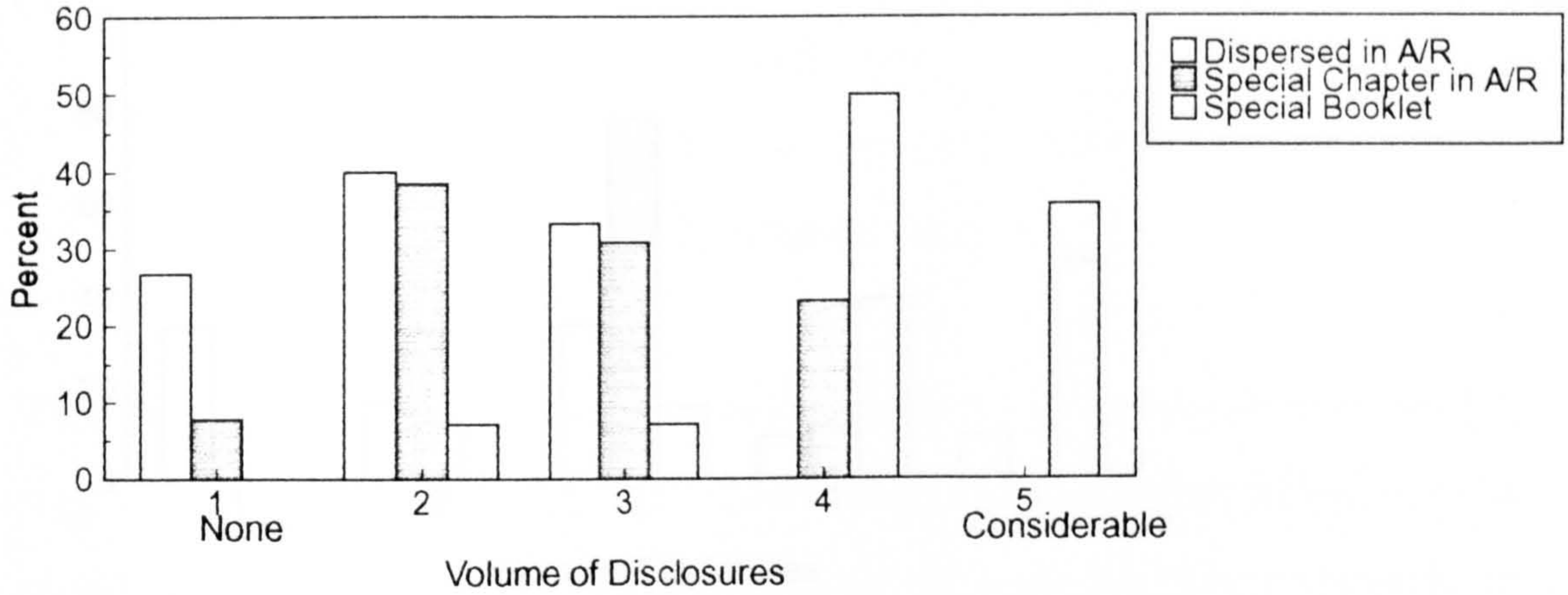
Site reports

**Quantified / Statistical**

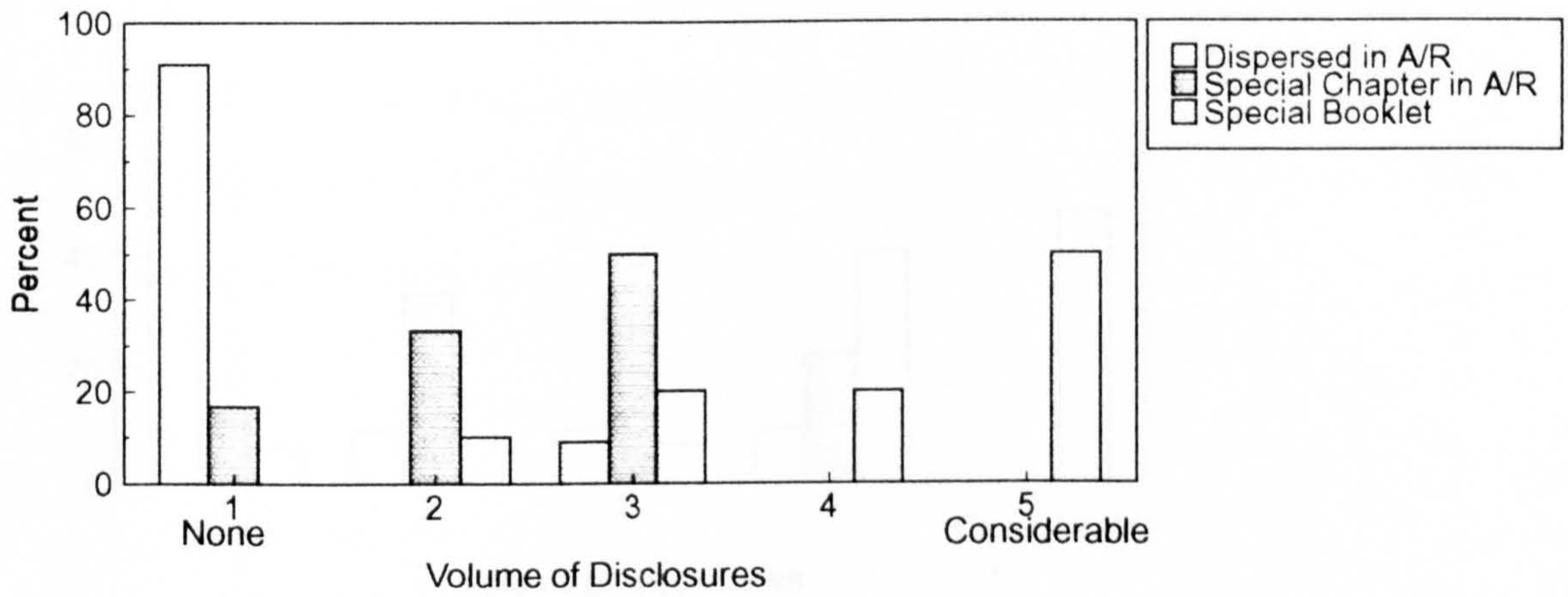
Site reports

Chart 5.5 a) **Volume of disclosures in "latest financial year" (showing percentage of total responses)**

i) Qualitative/Unquantified



ii) Quantified/Statistical



iii) Financial

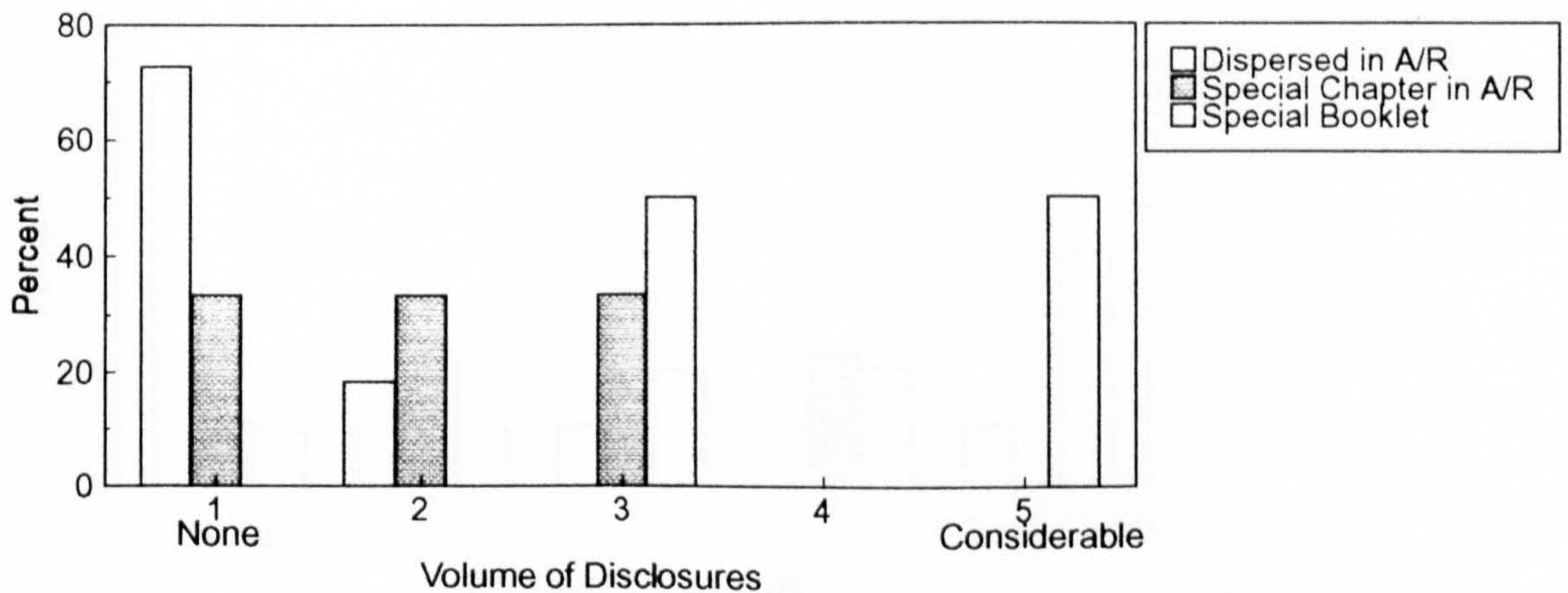
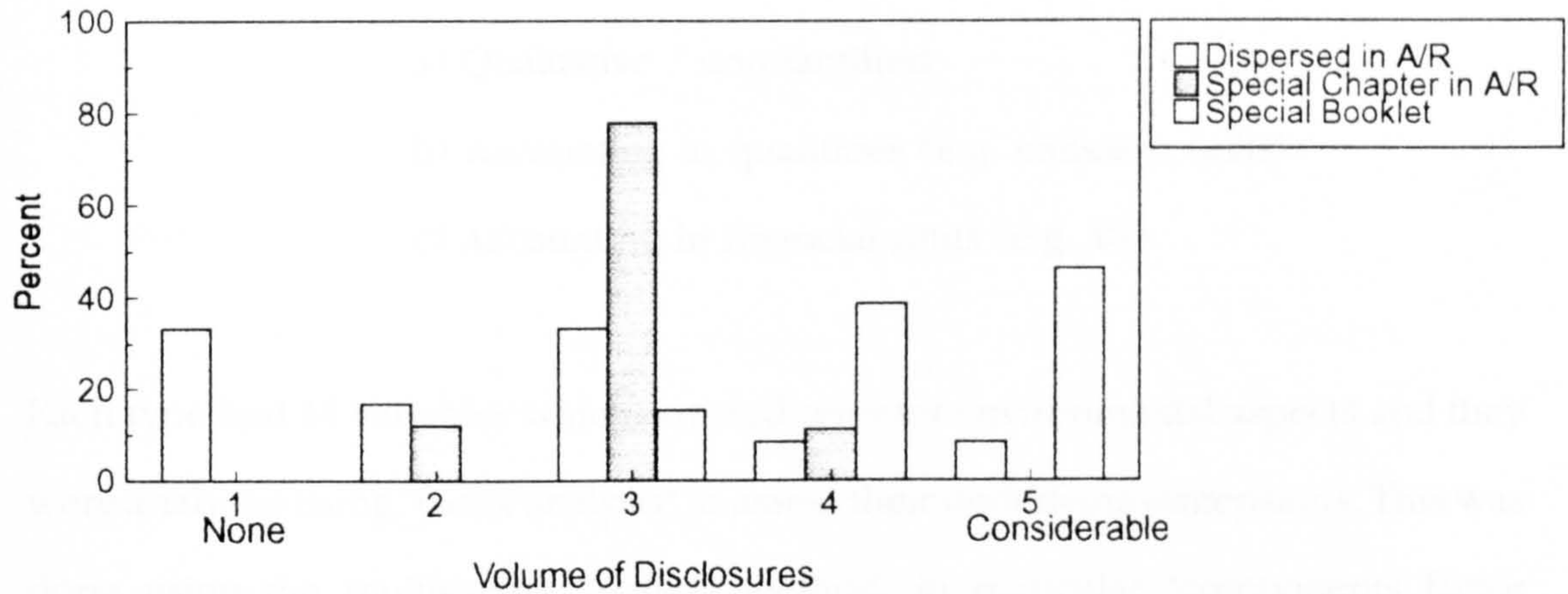
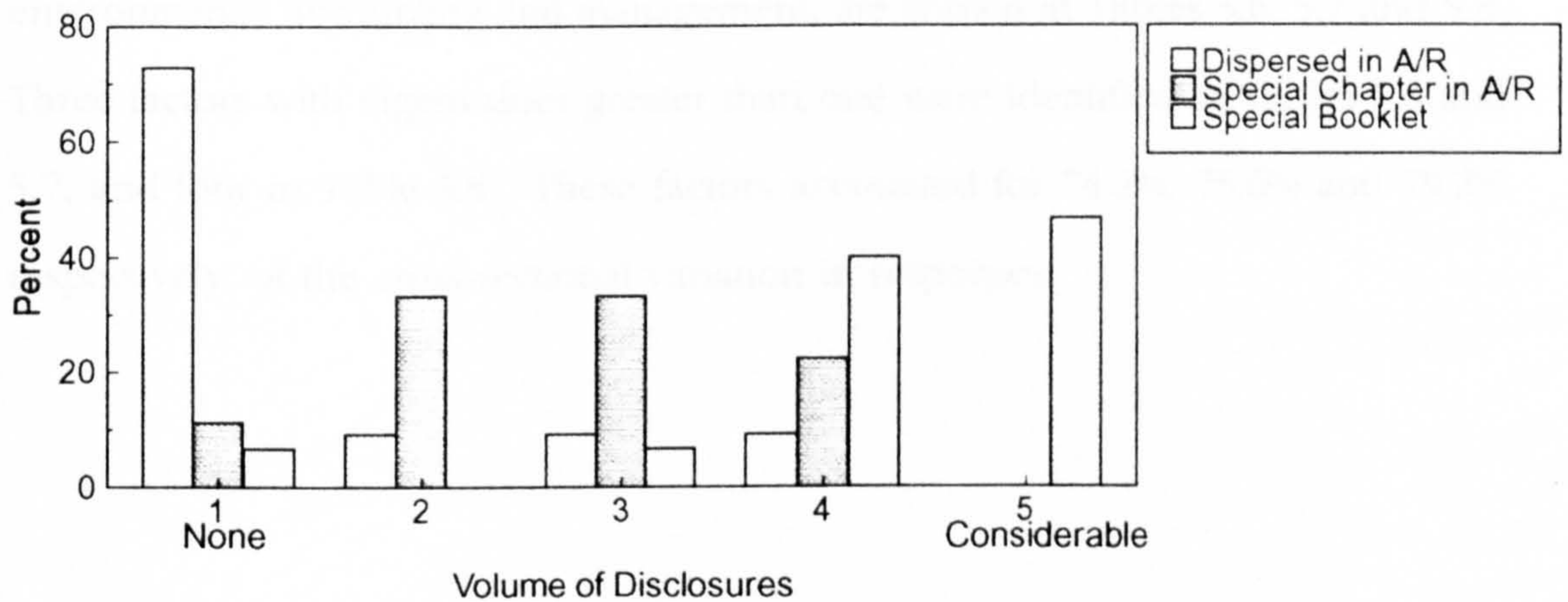


Chart 5.5 continued b) **Volume of disclosures "by the end of the next five years" (showing percentage of total responses)**

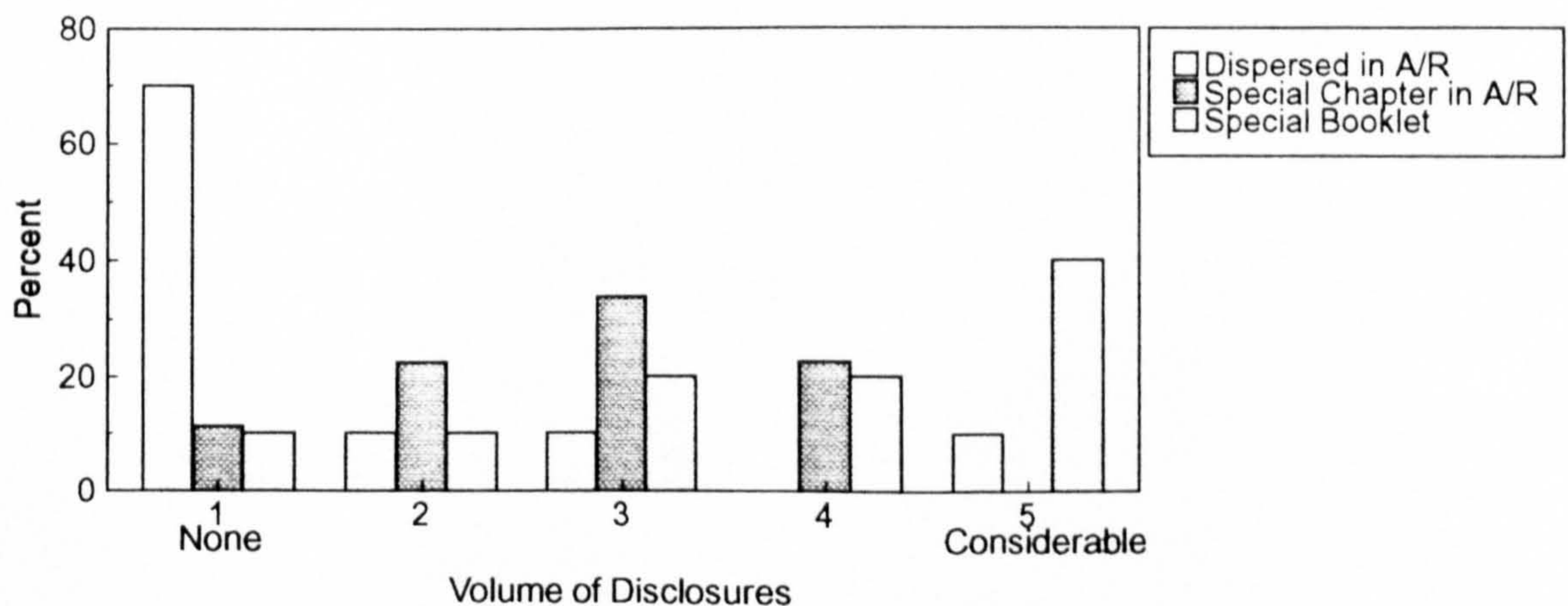
i) Qualitative/Unquantified



ii) Quantified/Statistical



iii) Financial



#### **5.2.4.2 Factor analysis**

##### **Methods of environmental accounting and management**

The variables of question 9 dealt with three methods of environmental accounting and management, namely:

- a) Qualitative / unquantified
- b) Accounting in quantities (e.g. emission units)
- c) Accounting in financial units (e.g. £'s)

Each type had 14 variables which covered relevant environmental aspects and they were analysed using "factor analysis" to assess their underlying dimensions. This was done using the multivariate analysis method; in particular "components factor analysis with varimax rotation". The results for each of the three methods of environmental accounting and management, are shown in Tables 5.6, 5.7 and 5.8. Three factors with eigenvalues greater than one were identified in Tables 5.6 and 5.7, and four in Table 5.8. These factors accounted for 74.2%, 75.6% and 79.2% respectively, of the cross-sectional variation in responses.

**Table 5.6 Factor analysis for the qualitative / unquantified method of environmental accounting and management**

Analysis number 1 Replacement of missing values with the mean

Extraction 1 for analysis 1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
Q9.1A	1.00000	*	1	8.12583	58.0	58.0
Q9.2A	1.00000	*	2	1.18713	8.5	66.5
Q9.3A	1.00000	*	3	1.06911	7.6	74.2
Q9.4A	1.00000	*	4	.83955	6.0	80.2
Q9.5A	1.00000	*	5	.72248	5.2	85.3
Q9.6A	1.00000	*	6	.56118	4.0	89.3
Q9.7A	1.00000	*	7	.38759	2.8	92.1
Q9.8A	1.00000	*	8	.29592	2.1	94.2
Q9.9A	1.00000	*	9	.20957	1.5	95.7
Q9.10A	1.00000	*	10	.19646	1.4	97.1
Q9.11A	1.00000	*	11	.16957	1.2	98.3
Q9.12A	1.00000	*	12	.11441	.8	99.1
Q9.13A	1.00000	*	13	.06602	.5	99.6
Q9.14A	1.00000	*	14	.05519	.4	100.0

PC extracted 3 factors.

VARIMAX rotation 1 for extraction 1 in analysis 1 - Kaiser Normalization.

**Table 5.7 Factor analysis for the accounting in quantities method of environmental accounting and management**

Analysis number 1 Replacement of missing values with the mean

Extraction 1 for analysis 1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
Q9.1B	1.00000	*	1	8.36877	59.8	59.8
Q9.2B	1.00000	*	2	1.20527	8.6	68.4
Q9.3B	1.00000	*	3	1.01406	7.2	75.6
Q9.4B	1.00000	*	4	.84892	6.1	81.7
Q9.5B	1.00000	*	5	.70777	5.1	86.7
Q9.6B	1.00000	*	6	.59353	4.2	91.0
Q9.7B	1.00000	*	7	.38768	2.8	93.8
Q9.8B	1.00000	*	8	.25235	1.8	95.6
Q9.9B	1.00000	*	9	.20569	1.5	97.0
Q9.10B	1.00000	*	10	.13420	1.0	98.0
Q9.11B	1.00000	*	11	.11167	.8	98.8
Q9.12B	1.00000	*	12	.08844	.6	99.4
Q9.13B	1.00000	*	13	.04963	.4	99.8
Q9.14B	1.00000	*	14	.03201	.2	100.0

PC extracted 3 factors.

VARIMAX rotation 1 for extraction 1 in analysis 1 - Kaiser Normalization.

**Table 5.8 Factor analysis for the accounting in financial units method of environmental accounting and management**

Analysis number 1 Replacement of missing values with the mean

Extraction 1 for analysis 1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
Q9.1C	1.00000	*	1	7.07599	50.5	50.5
Q9.2C	1.00000	*	2	1.67454	12.0	62.5
Q9.3C	1.00000	*	3	1.33481	9.5	72.0
Q9.4C	1.00000	*	4	1.00024	7.1	79.2
Q9.5C	1.00000	*	5	.80827	5.8	85.0
Q9.6C	1.00000	*	6	.55350	4.0	88.9
Q9.7C	1.00000	*	7	.44166	3.2	92.1
Q9.8C	1.00000	*	8	.38642	2.8	94.8
Q9.9C	1.00000	*	9	.28349	2.0	96.8
Q9.10C	1.00000	*	10	.14428	1.0	97.9
Q9.11C	1.00000	*	11	.12954	.9	98.8
Q9.12C	1.00000	*	12	.07712	.6	99.4
Q9.13C	1.00000	*	13	.05553	.4	99.8
Q9.14C	1.00000	*	14	.03460	.2	100.0

PC extracted 4 factors.

VARIMAX rotation 1 for extraction 1 in analysis 1 - Kaiser Normalization.

### **Types of environmental monetary evaluations and their disclosure**

For the purpose of factor analysis, the variables of question 13 were classified into the following three categories:

- 1) Profit and Loss - Environmental items
- 2) Balance Sheet - Environmental items
- 3) All other.



A number of factors with eigenvalues greater than 1 were identified, as shown below together with their cumulative percentage of variance.

Category	Number of factors	Cumulative % of variance
1	4	82.3
2	3	82.0
3	2	73.5

### **Factor comparability analysis with "split-halves"**

The identified factors were analysed further by using factor comparability analysis with a "split-halves" technique. The "split-half" method splits the scale, randomly, into two parts and calculates the correlation between them. The first half of the items form the first part, and the rest of the items forms the second part. It is necessary for the demonstration, that sets of data contain some common factors, should also be supported by evidence that they have been correctly extracted. In this instance, the identification of factor groupings from groups of responses can be further validated by the split-halves technique. The relevant variables and results of this analysis are shown in Table 5.9. Twenty three coefficients were returned by this test and they were all greater than .600. The probability was 0.000 which is highly significant ( $p < 0.001$ ).

**Table 5.9 Reliability analysis - scale (split)**

1.	Q7.1	Fair bus. practices
2.	Q7.2	Human resources
3.	Q7.3	Prot. of envrt.
4.	Q13.5IAA	Carry out Rev. Market growth eval. ?
5.	Q13.5IAB	Disclose Rev eval. market growth
6.	Q13.5IBA	Carry out mon eval't'n mrk decline
7.	Q13.5IBB	Disclose mon evl'n market decline
8.	Q13.62AA	Carry out b/s "Damages" evl'n
9.	Q13.62AB	Disclose b/s "Damage"evl'n
10.	Q13.62BA	Carry out "b/s "Fines" eval'n
11.	Q13.1A	Mon eval local dang
12.	Q13.1B	Disclose local damage
13.	Q13.2A	Carried out "global" damage ?
14.	Q9.1A	Air pol. qual/unqunt
15.	Q9.2A	Water pol- Qunt./Un
16.	Q9.3A	Land pol Qualt/Unqd
17.	Q9.1B	Air pol. in quantities
18.	Q9.2B	Water pol. a/g in quts
19.	Q9.3B	Land pol a/g in units
20.	Q9.1C	Air pol. in finc'l units
21.	Q9.2C	Water pol. finc'l units
22.	Q9.3C	Land pol a/g in finc'l
23.	Q9.4C	Wastes a/g in finc'l

**Analysis of Variance**

Source of Variation	Sum of Sq.	DF	Mean Square	Q	Prob.
Between People	34.4130	5	6.8826		
Within People	153.3913	132	1.1621		
Between Measures	73.9710	22	3.3623	63.6553	.0000
Residual	79.4203	110	.7220		
Total	187.8043	137	1.3708		
Grand Mean	2.8478				

Reliability Coefficients 23 items

Correlation between forms =	.6017	Equal length Spearman-Brown =	.7513
Guttman Split-half =	.7513	Unequal-length Spearman-Brown =	.7516
Alpha for part 1 =	.8865	Alpha for part 2 =	.7992
12 items in part 1		11 items in part 2	

**Reliability analysis - scale (Guttman)**

Another reliability analysis test was carried out using the Guttman reliability analysis, which can produce up to six coefficients, all of which are less than or equal to true reliability. The variables which have been identified so far as having the highest reliability were used in this test. The analysis produced five coefficients, all of which had values greater than .800 as shown in Table 5.10.

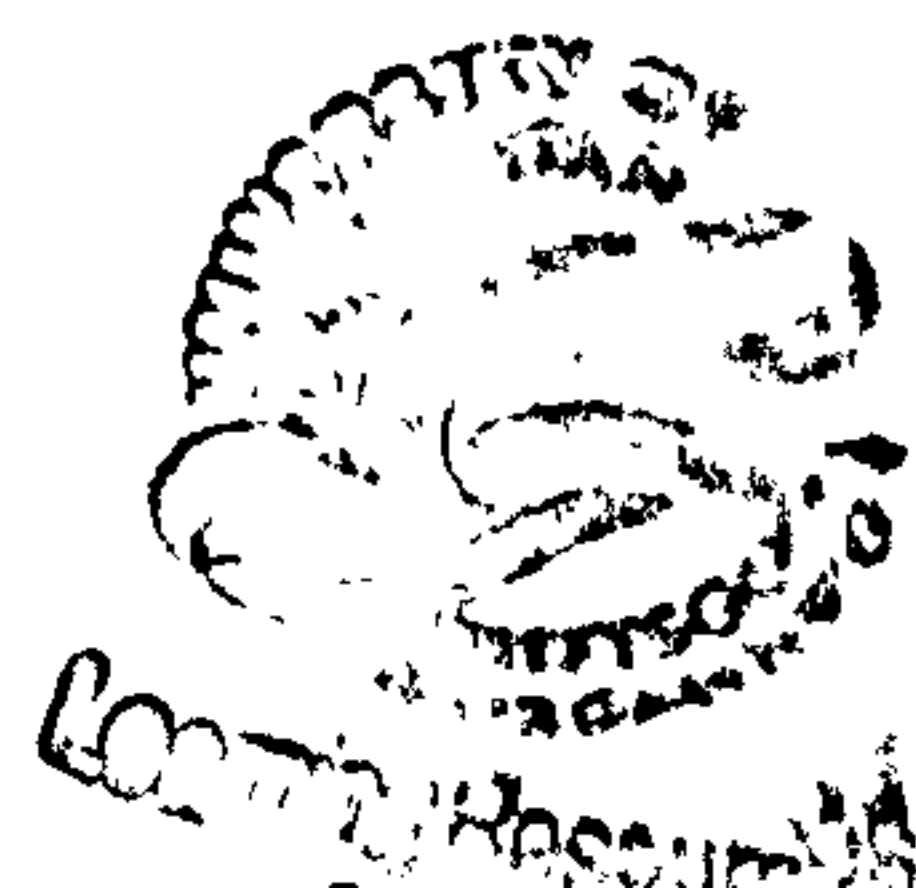


Table 5.10 Reasons for disclosing / not disclosing environmental information

RELIABILITY ANALYSIS - SCALE (GUTTMAN)

1.	Q7.1	Fair bus. practices
2.	Q7.2	Human resources
3.	Q7.3	Prot. of envrt.
4.	Q9.1A	Air pol. qual/unqunt
5.	Q9.2A	Water pol- Qunt./Un
6.	Q9.3A	Land pol Qualt/Unqd
7.	Q9.1B	Air pol. in quantities
8.	Q9.2B	Water pol. a/g in quts
9.	Q9.3B	Land pol a/g in units
10.	Q9.1C	Air pol. in finc'l units
11.	Q9.2C	Water pol. finc'l units
12.	Q9.3C	Land pol a/g in finc'l
13.	Q9.4C	Wastes a/g in finc'l
14.	Q13.1A	Mon eval local damg
15.	Q13.1B	Disclose local damge
16.	Q13.2A	Carried out "global" damage ?
17.	Q13.5IAA	Carry out Rev. Market growth eval. ?
18.	Q13.5IAB	Disclose Rev eval. market growth
19.	Q13.5IBA	Carry out mon evalt'n mrk decline
20.	Q13.5IBB	Disclose mon evl'n market decline
21.	Q13.62AA	Carry out b/s "Damages" evl'n
22.	Q13.62AB	Disclose b/s "Damage"evl'n
23.	Q13.62BA	Carry out "b/s "Fines" eval'n

\* \* \* Warning \* \* \* Determinant of matrix is zero

Statistics based on inverse matrix for scale GUTTMAN are meaningless and printed as .

N of Cases = 6.0

Reliability Coefficients 23 items

Lambda 1 = .8562	Lambda 2 = .9332	Lambda 3 = .8951
Lambda 4 = .8271	Lambda 5 = .8994	Lambda 6 = .

---

Question 12 dealt with the reasons for disclosing and not disclosing environmental information. Chart 5.6 shows that the most important reason for disclosing was "for the benefit of the company's shareholders / investors" which was followed by "the employees should know".

Chart 5.6 Reasons for disclosing environmental information

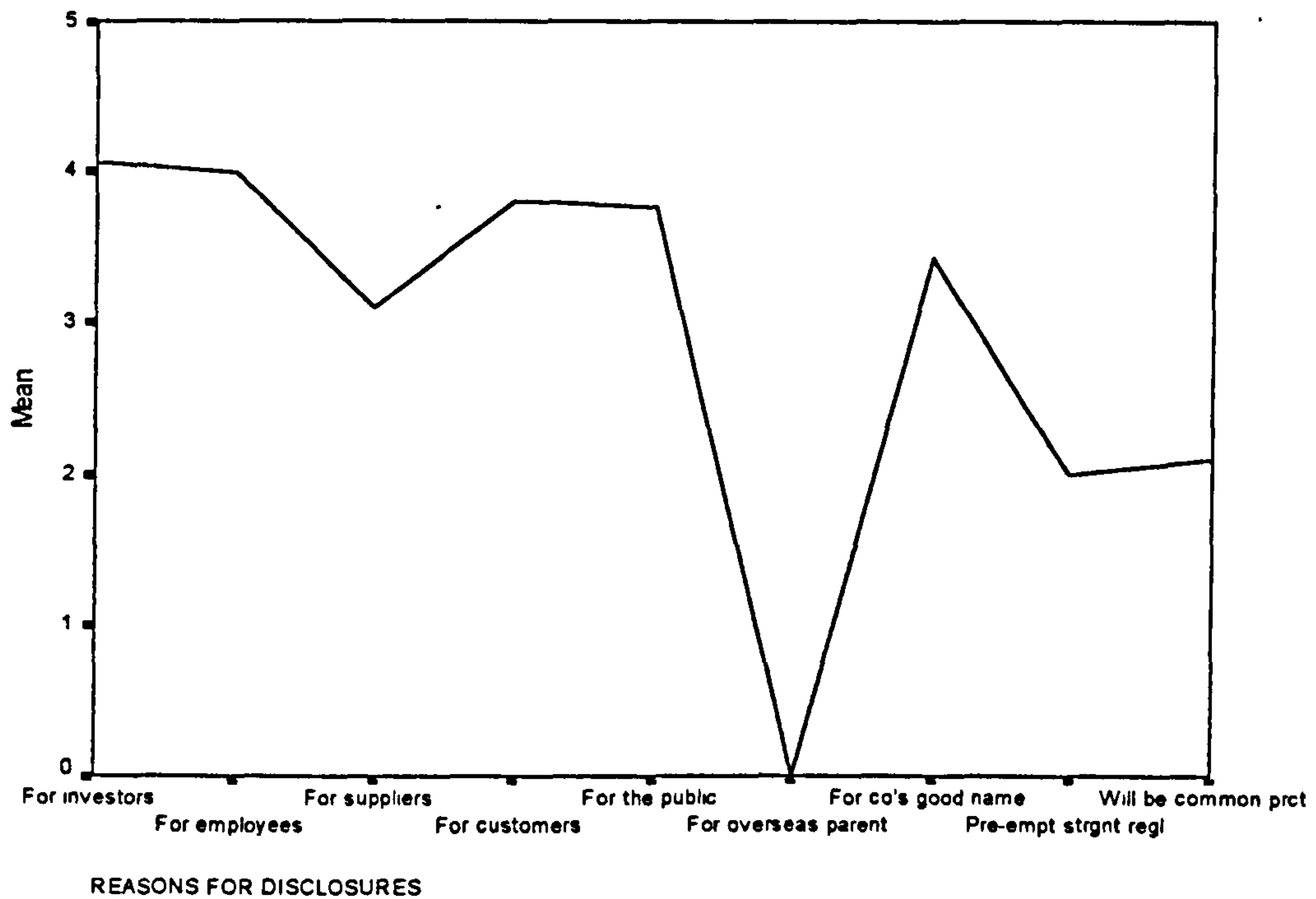
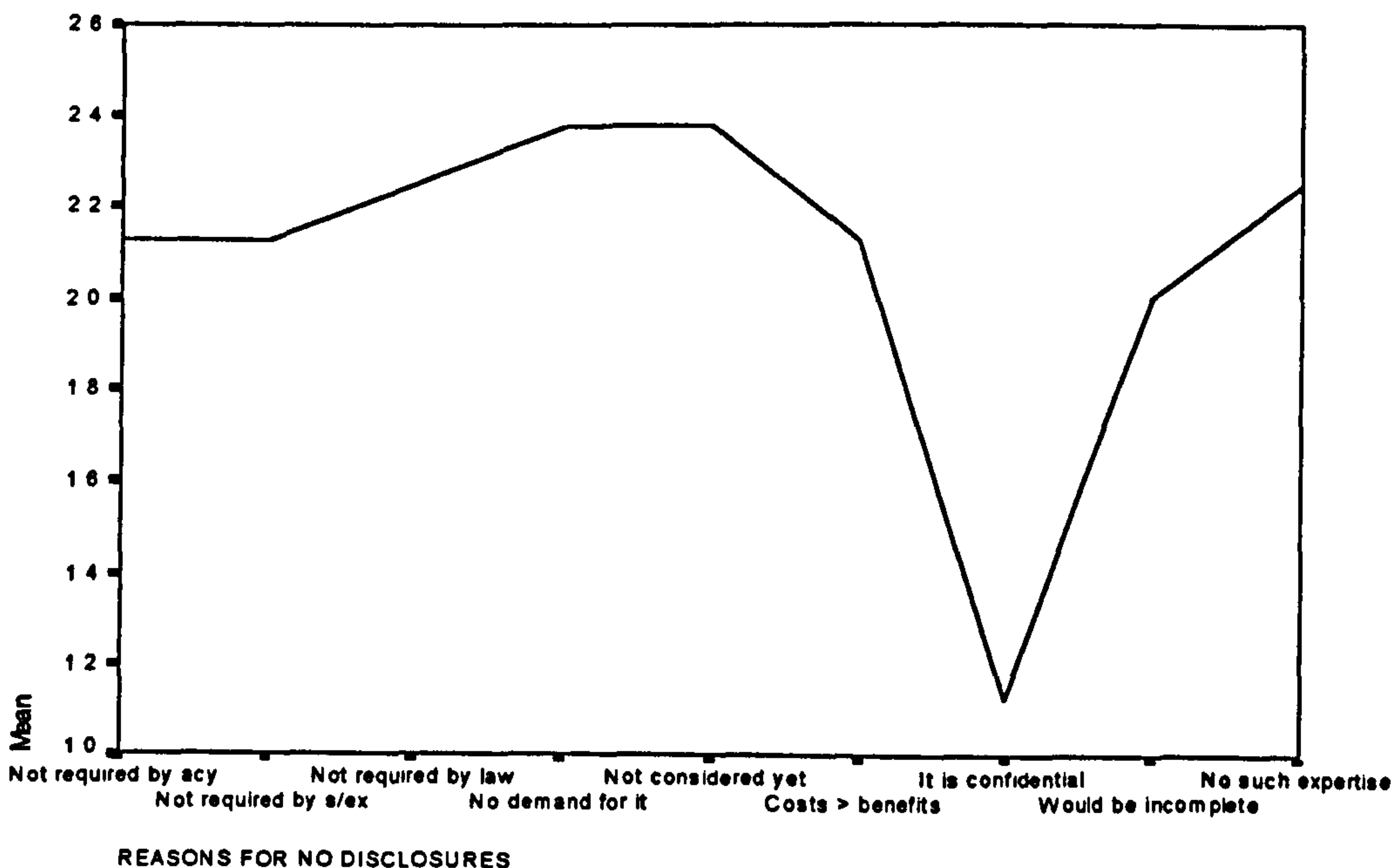


Chart 5.7 shows the reverse situation i.e. reasons for not disclosing. Here the most important reason for not disclosing environmental information was "not considered yet" followed by "no demand for it".

Chart 5.7 Reasons for not disclosing environmental information



Factor analysis was also carried out on the variables of question 12. Two factors with eigenvalues greater than 1 were identified from section 12(a) and two from section 12(b) as shown below:

Section	Number of factors	Cumulative % of variance
12(a)	2	71.3
12(b)	2	78.8

In addition further analyses were carried out using factor comparability analysis with the "split-halves" technique. The correlations between the two parts (halves) for question 12(a) are shown in Table 5.11. The reliability coefficient using Guttman Split-half amounted to 0.7424 which is of high reliability; a perfect correlation is 1.000. Question 12(a)6 was not included in this analysis because it was not 100% applicable.

**Table 5.11 Reliability analysis - scale (split)**

1.	Q12.A1	For investors
2.	Q12.A2	For employees
3.	Q12.A3	For suppliers
4.	Q12.A4	For customers
5.	Q12.A5	For the public
6.	Q12.A7	For co's good name
7.	Q12.A8	Pre-empt strngt regl's
8.	Q12.A9	Will be common prct.

**Correlation Matrix**

	Q12.A1	Q12.A2	Q12.A3	Q12.A4	Q12.A5
Q12.A1	1.0000				
Q12.A2	.8931	1.0000			
Q12.A3	.6233	.6852	1.0000		
Q12.A4	.7647	.8451	.6324	1.0000	
Q12.A5	.8464	.7546	.6070	.6545	1.0000
Q12.A7	.4912	.4458	.3502	.4261	.3610
Q12.A8	.3638	.3494	.3307	.3135	.3169
Q12.A9	.0734	.0762	-.0226	.1729	.0524

	Q12.A7	Q12.A8	Q12.A9
Q12.A7	1.0000		
Q12.A8	.6749	1.0000	
Q12.A9	.5766	.2673	1.0000

N of Cases = 29.0

Reliability Coefficients 8 items

Correlation between forms = .5997 Equal length Spearman-Brown = .7498

Guttman Split-half = .7424 Unequal-length Spearman-Brown = .7498

Alpha for part 1 = .9183 Alpha for part 2 = .7077

4 items in part 1

4 items in part 2

Similar analysis was carried out for question 12(b). Table 5.12 shows the results of this analysis. The Guttman Split-half coefficient was 0.8828, which also demonstrates very high reliability.

**Table 5.12 Reliability analysis - scale (split)**

1.	Q12.B11	Not required by any prof.
2.	Q12.B12	Not required by s/exc
3.	Q12.B13	Not required by law
4.	Q12.B14	No demand for it
5.	Q12.B15	Not considered yet
6.	Q12.B16	Dislr costs > benefits
7.	Q12.B17	It is confidential
8.	Q12.B18	Would be incomplete
9.	Q12.B19	No such expertise

Correlation Matrix

	Q12.B11	Q12.B12	Q12.B13	Q12.B14	Q12.B15
Q12.B11	1.0000				
Q12.B12	1.0000	1.0000			
Q12.B13	.9826	.9826	1.0000		
Q12.B14	.6153	.6153	.6406	1.0000	
Q12.B15	.1549	.1549	.2160	.5504	1.0000
Q12.B16	.6625	.6625	.7188	.8014	.4966
Q12.B17	.6351	.6351	.5267	.4459	.0760
Q12.B18	.5561	.5561	.4169	.2152	-.3231
Q12.B19	.8830	.8830	.8808	.5330	.3293
	Q12.B16	Q12.B17	Q12.B18	Q12.B19	
Q12.B16	1.0000				
Q12.B17	.1093	1.0000			
Q12.B18	.2171	.5882	1.0000		
Q12.B19	.5636	.4752	.4406	1.0000	

N of Cases = 8.0

Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
Part 1	2.2515	2.1262	2.3775	.2513	1.1182	.0157
Part 2	1.8762	1.1263	2.2512	1.1250	1.9989	.2604
Scale	2.0847	1.1263	2.3775	1.2513	2.1110	.1446

Reliability Coefficients 9 items

Correlation between forms = .8658 Equal length Spearman-Brown = .9281

Guttman Split-half = .8828 Unequal-length Spearman-Brown = .9289

Alpha for part 1 = .8607 Alpha for part 2 = .6744

5 items in part 1 4 items in part 2

### 5.2.4.3 Variable associations

In order to examine / investigate any associations between variables "the protection of the environment", of question 7, was used for crosstabulation and correlation coefficient analysis. As a first step in this analysis, the "company objectives" were crosstabulated with environmental policies (question 8). Table 5.13 proves the null hypothesis that there is no association between them. All the probability levels are higher than 5% and therefore not statistically significant.

Table 5.13 Summary of crosstabulation of "company objectives" by "adoption of environmental policies"

<i>Variables/Description</i>	<i>Pearson Chi-Square</i>	<i>D.F.</i>	<i>Significance *</i>
<i>Company objectives:</i>			
<i>Fair business practices</i>	<i>29.47</i>	<i>30</i>	<i>0.493</i>
<i>Human resources</i>	<i>24.84</i>	<i>25</i>	<i>0.471</i>
<i>Protection of the environment</i>	<i>39.02</i>	<i>30</i>	<i>0.125</i>
<i>Profit making</i>	<i>26.87</i>	<i>30</i>	<i>0.630</i>
<i>Energy conservation/efficiency</i>	<i>28.27</i>	<i>30</i>	<i>0.556</i>
<i>Community involvement</i>	<i>24.66</i>	<i>20</i>	<i>0.214</i>
<i>Product quality</i>	<i>25.50</i>	<i>20</i>	<i>0.182</i>

\* No significance revealed at  $p < .05$

### Examination of possible association between the "methods of publication of environmental information" and the "protection of the environment"

A crosstabulation analysis of the "methods of publication of environmental information" by the "protection of the environment" was carried out and the "Pearson chi-square" test was used in order to test the hypothesis that the variables are independent. The test showed that all the significance levels fell outside the probability level of 5% (none in range of  $p < .05$ ) and therefore the hypothesis was confirmed i.e. there is no statistical link between the protection of the environment and any of the methods of "environmental disclosure".



## Reasons for making or not making public environmental information

Question No 12 comprised a number of variables which dealt with possible reasons why companies make or do not make public their environmental information. Tables 5.14 and 5.15 show the results of crosstabulation statistical bivariate analyses. The Pearson Chi-square is shown, together with the D.F. and significance levels. The crosstabulation chi-square is used to test the hypothesis that the variables are independent.

**Table 5.14 Summary of crosstabulation of "reasons why companies disclose / do not disclose environmental information" by "protection of the environment"**

<i>Variables/Description</i>	<i>Pearson Chi-square</i>	<i>D.F.</i>	<i>Significance *</i>
<i>a) Reasons for disclosures</i>			
<i>The company's shareholders/investors should know</i>	19.59	18	0.35
<i>The company's employees should know</i>	18.94	18	0.40
<i>The company's suppliers should know</i>	36.25	30	0.20
<i>The company's customers should know</i>	25.70	18	0.11
<i>The public should know</i>	32.55	24	0.11
<i>To safeguard the company's good name</i>	42.66	24	0.01*
<i>To pre-empt more stringent legal requirements</i>	22.92	30	0.82
<i>Sooner or later it will become common practice</i>	35.24	30	0.23
<i>b) Reasons for no disclosures</i>			
<i>Not required by the accountancy profession</i>	6.93	8	0.54
<i>Not required by the Stock Exchange</i>	6.93	8	0.54
<i>Not required by law</i>	6.93	8	0.54
<i>No demand for such information</i>	5.40	8	0.71
<i>Not yet considered by the company</i>	11.20	8	0.19
<i>The costs outweigh the benefits</i>	16.00	10	0.10
<i>Such information is confidential</i>	5.52	4	0.24
<i>Environmental data would be incomplete</i>	10.00	8	0.26
<i>The company lacks such expertise</i>	6.80	8	0.56

\*  $p < 0.01$

**Table 5.15 Summary of crosstabulation of "reasons why companies disclose / do not disclose environmental information" by "environmental policies"**

<i>Variables/Description</i>	<i>Pearson Chi-square</i>	<i>D.F.</i>	<i>Significance*</i>
<i>a) Reasons for disclosures</i>			
<i>The company's shareholders/investors should know</i>	27.52	15	0.02*
<i>The company's employees should know</i>	32.25	20	0.04*
<i>The company's suppliers should know</i>	32.71	25	0.13
<i>The company's customers should know</i>	31.22	20	0.05*
<i>The public should know</i>	47.64	20	0.000***
<i>To safeguard the company's good name</i>	41.05	25	0.02*
<i>To pre-empt more stringent legal requirements</i>	15.25	25	0.93
<i>Sooner or later it will become common practice</i>	35.27	25	0.08
<i>b) Reasons for no disclosures</i>			
<i>Not required by the accountancy profession</i>	16.89	16	0.39
<i>Not required by the Stock Exchange</i>	16.89	16	0.39
<i>Not required by law</i>	16.89	16	0.39
<i>No demand for such information</i>	15.00	16	0.52
<i>Not yet considered by the company</i>	24.00	16	0.09
<i>The costs outweigh the benefits</i>	27.55	20	0.12
<i>Such information is confidential</i>	12.27	8	0.14
<i>Environmental data would be incomplete</i>	18.89	16	0.27
<i>The company lacks such expertise</i>	22.22	16	0.13

\*  $p < 0.05$ ; \*\*\*  $p < 0.001$

The results show that six variables (one in Table 5.14 and five in Table 5.15) have values which are statistically significant and for them, the null hypothesis can be rejected.

### **The relationship between environmental monetary evaluations and their disclosure (question 13)**

The purpose of question number 13 was to establish which specific types of environmental monetary evaluations and practices were carried out and whether they were disclosed outside the Company / Group. A paired-samples T test was carried out in order to examine the relationship between the two variables, and the populations who responded to them.

Obviously, if a company does not carry out monetary evaluations it would not be in a position to disclose them. Conversely, if a company carries out environmental

monetary evaluations it would very likely disclose them, for PR purposes.

Table 5.16 shows the results of this test. Approximately 90% of the variables revealed significances of between  $p < .05$  and  $p < .001$ , which demonstrate a large degree of uniformity between the populations responding to the two variables i.e. the "doing" and the "disclosing". This result also demonstrates and strengthens the reliability of the data by rejecting the null hypotheses for so many variables of question 13.

**Table 5.16 Paired-samples T test of environmental monetary evaluations, and disclosures**

<i>Variable pairs</i>	<i>t-value</i>	<i>D.F.</i>	<i>2-tail Significance</i>
<i>Local environmental damage and disclosure</i>	-3.46	21	0.002***
<i>Global environmental damage and disclosure</i>	-2.18	19	0.042*
<i>Material environmental damage and disclosure</i>	-3.37	18	0.003**
<i>Non-material environmental damage and disclosure</i>	-2.40	16	0.029*
<i>Profit and loss - Market growth and disclosure</i>	-2.95	16	0.009**
<i>Profit and loss - Market decline and disclosure</i>	-2.95	16	0.009**
<i>Profit and loss - Clean up / remediation and disclosure</i>	-5.67	23	0.000***
<i>Profit and loss - Emission control and disclosure</i>	-7.86	24	0.000***
<i>Profit and loss - Fines and disclosure</i>	-3.43	22	0.002**
<i>Profit and loss - Insurance and disclosure</i>	-5.67	23	0.000***
<i>Profit and loss - Licences and disclosure</i>	-5.21	23	0.000***
<i>Profit and loss - Regulation compliance and disclosure</i>	-6.19	23	0.000***
<i>Profit and loss - Research and development and disclosure</i>	-4.05	23	0.000***
<i>Profit and loss - Depreciation and disclosure</i>	-3.51	20	0.002**
<i>Balance sheet - Land remediation and disclosure</i>	-3.87	20	0.001***
<i>Balance sheet - Plant and disclosure</i>	-3.37	18	0.003**
<i>Balance sheet - Depreciation and disclosure</i>	-3.37	18	0.003**
<i>Balance sheet - Damages and disclosure</i>	-3.13	21	0.005**
<i>Balance sheet - Fines and disclosure</i>	-3.39	23	0.003**
<i>Balance sheet - Remediation and disclosure</i>	-2.83	23	0.010**
<i>Notes to the accounts - Environmental capital commitments and disclosure</i>	-3.16	20	0.005**
<i>Notes to the accounts - Environmental contingent liabilities and disclosure</i>	-2.83	20	0.010**
<i>Notes to the accounts - Environmental policies and disclosure</i>	-0.81	23	0.426
<i>Auditing of environmental disclosure and disclosure</i>	-1.83	19	0.083
<i>Environmental / Eco-auditing and disclosure</i>	-2.02	20	0.056

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

**The relationship between environmental monetary evaluations and the adoption of environmental policies**

**a) Carry out environmental evaluations**

Paired-samples T test was carried out on the responses for "carrying out" environmental monetary evaluations and the adoption of environmental policies. The results were significant for all the variables; the actual levels of significance varied from  $p < .05$  to  $p < .001$ . This demonstrates that companies which carry out environmental monetary evaluations would have adopted environmental policies and progressed beyond stage one, since the first step in environmental excellence is the adoption of environmental policies.

**b) Disclosure of environmental evaluations**

Similar T tests were carried out with regard to the relationship between the adoption of environmental policies and the "disclosure" of environmental monetary evaluations. The following had scores which were significant:

	<i>t-value</i>	<i>D.F.</i>	<i>2-tail Significance</i>
<b><i>Disclosure of:</i></b>			
<i>Cleanup/remediation costs</i>	-2.16	23	0.041*
<i>Emission control costs</i>	-2.13	24	0.044*
<i>Fines</i>	-2.04	22	0.054*
<i>Regulation compliance costs</i>	-2.51	23	0.020*
<i>Research and development</i>	-2.07	23	0.050*
<i>Environmental policies (Notes to the accounts)</i>	-2.79	23	0.010**

\*  $p < .05$ ; \*\*  $p < .01$

These results are highly significant in that the responses for the "disclosure" of monetary evaluations are similar to those for the "adoption" of environmental policies.

## Monetary evaluation practices and the protection of the environment

The crosstabulation and Pearson Chi-square tests were carried out with regard to the various types of monetary evaluations and practices covered by question 13 and the protection of the environment. The tests revealed that some of the variables for the protection of the environment (shown in Table 5.17) had significance levels less than 0.05 and therefore they are not the result of chance but the outcome of a definite relationship, and the null hypothesis can be rejected.

Table 5.17 Extracts from crosstabulation of "types of monetary evaluations and practices" by "protection of the environment"

<i>Variables</i>	<i>Significance *</i>
<i>Global environmental damage</i>	<i>0.05</i>
<i>Material environmental damage</i>	<i>0.03</i>
<i>Non-material environmental damage</i>	<i>0.01</i>
<i>Emission control</i>	<i>0.05</i>
<i>Disclosure of emission control</i>	<i>0.02</i>
<i>Environmental policies</i>	<i>0.04</i>
<i>Auditing of environmental disclosures</i>	<i>0.02</i>
<i>Environmental/Eco-auditing</i>	<i>0.04</i>
<i>Disclosure of Environmental/Eco-auditing</i>	<i>0.03</i>

\*  $p < 0.05$

## Analysis of variance

Analysis of variance (ANOVA) tests show the degree of relationship among variables. Table 5.18 compares the mean scores of the "protection of the environment" (the dependent variable) by "environmental monetary evaluations" (the independent variable). The result is that seven items were statistically significant at  $p < 0.05$ . In the Profit and Loss section "clean up / remediation" and "fines" were significant, whilst in the Balance Sheet, "damages" and "remediation" were significant, and in the Notes to the accounts all were significant. Therefore, for these

items the null hypothesis can be rejected; there is a definite relationship between the variables which is statistically significant.

**Table 5.18 Analysis of variance of protection of environment by environmental monetary evaluations**

<i>Source of variance</i>	<i>Sum of Squares</i>	<i>D.F.</i>	<i>Mean Square</i>	<i>F</i>
<i>Profit &amp; Loss items:</i>				
<i>Clean up/remediation costs</i>	18.9	2	9.4	3.9*
<i>Emission control</i>	2.6	2	1.3	0.5
<i>Fines</i>	17.6	2	8.8	3.7*
<i>Regulation compliance</i>	7.4	2	3.7	1.6
	<i>RESIDUAL</i>	21	2.4	
	<i>TOTAL</i>	29	3.8	
<i>Balance sheet items:</i>				
<i>Land remediation - assets</i>	4.5	2	2.3	0.8
<i>Plant - assets</i>	6.8	2	3.4	1.2
<i>Damages - liabilities</i>	21.0	2	10.5	3.8*
<i>Fines - liabilities</i>	6.6	2	3.3	1.2
<i>Remediation - liabilities</i>	18.9	2	9.5	3.5*
	<i>RESIDUAL</i>	48	5.6	
	<i>TOTAL</i>	58	7.6	
<i>Notes to the accounts:</i>				
<i>Environmental capital commitments</i>	20.1	2	10.0	3.5*
<i>Environmental contingent liabilities</i>	24.8	2	12.4	4.4*
<i>Environmental policies</i>	22.6	2	11.3	3.7*
	<i>RESIDUAL</i>	77	8.9	
	<i>TOTAL</i>	83	10.7	

\*  $p < 0.05$

**Correlation coefficients of selected variables**

**a) Monetary evaluations and disclosures**

Table 5.19 is the first page of the printout of correlation coefficients of certain

variables of question 13 which have been identified in earlier analyses as being significant. The printout was five pages long and it was not considered essential to include all of it. Correlation coefficients are a measure of linear association between two variables. Values range from -1 (for a perfect negative relationship) to +1 (for a perfect positive relationship). A value of 0 (zero) indicates no linear relationship.

The table also shows the number of cases analysed by this test and the 2-tail significance level (as  $p = \dots$ ). The purpose of this analysis was to see how the variables which had a high significance level were correlated. As shown by the table, all the variables are positively, and mostly highly, correlated. Also the 2-tail significances are almost all less than .05. These results are statistically significant, in that they are not the result of mere chance, and therefore the null hypothesis is rejected.



**Table 5.19 Correlation coefficients of selected variables dealing with monetary evaluations and disclosures**

	Q13.2A	Q13.3A	Q13.3B	Q13.4A	Q13.52AA	Q13.52AB
Q13.2A	1.0000 ( 33) P= .	.6166 ( 29) P= .000	.6211 ( 17) P= .008	.4154 ( 29) P= .025	.6674 ( 30) P= .000	.5487 ( 22) P= .008
Q13.3A	.6166 ( 29) P= .000	1.0000 ( 31) P= .	.7454 ( 19) P= .000	.6132 ( 29) P= .000	.5516 ( 31) P= .001	.4260 ( 23) P= .043
Q13.3B	.6211 ( 17) P= .008	.7454 ( 19) P= .000	1.0000 ( 19) P= .	.3920 ( 17) P= .120	.5450 ( 19) P= .016	.6344 ( 19) P= .004
Q13.4A	.4154 ( 29) P= .025	.6132 ( 29) P= .000	.3920 ( 17) P= .120	1.0000 ( 29) P= .	.4953 ( 29) P= .006	.3752 ( 21) P= .094
Q13.52AA	.6674 ( 30) P= .000	.5516 ( 31) P= .001	.5450 ( 19) P= .016	.4953 ( 29) P= .006	1.0000 ( 32) P= .	.7972 ( 24) P= .000
Q13.52AB	.5487 ( 22) P= .008	.4260 ( 23) P= .043	.6344 ( 19) P= .004	.3752 ( 21) P= .094	.7972 ( 24) P= .000	1.0000 ( 24) P= .
Q13.52BA	.4026 ( 31) P= .025	.5014 ( 31) P= .004	.5450 ( 19) P= .016	.3160 ( 29) P= .095	.7462 ( 32) P= .000	.5581 ( 24) P= .005
Q13.52CA	.5728 ( 30) P= .001	.4003 ( 31) P= .026	.6299 ( 19) P= .004	.2098 ( 29) P= .275	.7505 ( 32) P= .000	.6008 ( 24) P= .002
Q13.52FA	.4775 ( 31) P= .007	.3321 ( 31) P= .068	.3247 ( 19) P= .175	.4976 ( 29) P= .006	.6504 ( 32) P= .000	.5904 ( 24) P= .002
Q13.52GA	.4925 ( 30) P= .006	.3839 ( 30) P= .036	.5445 ( 19) P= .016	.3663 ( 28) P= .055	.6616 ( 31) P= .000	.6163 ( 23) P= .002
Q13.7CA	.5217 ( 30) P= .003	.4205 ( 29) P= .023	.6364 ( 18) P= .005	.4632 ( 27) P= .015	.4971 ( 30) P= .005	.4148 ( 22) P= .055

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

### **b) Company objectives (question 7)**

Correlation coefficient analysis was also done on the variables of question 7 and the results are shown in Table 5.20. The correlations of the "Protection of the environment" (Q 7.3) with the other variables of question 7 are explained below:

Q7.1 "Fair business practices" has a high negative (-0.4929) correlation and a probability level of  $p < 0.002$  which is highly significant.

- Q7.2 "Human resources" is also negatively correlated but it has a probability of  $p < 0.06$  which is not statistically significant.
- Q7.4 "Profit making" has the highest negative correlation (-0.5557) and the highest statistical significance level of  $p < .000$ . From this it may be inferred that there is a conflict between "making profit" and "protecting the environment". More of the one means less of the other.
- Q7.5 "Energy conservation / efficiency" has a high positive correlation (0.4783) and also a high significant probability level of  $p < 0.003$ . Unlike the position in Q7.4 above, "energy conservation / efficiency" and "the protection of the environment" are in unison.
- Q7.6 "Community involvement" is slightly negatively correlated (-0.0566) with the "protection of the environment" but the probability is not statistically significant, at  $p < 0.743$ .
- Q7.7 "Product quality" is negatively correlated with the "protection of the environment" (-0.3682) with a statistical significance of  $p < 0.03$  which is almost in the same situation as Q7.4 above; product quality is maintained at the expense of the environment.

Table 5.20 Correlation coefficients

	Q7.1	Q7.2	Q7.3	Q7.4	Q7.5	Q7.6
Q7.1	1.0000 ( 36) P= .	-.0685 ( 36) P= .691	-.4929 ( 36) P= .002	.1569 ( 36) P= .361	-.4509 ( 36) P= .006	-.1779 ( 36) P= .299
Q7.2	-.0685 ( 36) P= .691	1.0000 ( 36) P= .	-.3170 ( 36) P= .060	.1868 ( 36) P= .275	-.3879 ( 36) P= .019	-.3853 ( 36) P= .020
Q7.3	-.4929 ( 36) P= .002	-.3170 ( 36) P= .060	1.0000 ( 36) P= .	-.5557 ( 36) P= .000	.4783 ( 36) P= .003	-.0566 ( 36) P= .743
Q7.4	.1569 ( 36) P= .361	.1868 ( 36) P= .275	-.5557 ( 36) P= .000	1.0000 ( 36) P= .	-.5267 ( 36) P= .001	-.2412 ( 36) P= .156
Q7.5	-.4509 ( 36) P= .006	-.3879 ( 36) P= .019	.4783 ( 36) P= .003	-.5267 ( 36) P= .001	1.0000 ( 36) P= .	.2586 ( 36) P= .128
Q7.6	-.1779 ( 36) P= .299	-.3853 ( 36) P= .020	-.0566 ( 36) P= .743	-.2412 ( 36) P= .156	.2586 ( 36) P= .128	1.0000 ( 36) P= .
Q7.7	.1461 ( 35) P= .402	.1918 ( 35) P= .270	-.3682 ( 35) P= .030	.1304 ( 35) P= .455	-.4421 ( 35) P= .008	-.3783 ( 35) P= .025
Q7.7						
Q7.1	.1461 ( 35) P= .402					
Q7.2	.1918 ( 35) P= .270					
Q7.3	-.3682 ( 35) P= .030					
Q7.4	.1304 ( 35) P= .455					
Q7.5	-.4421 ( 35) P= .008					
Q7.6	-.3783 ( 35) P= .025					
Q7.7	1.0000 ( 35) P= .					

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

### 5.3 RESULTS

The presentation of the results follow a logical order rather than the question/number sequence.

#### 5.3.1 The Protection of the environment and the adoption of environmental policies (Questions 7 and 8)

The responses to questions 7 and 8 were analysed by industry sector. Chart 5.3 shows the periods for the adoption of environmental policies. *Prima facie* it would be right to assume that the adoption of environmental policies is indicative of a company's concern for the environment. The level of commitment to this can be demonstrated by industry from the following league table, concerning the adoption of environmental policies "over 3 years ago."

Group	Type of industry, etc.	Percentage
A	Chemicals, Plastics, Pharmaceuticals, Oil and Gas	57
B	Electricity, Transport and distribution, and Water	55
C	All other industries	17
D	Companies with turnover > £4000 million	40

It can, therefore, be deduced from this table that the type of industry and size of companies play an important part in the environmental practices of companies; this is in line with previous studies (see for example, Deirkes, M. and Preston, L.R., 1977<sup>24</sup>; Belkaoui, A. and Karpik, P.G., 1989<sup>25</sup>; Gray, R., 1990<sup>26</sup>).

Question 7 dealt with the relative importance of the 'Protection of the environment'. The respondents were asked to rank seven company objectives (most important to least important). Table 5.21 presents the ranking which was arrived at from the

mean for each of the seven variables.

Table 5.21 **Ranking of company objectives**

<i>Company Objectives</i>	<i>Ranking</i>				
	<i>All</i>	<i>Group</i>			
		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
<i>Product Quality</i>	1	1	1	2	1
<i>Profit making</i>	2	1	2	1	2
<i>Fair business practice</i>	3	4	4	3	4
<i>Human resources</i>	4	5	3	4	3
<i>Protection of the environment</i>	5	3	4	6	5
<i>Energy conservation/efficiency</i>	6	6	6	5	6
<i>Community involvement</i>	7	7	7	6	7

The companies which ranked the protection of the environment the highest, i.e. third were the companies with the most environmentally sensitive activities (Group A). The companies with less sensitive activities (Group B) ranked it fourth. The largest companies ranked it fifth, and Group C - 'all other industries' - ranked it sixth. These findings reaffirm the result obtained for the adoption of environmental policies. Although the same conclusions have been reached from the two variables, this was not as a result of an association between them. The cross tabulation of the "Protection of the environment" by the "Adoption of environmental policies" produced a level of significance of  $p < 0.125$  which is not statistically significant as shown in Table 5.13.

The above analysis also demonstrates that profit making and product quality (which go together) are the primary objectives of corporations and that the company objectives which are covered by Corporate Social Reporting (CSR) are less important. To a corporation, societal responsibilities (e.g. eco-efficiency and accountability) are secondary responsibilities. This situation must be influenced by the fact that environmental and social obligations have not yet been established by

legal precedent (see Rubenstein. D.B., 1992<sup>27</sup>). In the meantime, the growth in awareness of corporate social responsibility has added to the criticisms of the use of profit as an all-inclusive measure of corporate performance" (Hackson, D. and Milne, M., 1996<sup>28</sup>). And as corporations' environmental obligations are dependent on their *own* perceived obligations, it is inevitable that there would be variations in their concern for the environment. This is borne out by the variations in ranking of the "protection of the environment." Such variations would not arise if the protection of the environment was covered by law.

### 5.3.2 Methods of publication/disclosure of environmental information

#### (Question 10)

The responses to this question were analysed in the previous section. The popularity of each method of disclosure is shown below in a more simplified fashion.

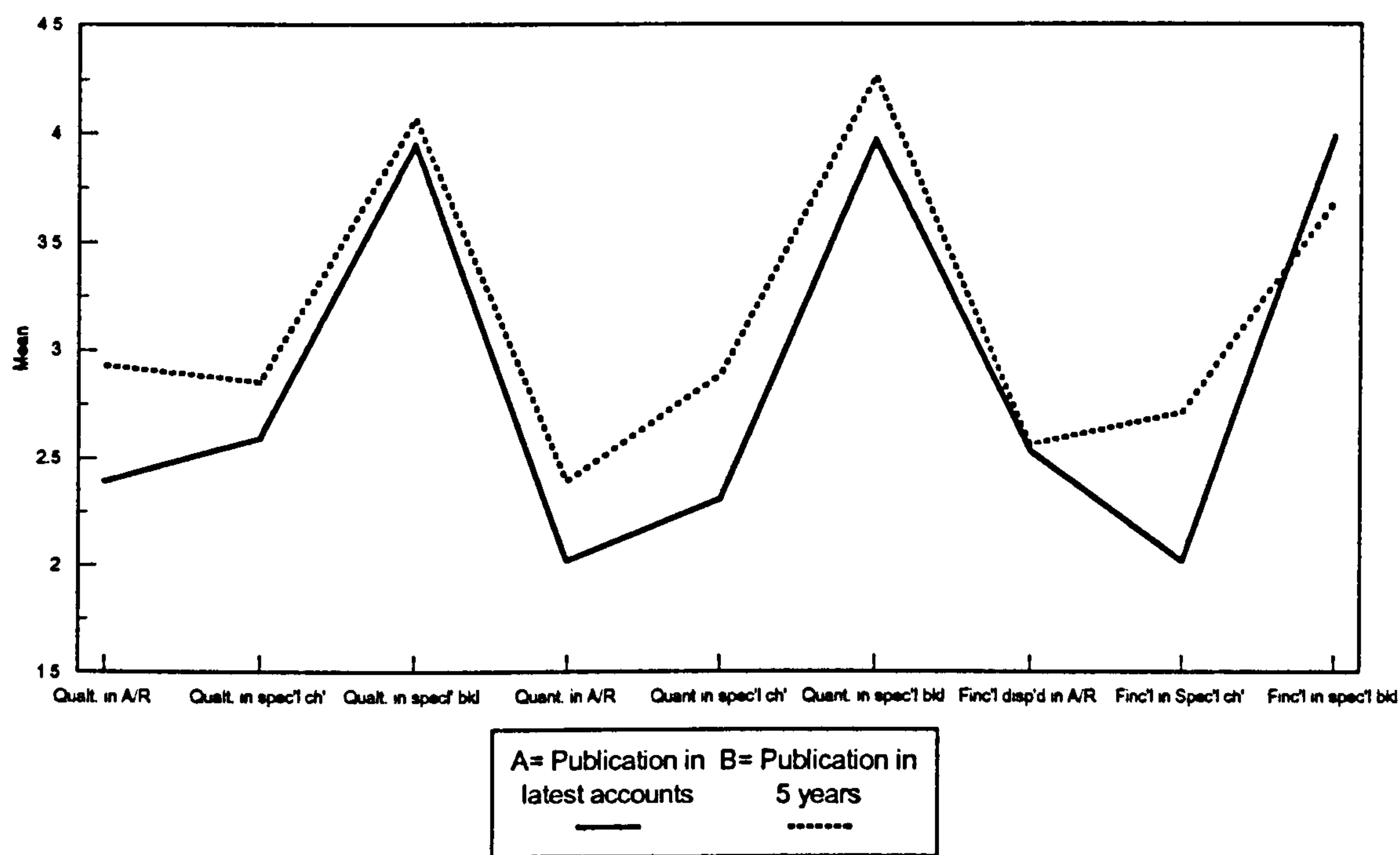
<i>Method of accounting</i>	<i>Method of disclosure</i>			
	<i>Dispersed in the A/R</i>	<i>Special chapter in A/R</i>	<i>Special booklet</i>	<i>Other methods</i>
<i>Qualitative/Unquantified</i>	<i>3rd</i>	<i>2nd</i>	<i>1st</i>	<i>4th</i>
<i>Quantified/Statistical</i>	<i>2nd</i>	<i>2nd</i>	<i>1st</i>	<i>4th</i>
<i>Financial</i>	<i>1st</i>	<i>Not used</i>	<i>1st</i>	<i>Not used</i>

The "special booklet" is the most popular method, but where financial environmental information is concerned the "dispersal in the A/R" (Annual Report and accounts) is equally popular. The use of the A/R for financial type of information is understandable since it fits in more naturally there. Some of the "other methods" of publishing environmental information which are worthy of note are: newsletter, presentations and site reports.

### 5.3.3 Volume of current and future disclosures, by method of disclosure and type of information (Question 11)

The responses to this question were summarised in percentage terms in the previous section and Chart 5.5 was prepared. Chart 5.8 was prepared from the means of volume of environmental disclosure on a scale of 1 to 5 (none/considerable) both as per the respondents' "latest accounts" (line A) and "by the end of the next five years" (line B).

Chart 5.8 Methods and level of disclosure of environmental information



The graph shows that the most popular method of disclosure both now and at the end of the next five years is the special booklet. The graph also shows that a small increase is expected in the volume of published information, both in qualitative / unquantified and in quantified / statistical types of information. The volume of the financial information is expected to increase in the special chapter of the A/R but it will reduce slightly in the special booklet. The observation strengthens the customary tendency of accountants to include environmental information in the Annual Report and Accounts. As the volume of such information increases, the

attraction of this method will diminish. A separate special booklet offers a more practicable solution, as it can accommodate "all" the relevant information and this is borne out by Chart 5.8.

In addition, Chart 5.8 shows that over the next five years, the respondents expect an increase, in general, in the disclosures by the three media. This confirms the view that pressure for environmental disclosures will not subside. In fact, recent evidence indicates that there is "a slow but inexorable growth in environmental disclosure..." (Accountancy Age 12/9/96).<sup>29</sup> The chart also demonstrates that all three types of reporting, i.e. qualitative, quantitative and financial are needed for environmental accounting and disclosures; the nature of the subject matter makes each indispensable. For example, as Gray *et al.*'s (1993)<sup>30</sup> analysis shows, when accounting for energy and wastes, both quantitative and financial methods are required, because, "accounting in physical units facilitates the setting of energy targets and subsequent assessment of volume variances"<sup>31</sup> (Owen, D., forthcoming). The provision of financial information in the special chapter showing a strong increase over the next five years. This would entail the internalisation of externalities by using some of the environmental evaluation techniques which were examined in Chapter 3 and other environmental expenditure incurred by companies. In effect, all three types of environmental reporting are required in order to deal effectively with the accountability and eco-efficiency aspects of environmental concern.

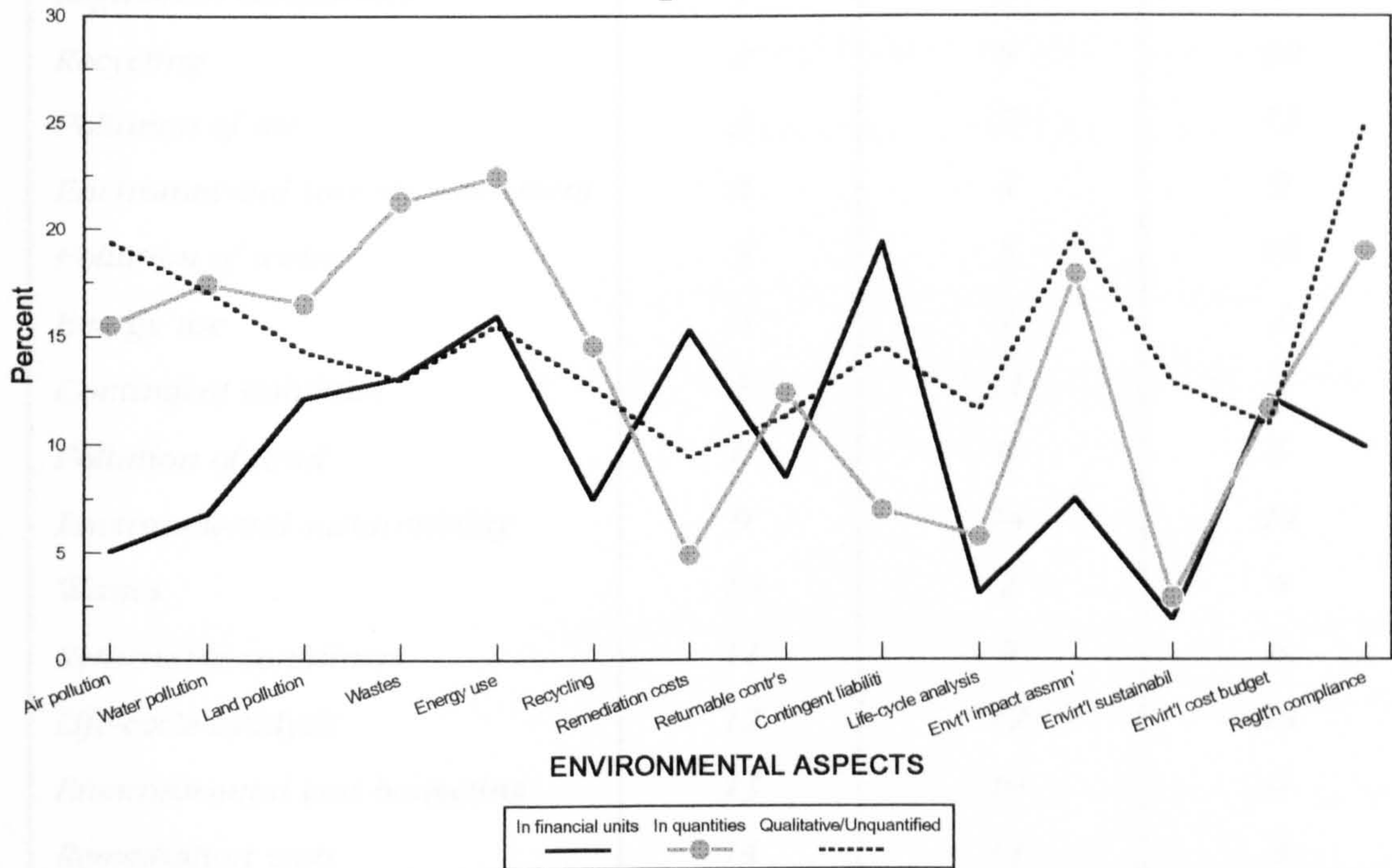
#### **5.3.4 Methods of environmental accounting for various environmental aspects (Question 9)**

Question 9 was designed to identify which methods of environmental accounting were being used "now" or will be used "in the near future" or whether there were "no such plans" or the former were "not applicable".



Chart 5.9 shows at a glance the percentages of the respondents who conduct environmental accounting "now" by type (e.g. in quantities) for each of the environmental aspects.

**Chart 5.9 Percentage of respondents who conduct environmental accounting "now" for each environmental aspect**



The chart demonstrates that the choice / use of accounting method depends on the extent to which the environmental aspect lends itself to that type of accounting / measurement. For example, wastes and energy use are showing a high percentage under the quantitative method because they can easily be measured in quantities, whereas for remediation costs, life-cycle analysis and environmental sustainability, the quantitative method is used to a lesser extent. This is made clearer for each method of environmental accounting by Table 5.22, which shows the ranking for each accounting method for all the environmental aspects (1 = most popular).

**Table 5.22 Ranking of environmental aspects which are currently being evaluated**

	<i>Method of environmental accounting</i>		
	<i>Qualitative</i>	<i>In quantiles</i>	<i>In financial units</i>
<i>Environmental aspects:</i>			
<i>Regulation compliance</i>	1	3	7
<i>Recycling</i>	2	8	10
<i>Pollution of air</i>	3	7	12
<i>Environmental income assessment</i>	4	4	9
<i>Pollution of water</i>	5	5	10
<i>Energy use</i>	6	1	2
<i>Contingent liabilities</i>	7	11	1
<i>Pollution of land</i>	8	6	5
<i>Environmental sustainability</i>	9	14	14
<i>Wastes</i>	10	2	4
<i>Returnable containers</i>	11	9	8
<i>Life-cycle analysis</i>	12	12	13
<i>Environmental cost budgeting</i>	13	10	6
<i>Remediation costs</i>	14	13	3

The use / choice of method also appears to depend on whether the relevant aspect is covered by law or other form of control. For example "regulation compliance" comes out on top under the qualitative method because it is necessary by law and "contingent liabilities" come out on top under the financial method because these are required by law and the accountancy profession, as they feature in the audited accounts of companies. The purely environmental aspects are relegated to the lower end of the scale especially under the financial method. The restriction of financial evaluations to those which have to be done may be due to any of the following reasons:

- i) Companies are content to do the least possible (i.e. qualitative and quantitative)

to enable them to have something to publish and protect their image. The literature review has shown that environmental concern is used as a Public Relations (PR) exercise.

ii) The financial evaluations are difficult, which is true, especially with regard to externalities, and they require expertise which companies do not have, as shown by Table 5.24. This is particularly relevant to pollution, life-cycle analysis, recycling and environmental sustainability, which have been ranked very low.

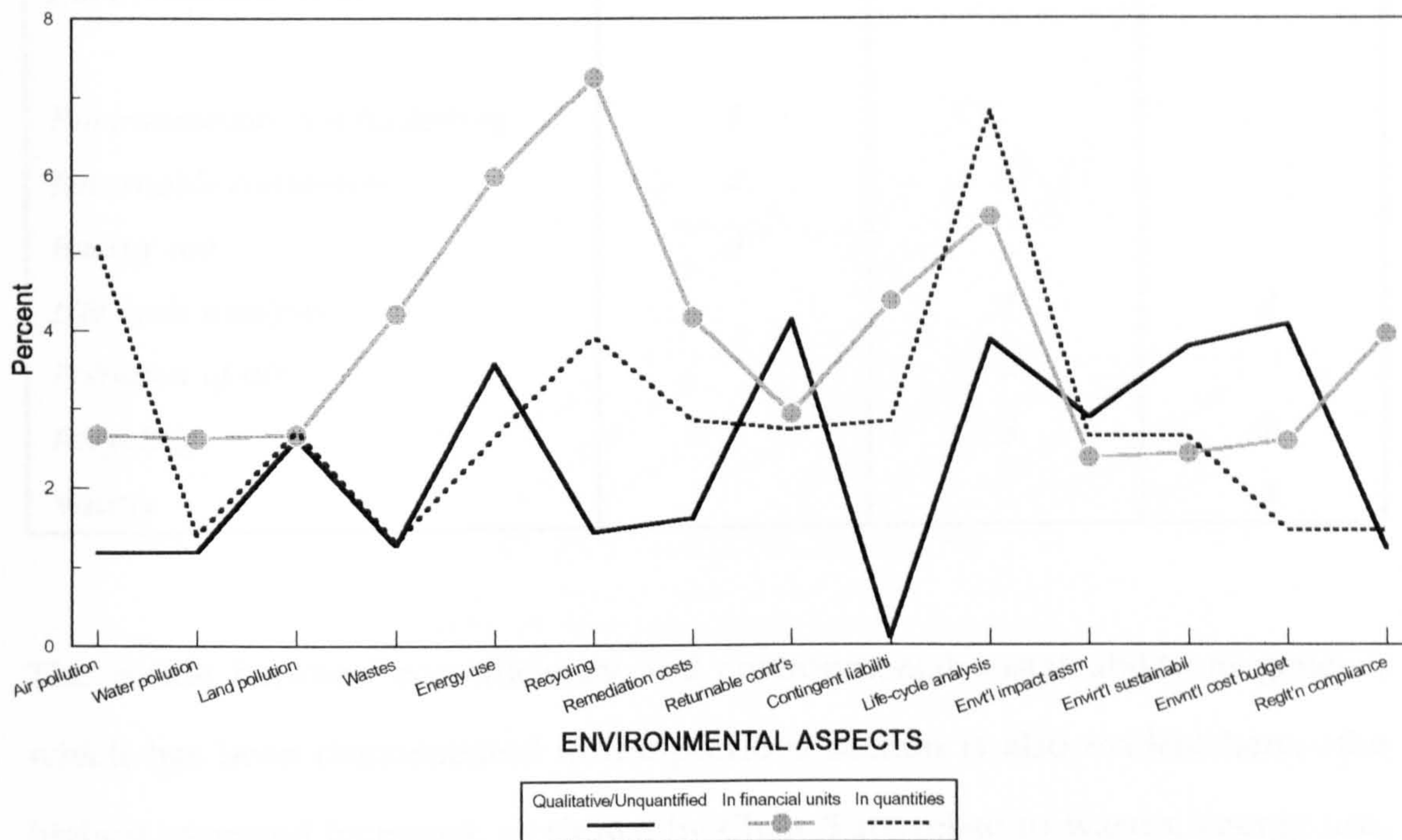
iii) Companies are *wrongly* convinced that the environmental dimension can only have a negative effect on their profitability. This view is supported by Table 5.21 and the literature review.

The priority of concern lies primarily with the financial interest of the companies and secondarily with the environment. In addition, both Chart 5.9 and Table 5.22 highlight the emphasis on eco-efficiency and the lack of concern for general sustainability. As explained in Chapter 2, sustainability covers both eco-efficiency, which is concerned with improvements in waste reduction, recycling, energy efficiency, pollution control and environmental protection, and eco-justice, which deals with inter- and intra-generational equity and earth stewardship. The reason why eco-efficiency is gaining strength is because "the 'polluter pays' ethos [is] driving much environmental legislation throughout the industrialised world [and it] has been instrumental in focusing business attention on the adoption of a more proactive environmental stance."<sup>32</sup> (Owen, D., forthcoming) Although eco-efficiency is being integrated into the economic activities, the environmental dimension is not; nevertheless, a start has been made in addressing some of the problems.

In order to establish the expected future trend of environmental accounting, the

relevant responses were summarised and presented in Chart 5.10.

Chart 5.10 **Percentage of respondents who expect to conduct environmental accounting "in the near future" for each environmental aspect**



Evidently, some increase in environmental accounting is expected "in the near future" (since this will be in addition to what is being done "now") for each method of environmental accounting and aspect, with the obvious exception of contingent liabilities under the qualitative method.

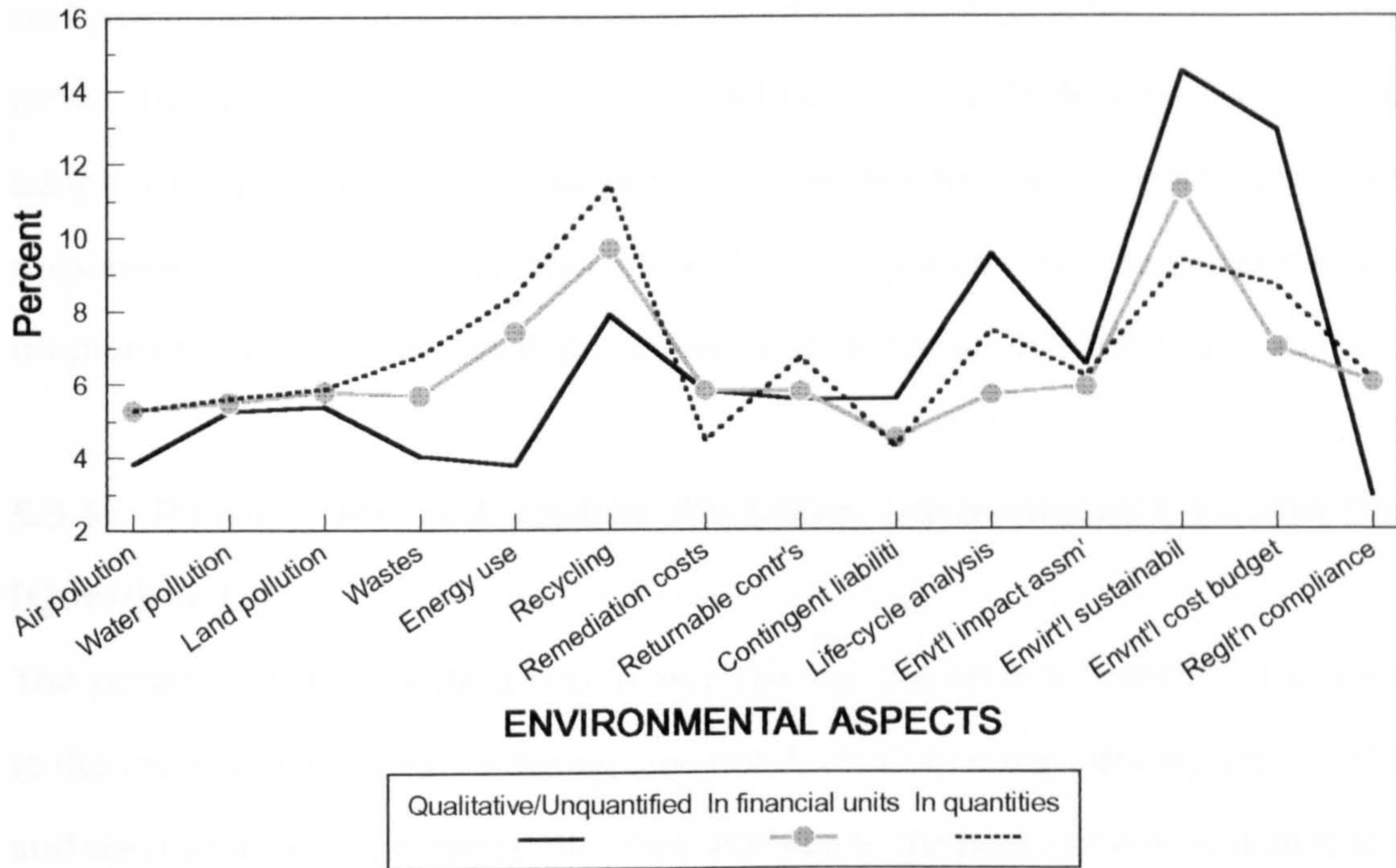
The environmental aspects which show the biggest increases are shown below:

	<i>Method of environmental accounting</i>		
	<i>Qualitative</i>	<i>In quantiles</i>	<i>In financial units</i>
<i>Environmental aspects:</i>			
<i>Environmental cost budgeting</i>	1		
<i>Returnable containers</i>	2		
<i>Energy use</i>	3		
<i>Life-cycle analysis</i>		1	2
<i>Pollution of air</i>		2	
<i>Recycling</i>		3	1
<i>Wastes</i>			3

The divide between eco-efficiency and environmental sustainability in general, which has been demonstrated in the previous section is also evident here; the highest expected increases, as shown by Chart 5.10, relate to wastes, energy use, recycling, returnable containers, life-cycle analysis and regulation compliance in monetary terms. Although these are environmental accounting practices, they are not driven by a concern for the environment and future generations, but by a concern for business, long-term profitability, and a desire to avert pressure from stakeholder groups. The pressure and economic impact from environmental groups can be enormous. For example, "At the time of the Brent Spar incident when Shell intended to dispose of an oil-storage tank in deep sea-water, prayers were said in Protestant churches in Germany to stop the dump.....A new maxim for industry might well become: 'If you can't dispose of it safely without dumping, don't make it'"<sup>33</sup> (Berkin, F., 1996).

The percentage of respondents who have "no plans" to adopt environmental accounting is summarised in Chart 5.11.

Chart 5.11 **Percentage of respondents who have no plans to conduct environmental accounting for each environmental aspect**



The graph shows that there are considerable similarities in trend in the three types of environmental accounting. The aspects with the highest inactions for environmental accounting are: recycling, life-cycle analysis and environmental sustainability. It should be noted that the reason why both charts (5.10 and 5.11) show high incidences for some aspects is because the measurements are made in relation to the other aspects and not with each other.

The following summary shows the ranking of the overall position for all environmental aspects for the three types of environmental accounting.

<b>Method of accounting</b>	<b>Conducting environmental accounting</b>		
	<b>Now</b>	<b>Increase in the near future</b>	<b>No such plans</b>
<i>Qualitative</i>	1	3	3
<i>In quantities</i>	2	2	2
<i>In financial units</i>	3	1	1

The most common method now used is the qualitative method followed by the

quantitative method; the least used method is the financial. This order is in line with the various steps for the adoption and implementation of environmental policies and practices. The expected increase in use of each method is however, in reverse order. This is because the quantitative and financial methods have not yet been adopted to the same extent and there is scope for further implementation. The responses for "no such plans" also follow the same pattern; more respondents have no plans to adopt environmental accounting in financial units than in quantities.

### **5.3.5 Reasons for and against disclosing environmental information (Question 12)**

The purpose of this question was to ascertain the importance companies attribute to the various reasons for disclosing (and not disclosing) environmental information and also to establish the importance they attribute to the needs of their stakeholders. Charts 5.6 and 5.7 show at a glance the reasons for disclosing and not disclosing respectively. In order to facilitate a more meaningful interpretation of the outcome of the analysis, the responses for disclosing and not disclosing environmental information have been ranked and shown in Tables 5.23 and 5.24 by using the mean values of the respondents.

**Table 5.23 Ranking of reasons for disclosing environmental information**

	<i>Ranking</i>
<i>The company's shareholders/investors should know</i>	1
<i>The company's employees should know</i>	2
<i>The company's customers should know</i>	3
<i>The public should know</i>	4
<i>To safeguard the company's good name</i>	5
<i>The company's suppliers should know</i>	6
<i>Sooner or later it will become common practice</i>	7
<i>To pre-empt more stringent legal requirements</i>	8

It can be seen from the above that the most important reasons are those dealing with dissemination of information to various interested parties. The bigger their interest in the company, the more concerned the company is about them. The safeguarding of the company's good name was ranked only fifth, although it is generally thought that disclosure of environmental practices is done mainly for PR reasons. The low ranking may be due to the fact that some PR value can be derived from the items which have been ranked 1 to 4 which include the need for the "public should know". According to Gray, R., *et al.*, (1995) "environmental disclosures were being used by companies as an attempt to negotiate the concept of "environment," and to determine the companies' relationship with society in general."<sup>34</sup> Items 1 to 4 are therefore "seen as furthering the self-interest of the corporation" (Epstein, M.J. and Freedman, M., 1994<sup>35</sup>), rather than reflect a willingness to demonstrate accountability and a concern for the environment. However, equally important is the fact that irrespective of reasons the "number of companies reporting environmental information has increased significantly in recent years"<sup>36</sup> (Owen, D. forthcoming, see also Jupe, R.E., 1994<sup>37</sup>.)

The two "reasons" which have been ranked the lowest (7 and 8) deal with potentialities and that may indicate either a lack of long-term interest in the subject or that the respondents do not indulge in speculation. The other reasons for disclosing environmental information which have been reported by respondents were:

1. In some cases it is required by law
2. To attract ethical investment
3. For immediate neighbours
4. Moral obligation

As shown by Table 5.24 "not yet considered by the company" was ranked first. This



demonstrates that a great number of companies do not have any environmental information to publish i.e. they are not concerned about the environment.

**Table 5.24 Ranking of reasons for not disclosing environmental information**

	<i>Ranking</i>
<i>Not yet considered by the company</i>	1
<i>No demand for such information</i>	2
<i>The company lacks such expertise</i>	3
<i>Not required by law</i>	3
<i>Not required by the accountancy profession</i>	5
<i>Not required by the Stock Exchange</i>	5
<i>The costs outweigh the benefits</i>	5
<i>Environmental data would be incomplete</i>	8
<i>Such information is confidential</i>	9

Furthermore, the high ranking of "the company lacks such expertise" (ranked 3rd jointly with "not required by law") corroborates that view. It can also be deduced from the high ranking of "not required by law" that environmental accounting and the publication of environmental information should be governed by law. This conclusion is also supported by the high ranking (second) of "no demand for such information". This, together with the conclusions reached in section 5.3.1 demonstrate that apart from certain industries and large companies, not many other companies will delve into environmental concern. Obviously, general environmental concern will not be spread voluntarily. Indeed, "many enterprises see the environment as a confusing dilemma rather than as a source of innovative potential and competitive advantage" (Murray-Bruce, R., 1996).<sup>38</sup>

Another reason for not disclosing environmental information, which has been reported by respondents was "misinterpretation"! This does not seem to be a valid reason since disclosure implies and indeed requires clear and unambiguous wording

which may, or preferably should be, reinforced with an environmental audit report.

### **5.3.6 Environmental monetary evaluations and their disclosure (Question 13)**

The purpose of this question was to discover which types of environmental monetary evaluations and practices are carried out and which are disclosed. In order to put each type into perspective, Table 5.25 was prepared. The ranking of each type for "doing" was derived from the number of replies received from each type, whilst the ranking for "disclosure" was based on the replies for disclosure expressed as a percentage of those "doing". This method was adopted because disclosure is associated and dependent upon the "doing" in the first place.

With the exception of item 5, the most important items from 1 to 8 are performed because they are, or they relate to, legal requirements. Item 5 represents stage 1 when deciding to go "green". The remaining monetary evaluations are done by companies voluntarily and their predominance decreases as shown by the league table. The evidence obtained from the responses received demonstrates that environmental monetary evaluations are done to a greater extent when they are a legal requirement and to a much lesser extent when they are not. This view reaffirms the conclusion reached for questions 9 and 12.

**Table 5.25 Ranking table for various types of monetary evaluations and practices and their disclosure**

<b>Types of monetary evaluations and disclosures</b>	<b>Ranking for:</b>	
	<b>Doing</b>	<b>Disclosing</b>
<i>1. Emission control costs in Profit and Loss (P &amp; L)</i>	1	21
<i>2. Regulation compliance costs in P &amp; L</i>	2	15
<i>3. Clean up/remediation costs in P &amp; L</i>	3	14
<i>4. Licences costs in P &amp; L</i>	4	17
<i>5. Environmental policies in Notes to Accounts</i>	5	1
<i>6. Fines costs in P &amp; L</i>	6	4
<i>7. Research and Development in P &amp; L</i>	6	10
<i>8. Fines as liabilities in the Balance Sheet (B/S)</i>	7	4
<i>9. Insurance costs in P &amp; L</i>	8	22
<i>10. Plant in Balance Sheet (B/S)</i>	9	19
<i>11. Depreciation in B/S</i>	10	18
<i>12. Depreciation in P &amp; L</i>	11	12
<i>13. Land remediation in B/S</i>	12	9
<i>14. Local environmental damage</i>	13	13
<i>15. Damage liabilities in B/S</i>	14	7
<i>16. Remediation liabilities in B/S</i>	14	2
<i>17. Environmental capital commitments in Notes to Accounts</i>	17	8
<i>18. Material environmental damages</i>	17	20
<i>19. Environmental contingent liabilities in Notes to Accounts</i>	19	2
<i>20. Auditing of environmental disclosures</i>	20	6
<i>21. Environmental / Eco-auditing</i>	21	20
<i>22. Non-material environmental damage</i>	22	15
<i>23. Market growth - Revenue in P &amp; L</i>	23	23
<i>24. Market decline - Revenue in P &amp; L</i>	23	23
<i>25. Product taxes - Revenue in P &amp; L</i>	23	23
<i>26. Global environmental damage</i>	26	10

The ranking of the relevant "disclosures" is not in unison with the ranking for carrying out environmental evaluations (with the exception of items 14, 23, 24 and

25 which are in any case not so predominant) as shown by Table 5.25. This is apparent right through the table but even more so at the top of the scale; items 1 to 4 of the evaluations are ranked only 14 to 21 for disclosure. The importance / ranking of disclosures appears to be dictated by financial significance. The most important are contingent liabilities, which were ranked joint second with remediation liabilities (the two could be either side of a coin). The importance of environmental contingent liabilities has now been recognised by the Institute of Chartered Accountants in England and Wales which issued a Discussion Paper<sup>39</sup> on the subject in April 1995. The paper covers, *inter alia*, the recognition of the relevant environmental costs as a liability, their possible treatment and disclosure in the accounts. The sheer size of liabilities arising from contamination of land, the sea shore and the impairment of assets will serve as a pivot to drive environmental monetary evaluations into the heart of accounting.

Environmental fines which have been ranked 4th for the Profit and Loss and the Balance Sheet have grown in importance since 1st April, 1991 when the Environmental Protection Act 1990 came into force. Fines are public knowledge, so when companies disclose them, they are not divulging anything new.

The auditing of environmental disclosures, which was 6th, demonstrates the importance some companies attach to their determination to evidence their commitment to environmental concern. Another category which is becoming more and more important is environmental capital commitments (ranked 8 under disclosures) because companies are gradually increasing their investment in new environmental technologies and equipment (see Wilkes, A.J., 1995)<sup>40</sup>. Also the disclosure of damages (as liabilities in the Balance Sheet) was ranked 7 and land remediation (as an asset in the Balance Sheet) which was ranked 9 can be very material and as such warrant disclosure albeit voluntary.

Other types, which have been ranked lower, are shown in Table 5.25. These may still contribute towards understanding and assessing the progress being made in environmental monetary evaluations and transparency through voluntary disclosures. For instance items, such as Research and Development and global environmental damage (ranked jointly 10) may serve as evidence of a company's commitment to converting to environmentally friendly processes and of the universality of its environmental objectives.

The evidence presented here, in the form of Table 5.25, and the above comments lead to the conclusion that the most commonly used environmental monetary evaluations are those which are mandatory whilst disclosures appear to be influenced by financial and other factors.

### **5.3.7 Summary and overview of results**

The results of the study have shown that type of activity and regulation have a greater influence on the environmental accounting practices of companies than company size. In particular, companies whose activities are environmentally sensitive lead the field; this means that there is a large number of companies which are either doing very little or nothing at all. The problem appears to be due to lack of expertise, fear of loss of profits and the lack of general legal or professional requirements to do so. Specifically, some companies appear to have a myopic view towards their survival and the environmental dimension. The protection of the environment was ranked fifth after what they perceive to be their primary survival objectives: (i.e. product quality, profit making, fair business practices and human resources). For such companies, eco-efficiency and accountability are secondary issues. This practice is not untypical of the 'tragedy of the commons' situations. The research has shown that the environmental dimension is not integrated into economic activities and that the protection of the environment should not be left to

the whims of corporations.

The level and method of disclosure depend primarily on the actual environmental accounting in use. The research has shown that the main reason why companies disclose environmental information is to keep various interested parties informed, e.g. their investors, employees and customers. The preferred method of disseminating environmental information is through the use of a special environmental booklet, both now and in the next five years, but where financial information is concerned it is, to a great extent, dispersed in the Annual Report and Accounts of companies. This is so for all types of disclosures i.e. qualitative, quantitative and financial. Because of the peculiarities and diversities of environmental effects, all the types of disclosures are necessary for managing, accounting and disclosing them effectively. The survey has shown that items which can be evaluated in financial terms, were ranked very high for accounting and disclosing purposes, whereas others (such as pollution) were ranked very low. In practice, the financial evaluation and disclosure of environmental effects are done because of legal requirements.

Although the research has shown that an increase in environmental accounting and disclosures is expected in the near future, it is doubtful whether the smaller companies and those whose activities are not environmentally sensitive will adopt them without some form of regulation. Furthermore, companies which fail to protect the environment voluntarily will very likely not consider sustainability (Brophy, M., *et al.*, 1995).<sup>41</sup> Moreover, the survey has shown that there is (and will be in the near future) a gap in environmental accounting activity between eco-efficiency and environmental sustainability.

The overview from the above analysis indicates that accounting is more akin to eco-

efficiency, and the effectiveness of the social measures it supports towards sustainability, is questionable. For example, no cost for the consumption of environmental resources is calculated and borne by the present generation, and the damage done to environmental resources (e.g. the ozone) will be passed on to future generations. According to Owen, D. (forthcoming) "environmental accounting shorn of any wider dimension becomes a narrow, purely technical exercise which fails to address itself to the key conceptual foundation of environmental challenge - that of sustainability."<sup>42</sup>

Nevertheless, although the solution to the problem may depend on the control of the means (e.g. by local and international laws) which support modern lifestyles, environmental accounting can, in the meantime, "provide some basis for environmental disclosure and accountability."<sup>43</sup> (Gray, R., *et al.*, 1996). In essence, "what is emerging is nothing less than a revolutionary new concept of corporate accountability".<sup>44</sup> (Rubenstein, D.B., 1991) which should now be supported by guidelines from the accountancy profession and, in time, by legislation. The analysis of the results recognises the lack of general application of accounting to social and environmental problems without demeaning its technical capabilities.

## **5.4 MODEL ENVIRONMENTAL REPORT**

### **5.4.1 Introduction to the model**

This section illustrates a theoretical Environmental Report of a hypothetical company, Greenco plc, which has a number of subsidiary manufacturing companies. In the model the data of only one site/subsidiary (at Treforest, Wales), is shown separately. The model is not intended to be unique or rigid and the information it contains is not exhaustive. It can be expanded to incorporate a larger diversity of information and data and modified to suit particular

companies/industries.

The message which comes across demonstrates clearly the company's transparency and accountability through the completeness and reliability of the information and data included in the Environmental Report. No changes to the model should be made to obscure this message.

The model is a free-standing report and it does not include any information on health and safety. Some companies may find it more expedient to include all three subjects in one report. If this is done, care should be taken to ensure that the three types of information do not cloud the environmental performance of the company.

The Environmental Report is the responsibility of the company and the auditor/verifier, if one is employed, expresses his opinion on it. If the company lacks the expertise, the auditor may carry out or participate in the accounting work involved in preparing the Environmental Report.

#### **5.4.2 Model criteria**

The creation of the model took into account the following criteria:

1) As already shown throughout the thesis, environmental accounting and reporting are still evolving. It is recognised that the creation of a model might imply that the subject in question has been fully developed, which is not the case. It must, therefore, be emphasised that the model is based on the current state of environmental accounting and reporting developments.

2) It is recognised that the type of information and data in environmental reports will vary from company to company. Therefore, the model should not be considered as a rigid form of environmental reporting. It can be easily modified to



take into account any other pertinent information and thus, present a "fair" picture of environmental performance in each case. Thus, the model enables environmental reporting to be selective in the choice of data and relevant information, which is necessary in order to be informative. From a pragmatic point of view, the model includes information about the major effects of Greenco's activities which convey a balanced view of its environmental performance.

3) The model assumes that a company which issues environmental performance reports must be striving for environmental excellence. Therefore, such a company will have the most stringent environmental policies and its efforts and performance will be among the best prevailing in the world. The model purports to demonstrate such a standard.

4) The overall impression of an environmental performance report should be that it conveys a high degree of accountability, transparency, reliability and completeness. The verification report included in the model reaffirms this impression.

5) Because of the different types of information which must be included in environmental reports (such as qualitative, quantitative and financial) proper segregation is essential in order to facilitate overall evaluation. This was achieved in the model by segregating pollutant emissions, wastes, financial data and other types of information. Also, technical and scientific terminologies have been expressed in layman's terms and a Glossary has been included for improved understanding.

6) The types of data and information which have been included in the model are not exhaustive. Although all activities which have major environmental impacts

were disclosed, others, relatively less significant, have been excluded. There is a need to limit the volume of information and it is important to know where to stop. For example, the model does not include:-

i) Details about stationery (usage and recycling). With some companies this may be a very important aspect of their environmental activities and should feature in their environmental reports.

ii) The evaluation and quantification of incremental costs, e.g. in order to reduce emissions, the company might have had to switch to a more expensive raw material and the extra cost could have been rightly evaluated and included in the environmental performance report.

iii) Similarly the costs/benefits of environmental discounting could be included in that summary.

7) The company's objectives and performance in relation to sustainable development feature in the model. The principles and relevant activities, although of limited development, demonstrate Greenco's stewardship of environmental and other resources and are disclosed to make possible comparative performance.

### **5.4.3 Sources of information for the creation of the model**

The creation of the model represents an important aspect of the research, as it brings together the results of the questionnaire survey and the literature review. The concepts demonstrated by the model and the sources of information emanate from the entire research as a whole. However, certain aspects and sources of information were more directly relevant and they are mentioned below:

1) The results of the survey questionnaire. Specifically, the Data analysis and Results have demonstrated the important aspects and trends in environmental

accounting and reporting, which underpin the concepts and composition of the model.

2) A large number of Annual Reports and Accounts which included relevant information, and a number of actual environmental performance reports. These documents were received following the issue of the questionnaire or through direct approach (i.e. letters and telephone calls). In particular, the more relevant and useful reports are listed in Table 5.26.

3) The need for compliance with Integrated Pollution Control regulations. In particular, the principles of BATNEEC (best available techniques not entailing excessive cost) and BPEO (best practical environmental option). In order to comply with these regulations, companies may have to incur "environmental expenditure" such as licences, capital; and fines for non-compliance. Similarly, although still voluntary, companies may think it advisable to adopt BS7750 or EMAS. This would require, *inter alia*, the implementation of accounting, reporting, management and auditing systems/procedures to enable the company to comply with the standard and achieve its environmental policies and planned future standards and targets.

4) The literature review

5) The latest UN recommendations for environmental disclosures, which were obtained direct from the UN (see Table 3.2).

6) The Valdez principles (see Table 3.4).

7) The ten steps to environmental excellence of John Elkington and Tom Burke (see Table 3.13).

Table 5.26 Environmental information used as reference material for creating the Model Environmental Report

<i>Name</i>	<i>Report description</i>
<i>Booker plc</i>	<i>Environmental Policy and Guidelines on good practice.</i>
<i>BP</i>	<i>New Horizons - The Environment and BP 1992.</i>
<i>BP</i>	<i>New Horizons - Health, Safety and Environment Report 1993.</i>
<i>British Gas</i>	<i>Environmental Review 1993.</i>
<i>British Gas</i>	<i>Environmental Review 1994.</i>
<i>BSO/ORIGIN</i>	<i>Annual Report 1993.</i>
<i>BT</i>	<i>A Report on BT's Environmental Performance 1994/95.</i>
<i>Courtlands Films</i>	<i>Environmental Review, 1993.</i>
<i>Courtlands Fibres</i>	<i>Courtlands Fibres Means Business on Environmental Care, Summer 1993.</i>
<i>ICI</i>	<i>Environmental performance 1993.</i>
<i>ICI</i>	<i>Environmental performance 1994.</i>
<i>National Westminster Bank</i>	<i>Environmental Report 1993.</i>
<i>Rhymney Valley</i>	<i>Rhymney Valley Environmental Charter.</i>
<i>RMC (Sand, Gravel and Readymix Division of RMC Group plc</i>	<i>Safeguarding our Future - Environmental Policy Statement.</i>
<i>Severn Trent plc</i>	<i>Care for the environment - Environmental Report 1991/92.</i>
<i>Severn Trent plc</i>	<i>Environmental Action plan. Progress reports - Autumn 1993.</i>
<i>Shell</i>	<i>Shell and the environment, 1990.</i>
<i>Shell</i>	<i>Environmental action - a shared responsibility - Jan. 1994.</i>
<i>The Anglian Water Group of Companies</i>	<i>Environmental Review 1992/93.</i>
<i>The Body Shop</i>	<i>1993/94 Environmental statement.</i>
<i>THORN EMI</i>	<i>Report and accounts - y/e 31.3.95.</i>
<i>THORN EMI</i>	<i>Environmental Report 1994.</i>
<i>Zeneca</i>	<i>Annual Report and Accounts 1993.</i>

The creation of the theoretical Model Environment Report should not be viewed as being an impediment to further developments in environmental reporting. In any event, the Model demonstrates Greenco's determination and success in striving for environmental excellence. Obviously, the Model demonstrates that Greenco is an environmentally oriented company, which would be the envy of its competitors and companies further afield. Such an environmental report would warrant the esteem of its investors and the public. Therefore, the Model should fulfil its objectives.

Finally, the Model demonstrates successfully a theoretical attempt to establish a reporting standard as a sub-system, within the sphere of traditional accounting.

### **MODEL ENVIRONMENTAL REPORT**

The Model Report on Greenco plc is set out on pages 275 to 296



**GREENCO PLC**  
**ENVIRONMENTAL REPORT**  
**1995**

The following is an extract from the Chairman's Review in the Annual Report for 1995 of Greenco plc:

**"Environment**

Our environmental performance and progress in achieving and maintaining the high standards which we set ourselves in 1991 is described in the 1995 issue of our Environmental Review. The second set of targets for the reduction of emissions and wastes has to be achieved by 1996 and I am confident that this will be done. Further investment in environmental programmes is planned for 1996 and the study for establishing the third set of targets (for 1999), which was started last year, will be completed soon.

Environmental issues are the major problem facing the world today; they affect all peoples and countries. Everyone can play a part in reducing the problem. The environmental debate is no longer whether we damage the environment but rather how to minimise and evaluate the damage. Greenco is committed to play its part by constant review of, and updating where necessary, its environmental management systems and by investing in environmentally friendly manufacturing technologies.

Allied to environmental pressures are the opportunities these may open for new products and processes and Greenco is in a position to take advantage of them.

It remains the responsibility of the Chief Executive and the Board of Directors of each operating company/division to ensure that its detailed policies and procedures comply with these requirements."

## CHAIRMAN'S STATEMENT

The company has, for a number of years now, been committed to excel in environmental performance and to strive for sustainable development. The first Environmental Report was published in 1991 and set out our environmental policy and plans for the future. In line with that policy we continue to improve our environmental management systems and operations, including products and life-cycle analysis, in order to secure more reliable data and minimise the environmental impact of our operations. This, our fifth Environmental Report, shows the progress we have made in meeting the targets we have set.

As a result of the pressure which is being exerted on all businesses through the upsurge in environmental awareness (especially in the last few years), environmental issues are now part of normal business considerations *viz* planning, decision making and monitoring. Our Environmental Report is an important part of this process.

In order to maintain a high standard in environmental management systems, the company is in the process of applying for full certification at its Treforest (Wales) factory for the British Standard BS7750. The study for this was started in 1994 and it has now concluded that certification will be beneficial.

Our environmental performance for the year has been very good. These improvements are a result of sound training, new technologies and improved manufacturing processes. However, we are still not perfect and our aim is for all the companies in the Group to excel in their environmental performance.

The Group's long term goal is commitment to the concept of sustainable



development; to satisfy the needs of the present generations without jeopardising those of future generations. We have demonstrated continuous and steady progress in environmental improvements and we are determined to continue to do so.

A N Other, Chairman, Greenco plc.

### **INTRODUCTION TO ENVIRONMENTAL REPORT**

This report covers the year to the 31st December 1995 and deals with the environmental policies and practices of Greenco plc and its subsidiary companies. It is the fifth annual Environmental Report and describes in particular, the progress made in meeting Group objectives which were set in 1991 and updated in 1993. The report covers the actions for each business activity and the progress made since the adoption of Group environmental policies and practices. The two sets of targets which were established by the Group were instrumental in motivating the staff for improving environmental performance.

The Group has, since 1993, published a more comprehensive report which is also verified by independent accountants, J Bloggs & Co. In the meantime we are keeping an eye on developments in environmental management systems so that we can modify ours and make them more effective.

The 1995 Report shows that the Group is continuing to make good progress in a number of areas but although we are proud of this performance, there is no room for complacency.

The message which comes across our Environmental Report is that we will continue to:-

- Publish (good and bad news)
- Strive for continuous improvement
- Expand the areas for future improvement
- Contribute, indirectly, to the development of high standards of environmental performance and environmental reporting
- Work towards the ultimate aim of sustainable operations

During the year we had no major incidents and, as shown in the Data section of the report, some further progress has been made in energy efficiency, emissions and wastes. International environmental concern about the ozone layer and the impact of halon and CFCs has contributed to the Group's decision to reduce to a minimum the use of these materials. Also during the year, the screening of the environmental policies and systems of major suppliers was extended to include all suppliers whose turnover with us is in excess of £50k p.a. This is in line with the Group's environmental ethic that its responsibilities go beyond its own activities.

The Group's determination to continue to improve its environmental performance is also demonstrated by the decision to spend several million pounds in modernising its operations in the development of new, environmentally friendly products by the year 2000. This will ensure that we are at the forefront of developments and will enable us to achieve the new targets which are being considered.

Greenco is a dynamic and performance-orientated company. Although good progress is constantly being made in environmental performance, there is still much

to be done and the policies and practices which have been adopted should enable us to achieve our goals.

### **GROUP ENVIRONMENTAL POLICIES**

The Group is committed to pursuing its business activities, wherever they may be, in ways which will reduce or eliminate potentially harmful impacts on the environment and the health of all concerned. Greenco plc is a signatory to the International Chamber of Commerce (ICC) Business Charter for Sustainable Development and the Group is continuously striving to improve its environmental performance and efficient use of non-renewable resources.

Overall responsibility for the environment rests with the Board of Directors. One executive director is responsible for co-ordinating and chairing the Environmental Committee, which is composed of the Chief Executive of each subsidiary/division. Implementation of the policy rests with these Chief Executives.

In particular, the Group policies are:

#### **Legislation**

Comply with relevant laws and regulations and where possible operate above the minimum regulations and codes of practice.

#### **Resources**

Use sound production methods and processes, energy and other resources as economically as possible, in ways which minimise waste and have the least impact on the environment.

**Recycling**

Recycle materials, wherever possible, and dispose of wastes (where not eliminated) in accordance with best practice, or find markets for their use.

**Emissions**

Reduce emissions to water, land and the atmosphere.

**Land**

Take into consideration environmental issues relating to land and ensure no lasting damage is done to the natural ecology. Restore land, as far as possible, in case of contamination, mineral extraction, excavation etc.

**Neighbours**

Respect the rights of our neighbours by minimising visual, noise and other impacts and develop their trust in our operations and our understanding of their concern.

**Suppliers**

Adopt purchase policies which require suppliers to have equally high environmental standards.

**Customers**

Develop and provide customers with products and services which have minimal environmental impacts and packaging. Advise customers of the safe use and eventual disposal of our products with regard to any environmental aspects.

**Community support and awareness**

To publicise our environmental policies, practices and performance by issuing annually an Environmental Report. Support local environmental community

programmes and participate with local government and other organisations for improving and developing solutions to environmental problems which affect our business.

### **Training**

Train and equip properly all relevant employees to enable them to carry out their duties in a safe and environmentally responsible manner and in the process encourage their participation in achieving our planned environmental standards.

### **General**

Promote and carry out research and development; ensure that due regard is given to the environment with regard to: all capital investment, discussions with the Unions and the impacts of our vehicles.

### **Methods**

We will set demanding targets and timescales for achieving them, and adopt sound environmental management systems to facilitate monitoring and auditing.

### **Sustainability**

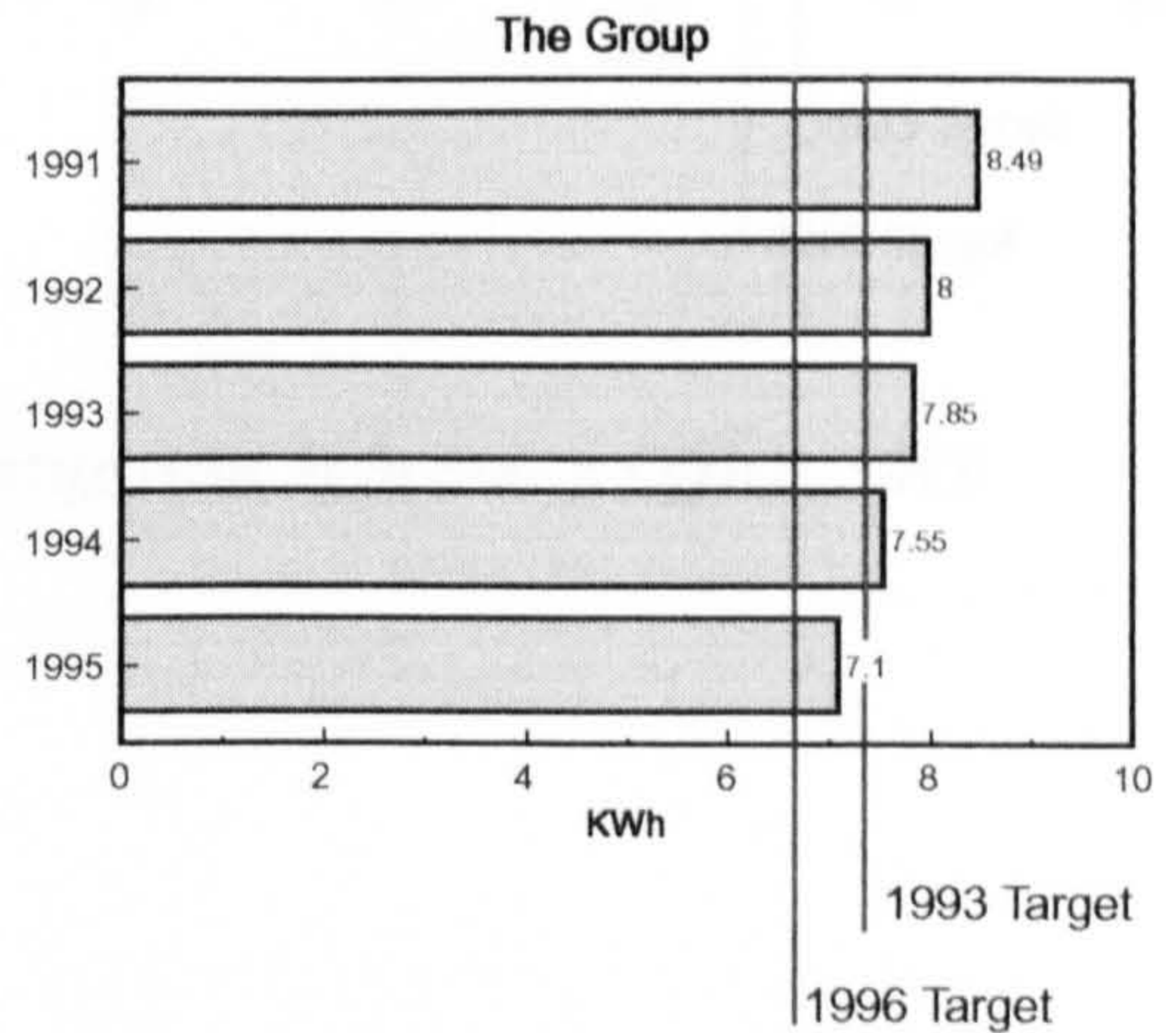
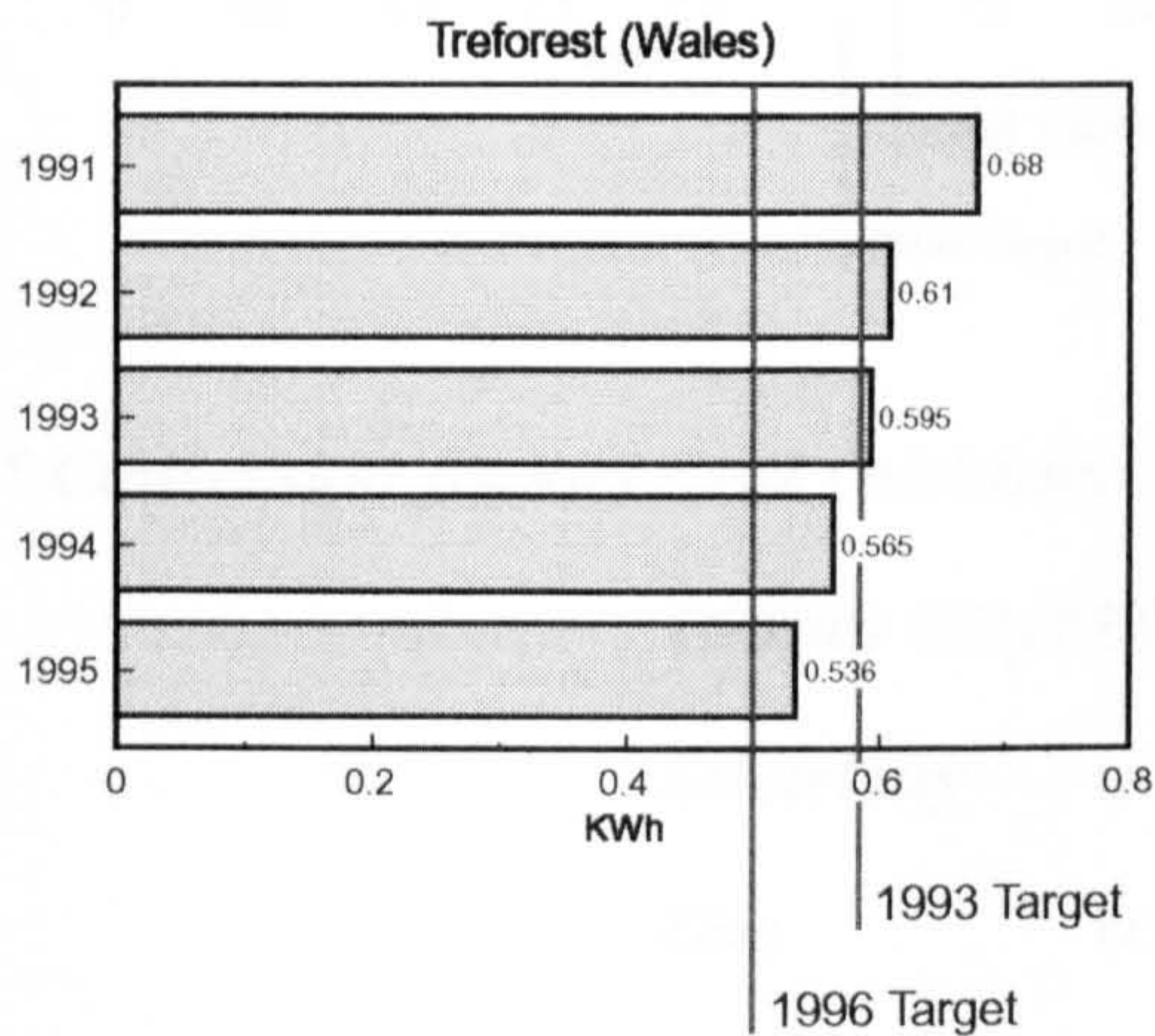
Sustainability is about equity and futurity. The Group will endeavour, through product stewardship, life cycle assessment, recycling and with its procurement policy, to use renewable resources wherever possible, and develop products which economise resources.

**MAJOR DATA**

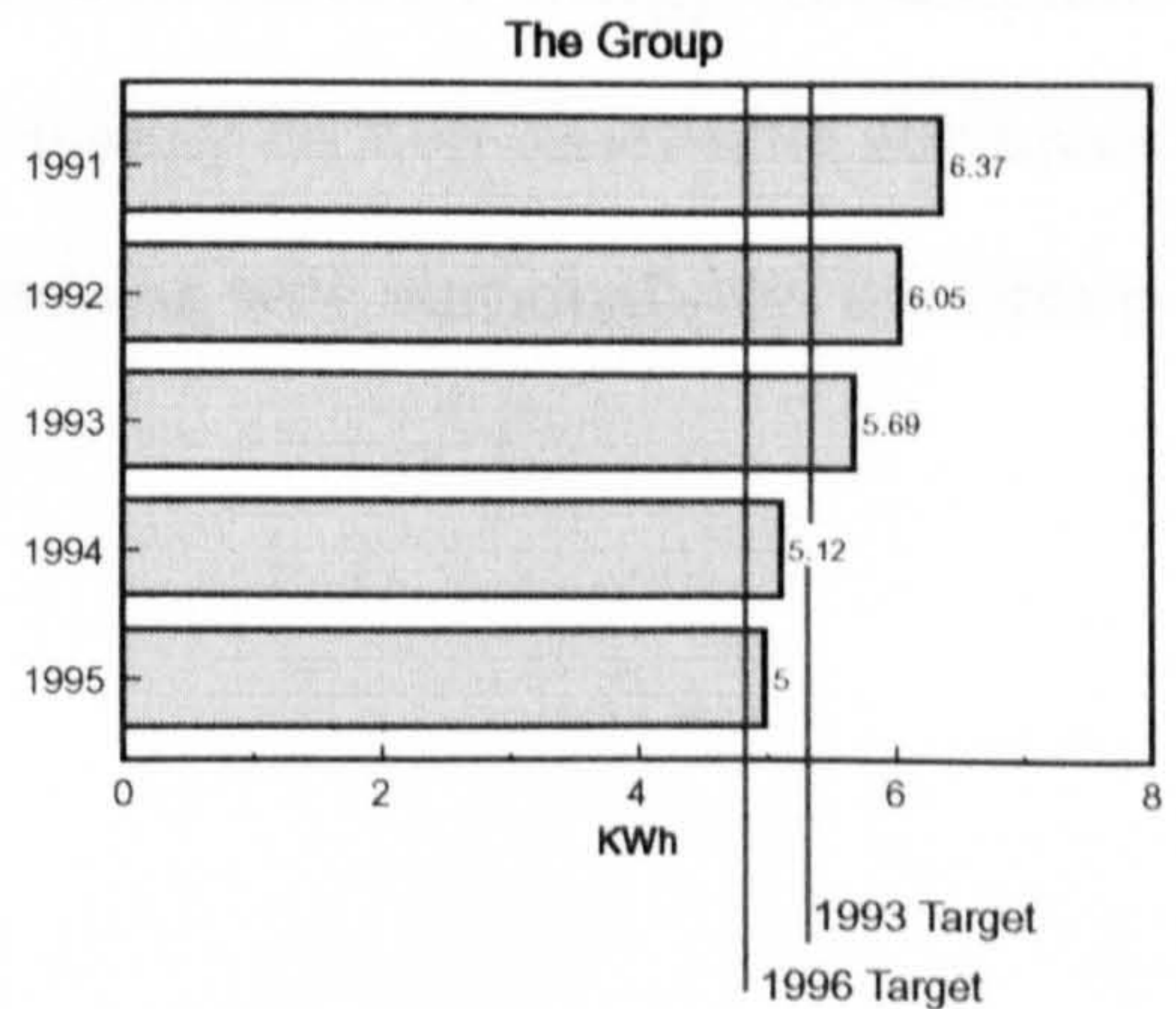
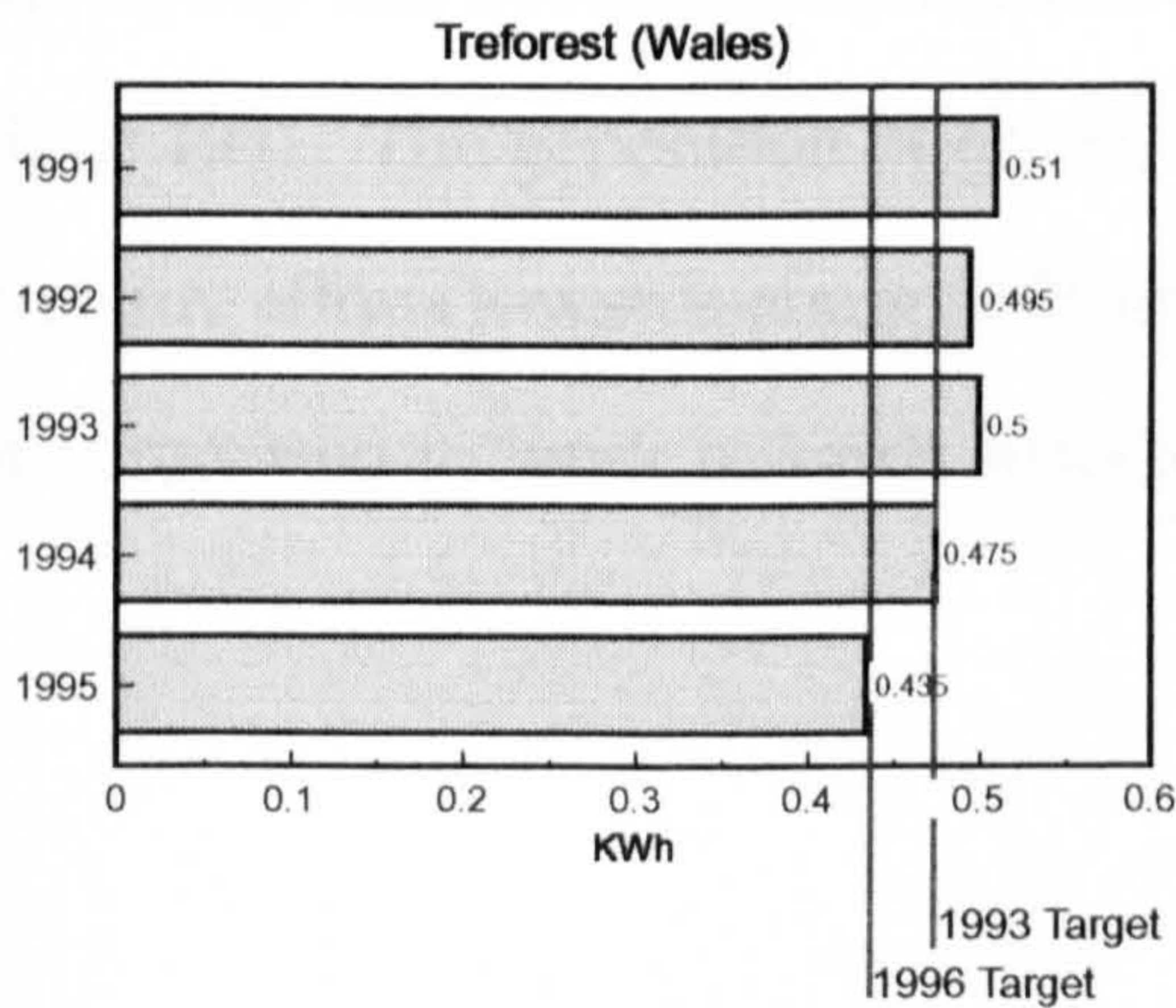
**ENERGY**

Greenco uses a great deal of energy in its operations. The overall trend since 1991 has been a larger reduction (21.2%) in the consumption of gas than in electricity (16.4%). Although the gas targets for 1993 were missed by 11%, the 1996 targets have already been met. Even larger energy savings are reflected in the ratio of turnover to energy as shown below.

**Electricity: Targets and performance (KWh)**

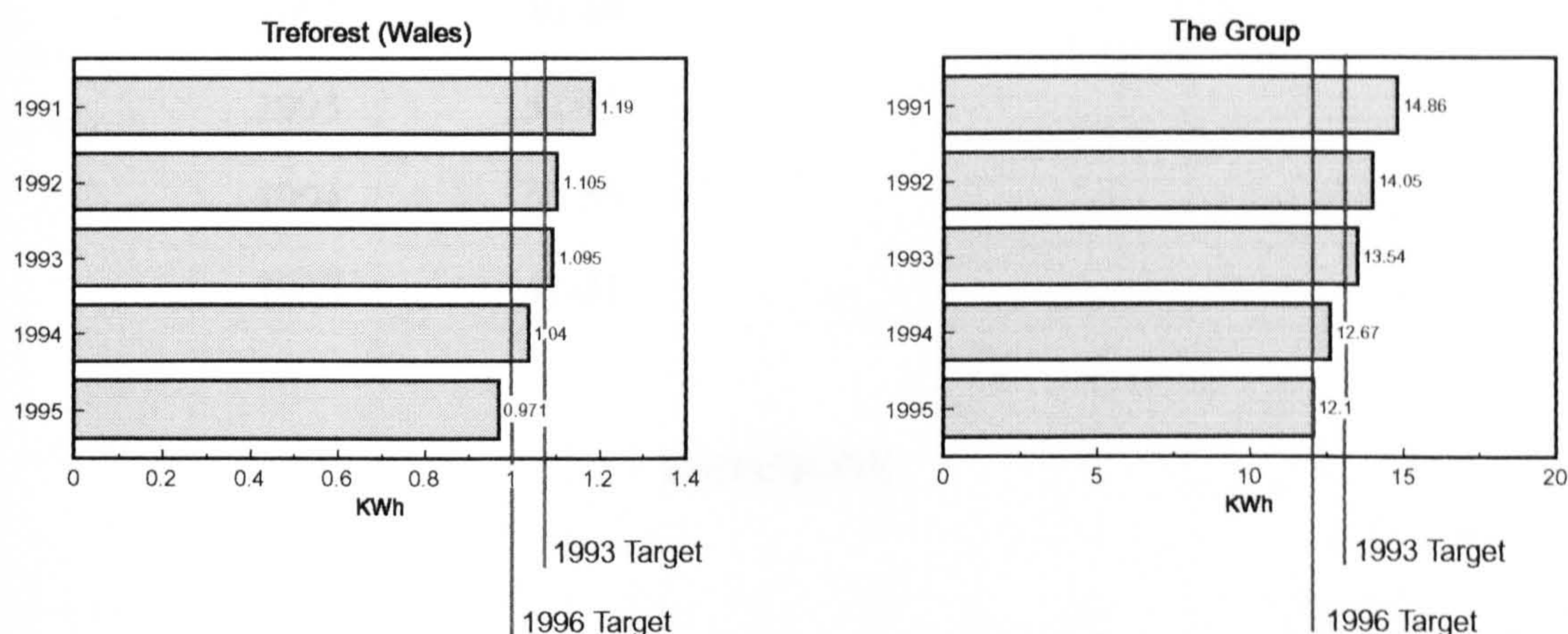


**Gas: Targets and performance (KWh)**



The total energy efficiency since 1991 improved by 18.6% . This reduction amounts to 2.67 MWh, which represents a reduction in CO<sub>2</sub> emissions of 13,000 tonnes\*

**Gas and electricity summary: Targets and performance (KWh)**



\* Conversion factors used (obtained from Energy and Efficiency Office, UK):

*Tonnes CO<sub>2</sub>/MWh*

*Electricity 0.73*

*Gas 0.21*

As a result of improved technology, plant modifications and energy management, the Group has succeeded in increasing output with reduced energy consumption since 1991. The generation of energy depends mainly on non-renewable resources and any efforts towards energy efficiency are helping with sustainability; the Group is committed to work towards sustainability.

Energy consumption, expressed in terms of turnover (£m turnover/MWh), reveals that the energy content, in turnover, has decreased by 51.06% since 1991, as shown below.

1991	27.28
1992	30.49
1993	32.83
1994	36.35
1995	41.21

### **EMISSIONS**

Transport makes a major impact on the environment and causes global warming and urban pollution. The United Nations Convention on climate change came into effect in March 1994. More than 160 governments agreed to control greenhouse gases, in particular, carbon dioxide (CO<sub>2</sub>).

The company is making good progress in reducing emissions from its vehicles. In 1993 the 1996 targets were adopted. The objective was to change, drastically, the mix of vehicles on the basis of fuel used. Arguably, diesel engines are more efficient than petrol engines and therefore cause less harm to the environment. Also, it was then agreed that all new vehicles bought should have catalytic converters and this policy was enforced throughout the Group.



Details of the actual vehicles mix are shown in the Table below.

### Vehicles (by type of fuel use)

	1991	1992	1993	1994	1995	1996 Target
<b>Commercial:</b>						
<i>Petrol</i>	135	120	102	95	67 (30%)	25%
<i>Diesel</i>	75	90	120	135	155 (70%)	75%
<i>Total</i>	210	210	222	230	222 (100%)	100%
<b>Company cars:</b>						
<i>Leaded</i>	40	25	20	15	-	-
<i>Unleaded</i>	15	17	15	24	22 (33%)	30%
<i>Diesel</i>	-	10	18	20	45 (67%)	70%
<i>Total</i>	55	52	53	59	67 (100%)	100%

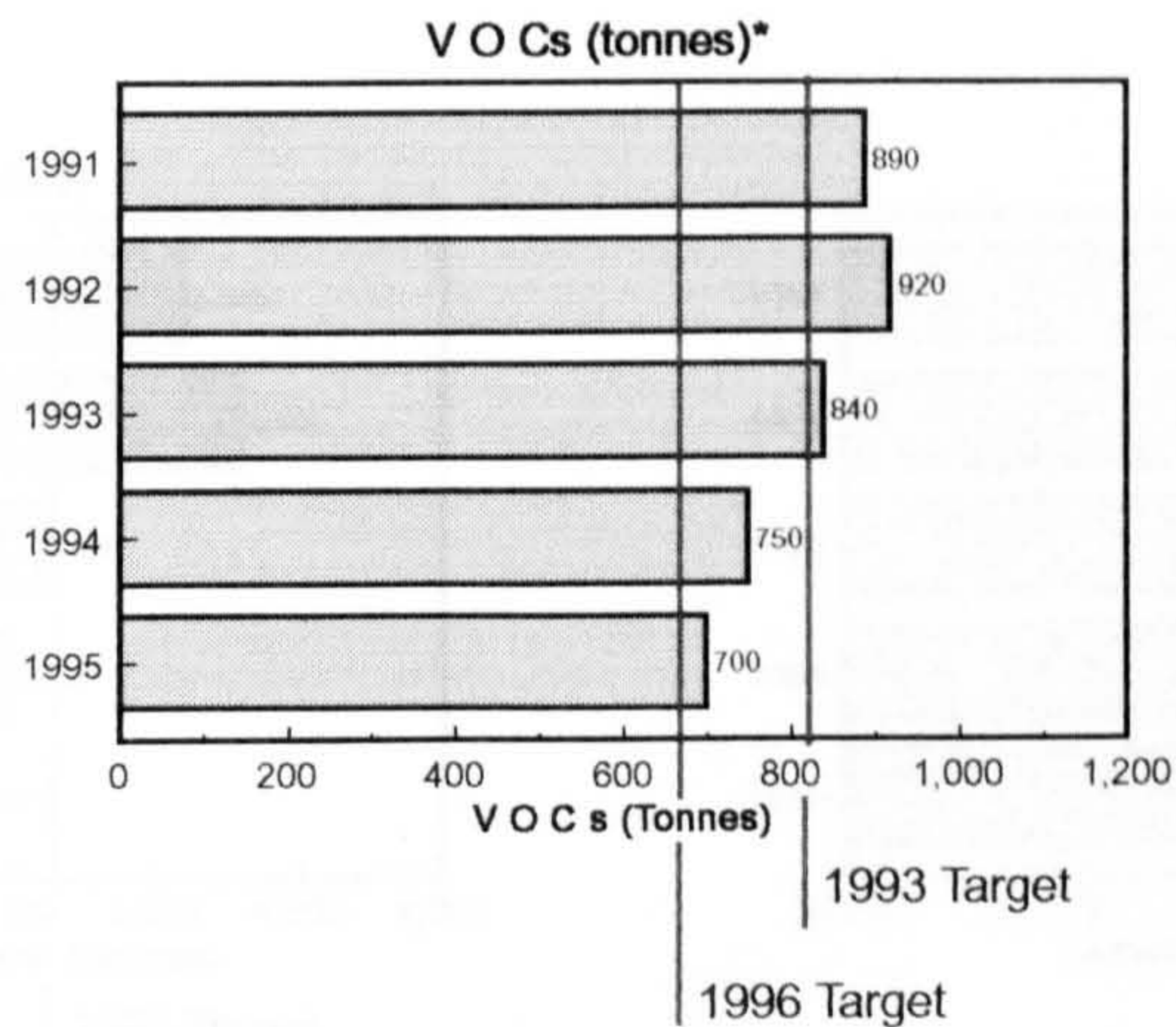
The mix of commercial vehicles has changed considerably since 1993 and the 1996 target should be achieved. In the case of company cars, none of them now uses leaded petrol and the 1996 diesel target of 70% has already been achieved; the unleaded target should be achieved by next year.

## WASTES

### Non-hazardous wastes

Greenco's main non-hazardous waste, namely, Volatile Organic Compounds (VOCs) comes from vehicle fuels, through evaporation and partially burnt fuel in exhausts. VOCs are organic compounds which enter the atmosphere and react with sunlight to create smog.

Petrol causes more VOCs than diesel and this was another reason for changing the composition of the Group's vehicle fleets. Through this measure the Group reduced its VOCs by 16.7% by 1995 and it should be able to achieve the 1996 target.

**VOCs (Tonnes)\***

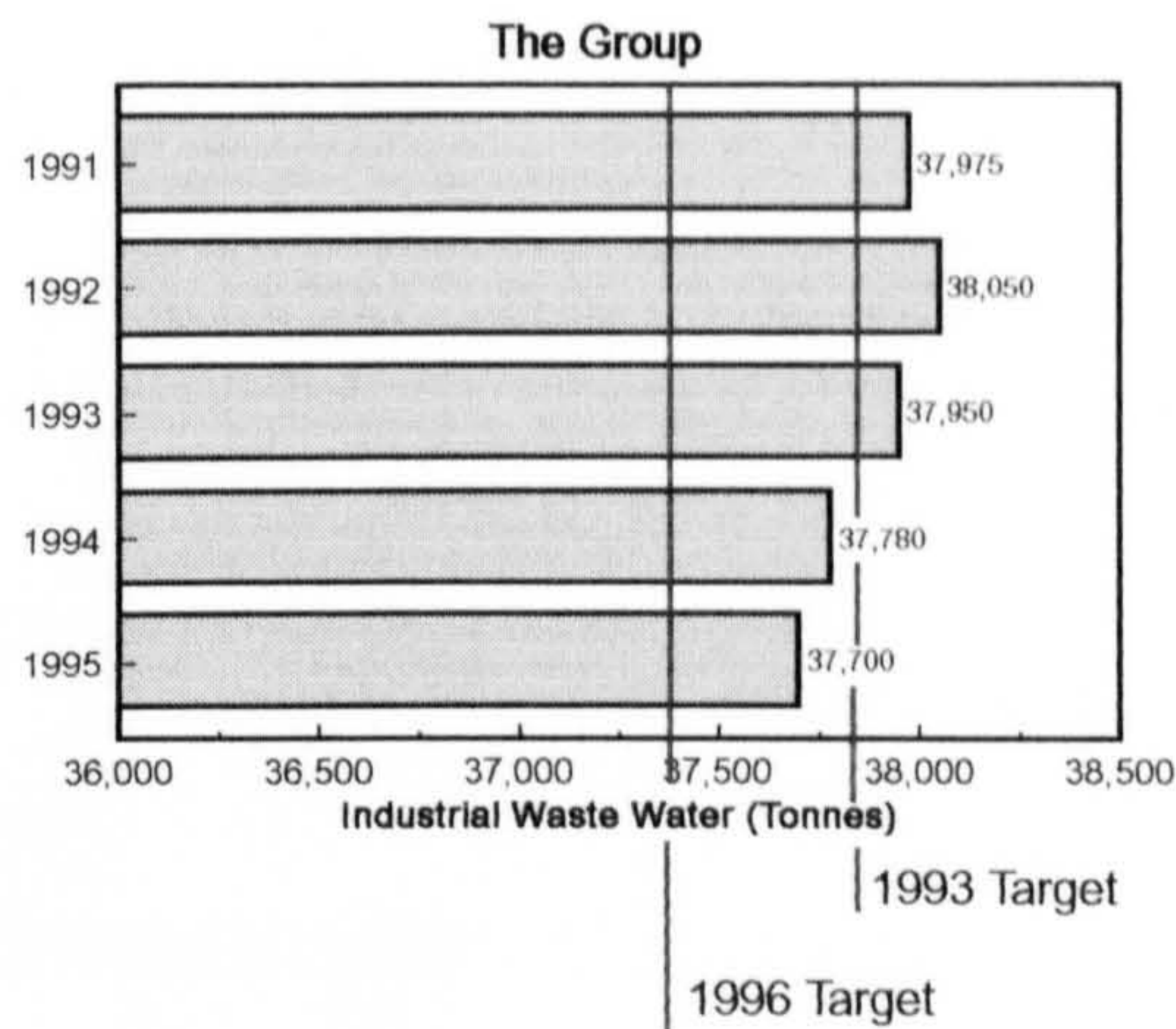
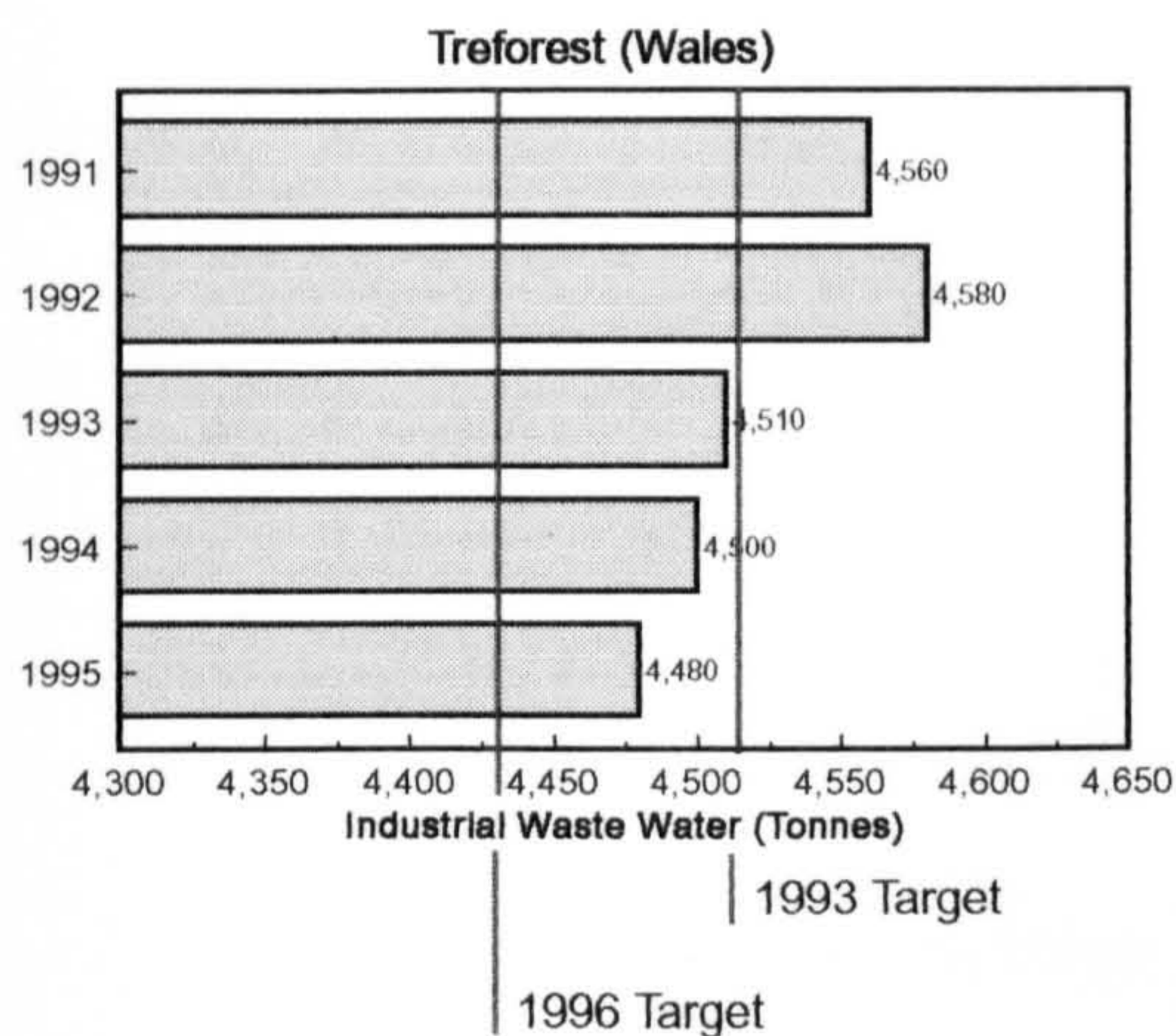
\* derived from mileage records and records of actual fuel; they include additives, thinners, kerosene, etc.

**Hazardous wastes**

Almost all the Group's hazardous liquid waste is industrial waste water. The environmental risks posed by this affect the sewerage systems, the rivers and the seas, where it eventually ends up. Our industrial waste water passes through a water treatment plant where it is tested for average burden of Chemical Oxygen Demand (COD) before it is allowed into the public sewerage system.

As our relevant processes depend on water, our efforts to reduce use of this 'precious' resource have not been very successful. We are concentrating our efforts mainly towards the prevention of environmental damage by continuous monitoring of the COD level; in the last five years the allowed COD limit has never been exceeded.

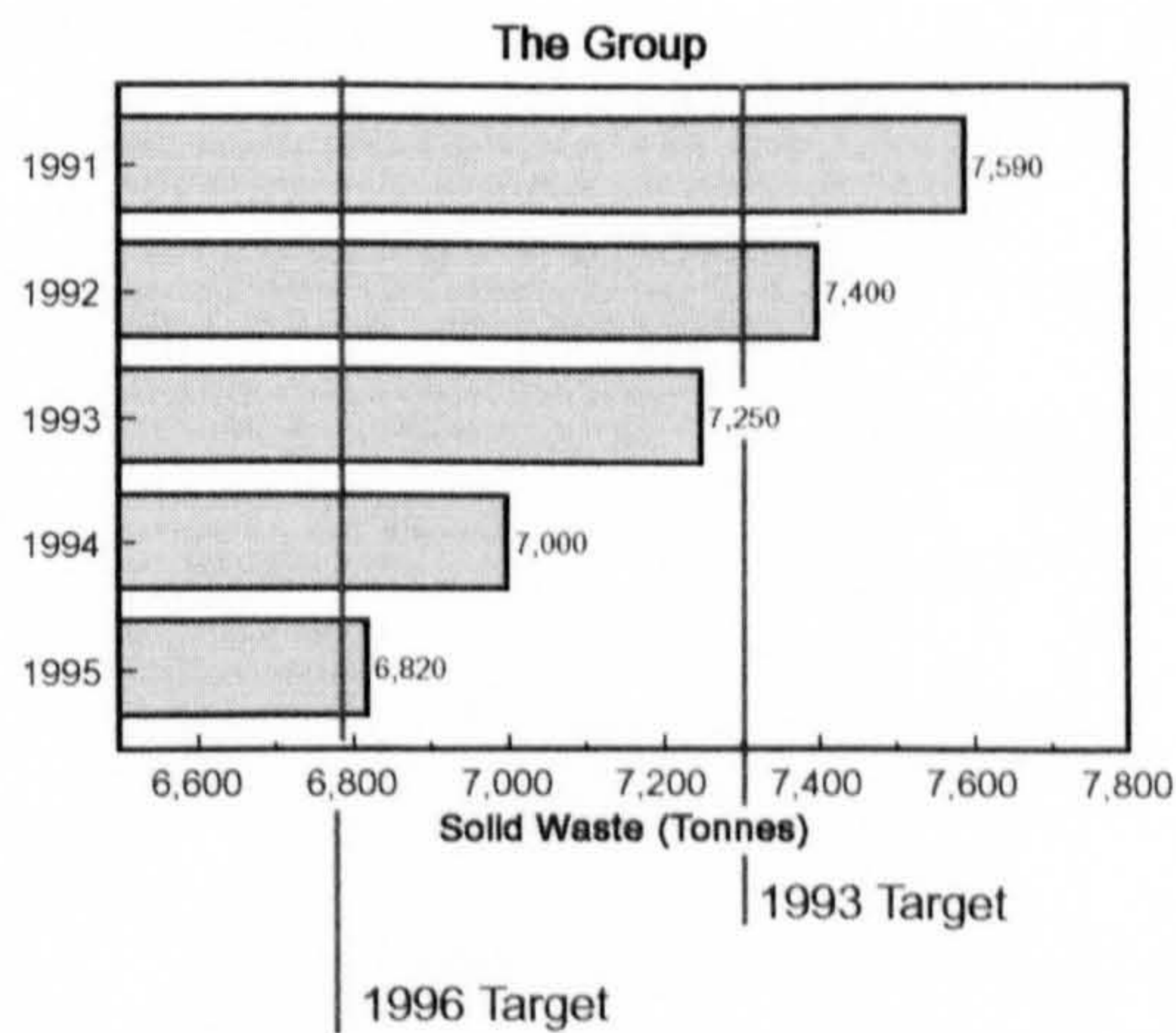
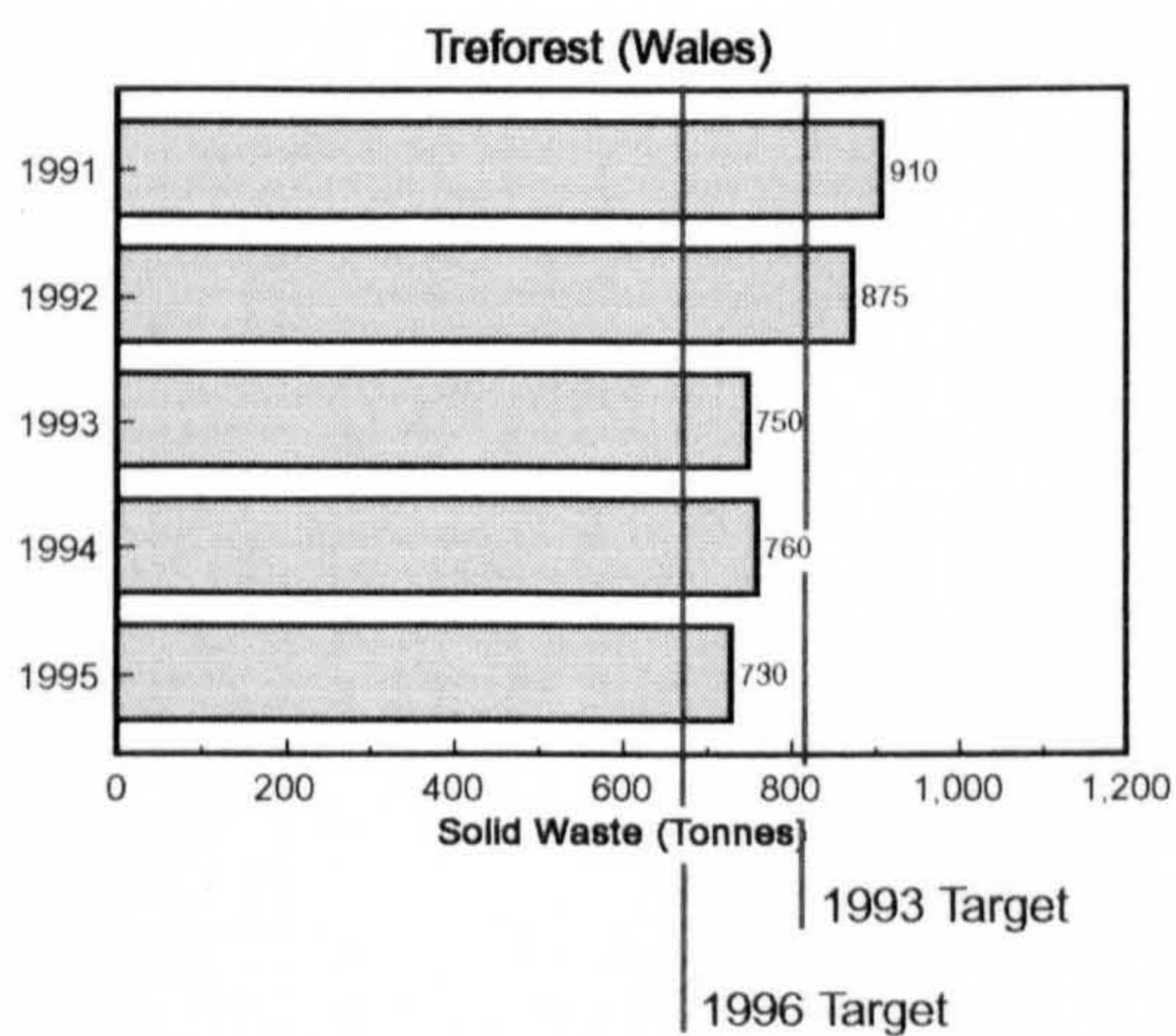
**Industrial waste water (Tonnes)**



**Solid waste**

The Group has been more successful in dealing with solid waste. Our approach to this waste is: reduction, reuse, and recycle. In accordance with our policy all packaging materials are made from renewable resources; a step towards sustainability. The final quantities are sent to landfill.

**Solid waste (Tonnes)**



In terms of turnover, solid waste has been reduced by 27.5% in the last five years:

*£m Turnover/Tonnes of Waste*

1995	13.7
1994	15.2
1993	16.3
1992	17.3
1991	18.9

### ENVIRONMENTAL EXPENDITURE

Greenco recognises the difficulties in ascertaining some environmental expenditure. It is often an integral part of day-to-day operating expenditure and is difficult to identify. Furthermore, there are no financial environmental accounting standards and no clear definitions of what should be classified as environmental costs and benefits. Nevertheless, we believe that these aspects of our business activities cannot be overlooked because of their intricacies and as they are set to grow, the Group endeavours to identify and cost them as realistically as possible.

#### Environmental costs and benefits summary (£million)

	<i>Capital</i>	<i>Costs</i>	<i>Benefits</i>	<i>Net</i>
1991	6.100	2.172	0.022	2.150
1992	2.475	2.640	0.040	2.600
1993	3.450	4.708	0.148	4.560
1994	3.750	4.240	0.170	4.070
1995	4.450	4.306	0.182	4.124
	<u>20.225</u>	<u>18.066</u>	<u>0.562</u>	<u>17.504</u>

**Breakdown of 1995 items (£million)**

<i>Operating</i>		<i>Capital</i>	
<i>Costs:</i>			
<i>Depreciation</i>	3.422	<i>New plant</i>	4.000
<i>Development costs</i>	0.570	<i>Waste plant modifications</i>	0.350
<i>Pollution control</i>	0.140	<i>Land reclamation</i>	0.100
<i>Wastes</i>	0.065		
<i>Clean ups</i>	0.052		
<i>Training</i>	0.045		
<i>All other</i>	0.012		
	<u>4.306</u>		
 <i>Benefits</i>			
<i>Energy efficiency</i>	0.100		
<i>Wastes-recycled</i>	0.050		
<i>-byproducts</i>	0.015		
<i>Packaging</i>	0.017	0.182	
<i>Net expenditure</i>	<u>£4.124</u>	<i>Total Capital expenditure</i>	<u>£4.450</u>

**Environmental capital commitments (£million)**

The group environmental capital commitments were:

	<u>1995</u>	<u>1994</u>
Contracted for	4.450	3.750
Authorised but not contracted for	<u>£2.500</u>	<u>£4.450</u>

**Environmental liabilities**

Provision for environmental liabilities is made when these become likely and the

amounts can be reasonably determined.

## **PRODUCT STEWARDSHIP**

Our environmental policies go beyond any possible environmental effects that our products and processes may cause; they also cover the eco-efficiency of the resources we use and the upstream and downstream environmental impacts. The Group's long term goals are to address the broader issues arising from sustainable development.

The long term success of our products depends on the environmental foundations we are now laying. In particular, we will concentrate and improve our:

- Life-cycle assessment
- Resource procurement
- Clean products and processes

Our life cycle assessment process begins with the inception of the product and ends with its disposal after use; production and distribution are no longer the main issues. This requires the collaboration of both our suppliers and customers. We are working with our suppliers through our procurement policy in identifying and using sustainable materials, processes and methods.

In 1995 we widened the screening process to include all suppliers who have a turnover of over £50k (previously £250k) with the Group; this limit now covers 90% of all suppliers (previously 60%). We value our customers and believe that they have the right to know how to use our products safely and also how to dispose of them after use.

## MISCELLANEOUS

### **Complying with the law**

Environmental laws are not only spreading around the world, they are also getting stricter. Our policy is to operate above the minimum required by the law. Unfortunately, due to unforeseen circumstances, we sometimes fail to do this. In 1995 one of our US subsidiaries was fined £15k under provisions of the Toxic Release Inventory (TRI).

### **Employee involvement and training**

The smooth running of a business depends to a very great extent on its employees. This includes the environmental aspects of our business, and the support of our employees is crucial for the implementation and success of our environmental policy.

All our industrial employees have been trained in the environmental standards and practices they are involved with. 'Environmental issues' have been a standard item on the agenda for discussion at all monthly plant meetings since 1993. Office staff are provided with copies of our environmental policies.

### **Participations**

The Group takes an active part in helping local government find solutions to environmental problems which are allied to its business. It also participates in the debate about sustainable development through any associated initiatives (e.g. the Chamber of Commerce's Charter for Sustainable Development; the Arena Network (The Welsh Business Environmental Initiative)).

**Awards**

In 1993 our subsidiary at Treforest (Wales) received a major commendation in the 'Business Commitment to the Environment Awards for 1993' for its work at the Treforest industrial waste plant.



## VERIFIER'S REPORT

We have been appointed by Greenco plc to verify the Environmental Report for the year ended 31st December 1995 which is set out on pages 237 to 258. The report includes the company's environmental policies (which form the foundation of the Group's environmental practices), major environmental data, environmental expenditure, and other information concerning the Group's environmental performance.

Our verification methodology and tasks were based on the E U's Eco-Management and Audit scheme and included the following:

- the sampling of data and the procedures used to obtain it.
- an examination of the methods for gathering and compiling the data.
- the verification of underlying information that supports statements.
- site inspections (sampled).
- interviews with employees and executives.
- examination of internal environmental audit findings and their follow up.
- systematic documented review.
- ensuring that policy commitments flow through to operations and are complied with.

As a result of carrying out these procedures we are satisfied that the relevant data has been properly prepared and that statements contained in the report are supported by underlying information.

J. Bloggs & Co.

Chartered Accountants

London

30 April 1996

## GLOSSARY

### **Carbon Dioxide (CO<sub>2</sub>)**

CO<sub>2</sub> is produced from fossil fuels when they are burnt or organic matter is decomposed. CO<sub>2</sub> is a major greenhouse gas.

### **Chemical Oxygen Demand (COD)**

COD is used to measure water pollution (from waste water discharges). Wastes provide additional food to bacteria which consume more oxygen thereby leaving less for plants and fish.

### **Greenhouse Gases**

Greenhouse gases alter the thermal capacity of the atmosphere. The main ones are: water vapour, carbon dioxide, methane, chlorofluorocarbons, halons and ozone.

### **Halon**

An ozone destroying gas which is used extensively because of its fire suppressant qualities in fire control systems. Halon has been phased out by the United Nations agreements (Montreal Protocol).

### **Hydrocarbons**

Hydrocarbons are organic compounds composed of hydrogen and carbon. Most are produced by nature. Man-made sources are fuel emissions (unburnt fuel and industrial emissions).

### **Toxic Release Inventory (TRI)**

Under US environmental law companies employing more than 10 people full-time

have to provide annual emissions data of certain toxic chemicals.

### **Volatile Organic Compounds (VOC's)**

VOC's come from vehicle fuels from evaporation and partially burnt fuel in exhausts. They enter the atmosphere and react with sunlight to create smog.

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Greenco's Environmental Report, which has been verified by independent accountants, J Bloggs & Co. is available free of charge from the Environmental Unit and the Company's Registrars at the address shown below.

A business reply card is enclosed with each copy of the report and Greenco welcomes any constructive criticism and comments.

J. Smith	Business Registration Services
Environmental Unit	XYZ Bank plc
Greenco plc	Threadneedle Street
High Street	London
London	W1A 2AY
W1A 2BB	☎ 0171 355 ....
☎ 0171 496 ....	Fax 0171 355 ....
Fax 0171 496....	

## 5.5 CONCLUSIONS

In conclusion, this Chapter attempts to carry out an empirical study of the unresolved issues remaining from the previous chapters concerning the ability of the accounting craft to be adapted in order to handle environmental effects. In order to carry out this study it was necessary to submit a survey questionnaire to major UK companies. In addition, the study has provided answers to the questions posed by the research.

These questions, which were not included in the questionnaire as such, were covered by its various theme(s). The answers to these research questions are, therefore, to be found in the various analyses of the questionnaire replies and/or from the research results as a whole, as explained below.

Research question (1): What environmental accounting and recording techniques are being used?

This theme was covered by questions 9, 10 and 13 of the questionnaire and the responses were fully analysed and discussed in earlier sections. The results demonstrated that companies deal with environmental aspects in one or more of three methods; namely, qualitative, quantitative and financial. The choice of method depends on whether the environmental aspect lends itself to the relevant method. Also, the areas to which environmental accounting and reporting are applied depend on the "forces" which impact on them e.g. the method of accounting for emissions is influenced by pollution control regulations. The analyses of the responses to questions 10 and 11 also demonstrated that all three methods are used in disclosing environmental information. Question 13 also revealed that a great deal of environmental evaluations is being done.

It is, therefore evident that environmental accounting embraces a variety of

techniques and topics and covers environmental effects which are averse to financial evaluation. These conclusions were taken into account in formulating the theoretical environmental reporting model.

Research question (2): Whether it is possible to integrate environmental data with financial information.

The simplicity and strength of financial accounting is derived from uniformity through a common denominator: money. Unlike financial accounting, environmental accounting has to deal with diverse information and a multitude of data, which have no common denominator. The answer to this question was not derived from specific answers to the questionnaire but through the research as a whole.

The research has shown that only some aspects of environmental information (such as remediation costs, fines and contingent liabilities) can be integrated with financial information. As a result of this problem, environmental management and reporting information will become fragmented and ineffective if some of it is included in financial reports and the rest in other report(s). As shown by the questionnaire results of question 10, the majority of companies keep all their environmental information together, and separate from the financial information. Therefore, the theoretical model was developed as a stand-alone report.

Research question (3): Whether the pervasive and elusive effects of externalities can be evaluated and incorporated into the accounting and reporting system.

Answers to this problem were solicited from the respondents through a number of questions in the questionnaire. In particular, questions:- 9: (1), (2) (3) and (11); 13: (1), (2), (3), (4), (5iia), and (6ii). The subject was also considered in Chapters two and three.

The evidence obtained indicates that values can be placed on a large number of externalities and therefore, they can be integrated into environmental accounting and reporting. The reason why this is not done routinely is because there are no legal or other requirements to do so; only values affecting property rights are accounted for in financial accounts.

Research question (4): Whether it is possible for accounting to provide information to facilitate the efficient use of environmental and other resources and thereby contribute to sustainability.

This subject was covered by the literature review and was also included in the questionnaire: question No. 9 (12). The responses to this question indicate that the subject is addressed to some extent with regard to eco-efficiency and to a much lesser extent with regard to eco-justice more at the qualitative level.

The ethical and intergenerational problems relating to resource depletion and environmental degradation were covered in Chapter two and some broad approaches to the problem were suggested. From a practical point of view, accounting can make a contribution (albeit indirect) through its functionality i.e. by providing management with the necessary recording, evaluating and reporting systems for operational and management control purposes.

As the literature review has demonstrated, the traditional (financial) role of accounting is not equal to this task and it therefore has to evolve and embrace new concepts and techniques in order to deal with new demands. These requirements were taken into account when preparing the theoretical environmental performance model; it is replete with such new concepts and echoes with "environmental concern". It is, therefore, feasible for accounting to make a considerable contribution towards the eco-efficiency aspect of sustainability but very little

contribution towards the eco-justice aspect, which in any case falls outside the scope of environmental accounting.

The data analyses carried out and the examination of the results revealed that environmental accounting and reporting are done and therefore demonstrates that the accounting craft is adaptable and can handle environmental accounting evaluations.

Similarly, the preferred medium for disclosing environmental information has been demonstrated, although there is no uniformity in presentation or content. On the strength of the above, a theoretical environmental performance model has been developed as a result of this study.

The sub-objectives of the research which have been identified in the form of research hypotheses have been investigated by the research mainly through the replies to the questionnaire. The relevant results were analysed and evaluated in previous sections and conveniently summarised in Table 5.27. All the hypotheses were proven with one exception; that environmental accounting and reporting were mostly done by large companies. The fact that this hypothesis was not proven demonstrates that size is not a precondition for environmental accounting and therefore the practice is spreading.

Table 5.27 Outcome of the research with regard to the research hypotheses

<i>Hypotheses</i>	<i>Proved (Yes/No)</i>	<i>Reference</i>
1) <i>That environmental accounting is being done.</i>	Yes	<i>Table 5.22 Table 5.25 Section 5.3.4.4</i>
2) <i>That environmental accounting can be adapted to handle environmental accounting and reporting of environmental effects.</i>	Yes	<i>Derived from Table 5.22</i>
3) <i>The environmental accounting methods used by companies are: qualitative, quantitative and financial.</i>	Yes	<i>Table 5.5 Table 5.22 Chart 5.8 Section 5.3.2 etc.</i>
4) <i>That environmental accounting information is published by some specific medium.</i>	Yes	<i>Section 5.3.2</i>
5a) <i>There are clear and definite reasons why companies publish or</i>	Yes	<i>Table 5.23</i>
5b) <i>do not publish environmental information.</i>	Yes	<i>Table 5.24</i>
6) <i>Environmental accounts and reports are most likely done by large companies.</i>	No	-
7) <i>Environmental accounting and reporting is most likely done by companies whose activities are environmentally sensitive.</i>	Yes	<i>Deduced from Literature Review.</i>
8) <i>Companies attach a level of importance to environmental protection which can be compared with the company objectives</i>	Yes	<i>Table 5.21</i>



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## CHAPTER 6

### DISCUSSION AND CONCLUSIONS

#### 6.1 INTRODUCTION

Early in the thesis, the issue of environmental effects and their external reporting was introduced and accounting's ability to handle them was questioned. Three main themes were identified for investigation, for the purpose of demonstrating that environmental accounting is capable of handling them. These related to environmental evaluations, environmental accounting and environmental reporting. In the light of the intervening chapters, each of these themes is 'revisited' here and some conclusions are drawn.

As a result of the appearance and recognition of environmental problems in the last twenty years, accounting has become embroiled with the issues of recording and reporting them. This task involves the development of accounting management systems, the evaluation of the recorded data and their consequent publication through an appropriate medium. Because there has been very little progress made, accounting has been criticised on the grounds that it is unable to deal with the issues as it is currently constituted.

This research has set out to demonstrate the extent to which (or whether) accounting can handle environmental effects, by expanding the domain of its traditional tasks of dealing mainly with monetary transactions. In order to identify and evaluate the problem, a brief examination of environmental concern was carried out, which was followed by an examination of the monetization of environmental effects. The problem was put into perspective firstly by investigating its existence, causes and influences, and secondly by demonstrating whether or not environmental evaluations were possible, so that they could be dealt with by

accounting in monetary terms. In addition, the qualitative and quantitative accounting and reporting methodologies were examined and used in the research. Accounting is becoming a diverse craft, incorporating both monetary and quantitative data. Whilst the former relies on aggregation, the latter defies aggregation. The research has shown that diversification in accounting and reporting is not only necessary but also feasible.

The research method used involved the examination of relevant literature in order to evaluate the situation and formulate an approach for studying the problem. This resulted in the development and use of a postal survey questionnaire for the main study. The relevant data analysis was carried out in section 5.2 and the results were considered in section 5.3, culminating in the development of a theoretical environmental reporting model in section 5.4. By developing this model the research has demonstrated that accounting is capable of handling environmental problems. The importance of the Environmental Report cannot be overemphasised because it is the only visible evidence of a company's approach, methodology and performance with regard to environmental concern.

## **6.2 AIMS OF THE RESEARCH**

The final aims of the research were to answer the research questions, address the hypotheses and resolve the issues posed by the question of whether accounting could be adapted to handle and report environmental effects. The research questions, general hypotheses and the outcome of their examination were discussed in the previous chapter. All the research questions were answered and the general hypotheses have been confirmed with one exception, which was that "environmental accounting and reports are most likely done by large companies." Although the literature review would indicate that this is true, in practice there are

small companies which do so, such as for example, The Body Shop and BSO/Origin. Therefore, it cannot be said that environmental accounting is the prerogative of large companies.

### **6.3 DISCUSSION**

The emergence of environmental accounting and reporting is the result of prevailing environmental problems. As these problems are not a transient phenomenon, their influences on environmental accounting will inevitably intensify. The dilemma in tackling the problems will have to be resolved by accounting. Indeed, the research has shown that pressure to do this is constantly exerted by interested parties.

Although the pressure and demand for environmental information have not permeated through to all sectors of industry, it is likely that indirect pressure, which is emanating from investors, employees, customers and the public (as shown by the results in section 5.3) will gradually force companies to address these issues. In general, so far, the major performers have been the multinational corporations and companies whose activities can have major impacts on the environment. There are though, other companies which have been active in this field; these are companies whose foresight demonstrates that high performance in environmental matters would give them a definite advantage.

The study has approached the problem from a theoretical point of view. Admittedly, accounting is facing serious problems in addressing some environmental aspects. There is, for example, the fact that it is currently impossible to calculate the cost of long-term environmental effects (e.g. the damage to the ozone layer.) Ascribing values to non-market phenomena is difficult, especially when they do not impinge on private property or rights. However, the examination of environmental degradation has demonstrated that short-term environmental effects can take

tangible form by being ascribed monetary values. Also, by identifying and isolating the environmental expenditure of companies (such as environmental projects, remediations, licences and fines), it is possible for environmental accounts and reports to be prepared in monetary terms and thus be brought within the conventional scope of accounting.

The research has also shown that the diverse nature of environmental effects requires that their management, accounting and reporting use the qualitative and quantitative methodologies. Both these methods form an integral part of environmental management and control. They are used by organizations with regard to environmental policies, plans and activities, and compliance with legal requirements, e.g. emission standards. These aspects have been under consideration throughout the research and were covered in particular by the questionnaire survey. The analysis of the results of the survey (see section 5.3.4.4.) has shown that environmental accounting and reporting is in general adopted/done by companies in stages in the following sequence: qualitative, quantitative and financial.

Although the research has shown that corporate social responsibilities go beyond its shareholders, some companies do not address environmental issues because they perceive them as costly and as such they come into conflict with their main objectives *viz* making profit and maintaining high product quality. This was demonstrated by the results of the relevant analyses, which are presented in Table 5.21. "Profit making" had the highest negative correlation with the "protection of the environment," which was discussed in Section 5.2.4.3. The concern over costs and profit-making is a real obstacle to progress, which implies that issues will have to be addressed through regulation, although some pressure is being exerted for environmental information by interested parties. In particular, investors, apart from

the ethical investors, would only be interested in how environmental effects affect profits and not in the company's environmental performance. If the environmental measures taken by their company improved their financial interests, they would support them; if not, such measures would be of no interest to them.

This aspect of environmental reporting (i.e. the effect on profit) has not been addressed by companies. The main reason for this is that it is a difficult exercise, since some of the costs and benefits are embedded in the normal costs and benefits and there is no regulation regarding the form and content of environmental reports. Also, there is no agreed definition or a finite list of what constitutes environmental costs and benefits and no verification is required. As a result companies have been free to disclose what they like, the emphasis usually being on policies and emissions data, resource efficiency and to a lesser extent, product stewardship. Environmental accounting information should become more readily available, both because companies have to comply with Integrated Pollution Control regulations, and through the adoption of voluntary schemes, such as EMAS and BS7750. Environmental management relies on compliance through implementation of proper environmental management systems.

By demonstrating that the accounting craft can accommodate environmental data in monetary and quantitative terms, it also demonstrates that it is a social as well as a technical tool. With the reappearance of CSR and the increasing interest and developments in environmental reporting, accounting is creating a new niche for itself. It is addressing one of the major problems of the late 20th century: that of environmental degradation and resource depletion. The research has shown that this can be done by contributing towards environmental management and eco-efficiency in setting and monitoring targets and/or by input-output analysis (i.e. the eco-balance method). Environmental accounting is now emerging as a sub-system



within the traditional accounting system.

Pressure by society in general, is forcing companies to demonstrate their environmental performance and in doing so is forcing them to improve their environmental practices. The research has demonstrated that not only the shareholders of companies should have such information, but also its other stakeholders. There is a growing demand for accountability by, and for, a growing number of audiences. Although there are not yet any legal requirements for such disclosures, there appears to be a tacit expectation that society must receive such information. The very nature of the subject raises public concern and therefore a right-to-know may be invoked. Under the circumstances, it is not surprising that environmental reporting is being demonstrated willingly, both by companies whose activities are environmentally sensitive and by companies which are not engaged in such activities. However, there is no requirement for environmental disclosures to be audited and therefore some lack credibility, as they are used by companies for public relations (PR) purposes.

The research has made it possible for an environmental reporting model to be prepared which can help in improving environmental reporting practice. It demonstrates transparency and accountability, and provides credibility through the verification/audit report. The model will also of necessity improve the environmental management and monitoring techniques which are required in order to generate the relevant information.

Environmental accounting and reporting have only just begun and there is a long way to go. In the meantime they are evolving without direction and guidance from the accountancy profession. They need to be defined and made more reliable by verification and regulation, so that they will not be used for PR purposes. The lack

of environmental accounting and reporting standards may result in the issuing of incomplete and possibly misleading information which is bound to affect the level of effort directed towards environmental protection.

#### **6.4 RECOMMENDATIONS FOR IMPLEMENTATION**

The environmental problems with which companies are faced are many and varied. Obviously some companies will have more than others, merely because their products and processes have different impacts upon the environment. This diversity and complexity in problems create a variety of issues which have to be covered in environmental reports.

Variety in disclosures is fundamental to the integrity and completeness of environmental reporting, and regulation should not be allowed to stifle this process, forcing environmental accounting and reporting into a narrow set of legally defined techniques. The legal standards are often the minimum requirement which facilitates compliance, as extremely high standards would be unachievable and unenforceable. Since many companies profess that they strive for environmental excellence, they are expected to overachieve their targets and therefore operate above the minimum. Thus, regulation may actually bring down environmental standards. Therefore, an environmental regulation strategy would require standards which are above the minimum perceived necessary by the industry and the public. Alternatively, the emphasis should be on the variety of disclosures rather than standards which would be subjected to an audit. This would add credibility to environmental reporting, promote accountability and eliminate any PR orientation.

Also, because of the prevailing PR problem, interested parties do not feel they are getting the necessary and reliable information for assessing the environmental performance of management in fulfilling the company's environmental goals. Some

form of regulation and verification would be more beneficial to investors and consumers. Although diversity in environmental reporting is necessary, freedom of choice must be limited, especially with regard to environmental measurements and content. Otherwise, management may try to minimise any unfavourable environmental effects while maximizing the favourable effects.

The abuse of environmental reports for PR purposes by companies could be blamed on the accounting profession because of its failure to make an early and positive contribution to environmental issues. Therefore, the need for environmental accounting and reporting standards is more important and pressing than it might appear.

## **6.5 FURTHER RESEARCH**

This study has highlighted a number of areas relating to environmental accounting and reporting which warrant further investigation. These subjects deal with classification and costing, and would enhance and clarify identification of relevant items. In particular, further research is needed to deal with:

- 1) identification and classification of environmental costs and benefits, assets and liabilities, including the costs and benefits of both upstream and downstream environmental effects, and
- 2) segregation of the environmental element of those costs and benefits which are generally embedded in normal costs and benefits.
- 3) the practical testing and implementation of the environmental performance model.

Such research would make environmental accounting and reporting more comprehensive and add to their credibility.

## **6.6 CONCLUSIONS**

The study has shown that environmental effects are increasingly impacting on enterprises and are gradually perceived not just as business problems but as issues of competitiveness. An increasing number of companies are publishing details of their environmental policies and practices in an effort to demonstrate their concern for the environment. Whether this is done through genuine concern and accountability or for pure PR reasons may be irrelevant, since through their emergence (irrespective of motives) they lead to understanding of the issues and inspire a commitment to continuous and better environmental performance. In this respect the "abuse" of environmental reports for PR purposes is serving a purpose which might not have been envisaged.

However, the real purpose of environmental accounting and reporting does not lie in competitiveness and PR, but in demonstrating the management of environmental impacts and in the transparency and accountability of companies. Environmental management may be a new aspect of business management for some companies but the signs are that environmental management will gradually become a daily aspect of management through the imposition of legal requirements, standards or voluntary action. Consequently, the demand for environmental accounting and reporting is set to increase; this is borne out by the results of the questionnaire survey.

Admittedly, the need for environmental accounting and reporting has been apparent for some twenty years now, but development has been very slow, as evidenced by

the literature review. This was blamed on accounting's apparent inability to adapt and accommodate the needs of the environmental dimension. This study represents an attempt to discover the current state of such developments. The overall conclusion that emerges from this study is that environmental accounting is being done and is becoming more widespread.

One of the difficulties in the evolution of environmental accounting has been the problem of externalities. The evidence obtained from the literature review and the questionnaire survey demonstrated that not all externalities are measurable in monetary terms. Unfortunately, because of the prevailing views that externalities are either non-measurable or irrelevant, they lead to an attitude of mind which acts as a barrier to developments in this field. Obviously, some externalities, such as the effects of ozone depletion and acid rain, are still beyond quantification and evaluation. In this case the opportunity to shelter behind the non-measurability of externalities remains open. In any event, because of the diversity of environmental effects, investigation into accounting and reporting aspects had to be kept within reason and the theoretical environmental performance model was created on this premise.

Both the literature review and the questionnaire survey have also demonstrated that there is no evidence to indicate that there is a concerted effort by industry to address the question of sustainability. The evidence which was obtained shows that the only aspects which feature in industry's concern for sustainable development relate to eco-efficiency (e.g. in energy efficiency, pollution control, recycling and wastes). Consequently, accounting's contribution to sustainability is limited to the accounting and reporting aspects of resource use and efficiency.

Possibly one of the most important conclusions to be drawn is the need to put an

end to the perceived notion that environmental accounting and reporting is done for PR reasons. PR-oriented environmental reports may be an effort to hide poor environmental management which could lead to deteriorating environmental performance. Such reports distort the purpose of environmental reporting, as they are contrary to transparency and accountability. There is, therefore, an urgent need for regulatory bodies to make the verification of published environmental data and information mandatory.

At the beginning of this thesis, it was stated that the research would seek to address the relevant issues. The thesis has demonstrated that environmental accounting and reporting are both feasible and necessary, and in so doing it has pushed forward the literary and practical aspect of the subject. This conclusion can be supported by the original and significant contribution made by the research, the main aspects of this being:

- 1) The research developed and made it possible to demonstrate a system of double-entry book-keeping for dealing with environmental effects (see Section 3.3.2.2.4).
- 2) It demonstrated that accounting can be adapted to handle environmental effects and also the directions that environmental accounting developments are taking; in particular, incorporating and dealing with data which lack a common denominator.
- 3) It has made possible the preparation of a comprehensive stand-alone theoretical environmental performance model.
- 4) The empirical evidence has shown that environmental accounting and reporting are expected to increase. Also, that they are carried out by a variety of enterprises,

not just those whose activities are environmentally sensitive.

- 5) It has shown that environmental accounting and reporting cannot be satisfactorily integrated into the Annual Report and accounts of companies, and that to integrate only financial data would necessitate the fragmentation of environmental information and make it ineffectual. A stand-alone report is the best method according to the results of the questionnaire survey.
- 6) It has demonstrated that general uniformity in environmental accounting and reporting is impracticable. Flexibility is essential in order to accommodate the diversity of environmental effects.
- 7) The research has shown that there is an urgent need to have environmental reports verified to prevent the possible publication of misleading environmental data which may lead to the wrong conclusions being drawn at national level. Without such verification it is not possible to assess management's efforts in accomplishing environmental goals and objectives.
- 8) It identified the most important audience for environmental reporting (e.g. 1 = shareholders; 2 = employees; 3 = customers).
- 9) The results of the questionnaire survey demonstrated that it is perceived by management that there is a negative relationship between profit making (and product quality) and the protection of the environment. Although this was evident from the literature review, the research corroborated it,. The priority of concern lies firstly with the financial interests of the company; and secondly with the environment.

10) The research has shown that legislation should not be allowed to stifle variety in environmental reporting by introducing a narrow set of rules. Instead it should concentrate on environmental causes and effects.

Thus, in summary, the subject was brought about by the recent environmental disasters, continuing pollution, environmental degradation and resource depletions. These problems and the influence of pressure groups have increased the environmental concern of society in general, on an international scale. In the meantime, the 'polluter pays' principle and the concept of sustainable development have achieved almost universal recognition and environmental laws have been introduced by many countries. Environmental management is becoming a daily task; it is now both necessary and urgent.

The conditions are right for accounting (which is in a privileged position) to make a positive contribution and influence developments in environmental management systems. The research has demonstrated that the monetization and quantification of many environmental effects are possible and that environmental accounting and reporting are being done and being done increasingly. It has been demonstrated that accounting can, indeed, be adapted to handle environmental effects. The research has also highlighted the direction that environmental accounting and reporting are taking. They are embracing not only monetary values but also: qualitative information; quantitative and scientific data; environmental management systems; product stewardship; resource use efficiency; actual environmental control of emissions and wastes (by setting targets and monitoring progress in achieving them); improved employee training; and to a lesser extent working towards the ultimate aim of sustainability.

Although there are no legal requirements, standards, or guidelines for environmental



accounting and reporting, it has still been possible to make progress, admittedly for the wrong reasons, i.e. for PR purposes. These developments have their origins in environmental concern and the indications are that as long as environmental problems prevail, environmental accounting and reporting will thrive. In response to this perceived need, a theoretical environmental performance model was prepared which takes into account current developments and puts in perspective the functionality of the accounting craft.

The research has shown that environmental accounting and reporting is feasible and is adopted in three stages: qualitative, quantitative and financial, and that it is spreading gradually. As the practice becomes more widespread, it will also become more comprehensive and effective. Environmental problems are perceived by companies either as opportunities or hindrances to their main objective of making profit. Either way they will have to be addressed by all concerned.

The evidence suggests that it is only a question of time before the practice becomes widespread, either voluntarily or through legal requirements. The process of environmentalization emerging from the research is neither radical nor revolutionary, but progressive and pragmatic. As such, it is multidimensional; fulfilling the different needs of society, whilst allowing companies to pursue their primary goal of making profit (so long as they operate within established environmental criteria). It is suggested that a new business ethos is emerging which embraces the environmental dimension and endeavours to eliminate/minimize environmental damage and risk. Under this scenario of progressive environmentalization, environmental accounting can achieve a significant position in environmental management and in fulfilling its role of handling and reporting environmental effects.

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**APPENDIX A**

**QUESTIONNAIRE COVERING LETTER**



**Centre for Research  
in the Built Environment**

Pontypridd  
Mid Glamorgan CF37 1DL  
Telephone 0443 480480

16 May 1994

Dear Sir/Madam

**Environmental Accounting Research**

We are conducting research at the University of Glamorgan on the subject of Environmental Accounting and disclosures in the UK and would welcome your help with the enclosed questionnaire.

It would take only a few minutes of your time to complete and return it in the enclosed business reply envelope.

We would emphasise that individual company information will be kept confidential.

We hope to begin analysing the responses as soon as possible and look forward to receiving the completed questionnaire.

Yours faithfully

**A.K. Jones, MA, Dip Soc.Sc., Principal Lecturer.  
P.H. Makris, MA, FCA, ACIS, MBCS.**



**APPENDIX B**  
**QUESTIONNAIRE**

UNIVERSITY OF  
GLAMORGAN

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ENVIRONMENTAL  
ACCOUNTING/DISCLOSURES  
QUESTIONNAIRE

Department of Property  
and Development Studies  
University of Glamorgan  
PONTYPRIDD  
Mid Glamorgan  
CF37 1DL

Telephone: A K Jones ( Direct Line) 0443 482694  
Office 0443 482121  
Fax: 0443 482158

## UNIVERSITY OF GLAMORGAN QUESTIONNAIRE

ON

## ENVIRONMENTAL ACCOUNTING/DISCLOSURES

In order to establish the types of organisations which adopt environmental accounting and disclose their environmental practices, I shall be pleased if you would answer the following questions.

If you think that some questions could be better answered by someone else in your Company could you please pass on the questionnaire for him/her to deal with.

Please respond by circling the appropriate answer or by providing the required information, as the case may be.

1. Is your Company the ultimate Parent company of a Group?	YES NO
2. Where is the ultimate Parent company registered?	UK USA EUROPE ELSEWHERE
3. How long has the Company been in existence?	..... Years
4. What was the Group's turnover in the latest published accounts?	£..... Million
5. Where does the Company operate?	UK USA EUROPE ELSEWHERE
6. To which sector does your Company belong?	
1. Banking/finance	1
2. Building/construction	2
3. Chemicals/plastics	3
4. Electricity	4
5. Food and drink	5
6. Diversified Industrials	6
7. Engineering	7
8. Mining	8
9. Oil and Gas	9
10. Paper and packaging	10
11. Pharmaceuticals	11
12. Services	12
13. Transport/distribution	13
14. Water	14
15. Other (please specify) _____	15

7. Please indicate the level of importance that your Company attributes to the environment by ranking the following seven company objectives using each number from this scale once only.

Most important						Least important
1	2	3	4	5	6	7

	Ranking
Fair business practices	<input type="checkbox"/>
Human resources	<input type="checkbox"/>
Protection of the environment	<input type="checkbox"/>
Profit making	<input type="checkbox"/>
Energy conservation/efficiency	<input type="checkbox"/>
Community involvement	<input type="checkbox"/>
Product quality	<input type="checkbox"/>

8. With regard to Environmental Policies please indicate the appropriate response for your Company by ticking the relevant box below.

- 1. Adopted by the Company one year ago
- 2. Adopted by the Company three years ago
- 3. Adopted by the Company more than three years ago
- 4. Planning to adopt them within the next year
- 5. Planning to adopt them within the next three years
- 6. No plans as yet to adopt them.

If your Company has adopted Environmental Policies could you please enclose a copy of them when returning this questionnaire.

9. The methods for Environmental Accounting and Management can be qualitative, quantitative, financial or a combination of all these and may cover the aspects listed below.

Please indicate which method(s) your Company uses or is likely to use, for each aspect by ticking the appropriate boxes.

Environmental aspects	1	2	3	4	5	6	7	8	9	10	11	12
	Qualitative/Unquantified				Accounting in quantities (e.g. emission units)				Accounting in financial units (e.g. £ s)			
	Now	In the near future	No such plans	N/A	Now	In the near future	No such plans	N/A	Now	In the near future	No such plans	N/A
1. Pollution of : Air	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Wastes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Energy use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Recycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Remediation costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Returnable containers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Contingent liabilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Life-cycle analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Environmental impact assessments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Environmental sustainability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Environmental cost budgeting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Regulation compliance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Others (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If your Company has implemented any of these methods for any of the environmental aspects mentioned above, could you please let me have details below or on the reverse of this page of how it is done.

10. The publication/disclosure of environmental information may be done in the following manner.

Please tick the appropriate box(es) to indicate the method(s) of disclosure used by your Company :

	a	b	c	d	e
	Dispersed in the Annual Report	Special Chapter in Annual Report	In a Special booklet	None	Other method of disclosure (please specify)
1. Qualitative/Unquantified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
2. Quantified/statistical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
3. Financial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

11. For each medium of disclosure you ticked above, please indicate the volume of your Company's disclosures by writing the appropriate number from this scale in the boxes below.

None				Considerable
1	2	3	4	5

a) In respect of the Company's latest financial year:

1. Qualitative/Unquantified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
2. Quantified/statistical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
3. Financial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

b) By the end of the next five years:

4. Qualitative/Unquantified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
5. Quantified/statistical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
6. Financial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

If your Company makes any disclosures could you please enclose a copy of them when returning this questionnaire.

12. Could you please indicate the reasons why your Company makes public its environmental information by circling the appropriate number in the scale or N/A on the right hand side below. If your Company does not disclose any such information please answer section (b) below instead.

Most important				Of no importance	
5	4	3	2	1	N/A

**Section (a) Reasons for disclosures**

1. The Company's shareholders/investors should know	5	4	3	2	1	N/A
2. The Company's employees should know	5	4	3	2	1	N/A
3. The Company's suppliers should know	5	4	3	2	1	N/A
4. The Company's customers should know	5	4	3	2	1	N/A
5. The public should know	5	4	3	2	1	N/A
6. Required by an overseas Parent company	5	4	3	2	1	N/A
7. To safeguard the Company's good name	5	4	3	2	1	N/A
8. To pre-empt more stringent legal requirements	5	4	3	2	1	N/A
9. Sooner or later it will become common practice	5	4	3	2	1	N/A
10. Other (please specify) -----	5	4	3	2	1	N/A

**Section (b) Reasons for NO disclosures**

11. Not required by the Accountancy profession	5	4	3	2	1	N/A
12. Not required by the Stock Exchange	5	4	3	2	1	N/A
13. Not required by law	5	4	3	2	1	N/A
14. No demand for such information	5	4	3	2	1	N/A
15. Not yet considered by the Company	5	4	3	2	1	N/A
16. The costs outweigh the benefits	5	4	3	2	1	N/A
17. Such information is confidential	5	4	3	2	1	N/A
18. Environmental data would be incomplete	5	4	3	2	1	N/A
19. The Company lacks such expertise	5	4	3	2	1	N/A
20. Other (please specify) -----	5	4	3	2	1	N/A

13. Here I am trying to establish which specific types of environmental monetary evaluations and practices are carried out and disclosed by your Company.

Please circle the appropriate answer for each type.

Types of monetary evaluations and practices	1 2 3 Carried out?			4 5 6 Disclosed outside the Co/Group?		
	Yes	No	N/A	Yes	No	N/A
1. "Local" environmental damage	Yes	No	N/A	Yes	No	N/A
2. "Global" environmental damage	Yes	No	N/A	Yes	No	N/A
3. Material environmental damage only	Yes	No	N/A	Yes	No	N/A
4. Non material environmental damage	Yes	No	N/A	Yes	No	N/A
5. Profit and Loss – Environmental items:						
i. Revenue/beneficial items:	Yes	No	N/A	Yes	No	N/A
a. Market growth	Yes	No	N/A	Yes	No	N/A
b. Market decline	Yes	No	N/A	Yes	No	N/A
c. Product taxes	Yes	No	N/A	Yes	No	N/A
d. Other (please specify)	Yes	No	N/A	Yes	No	N/A
ii. Costs/non beneficial items:						
a. Clean up/remediation	Yes	No	N/A	Yes	No	N/A
b. Emission control	Yes	No	N/A	Yes	No	N/A
c. Fines	Yes	No	N/A	Yes	No	N/A
d. Insurance	Yes	No	N/A	Yes	No	N/A
e. Licences	Yes	No	N/A	Yes	No	N/A
f. Regulation compliance	Yes	No	N/A	Yes	No	N/A
g. Research and Development	Yes	No	N/A	Yes	No	N/A
h. Depreciation	Yes	No	N/A	Yes	No	N/A
i. Other (please specify)	Yes	No	N/A	Yes	No	N/A
6. Balance sheet – Environmental items:						
i. Assets:						
Land remediation	Yes	No	N/A	Yes	No	N/A
Plant	Yes	No	N/A	Yes	No	N/A
Depreciation	Yes	No	N/A	Yes	No	N/A
ii Liabilities:						
Damages	Yes	No	N/A	Yes	No	N/A
Fines	Yes	No	N/A	Yes	No	N/A
Remediation	Yes	No	N/A	Yes	No	N/A
7. Notes to the accounts:						
Environmental capital commitments	Yes	No	N/A	Yes	No	N/A
Environmental Contingent liabilities	Yes	No	N/A	Yes	No	N/A
Environmental Policies	Yes	No	N/A	Yes	No	N/A
8. Auditing of environmental disclosures	Yes	No	N/A	Yes	No	N/A
9. Environmental/Eco-auditing	Yes	No	N/A	Yes	No	N/A

If your Company has developed its own methods for valuing environmental damage could you please let me have details on the reverse of this page of how it is done.



I would like to thank you for your assistance in completing this questionnaire. It is much appreciated. Please return the questionnaire with any other information in the enclosed stamped addressed envelope.

I would like to assure you that all individual company responses and any other information you may provide will be kept confidential. After completion of the results of this research, all replies will be destroyed.

Should you like to receive a summary of the results of this questionnaire please write your name and address below. It will be forwarded to you at a later date.

Name : -----

Address : -----  
-----  
-----  
-----

---

**Acknowledgement**

This questionnaire draws heavily upon work carried out in this field by Professor Rob Gray of the University of Dundee.

**APPENDIX C**  
**REMINDER LETTER**



Our ref: PHM/ftqr/ph

«FirstName» «LastName»  
«JobTitle»  
«Company»  
«Address1»  
«Address2»  
«City»  
«PostalCode»

**Centre for Research  
in the Built Environment**  
Pontypridd  
Mid Glamorgan CF37 1DL  
Telephone 0443 480480

15 June 1994

Dear Sir/Madam

**University of Glamorgan Questionnaire**

On the 16 May we sent to you a questionnaire on the subject of environmental accounting and disclosures, and as we have not received a reply, we would remind you that your response will be greatly appreciated because it could determine the outcome of this work.

We would stress again that the individual replies will be kept confidential and it would only take a few minutes of your time to complete the questionnaire.

If the questionnaire has been mislaid, please do not hesitate to ask us for another copy. Thank you, in anticipation, for your valued response.

Yours faithfully

**A.K. Jones, MA, Dip Soc.Sc., Principal Lecturer**  
**P.H. Makris, MA, FCA, ACIS, MBCS**

**APPENDIX D**

**LETTER FROM UNITED NATIONS**



Télégrammes : UNATIONS GENEVE  
Télex: +41 29 62 UNO CH  
Téléfax : +41 22 907 0195  
Téléphone : +41 22 907 5802  
+41 22 907 6294  
+41 22 907 5257

Palais des Nations  
CH-1211 GENEVE 10

REF. N°:

22 August 1995

Dear Mr. Makris,

Following your letter of 7 July 1995, please find enclosed para XI. ENVIRONMENTAL DISCLOSURES 77/ of the UNCTAD brochure entitled:

**CONCLUSIONS ON ACCOUNTING AND REPORTING BY TRANSNATIONAL CORPORATIONS**

by the Intergovernmental Working Group of Experts on International Standards of Accounting and Reporting.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Ramon de Reyna'.

Ramon de Reyna,  
Acting Chief  
Accounting Section

Division on Transnational Corporation and Investment

Mr. Petros H. Makris  
1 Plas-y-coed  
Lake Road East  
Road Park  
Cardiff CF2 5PA  
UNITED KINGDOM

**APPENDIX E**

**PILOT STUDY**

**Extracts from Examined Published Accounts.**

No.	Name	Accounting Date	Turnover £million	Environmental Policies	
				Yes	No
F) Paper/Books					
66	Arjo Wiggins Appleton	31/12/91	2,487	Yes	
67	Bowater	31/12/91	1,268	Yes	
68	Pearson	31/12/91	1,600	Yes	
69	Reed International	31/03/92	1,631		No
			<u>6,986</u>	<u>5,355</u>	<u>1,631</u>
G) Water					
70	Thames Water	31/03/91	836	Yes	
71	Northumbrian Water	31/03/92	204	Yes	
72	Welsh Water	31/03/92	342	Yes	
73	Wessex Water	31/03/92	191	Yes	
			<u>1,573</u>	<u>1,573</u>	<u>-</u>
H) Miscellaneous					
74	Barclays Bank	31/12/91	3,620	Yes	
75	BAT Industries	31/12/91	16,480		No
76	BET	28/03/92	2,345	Yes	
77	British Telecom	31/12/92	13,337	Yes	
78	Burton Group	29/08/92	1,765		No
79	Cable & Wireless	31/03/92	3,176	Yes	
80	Coats Viyella	31/12/91	1,948		No
81	Commercial Union	31/12/90	3,596		No
82	Courtaulds	31/03/92	1,943	Yes	
83	Dixons	27/04/91	1,695	Yes	
84	East Midlands Electricity	31/03/92	1,544	Yes	
85	Great Universal Stores	31/3/92	2,597		No
86	Kingfisher	01/02/92	3,389	Yes	
87	Legal and General	31/12/91	2,101		No
88	Marks and Spencer	28/03/92	5,793	Yes	
89	Pilkington	31/03/92	2,611	Yes	
90	P & O	31/12/91	4,897	Yes	
91	Racal Electronics	31/03/92	1,607		No
92	The Rank Organisation	31/10/91	2,114		No
93	Sears	31/01/92	1,979	Yes	
94	Sedgwick Group	31/12/91	622		No
95	Storehouse	28/03/92	1,180		No
96	South Wales Electricity	31/03/91	567	Yes	
97	Thorn EMI	31/03/92	3,954		No
98	University College, Cardiff	31/07/92	81		No
99	University of Swansea	31/07/92	49		No
100	Willis Corroon Group	31/12/91	585		No
			<u>85,575</u>	<u>44,551</u>	<u>41,024</u>

No.	Name	Accounting Date	Turnover Emillion	Environmental Policies	
				Yes	No
D) Food and Drink					
30	Allied-Lyons PLC	07/03/92	5,360		No
31	Bass PLC	30/09/91	4,383	Yes	
32	Cadbury Schweppes	29/12/90	3,146		
33	Dalgety PLC	30/06/92	3,982	Yes	
34	Forte PLC	31/01/92	2,662		No
35	Grand Metropolitan	30/09/91	8,748	Yes	
36	Greenall Whitley	28/09/90	496		No
37	Guinness PLC	31/12/91	4,067	Yes	
38	Isosceles	25/04/92	3,024		No
39	Ladbroke Group PLC	31/12/91	3,786		No
40	Rank Hovis McDougall	01/09/90	1,771		No
41	J. Sainsbury	14/03/92	9,202	Yes	
42	Tate and Lyle	26/09/92	3,366	Yes	
43	Scottish & Newcastle	03/05/92	1,487	Yes	
44	United Biscuits	28/12/91	2,979	Yes	
45	Vaux Group	28/09/91	267		No
46	Whitbread PLC	29/02/92	2,191	Yes	
			<u>60,917</u>	<u>43,551</u>	<u>17,366</u>

E) Industrial/ Engineering					
47	BTR	31/12/91	6,742		No
48	Christian Salvessen	31/03/92	484	Yes	
49	The Chillington Corpn	31/12/91	49		No
50	Dowty	31/03/92	769		No
51	Delta PLC	28/12/91	774	Yes	
52	GEC	31/03/92	9,435	Yes	
53	GKN	31/12/91	2,432	Yes	
54	Hanson	30/09/92	8,798	Yes	
55	Inchcape	31/12/91	3,636		No
56	London International	31/03/92	398	Yes	
57	Lonrho	30/09/91	4,846		No
58	Powell Duffryn	31/03/92	749	Yes	
59	Rolls-Royce	31/12/91	3,515		No
60	RTZ Corporation	31/12/91	4,885	Yes	
61	Siebe	04/04/92	1,628		No
62	The Simon Group	31/12/91	515	Yes	
63	TI Group	31/12/91	899	Yes	
64	Tomkins	02/05/92	1,274	Yes	
65	The Weir Group	27/12/91	424		No
			<u>52,252</u>	<u>30,643</u>	<u>21,609</u>



## PILOT STUDY

### Extracts from examined published accounts

No.	Name	Accounting Date	Turnover £million	Environmental Policies	
				Yes	No
A) Oil and Gas					
1	British Petroleum Co.	31/12/91	32,613	Yes	
2	The BOC Group	30/09/92	2,863	Yes	
3	British Gas PLC	31/12/91	10,485	Yes	
4	Calor Group PLC	31/12/91	362		No
5	LASMO	31/12/91	281	Yes	
6	Royal Dutch Petroleum	31/03/92	58,089	Yes	
7	Ultramar PLC	31/12/91	1,761	Yes	
			106,454	106,092	362
B) Chemicals/ Pharmaceuticals					
8	The Boots Co. PLC	31/03/92	3,656	Yes	
9	Fisons	31/12/91	1,225	Yes	
10	Glaxo Holdings PLC	30/06/92	4,096	Yes	
11	Harrisons & Crofield PLC	31/12/91	1,825	Yes	
12	ICI	31/12/91	12,488	Yes	
13	Laporte PLC	29/12/91	616	Yes	
14	Reckitt & Colman	04/01/92	1,987	Yes	
15	Smith Kline Beecham	31/12/91	23,163	Yes	
16	Unilever PLC	31/12/91	4,685	Yes	
			53,741	53,741	-
C) Building/ Construction					
17	Beazer	30/06/90	2,305	Yes	
18	BICC Group	31/12/91	3,790	Yes	
19	Blue Circle Industries	31/12/91	1,114	Yes	
20	BPB Industries PLC	31/03/92	1,021	Yes	
21	Costain Group	31/12/91	1,316	Yes	
22	ECC Group	31/12/91	1,012	Yes	
23	George Wimpey PLC	31/12/91	1,753	Yes	
24	MB Caradon PLC	31/12/91	679		No
25	Redland PLC	31/12/91	1,504	Yes	
26	The Rugby Group	31/12/91	532	Yes	
27	Tarmac	31/12/91	3,225	Yes	
28	Trafalgar House	30/09/92	3,890	Yes	
29	Williams Holdings	31/12/91	1,002	Yes	
			23,143	22,464	679

## APPENDIX F

### LIST OF PUBLISHED ARTICLES

The following publications by Petros H Makris are included in the thesis as Appendix F:

Environmental Accounting, *Accountancy Age* (1991)  
Environmental Project Evaluations, *Administrator* (1991)  
Environmental Taxation, *Accountancy Age* (1992)  
Integrated Pollution Control, *Administrator* (1994a)  
Environmental Audits - Spreading Like Wild-Fire, *Journal of Business and Society* (1994b)  
Quo Vadis, Pacioli?, *Certified Accountant* (1994c)

## ENVIRONMENTAL PROJECT EVALUATIONS



The basic method formerly used to evaluate a major project, be it a barrage, an airport or a nuclear power station, was cost benefit analysis (CBA). However, because this method was not 'sensitive' to environmental issues, environmental impact analysis (EIA) was developed in the 1970s and has, since then, been used in conjunction with CBA. The complete process will comprise:

- (i) a study of any alternative proposals
- (ii) the consequences of each course of action (e.g. spill-over effects)
- (iii) the actual evaluation of the project
- (iv) the findings of the 'study'.

● The final report is intended not to seal the fate of the project, but to present all the relevant facts, including any aspects which are beyond quantification to those concerned (usually the government).

● It is those methods used in evaluating the environmental aspects of the project which are covered by stage (iii) with which this article is concerned. This is the stage where serious conceptual problems are encountered. For example, where the labour force (or part of it) would otherwise be unemployed, should the total value of labour be included in the cost or only a proportion of it? In such a situation the opportunity cost is the value only of the leisure time lost and, therefore, only that should be included. This is known as the 'shadow price' of labour, and it represents that element which has been used up by the project.

● Similar problems are caused by imperfect competition, indirect taxes, etc. They, too, must be rectified with 'shadow prices'. But the most difficult evaluation problems arise from goods which are not traded at all. This category includes the costs and benefits arising from changes to, or in, environmental amenities, aesthetic landmarks, wilderness, clean air and water, etc.

When the construction of a major project is being considered, much is usually written about its advantages, disadvantages and its cost, but not much is published about the actual methods used in costing the project. Also, it is only since the 1970s that the planning of major projects includes a study of both economic efficiency and environmental consequences. P. H. Makris ACIS examines some of the techniques used to establish the project's cost and net 'flows' over its expected life.

The various considerations and methods discussed here may be traced, step by step, in Figure 1.

● One of the rules of CBA is that no project should be undertaken unless the benefits to be derived from it exceed those which existed prior to carrying out the project. Therefore, all such projects must have positive social benefits and be Pareto Optimal. (Pareto Optimality is achieved when it is



not possible to make some individual(s) better off, without making others worse off.) Environmental projects have, as a rule, a very long life, but the net flows of all the benefits and costs need to be determined in the current period in present day values, in order to be useful in making rational decisions. To arrive at these net present values (NPV), CBA uses discounting, which I consider later.

#### LAND USE

Probably the trickiest problems encountered in environmental evaluations are those dealing with the use of land as a wilderness or recreational facility, or merely as a unique landscape. The problems raised here are quite perplexing. For instance, what is the opportunity cost of such resources when transformed or destroyed? Somehow their qualitative 'values' must be translated into monetary values. Since their benefits are derived solely by their users, in order to calculate their value we need to add up the price people are 'willing to pay' in order to enjoy the site. This method is known as the Clawson Technique, and it takes into account, in addition to any entrance fees, the cost of travelling to the site.

● Another method, known as the Bouma method, uses the 'alternative facility' technique, i.e. the value of a site is equal to the cost of the provision of an alternative site with the same benefits.

● Valuation difficulties also arise with goods suffering from environmental degradation. Here, also, it is necessary to arrive at a valuation indirectly. The methods used are:

- (i) *The property price method*

The value is the difference between two identical properties, where one is in the polluted area and the other is not. A house in a clean and peaceful

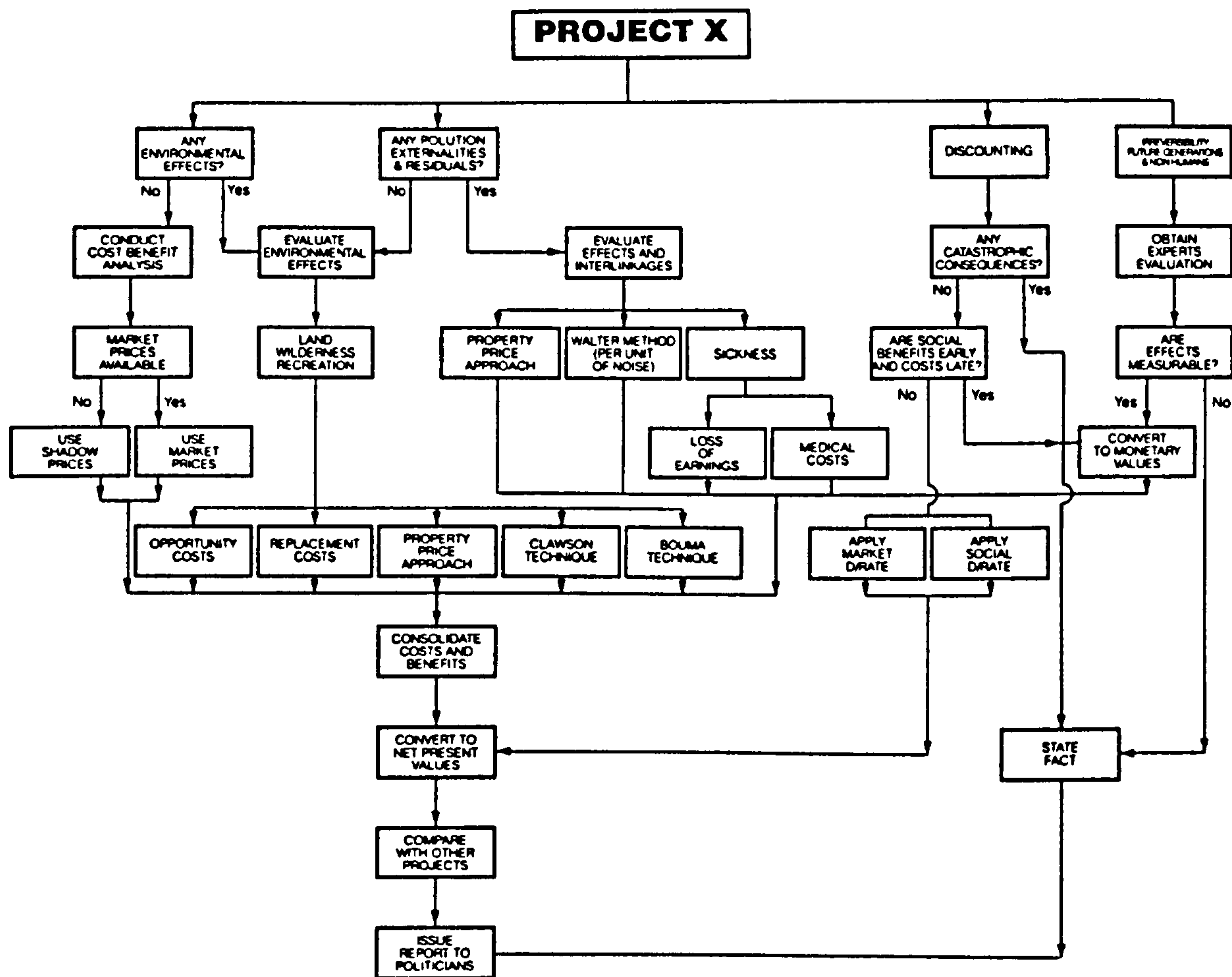


Figure 1: Flow Chart for Environmental Project Evaluation.

district is bound to be worth more than one which is in a noisy and dirty one.

(ii) *The Walters method*

This method uses a value per 'unit of noise'. It involves the actual valuation of noise which is then applied to the affected assets. An obvious application is in a CBA project for the construction of an airport.

● Another means of capturing the cost of pollution (whether it is air or water pollution) is from its effects on health. Health has definite effects on the economy as a result of absenteeism and from medical costs.

THE SCOPE OF EIA

EIA takes into account not only the type but also the distribution of impacts arising from a proposed project. It also looks at what cannot be converted into monetary values and as such cannot be included in the summing up of NPV.

● Once the costs and benefits of a project

have been established they should all be discounted (with the exception of the construction costs incurred in the first period) in order to arrive at NPVs. Many of the environmental changes will have arisen during the early life of the project, e.g. flooding from a dam. However others, e.g. erosion or water pollution, will not surface for many years, and when they do are usually more noticeable and severe.

DISCOUNTING

PROBLEMS

These long-term harmful effects will not be ascribed heavy values by discounting. It is this 'blanket' treatment of costs and benefits which is questionable in discounting environmental effects. This is particularly important for projects with long lives, because normal discounting rules are based on 'time preference' and assume that society will not value costs and benefits as much in the future as at present.

● This is especially contentious with

regard to projects with losses arising in the distant future which would be discounted now to almost zero, but which would constitute gigantic costs/problems for future generations. For example, a long-term project (such as a nuclear power station) will pass the Pareto criterion, but at the end of its life (when the time comes to decommission it - undoubtedly at astronomical costs and risks) it will be another generation that will be 'left holding the baby'.

APPLICATION OF THE DISCOUNT RATE

The application of the Discount Rate (DR) should be viewed critically when it is likely that it will discriminate against or in favour of a project. The higher the DR, the more it will discriminate against future people. This is because long-life projects with very high costs towards the end of their life will be discounted to negligible amounts and, conversely, projects with high social benefits in their early life will retain their high

values. So projects with such attributes will reflect high NPV, and will be favoured by the present generation, but they may spell disaster for future generations.

● There are undoubtedly good commercial and social reasons for using DRs, since to do otherwise would effectively bend the rules in favour of future generations. We have only to treat future people's interests as equal to the interests of present generations and, indeed, intergenerational Pareto optimality demands this. The argument that we should discount the future because future generations will be wealthier and better equipped to handle unfavourable legacies is, I think, unrealistic, because our resources are not infinite.

### CONCLUSION

As shown above, both conceptual and

quantification problems arise in the evaluation of environmental projects, but they can be overcome with shadow prices and evaluation techniques. It is, therefore, possible to establish reasonable values for things which, at first sight, appear to be incapable of evaluation. However, it is essential that those who are responsible for adopting one method as opposed to another should be well aware not only of their current evaluation effects but also of any hidden long-term (intergenerational) consequences.

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### FELLOWSHIP

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Members and Graduates who think they may be eligible should contact Sara Nolan, the Members' Registrar at Park Crescent, for advice and further information.

# Green tax for costing the earth

Petros Makris reports the rivalry of ecological idealism and economic realism in environmental taxation

**A**lthough environmental resources serve economic functions, we do not pay for them. The failure of the market to include environmental costs may be corrected with the imposition of environmental taxation either on the producer or on the consumer, or on both. By incorporating a cost for the environment into our economic activities, we will reduce consumption and the harm done to the environment, although we can never restore it to its previous unpolluted state.

Environmental taxation is not a panacea for protecting environmental resources as some of them can never be replaced or remedied; there is no such thing as a 'full repairing lease' in environmental degradations. The environment is finite in quality and quantity and the most we can aim for is 'controlled degradation'.

The idea of environmental taxation was first proposed in 1920 by Arthur Pigou, but it was not until the late 1980s when it attracted attention. Even now, only a few countries have introduced any form of green taxes. Their recent introduction is not unconnected with the increase in both the level of pollution and the awareness of its consequences. By the end of the 1990s, green taxes will become more widespread, because of the moral arguments in their favour, and the fact that they are based on a vast tax resource base which is awaiting exploitation.

The environmental taxation which has been introduced by some governments takes the form of pollution tax and saleable quotas or permits. While the former is a tax on pollution, the latter is a right to pollute, albeit up to one's quota. Such taxes help internalise the costs of pollution and have a negative impact on consumption, which is good for the environment. Unfortunately, they are regressive, as they fall more heavily on people who have to spend all or most of their earnings. On the other hand, their effect on internalisation contributes to economic efficiency and people do have the choice of paying the higher price or avoiding the product altogether (for example, a heavy tax imposed on chlorofluorocarbon aerosols or CFCs). This 'polluter pays' principle safeguards to an extent the general public from footing the bill. But, even when the public does not pay, the harm done may outweigh by far the cost to the polluter (for example, in the damage



Pollution: the harm done may outweigh by far the cost of taxation to the polluter

caused to the ozone layer).

The first generation of environmental taxes were levied by some European countries, not for raising revenues or deterring pollution, but merely for raising enough to pay for the control and administration of pollution. In order for environmental taxation to be effective, it must be set at such a level that primarily discourages the production and consumption of the offending substance. By the end of the 1980s, a number of northern European governments had become concerned about the carbon dioxide emitted from the burning of fossil fuels. Two countries, namely Sweden and Finland, then introduced carbon taxes. Also, Norway and the USA imposed a tax on CFCs. In the meantime, other taxes are being considered by some countries. In Germany, for instance, the basis of car tax is planned to be charged from 'engine size' and 'exhaust fumes and noise' and Denmark is planning to triple the tax on rubbish. In December 1991, the European Community announced a plan to introduce a tax on oil for environmental protection and energy conservation.

Taxes will not prevent the exhaustion of natural resources or halt pollution. They might slow down the process and provide funds for

remedies, but there are cases where they would not have any effect, and the total prohibition of the process or practice may be the only solution (for example, halting the production of CFCs). Also, in the case of a monopoly, the extra cost arising from the taxes will be passed on to the consumer. For instance, if a tax was introduced on the burning of fossil fuels (or on the emission of carbon dioxide) for electricity generating, the cost would be recovered from the consumer without any improvement. Another example would be the proposition that the environment can tolerate only a certain level of harmful substances at a time, (a river may absorb a certain amount of effluent over a week, but not all of it on one day, for example). In this connection, the Italian government is considering the restriction of pig farms to 200 animals. In such situations, regulation of the industry by the introduction of standards and controls would be better than taxing it.

Another limitation of taxes is that they cause inflation, and governments do not like inflation. There will be increased costs to the producer and the consumer. The producer becomes less competitive on an international level if a competitor, like Japan, does not impose

such taxes. Also, the poorer local consumer bears a bigger burden, unless he is not affected by that commodity or service (for example, a petrol tax would not affect those who could not afford a car). On the face of it, it may be better for a government to impose standards, for example to limit exhaust emissions to a certain level. This, though, will cost a country a fraction of its

## Governments acquire a perverse sort of vested interest

gross national product with no corresponding increase in wealth. Of course, the adverse effects on the poor may be remedied by the redistribution of the revenue raised, so that they do not suffer unduly, and the loss of competitiveness may be remedied by grants or lower taxes on profits. A further possibility is the introduction of positive and negative green taxes, for example, to give refunds to those who convert to 'cleaner' products or practices and make those who have not converted pay more.

Standards raise no revenue, but they have proved popular with industry because they are determinable and uniformly applied. But in complying with them, some companies

may have to incur more costs than others. For example, it will cost more for a new factory to reconvert in order to comply with a new standard, than for an old factory which is due for modernisation to reconvert. The extra costs for conversion have a detrimental effect on industry's readiness to convert; progress is frustrated by fears of loss of competitiveness and the limitations in technology. This is recognised by the UK's new pollution regulations which stipulate compliance within known technological possibilities and reasonable cost.

The level of green taxes also requires consideration, as it is questionable whether an optimum level can be established. In other words, can the point at which the benefit equals the cost of production be fixed and, if so, for how long? That it can is doubtful because of constant changes in technology and pollution levels. The answer to this problem was found in tradeable permits in the USA. These are effectively 'permits to pollute' but their more attractive interpretation is that they are 'emission reduction credits'; this implies rewards for doing well instead of penalties for causing harm.

Basically, the total amount of pollution allowed from a source, for example, the emission of sulphur dioxide in a

year, is determined, and its equivalent in tons is allocated to, say, the electricity generating companies. They then may emit up to their allocation, or reduce emissions and sell their surplus permits. As long as the total emissions for the year are limited, the pollution of the environment is controlled. Permits do not create inflation and they are flexible as well as simple to administer and, above all, governments are clearly seen to be doing something good for the environment. Furthermore, outsiders may buy permits and just destroy them to prevent others from buying them for emissions.

The problem with permits, though, rests with their distribution. They may be shared on the basis of existing emissions, in which case those companies which make improvements and reduce pollution are disadvantaged. Alternatively, they may be sold to the highest bidder, in which case they take the form of environmental taxation.

By taxing pollution at a level whereby it can never be eliminated, governments acquire a perverse sort of vested interest, like the tax on cigarettes. Environmental taxation offers a varied and sustained source of revenue for governments to exploit for the good of the people and the planet.

It is evident that each type of environmental taxation has its advantages and disadvantages but, taken as a whole, they may be the main means for safeguarding the environment and preventing an environmental doomsday. Their general introduction will not be met with hostility, as are some taxes (for example, the poll tax). Although actions to save the environment work best when adopted internationally, lack of concerted action should not be used as an excuse to slow down or prevent wider introduction of environmental taxes or standards by those countries that advocate such policies. Unless the rich industrialised countries, which are the main culprits in environmental degradation, do something about the environment, it is unlikely that the third world will be concerned about global warming, the destruction of the ozone layer, the rain forests, and other problems. The appeal of such policies makes it highly likely that by the end of the century there will be a plethora of environmental taxes and standards. ■

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# Integrated pollution control

Three years after its introduction the Environmental Protection Act has failed to make an impact, reports Petros H. Makris ACIS.

Integrated pollution control (IPC) was introduced in the UK by Part I of the Environmental Protection Act 1990 (EPA) and has been in force since 1 April 1991. When it was devised and introduced it was thought to be a most ingenious breakthrough in environmental control, but after three years it has failed to make an impact.

This conclusion can be drawn from a study by *Environmental Data Services*, the highly respected industrial journal (*ENDS*, Report 227, December 1993).

## Principles behind the EPA

The EPA was designed to introduce the integration of pollution control into prescribed processes through the incorporation of the following fundamental principles:

- i) *Polluter pays*. This principle, which is gaining universal recognition, ensures that those who are responsible for pollution pay for the environmental damage and safeguards.
- ii) *Best available techniques not entailing excessive cost (BATNEEC)*. This is an economic principle based on a pragmatic approach to achieve, over time, optimal allocation of resources, i.e. the marginal costs of environmental measures equal the marginal benefits.
- iii) *Best practical environmental option (BPEO)*. This is designed to minimise pollution by selecting the most effective pollution medium (i.e. air, water, or land).
- iv) The transparency principle, which provides free access to public registers in order to bring about public accountability.

## Objectives of pollution control

Objections to the introduction of integrated pollution control (IPC) came both from industry and environmentalists. Industry feared that

IPC would increase costs and reduce competitiveness if other countries did not adopt similar measures. Also there was the risk of confidentiality which would be lost through transparency. Environmentalists objected because it legalised the right to pollute.

IPC's aim was, and still is, to reduce harmful pollution by introducing control before production starts; this way IPC can be built into the method of production and discharge, becoming an integral part of factory planning, product development, production and distribution, rather than being a peripheral after-the-event issue.

This should have forced companies to establish and maintain administrative procedures for gathering, assimilating and monitoring pollution and its impact in order to prove both the effectiveness of their processes and compliance with their legal obligations. Unfortunately, this has not happened yet, as evidenced by the total lack of recorded data in the public registers (*ENDS*, Report 227, p.3). Industry is being granted a licence-to-pollute, 'unchecked'; if the situation does not improve the fears of environmentalists will be realised.

## Policing pollution

The EPA covers 5,000 polluting processes, and since 1 April 1991 all new or major modifications to existing prescribed processes must comply with IPC requirements; these are being phased in on a rolling timetable from 1 April 1991 to 1 April 1996. Once a process comes within the scope of IPC it cannot be operated without authorisation.

The implementation and enforcement of IPC was placed in the hands of HM Inspectorate of Pollution (HMIP) and local authorities, which deal with air pollution. HMIP is a statutory body and has the responsibility for air pollution.

Petros H. Makris ACIS



radiochemicals, hazardous waste and water pollution arising from polluting processes. HMIP was reorganised in October 1989 into three regions: East, North and West. Each covers four districts and has teams which can deal with all aspects of pollution control. In order to cover the work within the scope of IPC, HMIP has five Industrial Groups with teams of experts who cover the main industry sectors.

The *ENDS* report is very critical of the work of HMIP. Apparently, it 'has failed to force operators to address fundamental requirements of the Environmental Protection Act, 1990, and other information'. According to the *Daily Telegraph*, 6 January 1994, HMIP has also failed in its duty to be an 'arms-length' body and has given in to industry's pressure by providing a 'free consultancy service' to help companies comply with pollution regulation. The implication here is that HMIP compromises its position by having to implement pollution control. By getting involved with compliance it prejudices the objectivity of its work. In fact, not a single application has been rejected on the grounds of legal requirements (*ENDS*, Report 227, p.2).

The IPC scheme operates on the basis of fees which are payable on 'application', or on a 'substantial variation application', and for a 'subsistence charge', which is payable annually for holding the authorisation.

### BATNEEC

The most important principle of IPC is BATNEEC, and its success rests on its consistent and uniform application by HMIP, which has the task of determining what is BATNEEC for each application, and then prescribing the required condition(s) in the authorisation. Uniformity of application means that what is BATNEEC for one process will be BATNEEC for all similar processes. The application of BATNEEC is not based on a single aspect; there are numerous assessments involved, and there is an element of flexibility built into it, which gives it wide adaptability, applicability and acceptability. In order to clarify the principle of BATNEEC further, it is necessary to break it down into its various component parts.

'Best' relates to the effectiveness of the method in comparison with other methods in preventing and making harmless the relevant pollution. 'Available' means the process/equipment exists, and can be purchased by the producer. 'Techniques' is the key aspect of BATNEEC, and includes:

- (i) the process and methodology
  - (ii) the employees, their qualifications, training, supervision
  - (iii) the design, layout, construction and maintenance of the premises.
- The attraction of best available technology is that it is a clear objective standard; it is possible to identify and agree on what it is. However, it will not be imposed on the producer if it is unnecessarily expensive as stipulated by 'not entailing excessive cost'.

### BPEO

The second most important principle introduced by the EPA is the BPEO, which deals with the identification of the medium to be polluted. Again, this principle requires the identification and selection of the 'best' PEO, and this can be achieved only by considering all the possible options. BPEO is at the root of IPC as it recognises the interconnectedness of the three media. Each case has to be examined carefully in order to identify which medium can absorb the discharge or suffer the least from it.

The specific conditions, imposed by HMIP, are necessary in order to achieve the Act's objectives, i.e. to minimise pollution to the environment as a whole through BATNEEC and BPEO.

### Ineffective measures?

However, it seems that both principles are not being complied with by industry. According to the *ENDS* Report companies provide little or no information by way of justification for their chosen options to satisfy the BATNEEC and BPEO tests. In August 1993 HMIP granted authorisations to PowerGen to burn orimulsion which, according to

environmentalists, is the world's filthiest fuel (*Financial Times*, August 1993). These practices bear evidence that HMIP is having difficulty in applying the theoretical and legal principles of IPC in practice.

The UK's pollution control methodologies evolved from 'best practicable means' into BATNEEC and BPEO, which form the foundation of IPC. In theory these methodologies are a giant step forward, as they introduce regulation and allow continuity of industry, so that it can pay its way towards cleaner methods. But, in practice, their applicability is being questioned, probably

because of the congeniality and reluctance of HMIP to apply the severe measures required for instant success.

One way or another, we cannot entirely stop pollution, nor can we repair the damage. There

is no such thing as a 'full repairing lease' in environmental degradation. The most we can aim for is 'controlled degradation', and we have now made a start - albeit a poor one.

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ACIS, MBCS.

The implication here is that HMIP compromises its position by having to implement pollution control. By getting involved with compliance it prejudices the objectivity of its work.



## *Commentary*

### **Environmental Audits Spreading Like Wild-Fire**

**PETROS H. MAKRIS**

*Cardiff, UK*

**E** NVIRONMENTAL AUDITING SPRANG out of concern for the environment as a result of outside pressure to save the planet. The environmental awareness which began in the 1960s gradually became the concern of not only individuals but also of governments and businesses. Environment audits were first started in the US by companies which wanted to publicise their good environmental practices and social responsibilities. Industries which were historically the worst polluters, such as oil and chemicals, emerged as the leaders in this field. The adoption of proactive measures, such as environmental auditing, is now spreading rapidly to other industries and to local government.

Environmental auditing is effectively a compliance exercise, adopted by management to establish a company's level of compliance with good environmental practice. An environmental audit has been defined by the International Chamber of Commerce as a management tool, comprising a systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing, with the aim of helping to safeguard the environment. The environment is not merely the site within the perimeter fence, it also encompasses the areas outside, which may suffer heavily due to their proximity, as well as areas further afield and beyond, which may suffer delayed and indirect impacts. Thus, the concern of environmental audits is wider than that of health and safety audits and covers environmental regulations and the company's policies and practices.

Environmental policies represent the company's declared environment commitment for good environmental housekeeping and compliance with law. As such, environmental policies must have the full backing of top management. They are the starting point for the development of a corporate environmental philosophy, which establishes what standards are to be observed, and by when, and what goals to strive for. Once they have been formulated and adopted, they should be communicated to the public. The new dogma requires companies not only to adopt environmental policies, but also to publish them. The employees also should

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be advised and trained before taking on these new responsibilities. The requirement to develop and implement environmental policies should not be just for the sake of the favourable response a company will receive from environmentalists, consumers or the public at large, although it need not be deprived of any public relations benefit. Ideally, environmental policies must be in place before environment audits are undertaken, although this would depend on the type and scope of the environmental audit in question.

The term "environmental audits" encompasses a variety of audits and it could be confusing. The following are the main types:

- Compliance audits. They deal with the concern's environmental policies and cover compliance with the law and regulations affecting the relevant activity.
- Specific area audits. They deal, for example, with air or water pollution and the concern's capacity to deal with the problem.
- Liability audits. They are mainly the concern of banks and other lenders, insurance companies and companies in take-overs. For example, the actual or potential liabilities arising from contaminated land could be enormous.
- Environmental management audits. These consider the existence of environmental policies and practice and can advise and establish them if necessary.
- Waste minimisation audits. They look into the creation, management and disposal of wastes.
- Site audits. These are common where there are known or potential risks allied to the relevant activity (e.g., use of hazardous chemicals).

There are also Eco-audits to consider. These were introduced by the EC as a "regulation" and they cover not merely audits, but also environmental management systems. Although they are at present voluntary they may one day become a "directive" and, thus, become mandatory.

At this point it may be opportune to explain some other terminologies which are used in conjunction with environmental auditing. "Environmental review", for example, refers to the gathering and assimilation of data. Unlike the audit, the review is not a checking exercise, but it is the first stage towards establishing environmental audits. In the last few years, "environmental assessment" has been used in place of environmental audit, although the former encompasses all the aspects of environmental audits and reviews. Another phrase which is used is "environmental management systems". This refers to an approach which also provides a framework for an effective environmental audit. Lastly, and possibly the most important phrase which is now bandied around, is "environmental impact assessment". This deals with the possible impacts of proposed major developments, policies, and plans. It is also known as SEA (strategic environmental assessment). Environmental impact assessments are legally required by many countries around the world, including the EU countries. Paradoxically, the total environmental impacts of a business must also include those of its customers and its suppliers which arise from its products or its purchases. This is in contrast to financial audits, where the impact of a business' financial activities on its customers and suppliers is ignored. Environmental audits have some strange concepts and they are covered by a confusing variety of terminologies!

It is gradually becoming the norm for companies to be concerned about the environmental practices of their suppliers, customers, and neighbours. This

concern does not arise from ethical grounds alone; there are also financial implications involved. For example, because penalties, decontamination, and other costs can be enormous, the financial burden may fall (although unjustifiably) on the creditors by causing the company's liquidation. Environmental liabilities are of great concern to financial auditors as they are increasing in number through the introduction of new local legislation and EU regulations and directives. The increase in environmental concern, for whatever reason, makes it necessary for businesses to declare their environmental commitment and train their employees to implement the company's environmental policies in order to improve their environmental awareness and ensure compliance with regulations. It would not take long for an untrained or disaffected employee to create havoc, because of ignorance or negligence. Environmental awareness and concern should be the responsibility of everyone in an organisation, especially if its business can suffer from environmental mismanagement. The repercussions, both financial and environmental, can be both severe and horrendous. The imposition of penalties on the officers of the enterprise, who either willingly or through negligence cause the problem, is now embedded in all new regulatory laws. It is prudent for enterprises to be proactive and anticipate legislation.

The need to comply with new regulations is increasing the pressure for the introduction of environmental audits. For instance, in the UK, the Environmental Protection Act of 1990 introduced (progressively from 1 April 1991) Integrated Pollution Control. This will force companies to conduct, for example, "duty of care" audits to ensure compliance with Section 34 of the Act, or prior to applying for authorisation or permits to improve their chances of obtaining them. The UK BS7750, which was published in April 1992, lays down the required systems for introducing, checking, and improving environmental management. The EU is continuously introducing legislation on the environment which is also opening up more areas for environmental audits. A number of EU directives have been issued for water, packaging, waste, air, chemicals, and environmental impact assessment. This is likely to affect a large number of medium and small concerns which, very likely, are unaware of these regulations and possibly their own level of emissions. Although the EU is more active in environmental regulations, it is a few years behind U S developments. The U S Environmental Protection Agency encouraged the use of environmental audits as long ago as 1986. Furthermore, at the UNECE Bergen Conference, a number of countries (the UK being one of them) encouraged the use of environmental audits and included it in their Joint Agenda for Action. Pressure or opportunities (depending on what value is attributed to them) for environmental audits is increasing.

Because environmental audits are costly, if they are to be beneficial their benefits should outweigh their cost. Otherwise, they should only be carried out in order to ensure compliance with regulations and possibly to serve as a public relations exercise by demonstrating that the enterprise maintains a high standard of safety and operates in harmony with the environment. Therefore, the primary aim of environmental audits should be to ascertain and make available information about a business, its processes, products and by-products. Environmental audits should be proactive and continuous if they are to be of maximum benefit. In this way, fines and remediation costs can be avoided. Environmentally friendly capital investment can be identified and planned in advance and the purchase of contaminated land either directly or through acquisitions and mergers can be



avoided. In addition to being a management tool, environmental audits can be a useful public relations exercise by disseminating information to employees, the Unions, suppliers, customers, the local community, etc.; the "right to know" should be extended to all. Apart from commercially sensitive information, there is no advantage for not making public the results of environmental audits. In any case, there are indications that environmental performance will be brought out into the public domain by law. The public relations exercise should be extended to also include investors and the media.

The findings of environmental audits are of interest to all the levels of management; they can be used to mould products, processes and practices. Some of the findings will undoubtedly be of interest to financial auditors. There may be potential liabilities which could cause the liquidation of a profitable company if it had not, for instance, established the right level of insurance cover required for the possible damage its products and practices could cause. It might even prove that the risks are smaller, by demonstrating the existence of environmental controls to the insurance company, customers, suppliers, etc. On the other hand, the environmental audit may prove that efforts to control environmental effects are excessive, costly, and unwarranted. Either way, environmental audits are proving to be invaluable and will become more and more predominant.

# Quo vadis, Pacioli?

The accountancy profession has come a long way and has enjoyed unparalleled success since Luca Pacioli wrote his celebrated *Summa de Arithmetica Geometria, Proportioni et Proportionalita* some 500 years ago in Milan. But accounting's future may turn out to be less glorious than its past. And its intransigence could prove to be its Achilles' heel.

There is evidence that in the late 20th century accounting has been unable to come to terms with the accounting problems arising from the social and environmental issues. Unlike the problem of inflation accounting, these new problems are not a transient phenomenon.

The accountancy profession achieved its prestigious position because it excelled in the art of recording, measuring and reporting economic and financial informa-

tion, which was expected and valued by society. In the late 20th century, stakeholders and society at large also expect a great deal of social and environmental information.

The demand stems from the prevailing social problems which are becoming as important, if not more important, than economic problems. The public needs to know what measures companies adopt with regard to conditions of employment, health and safety, the local environment and beyond.

Attempts by the profession to develop social accounting began in the early 1970s but, by the end of the decade, these had become history, with little or no lasting effect. The subject of social accounting has been revived in the 1990s, and given the added impetus of the environmental dimension. So far, there has

tem, such as the one mentioned above, or to seek the simplest possible solution which generates monetary values and thereby brings the whole spectrum of environmental effects within the ambit of Pacioli's accounting. Obviously, the first choice is unpalatable to accountants and the second cannot be developed by accountants alone, as it would require the expertise of many other disciplines. This method would involve the codification of all environmentally harmful activities, in accordance with their level of harmfulness.

A unit of environmental harmfulness would have to be established and used as a yardstick to calculate how many 'units' a harmful activity or a release of a harmful substance into the three media (that is, air, water or land) should carry. The idea is similar to the establishment of calories for food. A £ value

per 'unit' of harmfulness would be fixed in order to complete the conversion of environmental degradation into a world ruled by money, and within the existing accounting system. Only when the harm done to the environment is given monetary values will accountants, the people, and governments, realise how much damage is being done to health and property, and do something about it. Within this scenario, accounting would have a major role to play for a long time to come.

The time is right now – in the half millennium of Pacioli's documentation of the double-entry book-keeping system – for accounting to take stock of itself, to look ahead, and to determine the shape of its future. The immediate task for the profession is to take an active part in the environmental debate and assert itself. Accountants must not shirk



Petros Makis FCCA: 'Accounting has to shape its own future'

been considerable debate and research carried out by academics but very little evidence of practical application.

The lack of progress stems mainly from practical problems of implementation. The subject requires the expertise of other disciplines (for example, biology, chemistry, economics and communication), and accounting can only handle transac-

from the task, otherwise other disciplines will solve the problem without any reference to accounting and, indirectly, shape its future, perhaps to its detriment.

Social and environmental accounting information is in demand by stakeholders and society, and will continue to be in demand because the problems of environmental degradation will gradually, but surely, increase. In years to come, the emphasis in accounting and reporting will almost certainly be as much on environmental activities as on trading activities. This is why accounting has to be in the forefront of events, in order to shape and secure its own future. ■

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# A natural response to finance

As calls for international environment resource policies grow, Petros Makris examines the options

A small number of countries have already adopted a system of environmental accounts. Although the scope of these first generation environmental accounting systems varies from country to country, the fact that some have taken them on, bears evidence that they are concerned about their natural resources and the effect of environmental degradation on their economies.

Probably the most advanced and comprehensive environmental accounts are those relating to French 'patrimony', which are independent of the system of national accounts (SNA) and include both quantities and values.

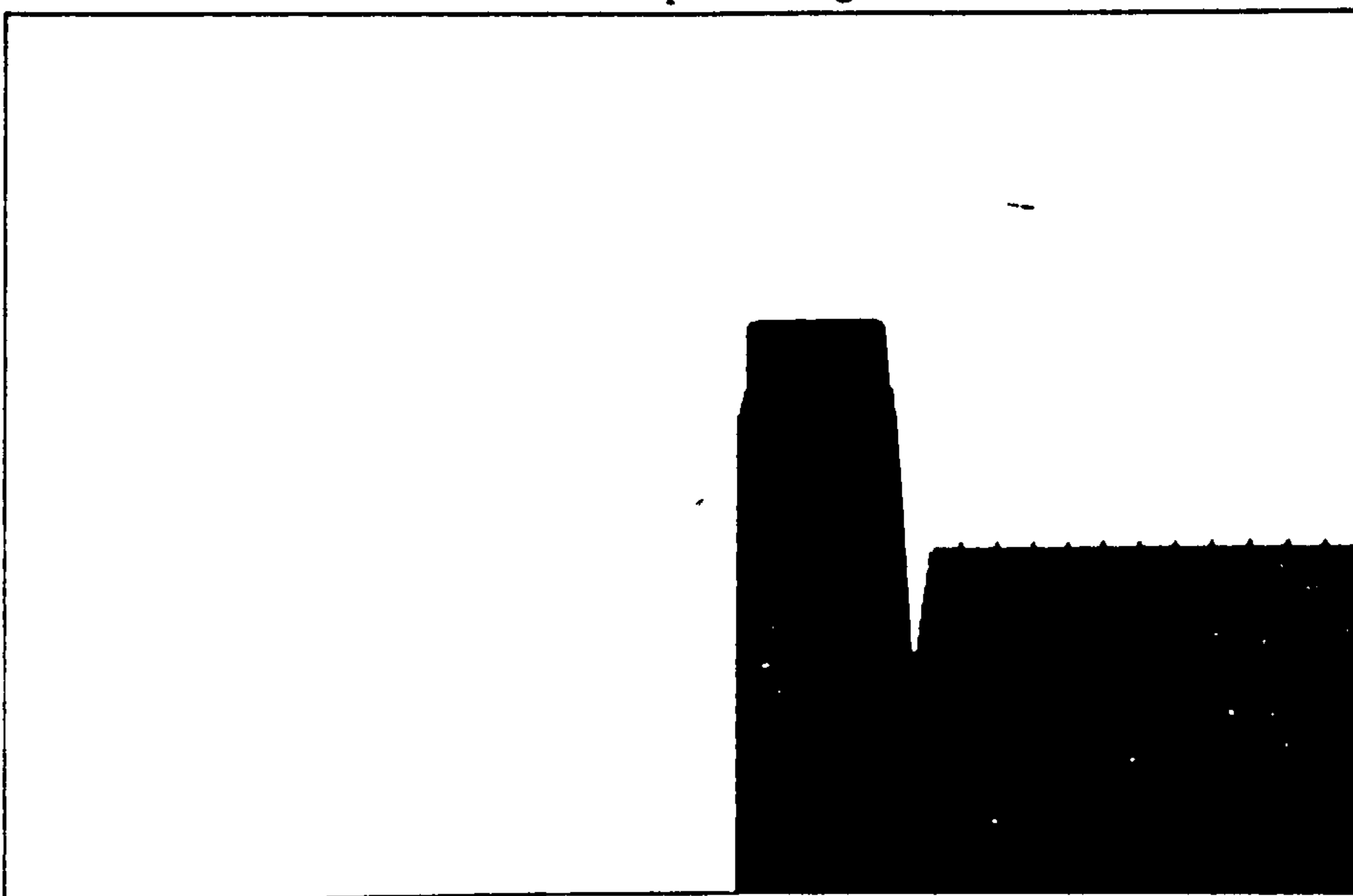
France's environmental policies aim to harmonise the social, economic and ecological functions of nature and as a consequence, the country's environmental objective is to assess the natural resources and their exploitability for its social, economic and ecological needs. Norway has also adopted an environmental and resource accounting system which includes minerals and various other resources such as air, water, land, ocean currents, and so on.

In the UK, no clear environmental resource policies and planning objectives have emerged and no environmental accounting system (EAS) has been adopted. As these resources are progressively under threat through environmental degradation, there is a pressing need for reassessment of the situation.

The resources which need special consideration are the purely environmental ones such as air, water and land as a wilderness. They are no different to other goods since they too perform economic functions, but because they are not traded, their value is zero. As they are liable to modification and degradation from the effects of economic activities, the economic functions they perform may become inefficient or they may even lose their functionality altogether.

Because their value is zero and they are free, the only amounts we can use for accounting purposes are 'quantities' and 'values' which arise from the economic influences on them (from pollution, for example). It is possible, therefore, to have either a quantitative EAS (physical, like the Norwegian) or a monetary EAS, or both (like the French 'patrimony' accounts).

Quantitative methods are quite simple to implement, however quantification may have to be done with ecological surveys. These are costly and time-consuming and are liable to produce vast amounts of irrelevant information, which cannot be put to any use. Furthermore, quantitative methods are not always ideal for accounting purposes, mainly because aggregations and comparisons



Monetary methods involve the pricing of pollutants affecting environmental resources

are not possible in the absence of a common denominator.

The monetary methods involve firstly the application of money values to the quantities established with the quantitative methods (where the quantities involved have a value). Secondly, the pricing of pollutants affecting environmental resources. In this way, we are not valuing the damage they cause but their own value.

The information required for valuing pollutants is readily available from manufacturing and consumer statistics, meaning that this method can be easily adopted by a country wishing to introduce a form of environmental accounting. Separate accounts can be prepared by each industry sector and then linked or integrated into the SNA. The

## There is a pressing need for reassessment of the situation

monetary methods, unlike the quantitative methods, can be consolidated to produce a grand total and may be more easily understood. But despite ready 'usability', environmental monetary data does not fit into the existing SNA.

The SNA used by many countries was standardised by the United Nations in 1968. These accounts reflect the goods and services produced in a year. Their aggregation however, is done irrespective of the level of contribution that the goods produced make to the total welfare of a country. This is especially evident with respect to externalities. For example, money spent to prevent the pollution

of a lake, improves neither its value nor the welfare derived from its use.

It is therefore important that, wherever it is possible to integrate or link environmental accounts with the SNA, it should be done in order to adjust the amount of the gross national product, as done in Japan.

I believe that a prerequisite to the establishment of an EAS is that it must be sensitive to environmental concepts, and I feel that the time is right for the establishment of such an accounting system as the groundwork has been prepared. In all industrialised countries there is an abundance of relevant environmental data, but it is fragmented and will have to be systematically assimilated to create a complete picture.

This can be done with the development of a relevant environmental information framework. This would capture only the right data and present it in a way that reflects the relationships existing between national welfare and environmental resources, their use and their degradation. Obviously, the primary objective of an EAS is to establish and record environmental resources, and show the flows arising in an accounting period. Its secondary objective should reveal the depletion, degradation and pollution of the relevant resources.

Both of the environmental methods mentioned have their advantages and disadvantages and I am of the opinion that there is nothing to be gained in deciding to use only one of them. Rather, it would be better to use one method for one item and the second for another, as appropriate. By not restricting implementation to one method, we

broaden the scope available and in turn, we may hasten implementation.

Finally and in summary an

EAS should comprise:

- An environmental report and accounts which should be prepared independently of

the SNA. There is no need to 'forcefully' create an EAS which integrates fully with the SNA, as environmental data may lose their integrity in the process.

- Separate subsidiary environmental accounts should be prepared by each industry sector, and then grouped or consolidated to produce a final set of accounts. They should reflect the environmental costs, benefits and natural resources capital (to show its depletion and/or its appreciation).

- Where quantitative data are used, reconciliations of stock movements from year to year should be provided, together with their quality and variations in it.

- An evaluation report should accompany the environmental accounts and deal, *inter alia*, with the major changes in the state of the environment during the year.

Although initial benefits may be small, a basic EAS in the UK may establish over time, trends which may not otherwise be forthcoming. Such evidence may be invaluable for improving environmental resource management in the long run. ■

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