



INTERNAL ENVIRONMENTAL ACCOUNTING

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Dedicated
to

All 'green' lovers of the environment and especially my spiritual mother,
Olive Dass, who herself is 'forever green'.

ABSTRACT

The world has been through a lot of dramatic change since the end of the Cold War. The winds of change, 'new world order' are sweeping through every field of life and ultimately affect Britain, which is not only different globally but also important for its hostile environment, viewed by Greenpeace (1990) as the "dirty man of Europe". Business and accounting as such have clear involvement in that, as Owen (1992) points out "conventional accounting techniques are heavily implicated in the current environmental mess we've got ourselves into." Whether or not one is entirely convinced by such allegations there are clearly grounds for suggesting that practical change is an urgent necessity. The purpose of this study is to investigate, more specifically, how business activities and the accounting profession are affected, in the sense of becoming environmentally active. In particular, internal environmental accounting and reporting are prioritised within businesses seeking to embrace the environmental agenda and to point the way towards practical change.

Now, whether organisational behaviour influences the accounting profession or the other way around, one must first recognise that accountants themselves need to be equipped and strong enough to sustain change. However, the author believes that 'you cannot change the accountant without accounting', and as Francis (1990) has argued, "through accounting, accountants have the capacity to change things in the world" (quoted in Burritt & Lehman, 1995).

The research findings indicate that organisations and accountants are in a disarray between protecting their activities and the interests of stakeholders. Meanwhile, the consensus is that there are stages in the responses of firms and accountants to environmental issues, ranging from resistant adaptation to a proactive strategy which requires a corporate environmentalism. The research concludes that we are only at the beginning of the road, but it is a step in the right direction.

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INTRODUCTION

As the Cold War drew to a close industrial countries began to consider environmental problems which were brought into focus by recent memories of the two biggest industrial accidents of all time. The first of these involved the leakage of methyl-isocyanate gas from the Union Carbide Plant at Bhopal, India, which killed some 3,000 people and committed many thousands more to progressive debilitation and premature death (Shrivastava, 1992). The accident sent waves of panic through the industrial nations, particularly in the US, as it shattered the belief that such accidents were beyond the limits of credibility. Fischer (1991) highlighted the fallibility of expert judgements which undermined the power of the technocratic élite. The second accident was a modern horror, which impacted on societal views regarding the acceptability of its host activity. On April 26, 1986, the nuclear power plant at Chernobyl in the former USSR came close to a core meltdown - the oft-quoted 'China Syndrome' - and resulted in the release of large quantities of radioactive material into the environment (Keesing's Volume XXXII, June 1986). These disastrous incidents were uppermost in the minds of statesmen and the general public, and this has started a reshaping of the world in which we live, and work so that new notions of ethical behaviour and ecological awareness are promoted. As Gray et al. (1993) sum up, the world has changed and continues to change. All organisations and eventually all professions will be greatly affected.

At the present there is hardly any field, whether economic, social, political or business, where the environmental agenda is not given serious consideration¹. As Young (1993) put it, the environment is a huge multi-dimensional issue going way beyond attempts to conserve the countryside.

On the political level, the United Kingdom went 'green' along with Tony Blair's promise that the environment will be at the heart of a Labour government's decisions (The Independent, 28.02.96), and the Conservative government have already subscribed in theory, as Mr John Gummer, the Environment Secretary, says "the touchstone of the UK's policies" (Cmnd. 2426, January 94), that which businessmen

¹ Smith (1993) sees the political and corporate development of environmental issues seem destined to remain a major agenda item during the 1990s, and Bill Clinton approved a strategy of environmentally-sustainable development into the next century (Financial Times 13.03.96). Therefore the author predicts that with the current green notion and increased environmental awareness which is sure to keep on growing rapidly until well into the next century, humanity may avoid entering the dangerous environmental bottleneck.

and environmentalists have sought to take forward in practice (Financial Times 13.03.96). Political parties in democratic countries in general and 'post-industrial' societies in particular are in search of 'green' voters². Whilst, environmentalism in Japan is part of the habits of the people and a way of life, opinion polls in the US, Europe and the former Soviet Union show environmental protection as a primary political issue facing nations (Garelik, 1990; Gorbachev, 1990).

Various environmental movements such as Greenpeace, Friends of the Earth and the Conservation Society have taken non-violent action at national or international levels, designed to attract global media attention and publicity³. On the one hand, this publicity has undermined old party loyalties and electoral coalitions, and on the other, has resulted in market pressures (McCloskey et al., 1993) such as the creation of ethical marketing & consumers, green competitors, environmental consciousness and a demand from society for environmentally-friendly products.

To summarize the point explained above, political parties will have to show the voter/customer the same concern - as described by Jean Baudrillard in *La Société de Consommation* - as commercial advertising does (quoted in Gorz, 1989). In knowledge-based societies markets and consumer purchases are now concerned with acquiring 'commodity signs' (Baudrillard, 1970). Whilst, Mr. Gummer said, (in April 1994) "Environmental excellence⁴ will increasingly be part of the price of access to the marketplace." In short, a word of warning to the enemies of nature: political, media and public concerns offer more

² In Germany for example, in a key regional election in May 95, 30 per cent voted for the Greens in Cologne. In the city's Sudstadt district, almost 40 per cent voted Green, (The Independent, 26.06.95) and the Financial Times on 13.03.96 writes that the 'green' vote in UK & US makes it perfectly sensible for Labour and the Democrats to position themselves as the environmentally-friendly party due to the forthcoming elections. Although, the environment as a political issue is a controversial subject, as some argue environmental issues are being used for political games. The case of the executed Nigerian environmentalist and writer Ken Saro-Wiwa (The Independent & Guardian, 11-19.11.95) for instance, or nuclear powers are raising environmental issues in order to put pressure on non-nuclear nations not to acquire nuclear arms. But one thing for sure, out of this welter of conflicting interests has arisen a new kind of environmentalism.

³ All the 'quality' newspapers and magazines such as The Independent and Time International, report news virtually everyday, and items on many aspects of the environmental debate. Although, academics such as Basia Zaba (T.H.E.S., 23.02.96) states that "I think the environment problems are overstated", and some industrialists accuse the media as promoting a propaganda and claim its' a tabloid tale. But that is evidence in itself and shows that the public are concerned, and therefore want to know (i.e. buy the press' story).

⁴ See, Elkington's Ten Steps' to Environmental Excellence, Ch.10.

threatening gestures than ever before.

On the economic level, the argument began with the economics of scarcity⁵. In Western economics it is assumed that we have insatiable material wants and yet are faced with the reality of scarcity of means. So we must engage in 'maximizing' behaviour and constantly calculate how to allocate our scarce resources in relation to our infinite capacity to want more. To cope with this dilemma⁶, unfortunately, says Sahlins (1974), endless struggles were used to advance the productive forces so as to reduce scarcity and rationally allocate resources in accordance with market/price signals concerning individual wants. But, under the policy of seeking higher productivity and thereby minimizing risks, organisational activities have many unintended destructive outcomes and consequently the biosphere has been damaged. With the current anti-ecological practices which are likely to continue, humanity has entered a dangerous environmental bottleneck, says Wilson⁷ (1994). Because of 'greedy' needs and fear of 'invented' scarcity⁸, humanbeings have not only misused nature, but have also invaded its' privacy only to meet invented economic needs. Therefore, one consequence is certain to be continued pressure on nature, which may result in the world wearing away most of its' natural resources. Worldwatch President Lester Brown (1995, 1996) expressed the opinions of many other environmental scientists, when he forecast

⁵ See for example: Ricardo, Adam Smith for economics of scarcity. The author also would like to notice the reader to the criticisms of the economists who believe that all wealth is economic in nature, especially Adam Smith's model, with land, labour and capital as the three essential factors of production. The important of these criticisms is the role of social structures in the creation and distribution of wealth and the importance of natural environment that goes far beyond normally assigned to land and that the process of economic activity can be just as important to people as the product that it yields (Adams, Richard, 1992).

⁶ Sahlins (1974) argues that this whole story is something of a Western/Economists myth. We are not locked into such a system by necessity but by choice and there are other possible solutions and alternative scenarios to the economist's nightmare. Thus, the problem of scarcity is mirage, a Western invention. By Western economy, Sahlins meant individuals, firms and governments under capitalism.

⁷ Wilson, a leading advocate of global conservation, points out that we should make it a goal to take as much of the rest of life with us as is humanly possible and the author recommends a need for 'human' economy for the present environmental predicament. See Elkington J. & Burke T. (1987) Ch. 2 for further discussion on these issues.

⁸ Sahlins' and others, argue that it is indeed the case that throughout most human history the majority of people have lived with the reality of scarcity (and the risk of famine, disease etc.) as ever present.

rising prices⁹, less grain devoted to meat production¹⁰ and ultimately more hunger in the world. “We’re in the early stages”, he says, “of a food transition from surplus to scarcity,”. Brown sees that, high food prices and food scarcity “could become the defining issue of the new era”, replacing the ideological conflict of the Cold War (THES, 01.03.96), and Thomas Malthus [quoted in Winch, (Ed.) 1992; Begg et al., 1994] has gone as far to predict mass starvation.

Nature has not only showed the ravages of mankind’s invasion but also began to retaliate. According to Skow (1995) “while wars have always been fought over territory, the future may see ‘green wars’ triggered by shortages of such basis resources as topsoil or water”¹¹. Butler (1995) agrees with Skow by predicting that “water, not oil, could be the cause of wars next century” and he claims “increasing and unsustainable demands on the world’s water resources are a threat to economic and political stability”. Furthermore, Brown (1995) notes “food scarcity and the economic instability are far greater threats to security than military aggression is”. It is generally agreed that ‘environmental’ war is a total war, in fact a war of all against all.

The situation is unbearable and the question is, where can we go? We are all hostages of this devastation. For many, the question is one of perspective: they argue that all human activities result in environmental degradation of some form, and consequently, society has to strike a balance between its material desires and the requirements for a sustainable environment.

⁹ Although, China, the world’s largest grain producer, emerged overnight as the second ranking grain importer. By March 1994, agricultural prices in Beijing were on a steep rise, as Brown (1995) had earlier predicted. The net grain imports were just 16 million tons, but says Brown, that’s only the beginning. He estimates that by 2030 China will need to import between 210 million and 370 million tons of grain annually, out of a total world production of 2.15 billion tons.

¹⁰ In Europe, there is a ban on the sale of hormonal beef, and the meat industry is on decline due to consumers’ fear of mad cow disease. The British consumers undoubtedly agree with their counterpart, to judge by decline in beef sales here since the ban on British beef (Financial Times, 22-26.03. 96). Further, The Guardian (19.03.96) wrote that “millions of voters (Conservative electorate) are disgusted with meat industry production methods”.

¹¹ According to Washington’s Worldwatch Institute, much of the arable land becomes less arable by the minute, as salted by urbanization, chemical pollution, desertification and the overuse of limited water supplies, the average amount of grainland per person has dropped in 30 years from more than 0.2 hectares to little more than 0.1 hectare. Although there is a boom in agriculture productivity which has kept the burgeoning population fed. Brown (1995) notes that global grain production has been stagnant for five years because of water scarcity and diminishing returns from the use of fertilizer. According to Butler (1995), by 1993 the Aral sea in central Asia had lost 75% of its water.

The dilemma between environmental protection/predicaments and economic problems/challenges is a global crisis which must ultimately influence scientists and policy-makers to come up with effective though probably expensive counter-measures to solve the problem of the deteriorating atmosphere and to save the global environment from 'irreversible catastrophe'. In line with that, the Financial Times (21.06.95) quotes that the legislation have added to companies' obligations, and often to their costs.

Economic problems/development and legislator pressures/solutions are beginning to influence business activities. Furthermore, Professor Homer Eriksen, chair of economics of Miami, says "The public is pressuring business everywhere to act more responsibly" (The Guardian, 18-19.11.95). Some organisations are becoming more green (Shrivastava, 1993; Smith, 1993; Gray et al., 1993, 1995a) and conceptualizations of accounting are changing (Bebbington et al., 1994). According to Smith (1993) that since the latter part of the 1980s, business activities and the role of accounting in industrial countries have been forced to adjust to changing economic and social circumstances that have frequently placed a strain on their resources and activities.

Owen (1992) points out that, the current wave of environmental concerns and various pressures have tremendous financial implications for business. Indeed, as environmental legislation becomes ever stricter, its impact on corporate financial statements, and hence the accounting function, becomes ever more clear.

To summarise, if the change is to be put into a few words it can be described as a general tightening of standards, a greater prohibition, a rising of the demands a *fragile* nature makes on businesses and a lowering of the demands businesses can make on limited resources of the earth. As a result accountants must take a leading role in environmental issues and rise to nature's 'squawk', to become its 'ambassador'.

Before addressing the aims and objectives of the dissertation, one might ask the obvious question 'why' has the environmental question not been debated long ago, and why is it of interest now? In fact as Smith (1993) writes, political and corporate concerns for environmental quality are not new concepts. Indeed, some of the earliest concerns can be traced back to the industrial revolution. Also as Maddox (1995a,

1995b) reports, political pressures have recently entered a calmer phase and after a period of strict green legislation, politicians are now more alert to the economic implications of over-penalising polluters.

Despite some early concern about the environment, the issue slipped down the political agenda during the 1980s only to re-emerge during the 1990s through the Bergen Conference in Rotterdam (1991) and the 1992 UN Conference on Environment and Development (Smith, 1993). Furthermore, it is generally agreed that the dangers that once seemed exaggerated or at least were comfortably remote, are now understood to be real and urgent. Global warming¹², ozone depletion¹³, deforestation¹⁴ and desertification of once arable land have become live and current issues. Recognition gains ground that organisational behaviour and activities such as pure economic self-interest need to be changed. According to Gray et al. (1993) the need for a substantial response to the Worldwide environmental crisis from businesses have never been clearer or more urgent, and in particular, there is a need for accounting to occupy an important central role in organisations and its' environmental awareness as it is acknowledged in the accounting literature that accounting can play powerful roles in processes of organisational change (for example, Gray, 1990; Broadbent, 1992; Hopwood, 1987,1990; Laughlin, 1991; Power, 1994).

Gray et al. (1993) affirm that, environmental accounting is now seen as an essential element in any organisation's environmental response. And prior to that, in 1992, the US Department of Ecology issued

¹² To illustrate this, consider the extreme climatological changes experienced in England over recent years, which can only go to show the resultant effect of the deteriorating ozone. As geologist, Harold Wanless informed, "Global warming is real and is already having an effect," whilst also adding that "We are at the beginning of a catastrophic revolution." (The Independent 04.05.96). Brown thinks that global warming seems likely to be a contributor to the recent run of very hot summers (Times Higher 01.03.96).

¹³ The Antarctic ozone hole is more severe this year than ever before, and ozone levels over temperate regions are dipping as well, despite the 1987 Montreal Protocol agreement (Times International 30. 10.95). Furthermore, scientists have reported that ozone levels have dropped to the lowest levels ever reported over Britain (The Independent, 13.03.96). And, according to a study conducted by researchers from London Medical School, there is a rise in deaths in London due to bad air pollution as well as ozone, sulphur dioxide and nitrogen oxide levels reached their highest concentration (British Medical Journal, 03.96).

¹⁴ In India, for instance, forest cover shrank at an average rate of 0.6 per cent a year throughout the 1980s. Nearly 31m hectares out of 77m ha of officially recorded forest have less than 40 per cent tree cover, and India has even imported teak in 1995 of which it once had plentiful reserves, according to the World Bank (Financial Times 06.09.95). And the US, has less than 5% of its ancient forests and suffers from a timber shortage (Time International 04.09.95). As such, between 1980 and 1990, an estimated 8% of the world's tropical-forest was depleted according to Worldwatch Institute (Time International 30.10.95).

guidelines on how to develop accounting systems for pollution prevention. Also, Owen (1993) and McCloskey et al. (1993) go further to point out that accounting provides the mechanisms whereby companies can take the environment into their auditing procedure and respond to such pressures.

At the same time as the issues seem more significant, the recession has reduced the ability of legislators to act. Financial Times (21.06.95) and The Independent (01.01.96) welcome the fact that the recession and continued requirements for growth have forced many countries to ease their environmental legislation. The USA, for example, as world leaders in environmental issues, are becoming ambivalent to environmental legislation due to the recession. In fact, it is one of the few nations not yet a formal party to the agreement (The Convention on Biological Diversity) which was signed by 156 nations and the European Union at the 1992 Earth Summit in Rio de Janeiro, (Time International, 30.10.95). But the author believes that the 'relaxation of standards' is short sighted. There has been no decrease in the number of crises, whether economical or environmental. Consequently, scientists and economists warned that if emissions continued to grow at their current rate the climate would be economically and ecologically unbearable in about 25 years (The Independent, November).

This research will seek to address some issues relating to internal environmental reporting in companies which seek to make a profit. Central to this discussion is the role of the accountant and the importance of environmental information which is available voluntarily (no compulsion by accounting standards, legislation or acts), for internal management use. In addition, this study investigates the environmental accounting initiatives in multinationals as well as small businesses. However, the focus is also upon 'progressive' industrial societies of the West, and in particular Britain, which are in the process of overcoming endemic human conditions of scarcity and want, as Mr.Gummer argues "no other nation had published such a broad range of indicators linking economic growth with environmental damage" (The Independent, 13.03.96). This does not mean that other types of government, societies, culture, etc. are not environmentally active, but environmental issues have started in the industrial nations and remain a priority, despite the fact that Third World countries are also blamed for ruining the environment and "the ecological fate of mankind will be decided in Asia," (Thilo Bode, executive director of Greenpeace,

told the Times, 10.06.96). But the problems are compounded in developing countries by the still limited political demand for this type of activity, because short-run problems are more pressing and the relevant resources needed are acutely scarce. According to Dr Paul Minus, US head of the council for Ethics in Economics, “people in developing countries are not prepared for full-blown Western ethics” (The Guardian 18-19.11.95). It is therefore clear that the development of environmental accounts in developing countries will take time (El Serafy and Lutz, 1989).

First, the research aims to contribute to the environmental accounting initiatives, since Bebbington et al. (1994), Gray (1990) and Owen (1993) point out that there is an urgent need for in-depth field research to examine the feasibility and practicality of such ideas, as very few have reached the public domain.

Second, it is the intention to prioritise environmental accounting on the academic agenda, as Bebbington et al. (1994) and Smith (1993) point out that, until recently, the academic business community has been loath to take environmental matters seriously since they run counter to the business paradigm. Gray (1990) and Smith (1993) also suggest that there is a growing need for business educators to give the next generation of accountants/managers the skills to cope with the demands of the new environmentalism. In addition, Bebbington et al. (1994) and Gray (1990) argue the urgent need for environmental techniques to be explored further and new research undertaken, if accountants are to contribute to the greening of organisations. As such, the Latin proverb says: *‘nemo dat quod non habet’* (you can’t give what you don’t have).

Third, it has been argued that accountants are not only myopic and accounting information systems are being used to serve their own ends (Birnberg et al., 1983) but even with an environmental agenda accounting may do more harm than good (Laughlin 1991, Power 1992; Puxty, 1991; Cooper, 1992). However, the aims of this dissertation are to examine critically the latter claims as well as to put current research into perspective and evaluate the counter argument presented by Morgan (1988), Gray et al., (1993) and Owen (1993) who claim accountants are forward-looking, and committed to the public interest and amelioration of the ecological crisis.

After this, the dissertation’s objective is to investigate recent organisations’ awareness of internal

environmental accounting/reporting (despite the recession) as there are a number of strands of theory which argue, on the one hand, that organisational behaviour and activities influence the accounting profession (Bebbington et al., 1994), or on the other that, as Gray et al. (1993) put it, business cannot change substantially until accounting does so.

Then, the author will assess the involvement of the accountant, as previous research findings indicate that accountants are not yet as involved as they could be, especially when some aspects of the environmental agenda and the attitudes of different groups are taken into account (Gray et al., 1993, 1995a; Gray & Owen, 1993; KPMG, 1992; Bebbington et al., 1994).

Next, the main aims are to increase the availability and use of information systems which integrate environmental information into corporate decision-making, planning, budgeting, etc. and serve the external reporting, environmental management and environmental audit which may prevent the company incurring future environmental liability/damage. In line with this, according to Owen (1993), “management information systems are needed to be developed which are designed to promote the green dimension to a central position within the corporate decision-making process”, and a survey conducted by Gray et al. showed that accountants in the UK are responsible for innovation and willing to develop financial information systems, in the environmental domain.

Finally, the question to consider is how far have accountants’ conceptualisations of green organisations/accounting changed over the last five years or so, and what implications does this suggest for their future development?

Through a review of the relevant literature, it is the aim, in Chapter 2, for the author to develop a specific framework within which to study the issues of internal environmental accounting and reporting. The author has limited the focus of study to internal environmental accounting and reporting, since there is lack of academic research in this area, with much of the current focus upon external environmental reporting, environmental auditing and ethical investment.

The remainder of this dissertation is organised as follows. Chapter 3 will focus upon the methodology adopted for this research. It explains and justifies the methods used, so as to enable testing of hypotheses

and to achieve a high quality research output. The method is divided into two parts: an extensive review of the internal environmental accounting and reporting; and supplemented by a postal questionnaire survey to test and validate the relevant issues.

Finally, before the conclusion, chapter 4 will present the findings of the empirical research which were obtained from a mail questionnaire survey. This involves analysis of the collected data statistically to show trends within the data set. This chapter will also discuss the initial research aims and issues, in the light of the empirical survey and examine the hypotheses and trends illustrated within the literature review. The implications will be considered to show the impact of internal environmental accounting.

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REVIEW OF THE LITERATURE

(2.1) Introduction

First, this chapter seeks to examine the nature of environmental accounting and 'green' organisations. Second it briefly examines the literature on internal environmental accounting and reporting in the broader context of making organisations accountable to ecological issues and the avoidance of future liabilities/risk. In particular, the debate over the awareness, benefit and usage of the system is to be considered.

(2.2) Environmental Accounting

Before being able to tackle the sophisticated debate related to the evaluation of green accounting/ organisations and their environmental agenda, I believe that, it is necessary to ask what is environmental accounting?

Any books, articles or published materials about environmental accounting, are immediately faced with the problem of defining it - there are 'no standard definitions'. In this section I define environmental accounting with the help of its objectives, through work done by Gray, Owen and other academics, along with some popular criticisms of accounting and accountants which resulted in development of the new accounting era.

Traditional accounting only accounted for economic ends in money terms, and not the environment (Gray, 1990; Maunders & Burritt, 1991; Rubenstein, 1992; Gray et al., 1993; Owen, 1993), and 'successful' organisations in the past have put more stress on mass production, fast growth and profit maximisation (Farmer & Hogue, 1973; Hopwood, 1984; Gray, 1990; Owen, 1992). But the problem is, once you begin to measure wealth in cash, enough doesn't exist. Whatever the sum, it could always be larger, says Gorz (1989). He implies accountancy is familiar with the categories of 'more' and of 'less' but doesn't know that of 'enough'. On the other level, Skow (1995) writes that no one knows what steps to take against overconsumption in economics when growth is still considered the measure of health. This has led to further explicit criticisms of the accounting professions, for example: Keynes (quoted in

Owen, 1993) claimed accountancy built slums rather than cities; Birnberg et al. (1983) and Morgan (1988) argued that accountants are “constructors of reality” in limited and one-sided ways; El Serafy & Lutz (1989) note that accounts encourage consumption, and promote habits of behaviour that cannot be sustained over the longer term; and Gray (1990) & Owen (1992, 1993) believe that accounting techniques wedded to notions of private ownership and prices tend to encourage exploitation of natural capital and hence mitigate against environmental enhancement. More worryingly, there is a widespread view that the accountant’s conventional approach is acting like a dead hand on the environmental innovation (Gray et al., 1993).

In recognising this tension, the accountants’ and academics’ profession felt the need for change and began to interact with the situation (Gray et al., 1987, 1993, 1995a; El Serafy & Lutz, 1989; Hopwood et al., 1990; ICAEW, 1992; Carey, 1992; Owen, 1992, 1993; Miller, 1994; Burritt & Lehman, 1995). As Financial Accounting Foundation President, R. Larson (1986) points out, “the accounting profession is in the midst of the greatest period of change we have ever known.” In line with this, the President of the Institute of Chartered Accountants in England and Wales, Michael Lickiss (1991) said that, “in responding to the challenges posed by the environment, which is our natural wealth, all aspects of accountancy including financial reporting, auditing, management accounting and taxation will have to change.” This saw the emergence of reforms.

Present environmental accounting systems, which according to Müller & Werk (1991) were first attempted in Switzerland, tend to address many problems and tensions that characterize relations between accounting, organisations, biosphere and the other interests of society (Gray, 1990; Hopwood et al., 1990; Cairncross, 1991; Maunders & Burritt 1991; Owen, 1992; Carey, 1992; Bebbington et al., 1994; Gray et al., 1993, 1995a)¹. More interestingly, academics insist that accountants and accounting systems will dominate the environmental argument, due to various reasons among which include their ever-

¹ These issues are also discussed, with somewhat different view, by Puxty, (1991), Cooper et al., (1992), and Cooper, (1992, 1994). As Cooper argues that the introduction of environmental accounting is actually a negative reform in that it arises from, and is located firmly within, the dominant capitalist, masculist hegemony. Also it has been argued that if ‘conventional’ accountants are to enter the environmental reporting and accounting for the environment, the definition of ‘environment’ will be restricted to a financial one.

present involvement in the resource allocation/decision-making process, and their ability to account for energy which relates to protection/destruction of the environment (El Serafy & Lutz, 1989; Owen, 1993; Adams Roger, 1992; Gray et al., 1990, 1993, 1995a; Epstein, 1996). But the consensus is that environmental accounting has no single unified structure or approach; it is an inexact science and dynamic in nature (Gray et al., 1987, 1995b; El Serafy & Lutz, 1989; Dekker, 1992; Ing, 1992; Wright, 1995; Owen et al., 1996)². The success of environmental accounting depends upon the skill, knowledge, willingness, personal ability, experience and freedom to innovate, of the environmental accountant (Bebbington et al., 1994; Hopwood et al., 1990). In part, this also reflects the wider lack of consensus as to the extent of a company's environmental responsibilities (Wright, 1995; Huizing & Dekker, 1992). For example, there are no binding regulations for the presentation of environmental accounting. Also, there are conceptual and practical difficulties in estimating environmental data (ie. natural capital) in monetary and physical terms³ (El Serafy & Lutz, 1989; Owen 1992, 1993; Huizing & Dekker, 1992; Ing, 1992; Wright, 1995) or even attaching financial values to environmental benefits such as clean air, as Beckerman (quoted in Boulton, 1996) says. Such measurements are clearly essential, as many environmentalists and economists whose aim is to use indicators of physical change to influence public opinion and environmental policies, feel that environmental accounting would not have *real* impact unless the accounts were monetized and figurised (Norgaard, 1989; Blades, 1989; El Serafy & Lutz, 1989; Huizing & Dekker, 1992; Gray, 1992; Wright, 1995). 'Unfortunately' according to Charles Handy, "what we count we value" (quoted in Baldwin, 1995), and before that Schumacher (1971) points out, "money is the highest of all values."

These elements are not new. Gray et al. (1987) forthrightly conclude that developing conceptually valid monetary measures is "one of the major misguided developments in the subject." But, what delights Gray is that in some areas accountants *have* an opportunity to itemise environmental items in accounting figures, for example, the decline in natural capital or the increase in environmental problems, cost of

² This argument applies also to internal environmental accounting and reporting.

³ See Footnote 2, and arguments below to further strengthen this.

waste, (including clean-up costs) and internalized environmental costs within the production processes (El Serafy & Lutz, 1989; Owen, 1993; Owen et al., 1996; Epstein, 1996). Also, it is suggested accountants can capture sustainability and the interaction between the environment and the economy (Gray, 1990; Huizing & Dekker, 1992).

In short, environmental accounting: recognises and seeks to mitigate the negative environmental effects of conventional accounting practice; separately identifies environmentally related costs and revenues within the conventional accounting systems; takes active steps to set up initiatives to ameliorate existing environmental effects of conventional accounting practices; devises new forms of financial and non-financial accounting systems, information systems and control systems to encourage more environmentally benign management decisions; includes more ecological information, develops accounting techniques which express assets/liabilities and cost in ecological (non-financial) terms; and develops new forms of performance measurement (Gray et al., 1993).

(2.3) Greening of Organisations

Industrial activities' effects on the ecosystem are now emerging as the overriding environmental issue of the new era. Examples are the use of chlorofluorocarbons (CFCs) for refrigeration and businesses dumping their effluent directly into the water supplies as a cheap way of waste disposal, which are promising to become the defining focus of the global environmental threat. This is most evident with the finding of 1995's Nobel-prizewinning chemists, Sherwood Rowland and Mario Molina, which indicate that the use of ozone-depleting CFCs can damage crops and cause cancer in humans. While, Rachel Carson - *Silent Spring* (quoted in Brown, 1995) - sees pollution of air and water continuing to be important issues, partly because of the enormous effect of pollutants on human health and the habitats. Estimates suggest healthcare costs annually of \$40 billion in the US derive from vehicle and industrial fuel combustion, congestion in London cost \$20 million in 1988, and carbon dioxide emissions blamed for global warming rose by 12 per cent between 1990 and 1995, as claimed by the Independent World Energy Council, in London (Manchester Evening News, 05.07.96). However, negative side-effects of

industrial activities also impact upon organisations themselves⁴ (Elkington & Burke 1987; Lester, 1992; Epstein; 1996), and eventually, mass output and growth will come to a halt as the world runs out of depletable resources (Pearce & Markandya, 1989; El Serafy & Lutz, 1989). A report, published by the Club of Rome in 1972, *The Limits to Growth*, argued that many of the world's raw materials would be completely exhausted within 100 years. Furthermore, it is argued that the benefits of economic growth are outweighed by its costs⁵. Pollution, congestion, and a hectic lifestyle are too high a price to pay for a rising output of cars, washing machines, and video games. Although most economists believe that this argument is incorrect, they also hold that the impact of organisations' activities outside their own boundaries has merely to do with the concept of externality costs (Farmer & Hogue, 1973; El Serafy & Lutz, 1989; Shrivastava, 1993; Coyne, 1993; Begg et al., 1994).

It is certain that as Schmidheiny (1992), Bebbington et al. (1994) and Gray et al. (1995a) argue, increasing awareness of the importance of the natural environment has stimulated a re-examination of the relationship between business and the biosphere. While, Boulton (1996) and Jackson (1996) imply that, in some cases industries have come to the conclusion that their future may depend on the success of the environmental agenda. Further, Pearce & Markandya (1989) have confirmed that economic and ecological systems cannot be separated. This has brought with it recognition of the new role of organisation in society and status of the firm's ownership. As Morgan (1988) puts it, "those who provide capital may legally own an organisation, but employees and managers invest their working lives, careers, creativity, energy and initiative." Customers may be vitally dependent on quality of the organisation's products and services for their continued well-being. The public at large also has a stake in ensuring that the organisation is a good citizen, and does not pollute the environment or engage in other socially irresponsible practices (see also, Farmer & Hogue 1973; Carey, 1992). Unsurprisingly, even the concept

⁴ The most widely reported example is that high levels of pollution in Athens caused industry temporarily to reduce output and schools to be closed (The Canberra Times, 1989, p.5 quoted in Maunders & Burritt, 1991), and this is further repeated in 1996 as industry was ordered to cut production by 30 per cent (Manchester Evening News, 05.07.96, p.6).

⁵ See Chapter 23 of Needham & Dransfield (1994) as a comprehensive argument of the conflicting interests of business - ie. costs and benefits.

of 'free' natural capital ownership is changing, where some organisations have begun to apply depreciation to natural assets, and use the revenue in building parks around their compound or in a conservation area. On the contrary, according to Owen (1992), some institutions still treat critical natural assets (ozone layer or rainforests) as free goods and therefore confer the right to abuse and deplete these assets, or as Harvey (1996) puts it, air, a river or a stock of fish in the sea has the character of a common property resource. The appearance of costlessness encourages misuse and without clear property rights externalities arise (Milne, 1991; Gray, 1990). Therefore, Buck (1992), Rubenstein (1989, 1992) and Gray (1990) stress the need for amendments to the concept of ownership towards a recognition that ownership involves stewardship, which entails a responsibility to care for and maintain the assets owned on behalf of this and future generations.

According to Brown (1996), even the economic and political institutions that find it hardest to adjust to this new world will start to do so by *force majeure*. He provides an example of the insurance-industry which is alarmed by increased storm damage & flood claims and already spending large amounts of money researching the possible economic effects of global warming. Interestingly, Franklin Nutter, President of the Reinsurance Association of America, agrees that "insurers now realise they could be wiped out by damage claims if, as scientists predict, climate change causes polar ice caps to melt, waters to rise and storms to intensify," (Time International, 10.06.96). While Buck (1992) says that "the forward-thinking company will spend money now to prevent pollution rather than spend vast amounts later to try to clean up the problems that it is causing." This argument is further strengthened by Gray et al. (1995a) who suggest that organisations will not have the option of ignoring environmental matters for much longer - specifically changes in EC law alone are going to change the climate in which business is conducted. This suggests that all type of organisations from small to multinational may end up working to save the atmosphere for the same reason they have polluted it: pure economic self-interest. Along with these 'ecological' problems, there are other reasons for organisations to take account of the environment, as Graedel & Allenby (1995) write "corporations that adopt responsible approaches to industrial activities will not only avoid problems but will benefit from their foresight." These 'Direct

Business Reasons' (see for example Elkington & Burke 1987; Coopers & Lybrand Deloitte, 1990; Lickiss, 1991; Blaza, 1992; Buck, 1992; Gray et al., 1993, 1995a; Smith, 1995; Carty, 1996; Boulton, 1996), are: the business will be classed as environmentally-friendly which will improve the image and status of the firm in the market providing competitive advantage; ecologically-conscious shareholders and investment institutions are more likely to invest; fiscal measures may become an incentive; long-term strategy, business survival and success may be influenced by legislative pressures, or the desire for membership of the Environmental Health Department, Environmental Management and Audit Scheme or British Standards Institution BS7750.

(2.4) Environmental Internal Reporting and Information Systems

There has been a considerable increase in the number of environmental reporting in the UK over the past twenty years. Most studies of environmental reporting (for example, Harte & Owen, 1991, 1992; Roberts, 1991, 1992; Patten, 1992; Gray et al., 1995b; Fekrat et al., 1996; Deegan & Gordon, 1996) have tended to concentrate on external reporting. While, there has been comparatively little attention given to internal reporting, although it is the grass roots of the greening process and the foundation stone of external reporting (Gray 1990; Owen, 1992; Lesley Phillips, 1992; Gray et al., 1995a). As Bebbington et al. (1994) put it, "not only does new disclosure often encourage the development of new information systems but there is widespread recognition that environmental disclosure needs the development of environmental management systems to support it." The next part provides a brief overview of the development of internal environmental accounting and reporting.

(2.5) Scope of Internal Environmental Accounting and Reporting

A business enterprise today operates under an environmental pressure characterised by the present legislation, public concern, green consumerism, environmental groups, ethical investment and others (Touche Ross, 1990; Owen, 1992; Adams Richard, 1992; Cowe, 1992; Gray et al., 1993; Shrivastava, 1993; McCloskey et al., 1993; Bebbington et al., 1994; Carty, 1996; Wheeler, 1996; Kreuze et al., 1996).

This has created many new problems for management. A failure to adopt policy decisions to respond to these problems may mean either losing ground to the competition or facing immense environmental liabilities⁶. In the US, for example, it is clear that *if* the 'Superfund' legislation on liability for contaminated land were fully enforced, many US companies responsible for the contaminated land, and their financial backers could be bankrupt (Maddox, 1995a, 1995b). Such uncertainties may be a factor behind the apparent finding in the UK by Environmental Data Services, that advising on responsibility for contaminated land, and cleaning it up, was currently the single largest category of consultancy work, accounting for 15 per cent of the sector's (Environmental Consultants) turnover (Maddox, 1995b; Foxon, 1995). However, to cope with growing environmental pressures and potential threats, management needs to be environmentally active by taking effective measures such as, collection and assessment of data, minimising waste and economising energy consumption, conserving non-renewable natural resources, anticipating demand for new environment-friendly products and devising safe means of transport based on internationally agreed safety standards etc. Furthermore, management is required to integrate environmental issues into the organisation's day-to-day activities like decision-making, forecasting & planning, coordination and control (Maunders & Burritt, 1991; Mathews, 1991; Gray, 1990; Epstein, 1996). 'Ecological' management also has to formulate an environmental policy to adapt to such new conditions together with environmental budgets to integrate environmental awareness into business activities (Gray, 1990, Owen, 1992, 1993; Blaza, 1992; Lester, 1992; Gray et al., 1993). Under these circumstances, accounting techniques in their traditional form cannot provide the newly demanded information for management to discharge its functions (Rubenstein, 1992). Therefore an acute need exists to modify or develop environmental internal accounting/reporting which seeks to meet the needs of managers and other internal users (Elkington, 1990; Gray, 1990; Maunders & Burritt 1991; Rubenstein, 1992; Philips, 1992; Lester, 1992; Owen, 1992 & 1993; Boulton, 96.). Thus internal environmental accounting is devising new forms of financial and non-financial accounting systems,

⁶ See Rubenstein (1992) for the example of the 'Love Canal', New York state, which suffered tremendous financial liabilities as a result of toxins dumped in the area during the 1950's by the Hooker Chemical Corporation, and whose successor (Occidental) was charged phenomenal clean-up costs estimating \$260 million in 1988.

information systems and control systems to encourage more environmentally benign management decisions. In other words, internal reporting in environmental accounting does not confine itself to financial data only, but also makes use of environmental information which cannot be measured in terms of money to assist management in its decision-making function, in the formulation of policies, and to encourage participation and openness from members of organizations (Jenkins, 1990; Gray, 1990; Harte & Owen, 1992).

(2.6) Nature & Object of Internal Environmental Accounting

Though the current accounting practice is the basis of internal environmental accounting systems, it does, for example, not supplant management accounting but supplements it to serve the diverse requirements of the modern management (Maunder & Burritt, 1991; Bebbington et al., 1994). Because this information is voluntary, with no legal requirement for publication, and is not subject to auditing, environmental accountants are free to supply it according to the demands and requirements of management, in a form and manner to serve their purposes. Also the business is free to install any system of internal environmental reporting, since there are no mandatory regulations with which to comply. However, this can lead to criticism.

Birnberg et al. (1983) identified several ways in which managers can affect the operations of the accounting information system and that this could result in manipulation of a superior's behaviour. "The manager and/or his accounting department exploit the options within the system to find the best message that can be sent subject to the events that actually occurred." In another situation, if the accountant can specify in advance which data is required by management or only supply the information needed to them, [as Hines (1988) emphasized that accounting is a communication device which both represents reality and constructs that reality through the discourse created] then s/he will only search for specific information, and therefore many issues/ activities will go unaccounted or unreported for the accountant and organisation alike. Birnberg et al. concluded that "it is clear that the information system may confer power to the members of the organisation for they are able to affect its output."

Criticism also arises because of the inability to draw boundaries around environmental impacts. It is not clear what the ecological effects of a company may be, for example when assessing pollution impacts on relations with local communities, there may be confusion between a company's emissions, and general air pollution in the area (Huizing & Dekker, 1992; Ing, 1992; Wright, 1995). On the other side, accountants seem genuinely uninformed by professional guidance and unsure how to develop environmental accounting systems, as the finance director of a multinational company in UK, put it, "we found it extremely difficult to see how we could put these things [environmental matters] into the accounting records ... accounting approaches encourage short-term attitudes - community investment, like environmental investment, requires a long-term attitude," (quoted in Bebbington et al., 1994; see also, Gray et al., 1995a).

A further criticism is the question of *who* exactly internal environmental reports are aimed at, employees, labour union, chief executive, board members or that 'vague' but fashionable group, stakeholders?⁷ (see Huizing & Dekker, 1992; and Owen et al., 1996 for example). According to Wright (1995), the short answer is all of them. He further argues, this poses many problems for the 'green' reporters. How detailed should the document be? How technical? Is its prime aim to communicate statistical information - or a broader environmental vision? There is no neat answer, except to the saying that any report worth its salt should encompass these broad issues! This latter suggestion clearly raises major practical problems (see, Ing, 1992), and it is believed that further research is needed.

(2.7) Accountants' Actual and Intended Involvement

It has been argued that environmental reporting is often driven by environmental health officers whereas a study concerning accountants' involvement in environmental information for management showed that they are willing to become involved (Bebbington et al., 1994). This argument is strengthened by Ing

⁷ According to Harvey (1996) the term 'stakeholders' is now common-currency. It, too, originated in the US. It is, of course, a play on the word 'stockholder' and implies the concept of corporate responsibility beyond that to shareholders. Another meaning of stakeholder is extracted from IBM's report *Consulting the Stakeholder*, where it covers employees, customers, suppliers, investors, lenders, insurers, government organisations and regulators, local communities, environmental experts and 'opinion formers'. However, in this chapter it means the latter.

(1992) who argues that, through their training, accountants are ideally placed to play a leading role in environmental reporting, and as Maunders & Burritt (1991) argue “accountants appear to have retained their role in company information systems despite predictions that computer and/or management science specialists would usurp this.” Furthermore, Roger Adams (1992) claims that “systems and controls are the accountants’ bread and butter,” (see also, Owen, 1993). But, Gray (1990) has cogently argued that accountants tend to over-rate their abilities in the realm of attaching financial numbers to various aspects of business activity whilst, at the same time, probably under-rating their most important talent - that of the design, recognition, assessment and control of information systems in an organisation. Among his recommendations, all of which have clear accounting implications, are to highlight the control and decision-making processes. Owen (1992, 1993) concludes that the aim of the accounting information system is to simply inform decision-makers of the extent to which their particular organisation is depleting the planet’s capital, whilst Preston (1981) sees such systems as a means of *preventing* ‘environmentally’ irresponsible decisions from occurring, rather than merely reporting and evaluating the damage. Accordingly, Siegel & Kulesza (1996) point out “in the new milieu, the role of the accountant has undergone a striking metamorphosis: from number-crunching preparer of financial statements to high-level decision-support specialist.” In practical terms the accountant can supply useful information on various matters to different functional authorities, help in making strategic decisions, like anti-ecological production, health & safety matters, environmental impact/liabilities and waste disposal, by analysing the data collected and suggesting better alternatives. For effective control, accountants may carry out an Environmental Audit which is defined by the International Chamber of Commerce (1989) as “a systematic, documented, periodic and objective evaluation of the performance of the organisation, management systems and processes designed to protect the environment.” This might help control environment impacts, complying with own environmental strategies and policies, which would include meeting regulatory requirements and minimising waste (Owen, 1992; Adam, 1992; Lester, 1992; Reed, 1992; Edwards, 1992).

According to Stelzig & Shrives (quoted in Edwards, 1992), environmental auditing is becoming an

internal management tool for both public and private sectors. Surprisingly, Bebbington et al. (1994) found that many respondents had never heard of an environmental audit and/or had no intention of exploring it. Blaza (1992) saw that this is attributable to confusion between financial and environmental audit, together with a shortage of environmental auditors who are often inadequately trained and educated. We return to this in the next part.

Previous studies have listed several activities that companies responding to the environmental agenda may be expected to undertake (Elkington et al., 1991, Lester, 1992; ICAEW, 1992; Coopers and Lybrand, 1992; Cowe, 1992; Gray, 1990; Gray et al., 1993, 1995a). They show energy, investment appraisal, activity & performance, and wastes as the dominant concerns. This is confirmed by Bebbington et al. (1994) who added the development of environmental policy to the above, but found that sustainability and life-cycle analysis were low in the green organisation/accountant's agenda. Bebbington et al. (1994) also note that water, air and land pollution have little importance, but Farmer & Hogue, (1973), Blades (1989), Lester (1992), and Huizing & Dekker (1992) see pollution of air and water as the most important issues especially for the oil/chemical/mining industry. Bebbington et al.'s finding comes as no surprise to Bode who told the *Time International* (10.06.96) that "Environmental problems are often perceived as being limited to issues such as clean air and clean water. But the real problem is resource consumption," and in particular, depletable resources (Harrison, 1989; El Serafy, 1989; Brown, 1996).

The good news is that energy in general is becoming less of a concern, as Brown et al. (1996) claim. It is possible that a renewable energy-based economy can emerge that will solve the big problems of oil prices and global warming (Hopwood et al., 1990). Also cheering to Brown et al. is the strong growth in paper recycling, where new technology and higher prices have added to its attractions. Interestingly, Epstein (1996) and Blaza (1992) shares the same view by claiming that many firms are already finding that energy conservation and waste reduction are actually economical as well as environmentally beneficial. However, many academics see the cost benefit approach as the way to encourage organisations to take the environment seriously, bearing in mind that a thing done willingly will be far better done than one done unwillingly. Blaza (1992) points out that environmental reporting in the future

should go beyond a 'compliance led' process, with its emphasis on costs and burdens, to a market-driven voluntary approach which identifies opportunities and benefits on which management can base long-term business plans.

One might reasonably expect that such pressure or benefit would lead to changes in practice, particularly in sensitive industrial sectors. However, there is little evidence of an actual response by organisations and to the practice of internal environmental accounting /reporting, and this is due to various reasons (see e.g. Owen 1992, 1993; Gray et al., 1993, 1995a; Bebbington et al., 1994). On the other hand, Rubenstein (1992) and Lester (1992) takes a somewhat different stand by arguing that, increasing legislation will continue to add pressure for organisations to set up policies appropriate to the environment. As part of the implementation of the policy, whether or not voluntary, there will be enhanced reporting, measuring and monitoring requirements at all levels (Ing, 1992).

In short, despite the criticisms of an ill-defined environmental agenda and the lack of a consensus about the nature of reporting, there is evidence of progress which has been made and an awareness that market pressures exist which will force further progress. The role of education in this progress is now briefly considered below.

(2.8) Education and Environmental Accounting/Reporting

The various studies briefly described above lead us to the conclusion that 'accounting for the environment' is a wide scope subject, for example, it considers government policies, market & economic conditions, impact of industrial activities, ecological state etc. A combination of these issues helps the accountant and management alike, to carry out their functions successfully. Therefore, it makes use of studies like economic, law, management, political science, statistics, ecological studies and others. However, the wide scope of environmental accounting, along with individual initiatives, as has already been noted, may result in inexactness and subjectivity in the conclusions drawn. There is every possibility that the environmental accountant may have a biased view in collecting and interpreting the data. Unless there is adequate education and training, accountants will remain vague in their

interpretation of these issues. Needless to say, in late capitalism, knowledge, science, education and representational skills became ever more important as key elements in the productivity of the economy and in the running of society, (Gorz, 1989). Furthermore, one of Elkington's (1987) '10 Steps to Environmental Excellence' is 'educate and train'. It is a vital step for the greening of organisations/accountants if they are to embrace the changing environmental agenda and maintain the current high status of the profession (Hopwood et al., 1990; Smith, 1993; Gray et al., 1993; Bebbington et al., 1994). It is possible to conclude, therefore, that a combination of training and personal dispositions could be powerful enough to shape the accountant and thereby affect his/her ability to innovate in the future (Granlesse & Barrett, 1990). According to Bebbington et al. (1994), current education and training methods inadequately prepare accountants for the environment they will face within organisations. There is an urgent need at all levels of the education system for reform (Gorz, 1989), and environmental concerns need to be incorporated into every educational level in general disciplines but in accounting in particular (Roger Adams, 1992; Smith, 1993). Bebbington et al.'s arguments effectively echo a substantial literature in which researchers have identified, that accountants as a whole, are ill-equipped to respond to new challenges (see for example, Lee, 1989; Power, 1991; Cramer et al., 1991; Lewis et al., 1992; and also see, French et al., 1992; Gill, 1993; Gray et al., 1994; Humphrey et al., 1996). This is not to say that accountants are incapable of change, but that they are ill-equipped through their training and education, to reflect upon and respond to challenges that lie outside the existing orthodoxy of current accounting techniques.

On the other side, although, UK professional accountancy bodies have a favourable environmental stance, their 'message' is either not getting through to practising members in industry, or is not yet perceived as sufficiently important to accountants' current activities (Bebbington et al., 1994). In addition, a study by Geddes (1995) examined the role of the accounting profession, and in particular the 'Big Six' firms, to suggest a 'gap' between theory of accounting taught within universities and current practice. This argument is further strengthened by Edwards (1993), to show a gap of communication between university research and accounting practice, as a result of turbulence in the higher education

environment through the merging of the former polytechnic sector with the traditional universities. Interestingly, Siegel & Kulesza (1996) in a recent review of accounting education in the US, argue on the same lines that, accountants and accounting education are steadily headed in a new direction. As they wrote: colleges and universities are changing to meet the needs of their corporate customers.

(2.9) Implication for Accountants and the Nature of the Challenge Facing Them

The role of education and training is doubted by some. Rustin (1994) criticises those (Dobson, 1990; Cramer et al., 1991; Stead & Stead, 1992) who give too much causal weight to the role of ideas/norms/morality/personal values and knowledge - in being capable of producing change. He argues the power of self-conscious agents to transform the world through shared morals and knowledge is exaggerated, thus taking a stance against 'spiritual reawakening' and voluntary actions (see also, Carey, 1992). This is best expressed by the example of the voluntary resolution passed by the Earth Summit in Rio (1992) urging Industrial Countries to reduce emissions of 'green house gases' to 1990 levels, mostly by increasing energy efficiency. Inside the industrial world, emission-reduction efforts have been most successful in ecology-minded Germany and Japan. But in the US, the world's biggest greenhouse polluter, legislators want to cut taxes rather than boost spending (Times International, 30.10.95). In line with this, Gray et al., (1993) argue that "there is no evidence to suggest that voluntary action alone will be sufficient to deal with the environmental crisis and there has been a steady trickle of information which suggests that voluntary initiatives are having only partial success," (see also, Gray et al., 1987; Gurthrie & Parker, 1989; Gray, 1990; Owen, 1993). Hence more market oriented pressures may be required to provide our best assurance of survival and truly human development (Henderson, 1991).

In promoting socially-benign environmental protection, legislation and taxation are seen by many business academics and practitioners as the most effective ways of combatting environmental problems by encouraging organisations to adopt a more environmental stance (Lester, 1992; Financial Times 13.03.96).

Despite all these rules to make the world a better place to live in, critics such as Beckerman and Harvey

(1996) doubt that environmental problems are anywhere close to being solved. According to Harvey (1996), government intervention, such as a carbon tax for example which might attempt to overcome market failure, proves to be not working, and the political processes involved in market intervention through taxation, subsidies or regulations are not perfect, whether within a nation state or in the even more complex international arena. He argues that “Profit-seeking within the law” is the conventional corporate creed. Indeed, research covering 185 companies found a mere 4 per cent which managed environmental issues as a fully fledged part of their business management (Financial Times, 17.05.96). In addition, Beckerman points out that the government wants to have it both ways, i.e. seek green votes and avoid the effect of eco-taxation on businesses.

On the other hand, Hopwood et al. (1990) and Huizing & Dekker (1992) highlighted the difficulties of using standards, to create change. Issues include the impact of standards on various sizes and types of organisation, the enforcement of regulation, and the design of standards capable of attaching consensus.

In the current climate, enforcement is mainly of the ‘club membership’ variety (Hopwood et al., 1990; Boulton, 1995), and government rules have added to companies’ obligations, and often, to their costs (Blaza, 1992; Carey, 1992; Owen, 1993; Maddox, 1995a; Clark, 1995; Harvey, 1996; Plaskett, 1996; Griffiths, 1996). Or, as Smith (1993) sees it, attempts to impose tighter regulations in Western countries have resulted in the export of such waste to the developing world. An example of lax enforcement and legislative failure is that “twenty years of US emission control have done little to improve air quality” (Bell, 1992). Another example, is the new ‘expensive’ European packaging directive, which industry groups have suggested that, in the UK alone, implementing the measures could cost £100m a year, much of which might eventually be passed on to consumers (Financial Times, 21.06.95; see also, Plaskett, 1996).

Then, the question is what, if anything, lies beyond the market and the law? According to Buck (1992) and Havery (1996), self-regulation represents possible discretionary sources of constrain on business behaviour beyond the core mechanisms of market and regulatory forces. In line with this, the chairman of Du Pont points out that “environmentalists can agitate; governments can regulate; but industry can

innovate,” and US west coast entrepreneur Paul Hawken reinforces the point: “Business is the only mechanism on the planet today powerful enough to reverse global environmental and social degradation” (Financial Times, 03.05.96).

However, the question of ‘business ethics as an internal approach’ will lead naturally to the question of who should take the leading role in the innovation within the organisation? Havery (1996) placed special emphasis on non-executive directors, and Power (1992, 1994) firmly believes that environmental accounting and accountants are effectively cast in the role of change-agents. Their position is ambiguous - typically they are ‘mediators’ in the sense that accountants are the link between bottom line and top management, and therefore might strike a balance between the management’s own interest and those of the stakeholder. Roger Adams (1992) in fact, goes so far to suggest accountants can be found at each level within the organisation, as well as externally within the government and the EC, and their skill and experience acquired over the years put them even ahead of environmental scientists. On the other hand, as has been mentioned earlier, there are several ways in which the accounting function can contribute to the environmental development of the organisation (see for instance, Jenkins 1990; Elkington, 1990; Gray, 1990; Gray et al., 1993; Adams, 1991; Owen, 1992, 1993; Blaza, 1992; Epstein, 1996).

Despite this, a study undertaken with UK, New Zealand and Canadian organisations by Gray et al. (1993) concludes that senior management were rarely able to see why the accounting function and accountant might contribute to the environmental innovation of their organisation. On the contrary, Bebbington et al. (1994) confirmed that accountants and accounting in the UK have low levels of involvement in their company’s environmental activities (see also Coopers & Lybrand, 1990, 1992; Elkington et al., 1991; ICAEW, 1992; Gray et al., 1993; Tennant, 1993). Meanwhile, some accountants maintain the environmental crisis has more to do with growth, expansion, mass production and mismanagement⁸, than with the accountant’s activities. The difficulty, however, is that growth and expansion are likely to remain objectives of organisations, and mismanagement can often be self-perpetuating rather than self-

⁸ The costs of environmental mismanagement have been estimated as at least 6% of the gross national product of most industrialized countries (Lester, 1992).

correcting. But that does not exclude the accountant from being part of the crisis, if not, at least part of the solution. As Bebbington et al. (1994) put it, senior accountants are normally to be found as part of the senior management team of an organisation - not as an isolated function. Therefore, opportunities for involvement with the organisation's developing environmental agenda can be expected to present themselves. In sum, industrial activities heavily contribute to the environmental problem and, as Gray et al. (1993) note, "accounting bears a serious responsibility for the growing level of environmental devastation" (see also, Roger Adams, 1992). In connection to this, we leave the last word to Mckibben (1990) (quoted in Owen, 1992), who notes, "The choice of doing nothing....is not a choice, in other words. It will lead us, if not straight to hell, then straight to a place with a similar temperature."

The difficulty lies here, whether accountants' responses appear to bear any relation to the environmentally-related behaviour of the organisation for which they work (Thomas, 1989; Rubenstein, 1992; Bebbington et al., 1994), or whether accountants, perhaps, reflect their professional affiliation to a greater degree than their organisational affiliation (Nahapiet, 1988; Harrel et al., 1989; Granleese & Barrett, 1990; Power, 1992; Hopwood, 1997, 1992). Although this is, of course, highly debatable. It seems likely that for the most effective change the two must work together (Gray, 1990).

(2.10) Conclusion

In an overly long chapter, I have not been able to do justice to the numerous evaluation studies, especially in internal environmental accounting and information systems, where they have proliferated. However, in conclusion, let me refer to the findings of one of the few comparative evaluation studies which was very recently published as an article (Burritt & Lehman, 1995). Environmental accounting is a developing discipline faced with many teething problems, which, according to Gray et al. (1995c) includes definition, since any research requires a definition of the thing to be researched. This chapter has examined the development of environmental accounting in the academic literature over the last five years or so, in an attempt to evaluate the current state of the art. The lack of generally agreed definitions of internal environmental accounting and reporting presented a major problem, since these have to be

precise and unique to enable any future content analysis. This problem was avoided (rather than solved) by focusing on its objectives, from textbooks and published articles written by academics.

Drawing on data from a number of sources, the author concludes that, among the various types of awareness programs, education and training programs are the most effective for change. Even if education and training programs do not lead to immediate awareness and available solutions, they may reduce long-term traditional practices and increase adaptability/accountability, thereby becoming a radical change. One might also stress the need for a close link between professional accountancy bodies, business schools and practising members in industry, in contrast with the sharp separation between education and work.

The author would also like to highlight the need for an 'optimum balance' to be found between persuasion and legislation, for governments and professional organisations to work closer together - ie. the convergence of a 'regulatory' and 'market' framework.

Although it would be easier to collect environmental data in the form of flexible reports on the state of the environment and organisation profiles, the paramount need is to develop a system of environmental accounts so that the information is standardized, exhaustive, summed up in physical and monetary terms, and comparable in time and space.

Further, it has been shown that internal environmental reporting is important for the greening of organisations, but at present the focus tends to be on the external side, due to reasons of compliance and of public concern. What is needed, however, is more research within the organisation to show the benefits of the internal system.

Finally, the new approach to internal environmental accounting and reporting, is obviously far from perfect, and it is not yet fully practised in any organisation. The author perceives it as a promising start that can and needs to be refined and improved. Owen et al. (1996) suggest this, claiming that a standardized reporting format *is* emerging in UK companies, although it remains far from being static. And as Wright (1995) claims "there's a lot of potential and the occasional flash of brilliance but it's a long way off maturity." Also it would appear that the topic is an interesting area for accounting

research. Unfortunately, the most fruitful approach - field research inside organisations - has not been a popular one with accounting researchers. What is needed is more research in these areas to make accounting for the environment more feasible. This is the contribution of this study.

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RESEARCH OBJECTIVES, PROCESS & METHODOLOGY

(3.1) Introduction

This chapter explains the particular methods and techniques employed for the purpose of this research. The methodology is divided into two broad areas - literature review and a postal questionnaire survey, addressed to the finance directors of a sample of profit organisations. The concentration on finance directors reflected the desire to obtain relevant opinions and attitudes on environmental reporting, although the questionnaire asked for the respondent title since it was probable that some questionnaires would be passed to, for example, environmental officers. First, the issues to be studied are outlined in the form of research questions. This is followed by a detailed description of the chosen methods.

(3.2) Research Objectives

The objectives of this research fall under three main categories:

First, to examine the role of internal reporting within the context of environmental accounting.

Second, to review and investigate the *use* of internal environmental accounting and reporting within a company and to assess whether or not such practices are deemed worthwhile by financial directors.

Third, to examine the *awareness* of environmental reporting on the part of the organisation and the accountants involved.

(3.3) Literature Review

Any investigation¹, whatever the scale, involves reading the work of other researchers in your area of interest. Such a task is designed to gather information to support or refute arguments presented, and to enable presentation of research findings. For the purpose of this research, a literature review was

¹ Throughout this dissertation, the author used terms 'research', 'investigation', 'inquiry' and 'study' interchangeably, though I realise this is not acceptable to everyone as some academics argue that 'research' is a more rigorous and technically more complicated form of investigation. See Howard & Sharp (1983), *The Management of a Student Research Project*, and Drew (1980) *Introduction to Designing Conducting Research* for further discussion of the issues.

essential as a means of devising a theoretical and analytical framework around which to develop and interpret the data, and to identify and explain relevant relationships (Verma and Beard, 1981).

Based on the amount of current research in the area of environmental accounting, the intent is to provide the reader with a broader picture of existing knowledge and contributions in the field. In terms of *method*, the focus must shift towards sound design, hypothesis construction and testing, and analysis and criticism of results. The inter-relation of these factors will heavily determine the relative success or failure of the research, and as Harre (1986) notes, it is extremely difficult to devise absolute standards for deciding whether or not 'true' knowledge is accumulated by the research process.

While reviewing the literature, the attempt was to identify relevant writings, and to describe the main arguments and thrust of the papers. It is argued by Ryans et al. (1992) that experienced researchers follow such an approach when dealing with a new area of research. It is of fundamental importance to identify the source of literature used, whether from academic journal literature, books, papers, case study or review of other general articles of interest. In such an approach, it is suggested that new research projects first require 'backtracking' from a recent known contribution, to use as an initial source of reference. The literature review suggested that most works by accounting researchers in the environmental area have been conducted using externally available sources of information, such as published financial statements and environmental reports. There has been much less research into internal sources of information. Thus this dissertation focuses on what is perceived as a gap in existing literature. It was decided to collect and analyse data about the availability of environmental information within organisations and about the perceptions of its value.

The next section of this chapter describes the data collection and analysis methods.

(3.4) Sample Selection

A sample² was designed to serve the research goals and to obtain a representative sample to make inferences about the whole population from which it was selected. For statistical purposes, the word

² A sample is a part of a population selected for further investigation.

TURNOVER COMPANY'S ANNUAL TURNOVER
by MARKET IMPORTANCE OF ER IN TERMS OF - MARKETING

Page 3 of 3

TURNOVER	Count	MARKET					Row Total
		NO IMPOR	VERY LIT	SOME IMP	IMPORANT	VERY IMP	
		TANCE 1	TLE IMPO 2	ORTANCE 3	T 4	ORTANT 5	
700 M	30			1			1 1.8
2.7 BN	31				1		1 1.8
450 M	32				1		1 1.8
13 BN	33					1	1 1.8
960 M	34			1			1 1.8
100 M	35				1		1 1.8
33.116 BN	36				1		1 1.8
160 M	37				1		1 1.8
Column Total		6 10.9	11 20.0	19 34.5	17 30.9	2 3.6	55 100.0

Number of Missing Observations: 5

GENDER by NOUSE ER FOR INTERNAL MANAGEMENT SERVE NO PURPOSE

Page 1 of 1

GENDER	Count	NOUSE				Row Total
		STRONGLY DISAGRE 1	DISAGREE 2	NO OPINI ON 3	NOT APPL ICABLE 99	
MALE	1	27	22	6	1	56 94.9
FEMALE	2	2	1			3 5.1
Column Total		29 49.2	23 39.0	6 10.2	1 1.7	59 100.0



'population' has a very specific meaning: it is the total collection of objects to be studied. In this research, the population of objects under scrutiny are for profit organisations. One might argue the reasons for not selecting the entire population, or the justification in how a sample can be more accurate than looking at the wider scale. In defence of this, researchers like Arber (1993), De Vaus (1991) and Wonnacott & Wonnacott (1990) argue that a sample can yield more accurate results since surveying the complete population is a task of such gargantuan nature that it yields to the possibility of increased errors, perhaps due to insufficient time/resources, and avoids repetition of results.

Basically, two types of a sample exist: (i) purposive and (ii) random. For this survey a random sample³ is the one used, for its ability to be representative of the population. As De Vaus (1991) points out the surest way of providing equal probability of selection is to use the principle of random selection. Furthermore, as Wonnacott & Wonnacott (1990) suggest, randomising ensures a sample against bias, with the additional advantage of evaluating sample uncertainty. They argued, a truly representative sample of 20 replies may be much better than a biased sample ten times as large. The author seeks to research only a random sample of companies, since previous academic studies in the area have focused solely upon those companies who have shown interest in and taken seriously environmental issues. Previous studies are thus heavily biased, and our approach minimises this by selecting companies which may or may not be involved in these issues (see Appendix 3 for listing of different company activities and turnovers). The moral here is that quality is more important than quantity. Modern polling organisations such as Gallup essentially use small random samples to obtain better results. In short, "you don't have to eat the whole ox to know it is tough" (Johnson quoted in Wonnacott & Wonnacott, 1990). A random sample of 200 companies was sought, which was hoped would produce a response of at least 60 companies. To obtain a response of this size a postal questionnaire was used. Having justified the use of sample, the obvious question is 'why' systematic selection is chosen. It is to a consideration of this distinct issue that we shall now turn our attention.

³ A random (or probability) sample is one in which all members of a population have a known chance or probability of selection (P_i).

(3.5) Systematic Selection

The lottery and the random number method of selection are cumbersome and time consuming especially when a large population is to be sampled as in this case. Therefore, using Systematic Selection, without replacement, was the option where all elements of the population were listed and a fixed sampling interval was used to select sample members. For instance there were 42 companies of Agriculture, Forestry & Fishing on the list and only 7 companies to be investigated, the interval was 6. Every sixth company on the list was selected after a random start between 1 and 6 (the sampling interval).

In order to avoid biased sample and to lower standard error, Systematic Selection was an advantage because sample members will be more evenly spread across the population than in the true simple random sampling (SRS). In other words, every sixth business does not share a particular characteristic because one element has been selected into the sample, the selection of all others was determined by the order of the list. It is impossible for neighbouring elements on the list to enter the sample. However, this list is called a 'sampling frame' which is described below.

(3.6) Sampling Frame

There is often no ready made Sampling Frame available for the population of interest or a list that covers the population we wish to study. Therefore we had to piece together a sample from more than one source. The three main sources were: First, Key British Enterprises - British Business Rankings - Britain's Top 50,000 Companies Vols.1-6; second, The Times 1000, and finally, C.D.Rom.

It was relatively easy to obtain names and addresses of the population of interest from the above mentioned sources. However, by the time the questionnaires were sent out, some companies may have closed down, or some companies may have shifted their offices or had little to do with environmental reporting. These establishments would be 'out of scope' and their inclusion in the Sampling Frame would not bias the sample. In fact, one might argue that omission of new companies is more serious because the resulting sample would under-represent entries in the market. To overcome this potential bias, we have sought to update the Sampling Frame by obtaining lists of recent companies (ie.1995) and ensuring

their existence and exact location. Having discussed the random sample and sampling frames, the techniques used to collect survey data are now discussed. The two coming sections focus on constructing questionnaires, and then the problems of non-response.

(3.7) Designing Questionnaires⁴

The postal questionnaire included three broad types of questions and the responses were designed to facilitate data entry and statistical analysis: (i) The first, 'closed' questions, where the respondent selects a response from a set of alternative answers. Closed questions have advantages because they can be pre-coded and less time consuming for the respondent to complete⁵; (ii) The second, 'open' questions or open-ended questions, which allow respondents to give unstructured answers; (iii) and finally, 'pre-coded' questions, where respondents were asked to give answers they like, with answers already coded into one of a number of response categories provided in the coding manuals.

Although some questions in the survey required subsequent coding (post-coding) after the questionnaires were completed, it was decided that the questionnaire survey would be mainly closed questions and pre-coded.

(3.8) Measuring Attitudes

Attitudes were measured using a 5 point Likert type scale where the respondents were asked to indicate strength of agreement or disagreement with a given series of statements on a five-point range. Answers were then scored, generally from 1 (strongly disagree) to 5 (strongly agree) and a measure of

⁴ Researchers are not in complete agreement about what should properly be called a questionnaire. Sometimes it is used to mean a document containing a set of questions for respondents to complete themselves (a self completion questionnaire) and sometimes to mean the list of questions which an interviewer reads out to respondents. Throughout this chapter it is the former that is meant: a questionnaire is given to respondents for them to fill in.

⁵ However, such structure questions also have disadvantage that they force the respondent to choose between the answers provided. In our questionnaires this difficulty was overcome by asking for further information to allow for more elaboration. For instance, 'other general comments' and 'other' were provided for those who cannot find an appropriate pre-coded response.

respondents' feelings were produced. For example, respondents were asked about the benefit of environmental internal reporting. In other questions, respondents were asked about the importance of certain aspects of their internal reporting, again using a Likert type scale to distinguish the strength of importance they attach to their reporting.

(3.9) Non-Response

The main argument against using postal questionnaires generally has been that the response rate is low. As Moser & Kalton (1971) point out “non-response is a problem”. To tackle the problem of size and non-response rate, the size and type of sample was decided as mentioned above, in order to have a reasonable return and sufficient results from which to generalise. As characteristics of the population from which the sample is drawn are known, the author has tried to compare the characteristics obtained in the sample with those of the population. The differences indicate the areas of bias and the extent of the differences indicate the degree of bias, and as De Vaus (1991) points out with this information adjustments can be made during the analysis to neutralise the effect of non-response.

In order to maximise the response rate, non-respondents were followed up. Although anonymity is promised, names were not asked to be given but a system of numbering was devised so that respondents and non-respondents could be identified and re-surveyed. This procedure maximises the response rate and falls within the questionnaire administration, which itself cannot be separated from the issues of sampling and questionnaire design (de Vaus, 1991). Eventually a response rate of 45 per cent was achieved, of which 30 per cent was usable. The next and subsequent sections involve practical issues in coding questionnaires and in preparing data for computer analysis.

(3.10) Coding And Managing Data

Once the research data was collected, the initial task was to start making sense of the material in the completed questionnaires and then to compare them. To do that required the information being organised into a form that will facilitate our understanding of its meaning. The data was organised into

categories to make comparisons easier, and to enable easy access to the data.

The coding process was based on 5 steps: (i) was to develop the coding frame for both pre-coded and open questionnaires; (ii) was to create the code book and coding instruction; (iii) coding the questionnaires; (iv) transferring the values to a computer; and (v) to check and validate the data.

The aim of coding was to assign a value to each piece of information. Each individual case will then consist of a complete set of values for each of the variables under inquiry. The result of such coding is the production of a data file which consists of numbers such that the rows correspond to each case⁶ and columns correspond to each variable. On some occasions, respondents have not replied to a particular question, or the question was 'not applicable' to the respondent, an identifying value was assigned to the variable in such cases. Care was required to ensure that each value was placed in the same column for each variable, and for each case, in order to have a rectangular data matrix. The questionnaires had many variables and multiple lines of data for each case were used.

Some respondents refused to answer certain questions for some reasons. Therefore, the decision was made to assign 0 code to the non-responses and missing values. While on the subject of missing data, there were other reasons for data to be missing for a particular case. For instance, respondents who did not know the answer to a particular question and replied with a 'don't know,' or a question or set of questions were inapplicable. Again a 98 code was assigned to 'Don't know' responses and 99 code to 'Not applicable' responses.

In coding the questions regarding respondents' sex the value 1 was assigned for those who responded 'male' and 2 for those who responded 'female,' because it is more usual to use a number since the use of alphabetic coding sometimes imposes restrictions on subsequent analysis.

In order to have a good result, codes were mutually exclusive. Any particular response must fit into one, and only one category. Furthermore, codes were exhaustive, covering all possible coding options and codes were applied consistently throughout the questionnaires for values being used for similar responses in different questions.

⁶ A case is the organisation which was investigated.

So far this section has discussed the coding of closed questions, and now we will focus on the coding of open questions, and pre-coded questions with options, ie. 'others.'

As Prescott-Clarke (1982) pointed out that in some open questions you could not possibly anticipate all responses and therefore need to develop a coding scheme after the questionnaires have been filled out. In this survey, the answers to such questions were left uncoded and analysed only after the due-date for receiving the questionnaires had past. The author has then tried to define a theoretically relevant distinction between responses and made a list that formed the basis of the coding frame used to code the rest of the questionnaires. However, due to respondents mentioning more than one risk, there was a problem in deciding how to code the answers. Therefore, the decision to deal with multiple responses in open questions is to code only one that satisfies certain criteria, for instance, respondents have ticked more than one box in the question about respondent's qualification. But the highest education level attained only was coded.

The pre-coded questions offered the options of 'other (please specify)' categories to act as a 'safety-net' in catching additional responses encountered infrequently, which could not therefore be pre-coded. A set of categories was developed within which to code such data, created from the data themselves (coding up). This process involved coding question by question (ie. across all 60 responses), and not case by case. This led to greater consistency in coding each variable, and reduced the possibility of any pre-conceived picture of the respondent which could lead to bias in the coding of any ambiguous response.

(3.11) Creation Of The Code Book

Having completed the coding instructions and created the coding frame, the code book was then derived before coding questionnaires. The mentioned code book was in a form in which the following information is recorded for each variable:

- Question number and wording.
- Variable name for use by computer programs to refer to the variable (restricted by the analysis software to 8 characters).

- Column location of each variable.
- Values that the variable can take and what these values represent.
- Missing value (s).
- Range of valid values.
- Coding the questionnaires

This meant going through each questionnaire and writing the ID number, checking for missing questions, marking the appropriate missing value, and marking the values for each open question.

At this stage, anticipation of frequent responses to add to the pre-coded answers was not possible. Therefore, any unanticipated responses to the questionnaires led to the reorganisation of the coding frame.

(3.12) Transferring The Data To A Computer

Having created the coding frame, written the coding instructions, created the coding book and coded the questionnaires, we were then ready to analysis the data. However, it was necessary to use a computer due to the level of analysis required and subsequent size of the questionnaire survey.

There are many statistical programs for analysing survey data that can help with the data entry process. The most popular and widespread software is the 'Statistical Package for the Social Sciences' (SPSS) which is available on the University network and was therefore accessible. It was easy with SPSS to enter data from the coded questionnaires. But before that, it was necessary to setup a program to recognise the variables. This involved giving a name to each variable, telling the program its value (whether numeric) and stating the column width (1/8).

Having set up the program with this initial information and defining each variable, it was then possible to enter the data.

(3.13) Conclusion

In summary, the object of this research was the extent of involvement of 'green' accounting and

accountants in their organisations and the awareness of both (i.e. accountants and organisations in the environmental issues)

Our method of data collection was as 'creative' as possible in that we were seeking to gain-with regard to the internal environmental accounting and reporting. As Cohen and Manion (1989) point out, the methods selected for gathering information will depend on the nature of information required. The author gathers data through reading published materials, corporate reports and postal questionnaires.

This chapter has shown the steps involved in designing and administering questionnaires, coding and managing data, and before that had justified the methods used for data collection.

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RESEARCH FINDINGS

This chapter examines the findings of the postal questionnaire survey, and it will be divided into two sections. The first will discuss the trends derived from the data set, through preliminary statistical analysis using SPSS. This will highlight significant variables and offer initial suggestions to explain any trends found. The second section will seek to offer more detailed evaluations of the results in the preceding section, through comparative analysis with the literature review in chapter 2. Concluding remarks will follow.

(4.1) TRENDS

Respondents were drawn from a wide range of industries so that this research has examined a very broad cross-section of organisations, unlike previous research which has tended to concentrate upon more specific types of business. Also, the spread in company turnovers, from 17 million to 33.116 billion, suggests a broad dispersion in the size of companies used within this survey which again indicates an unbiased and representative sample of organisations.

Considering these factors, qualitative statistics derived from the research questionnaire show significant trends and anomalies exhibited through the data set. At the basic level, the initial output obtained was a listing of frequency distributions for all variables, found in Appendix 3, to show frequencies and percentages of the total sample who replied to individual questions. This is a preliminary level of analysis which enables further crosstabulations and statistical correlations to be derived at a later stage, if required. This section presents the results of the questionnaire which is in Appendix 1.

(4.1.1) Number of Companies Which Have Internal Environmental Reporting?

The first point to note is the high percentage of companies which do presently have some form of internal environmental reporting (73.3%), shown in Table 1, which typifies the high validity¹ obtained within the

¹ Validity seeks to determine whether the data which have been collected are true pictures of what is being studied (ie. are the data evidence of what the researcher claims, or simply a product of the research method?).

survey (see later) and attaches greater meaning to subsequent responses.

Table 1

Numbers of companies with some form of IER

<i>Value</i>	<i>Frequency</i>	<i>Percent</i>
Some	44	73.3
None	16	26.7

Table 2

Does your company collect environmental data on any of the following

N=60	<i>Yes</i>	<i>No</i>
Use of scarce resources	41.7	58.3
Substitute renewable resources	30.0	70.0
Improve effic. of using scarce resources	50.0	50.0
Recovery & recycling of scarce resources	50.0	50.0
Pollutants due to prodn.of products	75.0	25.0
Pollutants due to use of products	43.3	56.7
Pollutants from distn.of products	40.0	58.3
Impact of prodn.on communities	70.0	25.0
Impact of prodn.on employees	78.3	20.0
Impact of products on customers	40.0	58.3

N.B. figures expressed in percentages; figures may not tally due to 'not applicable' and non-response; N= number of companies

Having established that approximately three-quarters of the respondents use environmental reporting within their organisation, Table 2 shows the types of information which are collected. The results showed certain major or 'key' issues which organisations felt to be of importance. These can loosely be classed under 'paternalistic', since 75% of companies claimed to collect data on the emission of pollutants due to production of companies' products, in addition to 70% concerned with the impact of production processes on local communities. Together these suggest widespread concern for issues such as personal health and pollution, which are currently high on the environmental agenda. Similarly, such paternalistic concerns, which can be categorised as 'external', also extend internally within the organisation since 78% of companies also seek to obtain data on the impact of production processes on

their own employees. As such, while concerns for a company's 'reputation' within the community are recognised, it is the case that a proportionately large sample also collect data about the safety of their employees. As a personnel issue of growing importance, this will be reviewed in the discussion section.

(4.1.2) Levels Of Satisfaction With Existing Reporting And Intentions To Change Reporting

Table 3 indicates that a total of 50% of companies are satisfied with current reporting. This confirms the 40.0% who disagree and 25% who strongly disagree with the need for radical changes in existing accounting systems with regard to internal environmental reporting. Thus, while recognising the necessity for internal environmental reporting, it would seem that a proportionately large sample of companies perceive their existing systems as adequate. This may be due to various reasons, such as a lack of knowledge in how to transform current systems, companies may regard the costs of making changes as exceeding any benefits accrued, and any new systems in themselves may be resisted by staff, especially if they are few in numbers. Alternatively, it may be that changes have recently occurred. 66.7% collectively agreed that the use of environmental information has changed over the last five years.

Table 3

Accountants' satisfaction

N=60	1*	2*	3*	4*	5*
Satisfied with reporting of IEA	5.0	25.0	18.3	43.3	6.7
Need for rad. changes in sys.	25.0	40.0	16.7	13.3	3.3
Use of env. info. changed	8.3	11.7	10.0	46.7	20.0

* for above key: 1 represents *strongly disagree*; 2 represents *disagree*; 3 represents *no opinion*; 4 represents *agree*; 5 represents *strongly agree*

N.B. figures expressed in percentages; N= number of companies; figures may not tally due to 'not applicable' and non-response

Respondents were asked to agree or disagree with a number of statements to assess their current satisfaction with the internal reporting of environmental activities within their company, and the

likelihood of changes in the future.

Table 4

N=60	Reason for improvement			
	Very Probable	Probable	Possible	Unlikely
Managerial needs	31.7	31.7	13.3	18.3
Public relations	20.0	26.7	23.3	26.7
Credibility with suppliers	6.7	15.0	28.3	40.0
Compliance with standards	23.3	26.7	28.3	15.0
Minimising waste	26.7	33.3	16.7	18.3
Reducing costs	26.7	26.7	30.0	11.7
Increasing profit	23.3	23.3	26.7	21.7

N.B. figures expressed in percentages; N= number of companies; figures may not tally due to 'not applicable' and non-response

Table 4 reports respondents perceptions about the likelihood of future change to internal reporting systems, to improve the quality of information for a number of purposes. It is interesting that for the purposes of public relations, compliance with standards, reducing costs and increasing profits, the results are relatively inconclusive and do not exhibit any definitive trend. However, 60% claim it is 'probable' or 'very probable' that environmental reporting will be improved for the purposes of minimising waste, and in total 63.4% believe improvements will be made to meet managerial needs. The anomaly in this case is perhaps the stronger percentage of companies (40%) which claim it is 'unlikely' that reporting will be improved to achieve credibility with suppliers, suggesting that the issues of internal reporting are displaced from company-supplier relationships.

Further, Table 5 shows that 76.7% are not willing to change systems to reduce the amount of internally reported data, whilst 86.7% are not planning to reduce the number of employees to whom data is available.

Table 5

Plans to change present internal environmental systems

N=60	<i>Yes</i>	<i>No</i>
Improve quality of internal data	56.7	38.3
Increase amount of internal data	40.0	55.0
Reduce amount of internal data	8.3	76.7
Increase no. employees to data avail.	30.0	61.7
Reduce no. employees to data avail.	0	86.7

N.B. figures expressed in percentages; N= number of companies; figures may not tally due to 'not applicable' and non-response

Such responses indicate that either companies are satisfied with present systems regarding the amount of internally reported data and are unlikely to alter present systems in ways which might *reduce* the amount or availability of the data.

(4.1.3) Information: Its Nature, Value And Users

Table 6 shows the frequency with which different levels of management receive environmental information. According to Arnold & Turley (1996) information needed depends upon the type of organisation and the level of management. However, at each level from board members to supervisory staff, information in this survey is received most commonly on a *monthly* basis.

Table 6

Which levels of management receive frequent environmental information

N=60	<i>Monthly</i>	<i>Quarterly</i>	<i>Half Yearly</i>	<i>Annually</i>	<i>Never</i>
Board members	31.7	26.7	6.7	11.7	16.7
Senior execs.	41.7	28.3	10.0	13.3	6.7
Middle managers	50.0	11.7	5.0	11.7	16.7
Junior managers	40.0	11.7	5.0	15.0	20.0
Supervis. staff	36.7	10.0	5.0	15.0	21.7

N.B. figures expressed in percentages; N= number of companies; figures may not tally due to 'not applicable' and non-response

The traditional role of the accountant in organisations has been to collect, record and report information,

yet only 43.3% of respondents (in Table 8) agreed with the statement that accountants should be involved in the preparation of environmentally related information for management. However, when asked who should take the lead in *both* collecting information *and* preparing reports, it would seem that respondents would prefer ‘environmental officers’ to take this lead (73.3% and 75% respectively), over the more traditional roles of accountants, computer, science specialists and engineers (see Table 7 below). This is perhaps not surprising if one is to consider that environmental activities per se tend to be regarded as ‘specialist’ in knowledge (Smith, 1993; Gray et al, 1994; Lawrence & Cerf, 1995; Humphrey et al., 1996) and as such require a specialist organisational role to manage them. The growing role of such ‘officers’ within organisations may be interpreted as their response to the prioritisation of environmental reporting as a managerial subunit in itself, not to be ‘merged’ into any other key organisational activity.

Table 7

Who should collect information and prepare reports?

N=60	Collecting Information	Preparing Reports
Accountants	18.3	21.7
Computer (IT)	11.7	6.7
Science specialists	25.0	23.3
Engineers	33.3	20.0
Environmental Officers	73.3	75.0
Line Manager	5.0	5.0
Manager	1.7	1.7
Nominated Person	1.7	1.7
Team Effort	1.7	1.7
Health & Safety	1.7	1.7
Production Staff	1.7	1.7
All	1.7	1.7
Business Manager	1.7	1.7

N.B. figures shown in percentages; N= number of companies; figures will not tally since information is drawn from numerous tables

Table 8 summarises respondents perception about the value of internal environmental information drawn from answers to Question 6 on the questionnaire at Appendix A. More than three-quarters of the sample (80%) agreed or strongly agreed that internal environmental information can be financially worthwhile,

and 70% agreed or strongly agreed that good *quality* environmental information is essential for managers. In addition to this, the most significant result shows that collectively 86.6% of the sample either strongly disagreed or disagreed with the statement that environmental reports for internal management serve no useful purpose. These findings indicate that companies *do* recognise the growing role and importance of environmental reporting. This is consistent with the perception that environmental information can be financially worthwhile, and shows that the respondents have recognised environmental reporting as a key managerial issue. This result also substantiates the 55% of companies who agree that such reporting can protect management from future financial liability or risk regarding damage to the environment, such as clean up costs.

Table 8

Value of internal environmental information

N=60	1*	2*	3*	4*	5*
Accountants involved in prep. IER financially worthwhile	8.3	28.3	15.0	43.3	3.3
Allow competitive advantage	0	1.7	16.7	56.7	23.3
Future benefits reflected	0	11.7	38.3	38.3	10.0
Good quality info. essential	5.0	21.7	48.3	15.0	5.0
Env. reports no purpose	3.3	8.3	16.7	40.0	30.0
Env. info. is obscured	48.3	38.3	10.0	0	0
Env. accounting encourage order	16.7	28.3	21.7	25.0	6.7
Env. reporting can protect mgt.	23.3	20.0	43.3	0	0
	1.7	21.7	16.7	45.0	10.0

* for above key: 1 represents *strongly disagree*; 2 represents *disagree*; 3 represents *no opinion*; 4 represents *agree*; 5 represents *strongly agree*

N.B. figures expressed in percentages; N= number of companies; figures may not tally due to 'not applicable' and non-response

Respondents generally recognise, as shown in Table 9, that there is some value in integrating environmental information into the management function, such as decision-making, forecasting &

planning and formulating policy. In addition, marketing is shown within the literature as a significant factor, and Richard Adams (1992) and McCloskey et al. (1993) show if any increase in internal environmental reporting occurs it can be accrued to market pressures. However, this research shows the contrary, with only 3.3% agreeing that marketing is very important. Other figures of particular concern relate to the areas most closely associated with accounting: auditing and budgeting. Respondents saw little environmental impact on budgeting but this is an area where corporate response to the environmental agenda needs to be addressed.

Table 9

Importance of environmental reporting to management

N=60	1*	2*	3*	4*	5*
Decision-making	6.7	6.7	33.3	35.0	18.3
Forecasting	5.0	16.7	38.3	23.3	16.7
Control	11.7	15.0	30.0	30.0	13.3
Auditing	21.7	30.0	20.0	16.7	10.0
Formulating policy	5.0	10.0	35.0	36.7	11.7
Marketing	10.0	21.7	35.0	28.3	3.3
Budgeting	10.0	31.7	30.0	16.7	10.0

* for above key: 1 represents *no importance*; 2 represents *very little importance*; 3 represents *some importance*; 4 represents *important*; 5 represents *very important*

N.B. figures expressed in percentages; N= number of companies; figures may not tally due to 'not applicable' and non-response

(4.1.4) QUESTION 6h

One question which has encountered problems within the survey is no. 6h (shown in Table 8), which states: 'Environmental accounting will encourage continuance of the present social order by legitimating destructive actions and producing political quietism'. The question sought to assess accountants' attitudes (positive or negative) towards environmental accounting, and to identify whether they are aware of the possibility that their work may serve to legitimise the wrong-doings of unethical management through the abuse of accounting techniques [for example, by presenting the public with a 'creative' picture (Birnberg et al., 1983)]. However, a large percentage of the sample (43.3%) replied to the above statement with no opinion. This result can be interpreted to suggest that many of the respondents were

unfamiliar with the academic language of the question, which was criticised during the pilot survey by a PhD respondent who asked “Are you trying to sound intellectual?” The question itself was derived from a quote by Cooper et al. (1992) in Gray et al. (1995a). However, Birnberg et al. (1983) and Solomons (1978) urge accountants to ignore politics and stick to neutral map-making, by claiming:

“There was once a time, not so many years ago, when accounting could be thought of as an essentially non-political subject” (Solomons, 1978).

The situation today perhaps conforms less to the above quote, in a climate where accountants are also being accused of being ‘anti-social’ (Willmott & Sikka quoted in Thame, 96), and “enslaved by traditional working practices,” (Accountants, May 1996) only to support the values and needs of specific interest groups, (Morgan, 1988; Birnberg et al, 1983; Prakash & Rappoport, 1977).

(4.1.5) The Respondents

The respondent classification data shows that within the sample, the modal age tends to be between 41 to 50, with 95% of responses by males. The most common degree held is a Bachelors, and the majority of respondents tend to have worked over 15 years since leaving college (83.3%). Initially, this portrays a ‘stereotypical’ picture of the executive responsible for this function, as a middle-aged man, with good education and having worked many years within industry. This is significant if one is to consider that environmental accounting is a relatively new area, not taught on many university or professional accounting syllabuses. As such, the respondents to this survey are people having worked and thus graduated over 15 years ago, and therefore having had little or no formal training in this domain. Whether such characteristics of the sample would explain the trends within the responses can be determined by further crosstabulations of significant variables.

The section that follows analyses these trends, explaining why and how they are likely to come about.

(4.2) DISCUSSION

The discussion is presented in four stages. First, a brief overview is given of respondents’ awareness

about environmental accounting/reporting and development of the environmental agenda in their organisation. Second, organisations' perceived level of involvement with these activities is examined. The third stage is a discussion of the role and involvement of accountants' in the greening of organisations, followed by further descriptive statistics to show the age & gender make-up of respondents. Concluding remarks are expressed later.

(4.2.1) Awareness

The mail questionnaire survey confirms that accountants have a general level of environmental awareness, which, for example, is reflected in Table 8. However, when asked whether they agreed that 'future ecological benefits are reflected in current performance' (question 6d), 48.3 % responded with 'no opinion'. This result implies a *conflict* between awareness of the environment, and accountants' apparent lack of knowledge about the possibilities of environmental accounting. This is further enforced in question 1 which shows 73.3% of companies claiming to use internal environmental reporting, but when asked more specific questions in Table 2, for example concerning the impact of production processes on employees or pollutants arising from company's products, the results exceed this at 78.3% and 75% positive responses respectively to show that accountants do not fully comprehend the subject of environmental reporting in the general sense. However, this finding agrees with a study by Bebbington et al. (1994) who concluded that accountants appear to experience conflict between their awareness of environmental issues and an inability to translate this into action within their corporate life.

This study confirms the external reporting literature and shows that organisations' current internal concerns are health & safety of employees and the impact of process & product on customers and others (Lester, 1992; Wright, 1995; Owen et al., 1996). As one of our respondents stated: "It is essential to integrate environmental issues with Health & Safety and Quality as good working practice." Furthermore, Morgan (1988) argues that organisations are increasingly viewed as being as much the property and concern of employees, customers, managers and the general public, as they are of owners, in the sense that each of these groups has a deep stake in the existence of an organisation. However Table

2 also indicates that internally many companies are collecting data on the use of scarce resources and that 50% have some information about the use and recycling of scarce resources. This finding gives a grounding to further research in what precisely are the ecological effects of the company, and for which effects can the company be held accountable? Further, what do individual companies need to take into their account - direct or indirect ecological effects - since their inclusion may be double-counted?

(4.2.2) Company Activity

It is important to note that this research investigated a random sample of companies so that it is possible to provide the reader with a general picture of companies' environmental activities and awareness. The smallest company in the sample had a turnover of £17 million, so that Buck's claim (1992) that smaller companies do not see green issues as relevant cannot be confirmed or denied by this sample (see Appendix 5). Furthermore, the issues of public relations and marketing are especially interesting.

An analysis of the results from question 3b, by industry, suggests that the importance of public relations depends upon the type of organisation. For example, public relations was more important to companies within the food industry.

Previous work on the growing importance of green consumers (McCloskey et al., 1993), may be partly due to consumer pressure as demonstrably a force to be reckoned with, and accordingly, supermarkets and cosmetic manufacturers are taking heed of 'green' issues and finding their actions good for business. Lester (1992) points out that many multinational companies have already taken this problem seriously while most smaller and medium sized companies have not, and will lose market share unless they react quickly. Our result, however, suggests something to the contrary which leads one to ask 'why'? Previous research has tended to concentrate upon sales departments, whereas this research has focused upon financial directors - this difference probably explains the discrepancies. Accordingly, the author suggests a growing need for more detailed case studies and interviews to be conducted in order to derive more first-hand, practical information within a firm. Also, this may be attributed to British consumers who are perhaps not fully environmentally-conscious compared with their German or Scandinavian counterparts

(Simon, 1991 quoted in McCloskey et al., 1993). And it is argued that consumers buy product benefits and not just product features. Or on the other level, the majority of manufacturers are merely using environmental reporting as advertising or promotional techniques only to create a 'green' image, instead of incorporating environmental concerns into their products and services.

The selection and design of information systems is a crucial element of organisations' environmental response. According to Gray (1990), the most obvious form of collecting information is in something like a monthly report to local and senior managers. This is corroborated by our research for all levels of management. However, one might question the validity of this information, since further research is needed to investigate whether reported information is: credible; accurate; understandable; relevant to the actors involved; and identifying what is and is not happening, ie. is it covering all possible activities?

Table 4 shows that companies are seeking to improve the quality of internally reported data, but not the quantity or availability of the data. The reasons for this are perhaps that such information may be classed 'commercially-sensitive' particularly towards the employees, and accordingly trade-unions do not have the power to demand access to it. Further, what is on trade unions' agenda may differ according to different companies. For instance environmental campaigning is more successful in the public than private sector, as fear of the public, press scrutiny and legislation may differ (Hackett, 1992; Jackson, 1992; Benn, 1992).

Also, data may not be perceived as important by the workers, and as some argue environmental initiatives start from the highest levels of an organisation and not from the 'grass roots' (Smith, 1995; Hackett, 1992). Interestingly, there appears to be evidence that companies may restrict the numbers of employees who receive environmental data.

(4.2.3) Accountants' Involvement

Whilst a minority of accountants appear to be aware of the environmental agenda as mentioned above, the majority do not seem to be involved (Gray et al., 1993, 1995c; Bebbington et al., 1994). This is shown in question 6k in Table 3 (40% disagree and 25% strongly disagree about the need for radical

change to accounting information systems) which confirms the previous finding where accountants in the UK are slow to change, with environmental accounting lagging behind (Bebbington et al., 1994). However, Power (1992, 1994) points out that there are no guarantees that change will produce the desired behaviour sought. Further, the data in Table 3 confirms the literature (e.g. Tennant, 1993; Bebbington et al., 1994) that accountants are aware of corporate responses to the environmental agenda, but in practical terms the level of their involvement is not high. This is felt by one respondent, who said, "In conclusion, I feel that environmental and social accounting are seriously needed in today's world, but I acknowledge that my view is very much in the minority."

This last suggestion is perhaps due to: (1) accountants and organisations being happy with the change so far; (2) they have not seen tangible benefits of internal reporting through environmental accounting; or (3) for the accountants, this responsibility may be on top of their usual jobs and may provide a great deal of work with no extra support or pay? This can only be determined with further in depth organisational case studies.

It may also be the case that accountants often make calculations in the balance sheet concerning areas to which they have little knowledge or physical involvement. This is certainly the case for environmental issues, which are specialist in background, and accordingly academics agree there is much difficulty in collection and estimation of environmental data - hence accountants have no tools to deal with such matters, unlike their counterparts in the areas of science, engineering and the environment (see Table 7). This is also claimed by a respondent in the area of Packaging & Paper Production, who says, "In reality environmental reporting in some businesses is crucial, thorough and conducted by specialists, in others it has a lower priority. Issues like minimizing waste and reducing costs are 'unlikely' to receive greater attention because they are already well controlled and form a key business objectives to keep them that way." This raises questions concerning 'green' accounting education and those who take charge in its teaching and the quality of research, especially in business schools (Gray, 1990). Therefore, there may be a strong need for compulsory courses and a well administrative institution using well-trained professionals in the counselling, training and education programmes (Smith, 1993; Humphrey et al.,

1996).

(4.2.4) Age and Gender of Respondents

Despite the representation of women in the workforce, the lack of women in senior organisational roles may have an impact on internal environmental reporting. "Women now make up almost half the workforce and 58 per cent of female professionals are under 35" (Cosmopolitan 1996). However, Kate Jenkins, an independent consultant on government, told The Independent (02.06.96) "there are no women in the top three grades in the cabinet office or Number 10." She also added that "women are just not getting the top managerial and financial jobs". Furthermore, a Cabinet Office spokeswoman claims in the private sector, "only 3 per cent of directors and 4 per cent of board members are women". In Japan also, fewer than one in 10 managers are women - one of the lowest ratios in the world (Kristof, 1996). However, this comes as no surprise to these research findings, which reveal that only 5 per cent of respondents were women, and the rest men in their forties.

The important point here, in a world that "is still dominated by a very traditional male elite", as claimed by Jenkins, is the difficulty in changing 'old practice.' As Tony Blair told the Daily Mail (12.06.96), Japanese board members had previously run factories as opposed to being retired diplomats or City figures, as is often the case in England. This suggests a move away from aristocracy to meritocracy, and further, the author suggests a greater degree of involvement for women in top management and politics (as financial directors and legislators), since the fact remains, "women in the 18 to 34 age group are more committed to achieving success than their male contemporaries" (Brinkworth 1996; Independent on Sunday, 1996). Also, previous studies have shown women to be more sensitive to the world and environmental matters (Warford, 1989; Robertson & Berger, 1986; Cosmopolitan, 1996), with a higher understanding of the ways to solve social problems. This is reflected in this research where womens' attitudes to the environment tended to be more strongly expressed than those of the men. For example, when questioned about environmental reporting serving no useful purpose, despite only 3 female respondents, 2 strongly disagree and 1 disagrees, to confirm this (see Table 10 below). The age and

gender make-up of the survey (2 of the female respondents are chartered accountants and Bachelor graduates) also suggests that education has a role to play if environmental issues are to become more significant to business organisations. Also, this research did not examine solely female financial accountants and their attitudes, and accordingly there are clear calls for further studies in the area to examine the role of women and their attitudes to the environment.

Table 10
(Wo)man Attitudes Towards the Environment

N=60	Strongly Disagree	Disagree	No Opinion
Male	27	22	6
Female	2	1	

N.B. Non-response & non-applicable is 3.3% (Male); N= number of companies

(4.3) Conclusion

Within the constraints of this chapter, it is impossible to include all the response details and deal with all the problems and issues which arise, since “there is no situation, however complex, which on careful examination does not become more complex” (Paul Anderson, quoted in Procter, 1993). But the overall picture showed accountants and organisations *are* aware of the importance of environmental reporting, but recognise practical difficulties in its application.

The results of our survey have been compared with other surveys for compatible elements. Previous studies have tended to investigate large companies which are known to have a strong record in the environmental area, and have often focused on companies in the more environmentally-sensitive industries. For example, these include pharmaceutical, chemicals, aerospace & defence, bodyship and extractive industries - see, ICAEW, 1992; Owen, 1992; Gray 1990; Gray et al., 1993. This bias has resulted in environmental accounting and the benefit of reporting being overstated. This has perhaps resulted in painting a more positive picture of the attitudes of accountants and organisations to the

environmental agenda (Bebbington et al., 1994). As one of the UK's leading software development multi-nationals claimed, "obviously environmental reporting can be of great use for the right industries/companies. The opposite is also true" (Finance Director, XXX Company). However, this survey based on a random sample of companies shows that while the majority of companies do collect environmental data, and do disseminate it regularly to management and supervisory ranks, the impact of the data on important business areas such as budgeting is very limited. In only about half of those companies which collect data does it figure in decision making, forecasting or organisational control. Hence, there is a need for researchers to identify ways in which company accountants can apply collected data within the organisation.

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SUMMARY AND IMPLICATIONS

(5.1) Initial Aims

As the century stumbles to a close, each year brings additional evidence that we are entering a new era. An age of relative expansion and fast growth is being replaced by one of accountability. The environmental era, however, will be characterised by a collision between economic interests and the earth's many natural limits. Indeed, the evolution of the global economy will be shaped by environmental issues, such as the need to renew or use scarce resources more efficiently.

One consequence of the increasingly frequent collisions between growing human demands and limits on natural resources is likely to be a further restraint on businesses in general, and thus on accounting. The purpose of this study was to examine the current and prospective impact of environmental issues on corporate decision making, by analysing their impact on the accounting function.

The research suggests that the majority of UK companies are aware of ecological issues, but are faced with many operational difficulties in their responses to the environmental agenda. They are unsure about how to proceed, lack a unified approach, and above all there is some confusion in how economics and ecology are related, and how this relationship is measured. This leads to the question - what precisely are the ecological effects and responsibilities of the company?

In the absence of hard information, it is difficult to assess what exactly the impact is. Further, according to Huizing & Dekker (1992), "If the business world genuinely wants to tackle ecological problems, they first need to find solutions to the difficulties of measuring the ecological effects of the company." Gray et al. (1993) confirm this by saying, "It is equally true that without a 'greener accounting' many environmental initiatives will simply not get off the ground." They also insist that "business cannot fully embrace the necessary environmental change until accounting and finance have done so."

After this, one might ask whether environmental accounting is really the solution to environmental problems or whether it is just part of the solution. The answer is that saving the last remnants of the natural environment requires more than just accounting information. There are also formidable economic

and political problems to be overcome. These are universal and accordingly all parties concerned must learn to cooperate and work in conjunction with accountants to find a global solution. As ecologists have always said, everything is tied to everything else. Problems on land become problems at sea and in the atmosphere. Thus, to what extent is the future shaped by accounting, and will the environmental accounting fix the problems created by traditional accounting?

After that the question remains, 'will Britain progress towards fulfilling her obligations in the run-up to 2030 (when UN has agreed climate control targets)?' At the moment, of course, it would be difficult to see this.

(5.2) Main Research Findings

The main findings show that accountants are environmentally aware and academic literature provides innovative actions to bring about change. But there is a lack of application, and the obstacle lies with inadequate training and education. As such, how should change be implemented?

There is no doubt that in order to change the deep core values of business we will have to change the values of those who will manage them. Therefore, environmental concern should be incorporated into academic business disciplines, and to have green accountants more application of research is needed. There is also an urgent need for business educators and practitioners to convey their exhortations concerning the environment to their members in industry.

However, lack of knowledge is not the only limitation facing today's accountants. Equally important is their 'creative' lack of ethical values/environmental sensibilities needed to make good judgements and decisions on environmental issues. As Lester (1992) claims, "caring for the environment requires the right attitude of mind and a long-term view", since "greens are motivated by a sense that the natural world is precious" (The Daily Telegraph, 08.03.96). Furthermore, although changing accounting may be able to contribute to change in the organisation's environmental posture, how substantive can this be? The 'deep greens' seek change in individual, societal and organisational perceptions of self and other-matters (Maunder & Burritt, 1991; Gray, 1992; Owen, 1992, 1993). Also, consumer practices are so

deep rooted not only in our economic but also our cultural and social life that it may prove virtually impossible to reduce the environmentally-harmful nature of such main activities (Farmer & Hogue, 1973). In short, what we need is an 'environmental culture'. However, according to Smith (1995), "environmental culture cannot be imposed", which may restrict the benefit of direct government intervention by legislation.

Bearing this in mind, in any action that is taken it must be remembered that industry alone is the creator of wealth (Buck, 1992), and before that, the Brundtland Commission (1987) suggested that industry is both central to the economies of modern societies and an indispensable motor of growth (Owen, 1992). Moreover, Professor Handy accepted that good profits are essential but argued that they are a means to an end and not an end in themselves (quoted in Carey, 1992). Further, Lickiss (1991) sees environmental pressures as primarily providing opportunities for business rather than placing constraints on it.

Despite the exhortations of environmental groups and the government, companies remain sceptical that, in the absence of legislative threats, it is worth their while to become 'greener'.

As such, Maddox (1995) sees that legislative wavering may be one reason why some companies appear less keen than in the past on adopting environmental improvements. According to Environmental Data Services, the recent slowdown could be reversed if the legislative momentum were maintained, and if regulations were fully enforced (Financial Times Survey, 21.06.95).

The Government must strike an optimum balance between persuasion and legislation. In fact, an element of both may be the most appropriate, since excessive legislation would probably lead to organisations adopting a negative attitude towards environmental improvement, and instead of striving for environmental excellence, they may make little effort to achieve more than the minimum required standards. On the other hand, an entirely voluntary approach could put environmentally-conscious companies at a disadvantage compared to their less responsible counter-parts (Carey, 1992).

What is needed more, according to Gummer, is for the UK to revise and refine its policies, "so that our economy can grow in a way which does not cheat on our children" (The Guardian, 13.03.96).

Although the preceding chapters have demonstrated that environmental reporting and accounting for

nature is a daunting task, it is a quickly changing field with the emergence of new research. Although, accountants through their past experience and training, are ideally placed to play a leading role in the environmental area they have not widely adopted this role in practice. Some, including the author of this dissertation, would argue it is their duty to undertake this role.

(5.3.1) Implications for Future Research

However, before very firm conclusions can be drawn, more research should be conducted with larger samples as well as different types of information provided. As Gray et al. (1995c) conclude “there is still a relatively small amount of empirical work on the role and effect of environmental issues on organisations and the role that accounting can and does play in green conceptions of organisation”. In addition, the lack of ‘relevant’ literature in the field also suggests the need for more research in general directed towards these issues.

The dissertation also raises several research questions that need to be investigated. These questions include, for example: the *reasons* for environmental internal accounting (or lack of reporting); whether there are industry-specific patterns in reporting and what is the best one; what should reporting encompass; is reporting made in response to pressures from legislation, regulation or stakeholders; and what is the link/effect of internal reporting on decision making, control or other types of management functions?

Further studies are also recommended to show the benefits of internal environmental accounting, perhaps on non-profitable organisations which are not as subject to short-run or profit-oriented needs. As such, the benefits of internal environmental accounting may be easier to identify. Also, enterprises must become more ‘open’ in order to derive a unified approach to reporting. There is a need for environmental accounting to impact decision making where emphasis is on numerical performance indicators. This affects the perception of the environmental information.

The findings have shown that availability of information within companies is quite widespread internally and that information exists which is not published. Internal information is received on a

monthly basis by senior management but in fact, it is not fully integrated into management functions such as budgeting. Consequently, future research is needed to ascertain the reasons why such information is not integrated, and to examine the effects if it is. This may be achieved through more direct methods of investigation, such as case study or fieldwork, to obtain information of a more detailed and practical value. It would also be interesting to conduct further research involving female finance directors.

(5.3.2) Limitations

Internal environmental accounting is in its initial stage, and will continue to develop. It, therefore, has the same impediments which any new discipline has, such as deriving a fluidity of concepts, raw techniques and imperfect analytical tools. One obstacle is the lack of any 'agreed' definition of environmental accounting, since this itself constrains effective analysis of the literature and practical applications.

Although attempts were made to unify the wording of the questionnaire, different types of activities within organisations gave problems of which one to investigate, resulting in many activities being left unaddressed.

Also, concerning limitations with the methodology adopted, the weakness of questionnaires lies with their subjective evaluation of a particular issue by parties unknown to the researcher. This problem would be remedied by the alternative use of first-hand interviews or case studies, since, academics (ie. Kaplan, 1985 quoted in Ryan et al., 1992) have increasingly argued that accounting should be studied in its more natural environment. This enables the researcher to experience the sights, sounds and feel of the organisation in question, as well as obtaining relevant information germane to the study.

(5.4) Final Thoughts

It is important to bear in mind that we can not stop industrial activities completely and it is not easy to ask for zero-growth rate. Practical and achievable solutions to put the ecosystem back to its natural order and to avoid a future 'ecological holocaust', probably require multi disciplinary approaches. However,

with the help of internal environmental accounting, businesses may recognise the impacts of their operations, and assess potential alternatives which may: lead to better management of organisations; accelerate environmental awareness amongst stakeholders; and eventually protect the natural resources of the country.

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APPENDIX 1

QUESTIONNAIRE

8 September 1995

Dear Sir/Madam

MSc Questionnaire Research Survey

I am a postgraduate research student on the MSc Accounting & finance course which is jointly taught at UMIST and the University of Manchester at present undertaking work to submit my dissertation. The area of my research is Environmental Accounting: Internal Reporting, and I would be most grateful if you could spare the time to complete the attached questionnaire regarding environmental issues within the organisation. I can assure complete anonymity of responses, and my research would benefit significantly from your help.

Please return the completed questionnaires to me,
c/o Mrs Pam Edwards (my research supervisor) in the enclosed reply paid envelope.

Your time and assistance is greatly appreciated.

Mr. Osama Saleh

ALL RESPONSES WILL BE TREATED AS STRICTLY CONFIDENTIAL

The questionnaire deals exclusively with the company's internal reporting systems and not with publicly available information.

1. Is your company presently using internal environmental reporting ? Please check all relevant boxes.

☐ Yes ☐ No

2. Does your company presently collect environmental data on any of the following issues ?

- | | |
|---|--------------------------|
| (a) Use of scarce resources | ☐ |
| (b) Efforts to substitute renewable resources | ☐ |
| (c) Improving the efficiency of using scarce resources | ☐ |
| (d) Recovery and recycling of scarce resources | ☐ |
| (e) Pollutants due to the production of the company's products | ☐ |
| (f) Pollutants arising from the use of the company's products | ☐ |
| (g) Pollutants arising from the distribution and disposal of the company's products | ☐ |
| (h) Impact of the company's production processes on local communities | ☐ |
| (i) Impact of the company's production processes on employees | ☐ |
| (j) Impact of the company's products on customers | ☐ |

Continued over

3. How possible is it that your internal environmental reporting will be improved for the following purposes, in the short or medium term?

	Very Probable	Probable	Possible	Unlikely
a) managerial needs	☐	☐	☐	☐
b) public relations	☐	☐	☐	☐
c) credibility with suppliers	☐	☐	☐	☐
d) compliance with standards	☐	☐	☐	☐
e) minimising waste	☐	☐	☐	☐
f) reducing costs	☐	☐	☐	☐
g) increasing profit	☐	☐	☐	☐

4. Are there plans to change the present internal environmental reporting systems ?

	Yes	No
Improve the quality of internally reported data	☐	☐
Increase the amount of internally reported data	☐	☐
Reduce the amount of internally reported data	☐	☐
Increase the number of employees to whom data is available	☐	☐
Reduce the number of employees to whom data is available	☐	☐

5. Which levels of management receive frequent information about environmental matters?

	Monthly	Quarterly	Half Yearly	Annually	Never
Board members	☐	☐	☐	☐	☐
Senior executives	☐	☐	☐	☐	☐
Middle managers	☐	☐	☐	☐	☐
Junior managers	☐	☐	☐	☐	☐
Supervisory staff	☐	☐	☐	☐	☐

Continued over

6. To what extent do you agree or disagree with the following statements ?

please respond using a scale of 1 - 5, on which

- 1 - represents strongly disagree
- 2 - represents disagree
- 3 - represents no opinion
- 4 - represents agree
- 5 - represents strongly agree

	1	2	3	4	5
A Accountants should be involved in the preparation of environmentally related information for management.	☐	☐	☐	☐	☐
B Internal environmental reporting can be financially worthwhile	☐	☐	☐	☐	☐
C Eco-management and environmental internal reporting practices allow businesses to gain competitive advantage over their competitors	☐	☐	☐	☐	☐
D Future ecological benefits are reflected in current performance.	☐	☐	☐	☐	☐
E Good quality environmental information is essential for managers.	☐	☐	☐	☐	☐
F Environmental reports for internal management serve no useful purpose.	☐	☐	☐	☐	☐
G Environmental information is obscured in current internal accounting practices in my company.	☐	☐	☐	☐	☐
H Environmental accounting will encourage continuance of the present social order by legitimating destructive actions and producing political quietism.	☐	☐	☐	☐	☐
I Environmental reporting can protect management from financial liability regarding environmental damage.	☐	☐	☐	☐	☐
J I am satisfied with the manner in which environmental activities are internally reported within my organisation	☐	☐	☐	☐	☐
K There is a need for radical changes to be made in our existing accounting systems with regard to internal environmental reporting	☐	☐	☐	☐	☐
L The use of environmental information has changed over the last 5 years with regard to internal reporting systems in my company	☐	☐	☐	☐	☐

Continued over

7. Please indicate the importance of environmental reporting to management in terms of:

- 1 Represents No importance
- 2 Represents very little importance
- 3 Represents Some Importance
- 4 Represents Important
- 5 Represents Very Important

a) Decision-making	1	2	3	4	5
b) Forecasting & planing	1	2	3	4	5
c) Control function	1	2	3	4	5
d) Auditing	1	2	3	4	5
e) Formulating policy	1	2	3	4	5
f) Marketing	1	2	3	4	5
g) Budgeting	1	2	3	4	5

8. Who do you think should take the lead in collecting information and preparing environmental reports for internal use ?

	Collecting Information	Preparing Reports
Accountants	☐	☐
Computer(IT department)	☐	☐
Science specialists	☐	☐
Engineers	☐	☐
Environmental officers	☐	☐
Others (please specify)	☐	

9. If there are any other general comments you would like to make, about environmental information for internal use, please do so.

.....

.....

.....

.....

.....

.....

Continued over

Respondent classification Data
(please check appropriate response)

10. Age ?

- ☐ under 30
- ☐ 31 to 40
- ☐ 41 to 50
- ☐ 51 to 60

11. gender ?

- ☐ male
- ☐ female

12. Accounting Qualifications ?

- ☐ CIMA
- ☐ CIPFA
- ☐ ICAEW
- ☐ other

13. Highest educational Degree earned ?

- ☐ Bachelor's
- ☐ Master's
- ☐ Doctorate
- ☐ Other

14. years of work experience since college ?

- ☐ 0 - 1
- ☐ 2 - 5
- ☐ 6 - 10
- ☐ 11 - 15
- ☐ Over 15

15. What is your formal designation within the organisation ?

.....

16. What are the principal activities of your business ?

.....

17. What is the approximately value of your company's annual turnover ?

THANK YOU FOR YOUR CO-OPERATION. PLEASE RETURN THE COMPLETED FORM IN THE ENCLOSED REPLY PAID ENVELOPE TO OSAMA SALEH, c/o MRS PAM EDWARDS, MANCHESTER SCHOOL OF MANAGEMENT, UMIST, PO BOX 88, MANCHESTER M60 1QD.

APPENDIX 2
QUESTIONNAIRE CODING MANUAL

QUESTIONNAIRE SURVEY - CODING MANUAL

Q.No.	NAME	VALUE LABEL				VALUE LENGTH	
1	Using IER	Yes=1		No=2		1	
2a	Scarce resources	Yes=1		No=2		1	
2b	Renew. resources	"		"		1	
2c	Improve efficiency	"		"		1	
2d	Recov & recycling	"		"		1	
2e	Prod.of products	"		"		1	
2f	Use of products	"		"		1	
2g	Distn. of products	"		"		1	
2h	Impact on commun.	"		"		1	
2i	Impact on employees	"		"		1	
2j	Impact on customers	"		"		1	
3a	Managerial needs	VP=1	Pr=2	Po=3	U=4	1	
3b	Public relations	"	"	"	"	1	
3c	Supplier Credib.	"	"	"	"	1	
3d	Compliance	"	"	"	"	1	
3e	Minimising waste	"	"	"	"	1	
3f	Reducing costs	"	"	"	"	1	
3g	Increasing profit	"	"	"	"	1	
4a	Improve quality	Yes=1		No=2		1	
4b	Increase amount	"		"		1	
4c	Reduce amount	"		"		1	
4d	Increase employees	"		"		1	
4e	Reduce employees	"		"		1	
5a	Board members	M=1	Q=2	HY=3	A=4	N=5	1
5b	Senior executives	"	"	"	"	"	1
5c	Middle managers	"	"	"	"	"	1
5d	Junior managers	"	"	"	"	"	1
5e	Supervisory staff	"	"	"	"	"	1
6a	Accountant involved	SD=1	D=2	NO=3	A=4	SA=5	1
6b	Financial worth	"	"	"	"	"	1
6c	Competitive advant.	"	"	"	"	"	1
6d	Future benefits	"	"	"	"	"	1
6e	Good information	"	"	"	"	"	1
6f	No useful purpose	"	"	"	"	"	1
6g	Env.info. obscured	"	"	"	"	"	1
6h	Encourage order	"	"	"	"	"	1
6i	Protect mgt.	"	"	"	"	"	1
6j	Satisfied	"	"	"	"	"	1
6k	Need change	"	"	"	"	"	1
6l	Use of info.changed	"	"	"	"	"	1

For above key: VP represents Very Probable, Pr Probable, Po Possible, U Unlikely; M Monthly, Q Quarterly, HY Half Yearly, A Annually, N Never; SD Strongly Disagree; D Disagree, NO No Opinion, A Agree, SA Strongly Agree.

Q.No.	NAME	VALUE LABEL					VALUE LENGTH
7a	Decision-making	NI=1	VL=2	SI=3	I=4	VI=5	1
7b	Forecasting	"	"	"	"	"	1
7c	Control function	"	"	"	"	"	1
7d	Auditing	"	"	"	"	"	1
7e	Formulating policy	"	"	"	"	"	1
7f	Marketing	"	"	"	"	"	1
7g	Budgeting	"	"	"	"	"	1
8a	Collect:Accountants	C=1	NC=2				1
8b	Computer (IT Dept.)	"	"				1
8c	Science specialists	"	"				1
8d	Engineers	"	"				1
8e	Environ. officers	"	"				1
8f	Prepare:Accountants	P=1	NP=2				1
8g	Computer (IT Dept.)	"	"				1
8h	Science specialists	"	"				1
8i	Engineers	"	"				1
8j	Environ. officers	"	"				1
10	Age	Under 30=1 31-40=2 41-50=3 51-60=4					1
11	Gender	Male=1 Female=2					1
12	Accounting quals.	CIMA=1 CIPFA=2 ICAEW=3					1
13	Highest degree	B=1 M=2 D=3					1
14	Work experience	0-1=1 2-5=2 6-10=3 11-15=4 Over 15=5					1

For above key: NI represents No Importance, VL Very Little Importance, SI Some Importance, I Important, VI Very Important; C Collect, NC No Collect; P Prepare, NP No Prepare; CIMA Chartered Institute of Management Accountants, CIPFA Chartered Institute of Public Finance & Accountancy, ICAEW Institute of Chartered Accountants in England & Wales; B Bachelors, M Masters, D Doctorate

Q.NO.8 WHO DO YOU THINK SHOULD TAKE THE LEAD IN COLLECTING INFORMATION AND PREPARING ENVIRONMENTAL REPORTS FOR INTERNAL USE

SERIAL NO.	OTHERS	CODE	CO.NO
1	LINE MANAGER	3	98
2	MANAGER	4	178
3	NOMINATED PERSON	5	29
4	TEAM EFFORT	6	53
5	HEALTH & SAFETY MANAGER	7	123
6	PRODUCTION STAFF	8	96
7	ALL	9	145
8	BUSINESS MANAGER	10	182

QUESTION NO. 12. ACCOUNTING QUALIFICATIONS ?
OTHER

SERIAL NO.	QUALIFICATION	CODE	CO. NO.
1	I.C.A.E.W.,A.T.I.I., F.C.T.	4	125
2	C.A.	5	37
3	ENGINEER	6	9
4	F.C.C.A	7	14

Q.15. WHAT IS YOUR FORMAL DESIGNATION WITHIN THE ORGANISATION ?

SERIAL NO.	TERM	CODE	CO.NO.
1	FINANCIAL DIRECTOR	1	125
2	GROUP FINANCIAL DIRECTOR	2	70
3	FINANCE MANAGER	3	164
4	MANUFACTURING MANAGER	4	98
5	ENVIRONMENTAL TECHNICAL SUPPORT MANAGER	5	576
6	GROUP ADVISOR HEALTH SAFETY ENVIRONMENT	6	127
7	GROUP FINANCIAL CONTROLLER	7	154
8	HEAD OF ENVIRONMENT	8	177
9	GROUP CONTROLLER	9	92
10	COMPANY SECRETARY	10	111
11	SENIOR CONSOLIDATION ACCOUNTANT	11	175
12	HS & F ADVISOR TO BOARD	12	9
13	ENVIRONMENTAL CO-ORDINATOR	13	197
14	ENVIRONMENTAL STRATEGY MANAGER	14	160
15	GROUP COMMUNICATIONS MANAGER	15	(22)
16	FINANCIAL MANAGER & COMPANY SECRETARY	16	112
17	HEAD OF GROUP PLANNING AND DEVELOPMENT	17	29
18	ASSOCIATE DIRECTOR - FINANCE	18	32
19	GROUP ENVIRONMENTAL CO-ORDINATOR	19	53
20	FINANCE CONTROLLER	20	23
21	DIRECTOR OF QUALITY	21	196
22	DIRECTOR	22	192
23	ENVIRONMENTAL MANAGER	23	96
24	ENVIRONMENTAL AFFAIRS MANAGER	24	75
25	TECHNICAL MANAGER	25	80
26	GROUP HEAD	26	181
27	CORROSION EXPERT	27	89
28	CHIEF ACCOUNTANT	28	52
29	GROUP DIRECTOR ENVIRON.ENGINEERING	29	145
30	POLICY ADVISOR	30	180
31	ENGINEERING DIRECTOR	31	182
32	EXTERNAL REPORTING	32	174
33	EHS MANAGER	33	106
34	ENVIRONMENTAL REGULATION MANAGER	34	185
35	HEAD OF HSE	35	12
36	ENVIRONMENTALIST	36	19
37	CHIEF ENGINEER	37	5
38	MANAGER	38	178

Q.NO.16. WHAT ARE THE PRINCIPAL ACTIVITIES OF YOUR BUSINESS ?

SERIAL NO.	ACTIVITIES	CODE	CO.NO.
1	BUILDING MATERIAL	1	125
2	CHEMICAL SPECIALTIES	2	103
3	CERAMIC TABLEWARE	3	132
4	ENGINEERING	4	70
5	SOFTWARE DIRECTOR	5	157
6	PUBLISHING & EXHIBITION	6	86
7	AUTO MANUFACTURE	7	164
8	MANUFACTURER OF ADHESIVES AND SEALANTS	8	98
9	POWER GENERATOR (NUCLEAR)	9	178
10	MANUFACTURER OF ABRASIVES	10	133
11	PRINT/PACKAGING/PAPER/BUILDING MATERIALS	11	76
12	AUTOMOTIVE ENGINEERING	12	127
13	MANUFACTURING	13	154
14	TRANSPORT	14	177
15	LUBRICANTS	15	111
16	GAS/OIL/DISTRIBUTION	16	175
17	ELECTRICITY GENERATION	17	197
18	VEHICLE MANUFACTURE	18	160
19	OIL REFINING	19	112
20	OIL COMPANY (MINING)	20	14
21	BUILDING MATERIALS/CONSTRUCTION	21	29
22	TEXTILES/PRECISION ENGINEERING	22	53
23	CONSTRUCTION	23	23
24	STEELMAKING	24	139
25	MANUFACTURING FOOTWEAR	25	123
26	ANALYTICAL INSTRUMENTATION & LIFE Sc.	26	196
27	AEROSPACE	27	191
28	TRADING PRECIOUS METALS	28	134
29	MANUFACTURE SALE OF TOBACCO PRODUCTS	29	52
30	ENGINE DESIGN/MANUFACTURE & DISTRIBUTION	30	145
31	PRODUCTS FOR AUTOMOTIVE	31	94
32	CHEMICALS & LUBRICANTS (MINING)	32	13
33	QUARRYING	33	20
34	TELECOMMUNICATIONS	34	174
35	MANUFACTURING OIL PRODUCTS	35	106
36	FIBRES & COATINGS	36	54
37	COMPLIANCE WITH REGULATORY CONTROLS	37	185
38	CIVIL & POWER ENGINEERING	38	31
39	DEFENSE & AEROSPACE	39	158
40	PACKAGING	40	102

Q.NO. 17. WHAT IS THE APPROXIMATELY VALUE OF YOUR COMPANY'S ANNUAL TURNOVER ?

SERIAL NO.	TURNOVER	CODE	CO. NO
1	4.1 BN	1	125
2	35 M	2	103
3	27 M	3	132
4	300 M	4	70
5	25 M	5	157
6	1 BN	6	86
7	52 M	7	98
8	500 M	8	37
9	4 BN	9	178
10	17 M	10	133
11	2.1 BN	11	127
12	1.1 BN	12	154
13	8 BN	13	177
14	9700 M	14	175
15	10 BN	15	9
16	550M	16	197
17	80 M	17	112
18	2 BN	18	14
19	2.5 BN	19	29
20	60 M	20	32
21	50 M	21	23
22	31 M	22	123
23	65 M	23	191
24	5BN	24	134
25	400 M	25	75
26	120 M	26	80
27	85 M	27	142
28	9 BN	28	89
29	640 M	29	52
30	700 M	30	94
31	2.7 BN	31	13
32	450 M	32	20
33	13 BN	33	174
34	960 M	34	185
35	100 M	35	102
36	33.116 BN	36	95
37	160 M	37	5

APPENDIX 3

QUESTIONNAIRE FREQUENCY STATISTICS

QUALITATIVE STATISTICS

USINGIER USING INTERNAL ENVIRONMENTAL REPORTING

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
TICK	1	44	73.3	73.3	73.3
NO TICK	2	16	26.7	26.7	100.0
	Total	60	100.0	100.0	
Mean	1.267	Median	1.000	Mode	1.000
Std dev	.446	Minimum	1.000	Maximum	2.000

SCARRES USE OF SCARCE RESOURCES

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
TICK	1	25	41.7	41.7	41.7
NO TICK	2	35	58.3	58.3	100.0
	Total	60	100.0	100.0	
Mean	1.583	Median	2.000	Mode	2.000
Std dev	.497	Minimum	1.000	Maximum	2.000

RENRES RENEWABLE RESOURCES

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
TICK	1	18	30.0	30.0	30.0
NO TICK	2	42	70.0	70.0	100.0
	Total	60	100.0	100.0	
Mean	1.700	Median	2.000	Mode	2.000
Std dev	.462	Minimum	1.000	Maximum	2.000

EFFICIEN IMPROVING EFFICIENCY OF SCARCE RESOURCES

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
TICK	1	30	50.0	50.0	50.0
NO TICK	2	30	50.0	50.0	100.0
	Total	60	100.0	100.0	
Mean	1.500	Median	1.500	Mode	1.000
Std dev	.504	Minimum	1.000	Maximum	2.000

RECOV RECOVERY AND RECYCLING OF RESOURCES

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
TICK	1	30	50.0	50.0	50.0
NO TICK	2	30	50.0	50.0	100.0
	Total	60	100.0	100.0	
Mean	1.500	Median	1.500	Mode	1.000
Std dev	.504	Minimum	1.000	Maximum	2.000

POLL DUE POLLUTANTS DUE TO COMPANY'S PRODUCTS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
TICK	1	45	75.0	75.0	75.0
NO TICK	2	15	25.0	25.0	100.0
	Total	60	100.0	100.0	
Mean	1.250	Median	1.000	Mode	1.000
Std dev	.437	Minimum	1.000	Maximum	2.000

POLL USE POLLUTANTS ARISING FROM COMPANY'S PRODUCTS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
TICK	1	26	43.3	43.3	43.3
NO TICK	2	34	56.7	56.7	100.0
	Total	60	100.0	100.0	
Mean	1.567	Median	2.000	Mode	2.000
Std dev	.500	Minimum	1.000	Maximum	2.000

POLL DISP POLLUTANTS ARISING FROM DISTRIBUTION OF PRODUCTS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
TICK	1	24	40.0	40.0	40.0
NO TICK	2	35	58.3	58.3	98.3
NOT APPLICABLE	99	1	1.7	1.7	100.0
	Total	60	100.0	100.0	
Mean	3.217	Median	2.000	Mode	2.000
Std dev	12.585	Minimum	1.000	Maximum	99.000

COMMUN IMPACT OF COMPANY'S PRODUCTION ON LOCAL COMMUNITIES

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
TICK	1	42	70.0	70.0	70.0
NO TICK	2	15	25.0	25.0	95.0
NOT APPLICABLE	99	3	5.0	5.0	100.0
	Total	60	100.0	100.0	
Mean	6.150	Median	1.000	Mode	1.000
Std dev	21.485	Minimum	1.000	Maximum	99.000

EMPLOY IMPACT OF COMPANY'S PRODUCTION ON EMPLOYEES

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
TICK	1	47	78.3	78.3	78.3
NO TICK	2	12	20.0	20.0	98.3
NOT APPLICABLE	99	1	1.7	1.7	100.0
	Total	60	100.0	100.0	
Mean	2.833	Median	1.000	Mode	1.000
Std dev	12.632	Minimum	1.000	Maximum	99.000

CUSTOMER IMPACT OF COMPANY'S PRODUCTS ON CUSTOMERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
TICK	1	24	40.0	40.0	40.0
NO TICK	2	35	58.3	58.3	98.3
	99	1	1.7	1.7	100.0
	Total	60	100.0	100.0	
Mean	3.217	Median	2.000	Mode	2.000
Std dev	12.585	Minimum	1.000	Maximum	99.000

MANAGER IMPROVEMENT OF IER TOWARDS MANAGERIAL NEEDS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY PROBABLE	1	19	31.7	33.3	33.3
PROBABLE	2	19	31.7	33.3	66.7
POSSIBLE	3	8	13.3	14.0	80.7
UNLIKELY	4	11	18.3	19.3	100.0
	0	3	5.0	Missing	
	Total	60	100.0	100.0	
Mean	2.193	Median	2.000	Mode	1.000
Std dev	1.109	Minimum	1.000	Maximum	4.000

PUBLIC IMPROVEMENT OF IER TOWARDS PUBLIC RELATIONS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY PROBABLE	1	12	20.0	20.7	20.7
PROBABLE	2	16	26.7	27.6	48.3
POSSIBLE	3	14	23.3	24.1	72.4
UNLIKELY	4	16	26.7	27.6	100.0
	0	2	3.3	Missing	
	Total	60	100.0	100.0	
Mean	2.586	Median	3.000	Mode	2.000
Std dev	1.109	Minimum	1.000	Maximum	4.000

CREDIBIL IMPROVEMENT OF IER TOWARDS CREDIBILITY WITH SUPPLIERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY PROBABLE	1	4	6.7	7.3	7.3
PROBABLE	2	9	15.0	16.4	23.6
POSSIBLE	3	17	28.3	30.9	54.5
UNLIKELY	4	24	40.0	43.6	98.2
	99	1	1.7	1.8	100.0
	0	5	8.3	Missing	
	Total	60	100.0	100.0	
Mean	4.873	Median	3.000	Mode	4.000
Std dev	12.962	Minimum	1.000	Maximum	99.000

COMPLIA IMPROVEMENTS OF IER TOWARDS COMPLIANCE WITH STANDARDS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY PROBABLE	1	14	23.3	24.6	24.6
PROBABLE	2	16	26.7	28.1	52.6
POSSIBLE	3	17	28.3	29.8	82.5
UNLIKELY	4	9	15.0	15.8	98.2
NOT APPLICABLE	99	1	1.7	1.8	100.0
	0	3	5.0	Missing	
	Total	60	100.0	100.0	
Mean	4.070	Median	2.000	Mode	3.000
Std dev	12.839	Minimum	1.000	Maximum	99.000

MINIMISE IMPROVEMENTS OF IER TOWARDS MINIMISING WASTE

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY PROBABLE	1	16	26.7	28.1	28.1
PROBABLE	2	20	33.3	35.1	63.2
POSSIBLE	3	10	16.7	17.5	80.7
UNLIKELY	4	11	18.3	19.3	100.0
	0	3	5.0	Missing	
	Total	60	100.0	100.0	
Mean	2.281	Median	2.000	Mode	2.000
Std dev	1.082	Minimum	1.000	Maximum	4.000

REDUCE IMPROVEMENTS OF IER TOWARDS REDUCING COSTS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY PROBABLE	1	16	26.7	28.1	28.1
PROBABLE	2	16	26.7	28.1	56.1
POSSIBLE	3	18	30.0	31.6	87.7
UNLIKELY	4	7	11.7	12.3	100.0
	0	3	5.0	Missing	
	Total	60	100.0	100.0	
Mean	2.281	Median	2.000	Mode	3.000
Std dev	1.013	Minimum	1.000	Maximum	4.000

INCREASE IMPROVEMENTS OF IER TOWARDS INCREASING PROFIT

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
VERY PROBABLE	1	14	23.3	24.6	24.6
PROBABLE	2	14	23.3	24.6	49.1
POSSIBLE	3	16	26.7	28.1	77.2
UNLIKELY	4	13	21.7	22.8	100.0
	0	3	5.0	Missing	
	Total	60	100.0	100.0	
Mean	2.491	Median	3.000	Mode	3.000
Std dev	1.104	Minimum	1.000	Maximum	4.000

IMPROVE PLANS TO CHANGE IER TO IMPROVING QUALITY OF DATA

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	34	56.7	59.6	59.6
NO	2	23	38.3	40.4	100.0
	0	3	5.0	Missing	
	Total	60	100.0	100.0	
Mean	1.404	Median	1.000	Mode	1.000
Std dev	.495	Minimum	1.000	Maximum	2.000

INAMT PLANS TO CHANGE IER TO INCREASE AMOUNT OF DATA

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	24	40.0	42.1	42.1
NO	2	33	55.0	57.9	100.0
	0	3	5.0	Missing	
	Total	60	100.0	100.0	
Mean	1.579	Median	2.000	Mode	2.000
Std dev	.498	Minimum	1.000	Maximum	2.000

REDAMT PLANS TO CHANGE IER TO REDUCE AMOUNT OF DATA

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	5	8.3	9.8	9.8
NO	2	46	76.7	90.2	100.0
	0	9	15.0	Missing	
	Total	60	100.0	100.0	
Mean	1.902	Median	2.000	Mode	2.000
Std dev	.300	Minimum	1.000	Maximum	2.000

INCNO PLANS TO CHANGE IER TO INCREASE NUMBER OF EMPLOYEES

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	18	30.0	32.7	32.7
NO	2	37	61.7	67.3	100.0
	0	5	8.3	Missing	
	Total	60	100.0	100.0	
Mean	1.673	Median	2.000	Mode	2.000
Std dev	.474	Minimum	1.000	Maximum	2.000

REDNO PLANS TO CHANGE IER TO REDUCE NUMBER OF EMPLOYEES

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NO	2	52	86.7	100.0	100.0
	0	8	13.3	Missing	
	Total	60	100.0	100.0	
Mean	2.000	Mode	2.000	Std dev	.000
Minimum	2.000	Maximum	2.000		

BOARD AMOUNT OF INFORMATION RECEIVED BY - BOARD MEMBERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
MONTHLY	1	19	31.7	33.9	33.9
QUARTERLY	2	16	26.7	28.6	62.5
HALF YEARLY	3	4	6.7	7.1	69.6
ANNUALLY	4	7	11.7	12.5	82.1
NEVER	5	10	16.7	17.9	100.0
	0	4	6.7	Missing	
	Total	60	100.0	100.0	
Mean	2.518	Median	2.000	Mode	1.000
Std dev	1.513	Minimum	1.000	Maximum	5.000

SENIOR AMOUNT OF INFORMATION RECEIVED BY - SENIOR MANAGERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
MONTHLY	1	25	41.7	44.6	44.6
QUARTERLY	2	17	28.3	30.4	75.0
ANNUALLY	4	6	10.0	10.7	85.7
NEVER	5	8	13.3	14.3	100.0
	0	4	6.7	Missing	
	Total	60	100.0	100.0	
Mean	2.196	Median	2.000	Mode	1.000
Std dev	1.470	Minimum	1.000	Maximum	5.000

MIDDLE AMOUNT OF INFORMATION RECEIVED BY - MIDDLE MANAGERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
MONTHLY	1	30	50.0	52.6	52.6
QUARTERLY	2	7	11.7	12.3	64.9
HALF YEARLY	3	3	5.0	5.3	70.2
ANNUALLY	4	7	11.7	12.3	82.5
NEVER	5	10	16.7	17.5	100.0
	0	3	5.0	Missing	
	Total	60	100.0	100.0	
Mean	2.298	Median	1.000	Mode	1.000
Std dev	1.614	Minimum	1.000	Maximum	5.000

JUNIOR AMOUNT OF INFORMATION RECEIVED BY - JUNIOR MANAGERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
MONTHLY	1	24	40.0	43.6	43.6
QUARTERLY	2	7	11.7	12.7	56.4
HALF YEARLY	3	3	5.0	5.5	61.8
ANNUALLY	4	9	15.0	16.4	78.2
NEVER	5	12	20.0	21.8	100.0
	0	5	8.3	Missing	
		-----	-----	-----	
	Total	60	100.0	100.0	
Mean	2.600	Median	2.000	Mode	1.000
Std dev	1.673	Minimum	1.000	Maximum	5.000

SUPERVIS AMOUNT OF INFORMATION RECEIVED BY - SUPERVISORY STAFF

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
MONTHLY	1	22	36.7	41.5	41.5
QUARTERLY	2	6	10.0	11.3	52.8
HALF YEARLY	3	3	5.0	5.7	58.5
ANNUALLY	4	9	15.0	17.0	75.5
NEVER	5	13	21.7	24.5	100.0
	0	7	11.7	Missing	
		-----	-----	-----	
	Total	60	100.0	100.0	
Mean	2.717	Median	2.000	Mode	1.000
Std dev	1.703	Minimum	1.000	Maximum	5.000

ACCOUNT ACCOUNTANTS' INVOLVEMENT IN PREPARATION OF INFORMATION

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
STRONGLY DISAGREE	1	5	8.3	8.5	8.5
DISAGREE	2	17	28.3	28.8	37.3
NO OPINION	3	9	15.0	15.3	52.5
AGREE	4	26	43.3	44.1	96.6
STRONGLY AGREE	5	2	3.3	3.4	100.0
	0	1	1.7	Missing	
		-----	-----	-----	
	Total	60	100.0	100.0	
Mean	3.051	Median	3.000	Mode	4.000
Std dev	1.105	Minimum	1.000	Maximum	5.000

INTERNAL IER FINANCIALLY WORTHWHILE

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
DISAGREE	2	1	1.7	1.7	1.7
NO OPINION	3	10	16.7	16.9	18.6
AGREE	4	34	56.7	57.6	76.3
STRONGLY AGREE	5	14	23.3	23.7	100.0
	0	1	1.7	Missing	
	Total	60	100.0	100.0	
Mean	4.034	Median	4.000	Mode	4.000
Std dev	.694	Minimum	2.000	Maximum	5.000

ECOMGT ECO-MANAGEMENT AND IER ALLOW COMPETITIVE ADVANTAGE

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
DISAGREE	2	7	11.7	11.9	11.9
NO OPINION	3	23	38.3	39.0	50.8
AGREE	4	23	38.3	39.0	89.8
STRONGLY AGREE	5	6	10.0	10.2	100.0
	0	1	1.7	Missing	
	Total	60	100.0	100.0	
Mean	3.475	Median	3.000	Mode	3.000
Std dev	.838	Minimum	2.000	Maximum	5.000

FUTURE FUTURE BENEFITS REFLECTED IN CURRENT PERFORMANCE

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
STRONGLY DISAGREE	1	3	5.0	5.3	5.3
DISAGREE	2	13	21.7	22.8	28.1
NO OPINION	3	29	48.3	50.9	78.9
AGREE	4	9	15.0	15.8	94.7
STRONGLY AGREE	5	3	5.0	5.3	100.0
	0	3	5.0	Missing	
	Total	60	100.0	100.0	
Mean	2.930	Median	3.000	Mode	3.000
Std dev	.904	Minimum	1.000	Maximum	5.000

GOOD GOOD EI ESSENTIAL FOR MANAGERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
STRONGLY DISAGREE	1	2	3.3	3.4	3.4
DISAGREE	2	5	8.3	8.5	11.9
NO OPINION	3	10	16.7	16.9	28.8
AGREE	4	24	40.0	40.7	69.5
STRONGLY AGREE	5	18	30.0	30.5	100.0
	0	1	1.7	Missing	
		-----	-----	-----	
	Total	60	100.0	100.0	
Mean	3.864	Median	4.000	Mode	4.000
Std dev	1.058	Minimum	1.000	Maximum	5.000

NOUSE ER FOR INTERNAL MANAGEMENT SERVE NO PURPOSE

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
STRONGLY DISAGREE	1	29	48.3	49.2	49.2
DISAGREE	2	23	38.3	39.0	88.1
NO OPINION	3	6	10.0	10.2	98.3
NOT APPLICABLE	99	1	1.7	1.7	100.0
	0	1	1.7	Missing	
		-----	-----	-----	
	Total	60	100.0	100.0	
Mean	3.254	Median	2.000	Mode	1.000
Std dev	12.698	Minimum	1.000	Maximum	99.000

ENVINF EI OBSCURED IN CURRENT INTERNAL ACCOUNTING

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
STRONGLY DISAGREE	1	10	16.7	16.9	16.9
DISAGREE	2	17	28.3	28.8	45.8
NO OPINION	3	13	21.7	22.0	67.8
AGREE	4	15	25.0	25.4	93.2
STRONGLY AGREE	5	4	6.7	6.8	100.0
	0	1	1.7	Missing	
		-----	-----	-----	
	Total	60	100.0	100.0	
Mean	2.763	Median	3.000	Mode	2.000
Std dev	1.208	Minimum	1.000	Maximum	5.000

ENVACC EA WILL ENCOURAGE CONTINUANCE OF PRESENT SOCIAL ORDER

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
STRONGLY DISAGREE	1	14	23.3	26.4	26.4
DISAGREE	2	12	20.0	22.6	49.1
NO OPINION	3	26	43.3	49.1	98.1
NOT APPLICABLE	99	1	1.7	1.9	100.0
	0	7	11.7	Missing	
	Total	60	100.0	100.0	
Mean	4.057	Median	3.000	Mode	3.000
Std dev	13.319	Minimum	1.000	Maximum	99.000

ENVREP ER CAN PROTECT MANAGEMENT FROM FINANCIAL LIABILITY

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
STRONGLY DISAGREE	1	1	1.7	1.8	1.8
DISAGREE	2	13	21.7	22.8	24.6
NO OPINION	3	10	16.7	17.5	42.1
AGREE	4	27	45.0	47.4	89.5
STRONGLY AGREE	5	6	10.0	10.5	100.0
	0	3	5.0	Missing	
	Total	60	100.0	100.0	
Mean	3.421	Median	4.000	Mode	4.000
Std dev	1.017	Minimum	1.000	Maximum	5.000

SATISFY I AM SATISFIED WITH REPORTING OF ENVIRONMENTAL ACTIVITIES

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
STRONGLY DISAGREE	1	3	5.0	5.1	5.1
DISAGREE	2	15	25.0	25.4	30.5
NO OPINION	3	11	18.3	18.6	49.2
AGREE	4	26	43.3	44.1	93.2
STRONGLY AGREE	5	4	6.7	6.8	100.0
	0	1	1.7	Missing	
	Total	60	100.0	100.0	
Mean	3.220	Median	4.000	Mode	4.000
Std dev	1.068	Minimum	1.000	Maximum	5.000

NEEDFOR NEED FOR RADICAL CHANGES TO IER

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
STRONGLY DISAGREE	1	15	25.0	25.4	25.4
DISAGREE	2	24	40.0	40.7	66.1
NO OPINION	3	10	16.7	16.9	83.1
AGREE	4	8	13.3	13.6	96.6
STRONGLY AGREE	5	2	3.3	3.4	100.0
	0	1	1.7	Missing	
	Total	60	100.0	100.0	
Mean	2.288	Median	2.000	Mode	2.000
Std dev	1.099	Minimum	1.000	Maximum	5.000

USEOFEI USE OF EI CHANGED OVER THE LAST 5 YEARS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
STRONGLY DISAGREE	1	5	8.3	8.6	8.6
DISAGREE	2	7	11.7	12.1	20.7
NO OPINION	3	6	10.0	10.3	31.0
AGREE	4	28	46.7	48.3	79.3
STRONGLY AGREE	5	12	20.0	20.7	100.0
	0	2	3.3	Missing	
	Total	60	100.0	100.0	
Mean	3.603	Median	4.000	Mode	4.000
Std dev	1.199	Minimum	1.000	Maximum	5.000

DECISION IMPORTANCE OF ER IN TERMS OF - DECISION-MAKING

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NO IMPORTANCE	1	4	6.7	6.7	6.7
VERY LITTLE IMPORTAN	2	4	6.7	6.7	13.3
SOME IMPORTANCE	3	20	33.3	33.3	46.7
IMPORTANT	4	21	35.0	35.0	81.7
VERY IMPORTANT	5	11	18.3	18.3	100.0
	Total	60	100.0	100.0	
Mean	3.517	Median	4.000	Mode	4.000
Std dev	1.081	Minimum	1.000	Maximum	5.000

FORECAST IMPORTANCE OF ER IN TERMS OF - FORECASTING

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NO IMPORTANCE	1	3	5.0	5.0	5.0
VERY LITTLE IMPORTAN	2	10	16.7	16.7	21.7
SOME IMPORTANCE	3	23	38.3	38.3	60.0
IMPORTANT	4	14	23.3	23.3	83.3
VERY IMPORTANT	5	10	16.7	16.7	100.0
	Total	60	100.0	100.0	
Mean	3.300	Median	3.000	Mode	3.000
Std dev	1.094	Minimum	1.000	Maximum	5.000

CONTROL IMPORTANCE OF ER IN TERMS OF - CONTROL FUNCTION

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NO IMPORTANCE	1	7	11.7	11.7	11.7
VERY LITTLE IMPORTAN	2	9	15.0	15.0	26.7
SOME IMPORTANCE	3	18	30.0	30.0	56.7
IMPORTANT	4	18	30.0	30.0	86.7
VERY IMPORTANT	5	8	13.3	13.3	100.0
	Total	60	100.0	100.0	
Mean	3.183	Median	3.000	Mode	3.000
Std dev	1.200	Minimum	1.000	Maximum	5.000

AUDIT IMPORTANCE OF ER IN TERMS OF - AUDITING

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NO IMPORTANCE	1	13	21.7	22.0	22.0
VERY LITTLE IMPORTAN	2	18	30.0	30.5	52.5
SOME IMPORTANCE	3	12	20.0	20.3	72.9
IMPORTANT	4	10	16.7	16.9	89.8
VERY IMPORTANT	5	6	10.0	10.2	100.0
	0	1	1.7	Missing	
	Total	60	100.0	100.0	
Mean	2.627	Median	2.000	Mode	2.000
Std dev	1.285	Minimum	1.000	Maximum	5.000

FORMULAT IMPORTANCE OF ER IN TERMS OF - FORMULATING POLICY

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NO IMPORTANCE	1	3	5.0	5.1	5.1
VERY LITTLE IMPORTAN	2	6	10.0	10.2	15.3
SOME IMPORTANCE	3	21	35.0	35.6	50.8
IMPORTANT	4	22	36.7	37.3	88.1
VERY IMPORTANT	5	7	11.7	11.9	100.0
	0	1	1.7	Missing	
		-----	-----	-----	
	Total	60	100.0	100.0	
Mean	3.407	Median	3.000	Mode	4.000
Std dev	1.002	Minimum	1.000	Maximum	5.000

MARKET IMPORTANCE OF ER IN TERMS OF - MARKETING

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NO IMPORTANCE	1	6	10.0	10.2	10.2
VERY LITTLE IMPORTAN	2	13	21.7	22.0	32.2
SOME IMPORTANCE	3	21	35.0	35.6	67.8
IMPORTANT	4	17	28.3	28.8	96.6
VERY IMPORTANT	5	2	3.3	3.4	100.0
	0	1	1.7	Missing	
		-----	-----	-----	
	Total	60	100.0	100.0	
Mean	2.932	Median	3.000	Mode	3.000
Std dev	1.032	Minimum	1.000	Maximum	5.000

BUDGET IMPORTANCE OF ER IN TERMS OF - BUDGETING

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NO IMPORTANCE	1	6	10.0	10.2	10.2
VERY LITTLE IMPORTAN	2	19	31.7	32.2	42.4
SOME IMPORTANCE	3	18	30.0	30.5	72.9
IMPORTANT	4	10	16.7	16.9	89.8
VERY IMPORTANT	5	6	10.0	10.2	100.0
	0	1	1.7	Missing	
		-----	-----	-----	
	Total	60	100.0	100.0	
Mean	2.847	Median	3.000	Mode	2.000
Std dev	1.142	Minimum	1.000	Maximum	5.000

ACCOUNTA WHO SHOULD COLLECT INFORMATION? - ACCOUNTANTS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	11	18.3	18.3	18.3
NO	2	49	81.7	81.7	100.0
	Total	60	100.0	100.0	
Mean	1.817	Median	2.000	Mode	2.000
Std dev	.390	Minimum	1.000	Maximum	2.000

COMPUTER WHO SHOULD COLLECT INFORMATION? - COMPUTER

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	7	11.7	11.7	11.7
NO	2	53	88.3	88.3	100.0
	Total	60	100.0	100.0	
Mean	1.883	Median	2.000	Mode	2.000
Std dev	.324	Minimum	1.000	Maximum	2.000

SCIENCE WHO SHOULD COLLECT INFORMATION? - SCIENCE SPECIALISTS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	15	25.0	25.0	25.0
NO	2	45	75.0	75.0	100.0
	Total	60	100.0	100.0	
Mean	1.750	Median	2.000	Mode	2.000
Std dev	.437	Minimum	1.000	Maximum	2.000

ENGINEER WHO SHOULD COLLECT INFORMATION? - ENGINEERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	20	33.3	33.3	33.3
NO	2	40	66.7	66.7	100.0
	Total	60	100.0	100.0	
Mean	1.667	Median	2.000	Mode	2.000
Std dev	.475	Minimum	1.000	Maximum	2.000

ENVIRON ENVIRONMENTAL OFFICERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	44	73.3	73.3	73.3
NO	2	16	26.7	26.7	100.0
	Total	60	100.0	100.0	
Mean	1.267	Median	1.000	Mode	1.000
Std dev	.446	Minimum	1.000	Maximum	2.000

OTHERS WHO SHOULD COLLECT INFORMATION? - OTHERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	0	49	81.7	81.7	81.7
	2	1	1.7	1.7	83.3
	3	3	5.0	5.0	88.3
LINE MANAGER	4	1	1.7	1.7	90.0
MANAGER	5	1	1.7	1.7	91.7
NOMINATED PERSON	6	1	1.7	1.7	93.3
TEAM EFFORT	7	1	1.7	1.7	95.0
HEALTH & SAFETY MANA	8	1	1.7	1.7	96.7
PRODUCTION STAFF	9	1	1.7	1.7	98.3
ALL	10	1	1.7	1.7	100.0
BUSINESS MANAGER					
	Total	60	100.0	100.0	
Mean	1.000	Median	.000	Mode	.000
Std dev	2.408	Minimum	.000	Maximum	10.000

ACCPRE WHO SHOULD PREPARE ER? - ACCOUNTANTS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	13	21.7	21.7	21.7
NO	2	47	78.3	78.3	100.0
	Total	60	100.0	100.0	
Mean	1.783	Median	2.000	Mode	2.000
Std dev	.415	Minimum	1.000	Maximum	2.000

COMPRES WHO SHOULD PREPARE ER? - COMPUTER (IT DEPARTMENT)

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	4	6.7	6.7	6.7
NO	2	56	93.3	93.3	100.0
	Total	60	100.0	100.0	
Mean	1.933	Median	2.000	Mode	2.000
Std dev	.252	Minimum	1.000	Maximum	2.000

SCIEPRE WHO SHOULD PREPARE ER? - SCIENCE SPECIALISTS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	14	23.3	23.3	23.3
NO	2	46	76.7	76.7	100.0
	Total	60	100.0	100.0	
Mean	1.767	Median	2.000	Mode	2.000
Std dev	.427	Minimum	1.000	Maximum	2.000

ENGIPRE WHO SHOULD PREPARE ER? - ENGINEERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	12	20.0	20.0	20.0
NO	2	48	80.0	80.0	100.0
	Total	60	100.0	100.0	
Mean	1.800	Median	2.000	Mode	2.000
Std dev	.403	Minimum	1.000	Maximum	2.000

ENVPRE WHO SHOULD PREPARE ER? - ENVIRONMENTAL OFFICERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
YES	1	45	75.0	75.0	75.0
NO	2	15	25.0	25.0	100.0
	Total	60	100.0	100.0	
Mean	1.250	Median	1.000	Mode	1.000
Std dev	.437	Minimum	1.000	Maximum	2.000

OTHERPRE WHO SHOULD PREPARE ER? - OTHERS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	0	49	81.7	81.7	81.7
	2	1	1.7	1.7	83.3
LINE MANAGER	3	3	5.0	5.0	88.3
MANAGER	4	1	1.7	1.7	90.0
NOMINATED PERSON	5	1	1.7	1.7	91.7
TEAM EFFORT	6	1	1.7	1.7	93.3
HEALTH & SAFETY MANA	7	1	1.7	1.7	95.0
PRODUCTION STAFF	8	1	1.7	1.7	96.7
ALL	9	1	1.7	1.7	98.3
BUSINESS MANAGER	10	1	1.7	1.7	100.0
	Total	60	100.0	100.0	
Mean	1.000	Median	.000	Mode	.000
Std dev	2.408	Minimum	.000	Maximum	10.000

AGE AGE

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	1	1	1.7	1.7	1.7
UNDER 30	2	19	31.7	31.7	33.3
31 TO 40	3	25	41.7	41.7	75.0
41 TO 50	4	15	25.0	25.0	100.0
51 TO 60					
	Total	60	100.0	100.0	
Mean	2.900	Median	3.000	Mode	3.000
Std dev	.796	Minimum	1.000	Maximum	4.000

GENDER GENDER

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	1	57	95.0	95.0	95.0
MALE	2	3	5.0	5.0	100.0
FEMALE					
	Total	60	100.0	100.0	
Mean	1.050	Median	1.000	Mode	1.000
Std dev	.220	Minimum	1.000	Maximum	2.000

QUALS ACCOUNTING QUALIFICATIONS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
CIMA	1	7	11.7	21.9	21.9
ICAEW	3	14	23.3	43.8	65.6
ICAEW, ATII, FCT	4	8	13.3	25.0	90.6
CA	5	1	1.7	3.1	93.8
ENGINEERING	6	1	1.7	3.1	96.9
FCCA	7	1	1.7	3.1	100.0
	0	28	46.7	Missing	
		-----	-----	-----	
Total		60	100.0	100.0	
Mean	3.094	Median	3.000	Mode	3.000
Std dev	1.445	Minimum	1.000	Maximum	7.000

DEGREE HIGHEST EDUCATIONAL DEGREE EARNED?

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
BACHELOR'S	1	28	46.7	63.6	63.6
MASTER'S	2	7	11.7	15.9	79.5
DOCTORATE	3	6	10.0	13.6	93.2
	4	2	3.3	4.5	97.7
	5	1	1.7	2.3	100.0
	0	16	26.7	Missing	
		-----	-----	-----	
Total		60	100.0	100.0	
Mean	1.659	Median	1.000	Mode	1.000
Std dev	1.033	Minimum	1.000	Maximum	5.000

WORK YEARS OF WORK EXPERIENCE SINCE COLLEGE

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
2 - 5	2	1	1.7	1.7	1.7
6 - 10	3	2	3.3	3.3	5.0
11 - 15	4	7	11.7	11.7	16.7
OVER 15	5	50	83.3	83.3	100.0
		-----	-----	-----	
Total		60	100.0	100.0	
Mean	4.767	Median	5.000	Mode	5.000
Std dev	.593	Minimum	2.000	Maximum	5.000

FORMDES WHAT IS YOUR FORMAL DESIGNATION

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
FINANCIAL DIRECTOR	1	17	28.3	28.8	28.8
FINANCE MANAGER	3	1	1.7	1.7	30.5
MANUFACTURING MANAGE	4	2	3.3	3.4	33.9
ENVIRONMENTAL TECHN	5	1	1.7	1.7	35.6
GROUP ADVISOR HEALTH	6	1	1.7	1.7	37.3
GROUP FINANCIAL CONT	7	1	1.7	1.7	39.0
HEAD OF ENVIRONMENT	8	3	5.0	5.1	44.1
GROUP CONTROLLER	9	1	1.7	1.7	45.8
COMPANY SECRETARY	10	1	1.7	1.7	47.5
SENIOR CONSOLIDATION	11	1	1.7	1.7	49.2
HS & F ADVISOR TO BO	12	1	1.7	1.7	50.8
ENVIRONMENTAL CO-ORD	13	1	1.7	1.7	52.5
ENVIRONMENTAL STRATE	14	1	1.7	1.7	54.2
GROUP COMMUNICATIONS	15	1	1.7	1.7	55.9
FINANCIAL MANAGER &	16	1	1.7	1.7	57.6
HEAD OF GROUP PLANNI	17	1	1.7	1.7	59.3
ASSOCIATE DIRECTOR -	18	1	1.7	1.7	61.0
GROUP ENVIRONMENTAL	19	2	3.3	3.4	64.4
FINANCE CONTROLLER	20	1	1.7	1.7	66.1
DIRECTOR OF QUALITY	21	1	1.7	1.7	67.8
DIRECTOR	22	2	3.3	3.4	71.2
ENVIRONMENTAL MANAGE	23	1	1.7	1.7	72.9
ENVIRONMENTAL AFFAIR	24	1	1.7	1.7	74.6
TECHNICAL MANAGER	25	1	1.7	1.7	76.3
GROUP HEAD	26	1	1.7	1.7	78.0
CORROSION EXERT	27	1	1.7	1.7	79.7
CHIEF ACCOUNTANT	28	2	3.3	3.4	83.1
GROUP DIRECTOR ENVIR	29	1	1.7	1.7	84.7
POLICY ADVISOR	30	1	1.7	1.7	86.4
ENGINEERING DIRECTOR	31	1	1.7	1.7	88.1
EXTERNAL REPORTING	32	1	1.7	1.7	89.8
EHS MANAGER	33	1	1.7	1.7	91.5
ENVIRONMENTAL REGULA	34	1	1.7	1.7	93.2
HEAD OF HSE	35	1	1.7	1.7	94.9
ENVIRONMENTALIST	36	1	1.7	1.7	96.6
CHIEF ENGINEER	37	1	1.7	1.7	98.3
MANAGER	38	1	1.7	1.7	100.0
	0	1	1.7	Missing	
		-----	-----	-----	
	Total	60	100.0	100.0	
Mean	14.305	Median	12.000	Mode	1.000
Std dev	12.269	Minimum	1.000	Maximum	38.000

PRINCIPAL ACTIVITIES OF BUSINESS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
BUILDING MATERIALS	1	1	1.7	1.7	1.7
CHEMICAL SPECIALTIES	2	5	8.3	8.5	10.2
CERAMIC TABLEWARE	3	1	1.7	1.7	11.9
ENGINEERING	4	3	5.0	5.1	16.9
SOFTWARE DIRECTOR	5	1	1.7	1.7	18.6
PUBLISHING & EXHIBIT	6	1	1.7	1.7	20.3
AUTO MANUFACTURE	7	1	1.7	1.7	22.0
MANUFACTURER OF ADHE	8	1	1.7	1.7	23.7
POWER GENERATOR (NUC	9	1	1.7	1.7	25.4
MANUFACTURER OF ABRA	10	1	1.7	1.7	27.1
PRINT/PACKING/PAPER/	11	4	6.7	6.8	33.9
AUTOMOTIVE ENGINEERI	12	1	1.7	1.7	35.6
MANUFACTURING	13	2	3.3	3.4	39.0
TRANSPORT	14	3	5.0	5.1	44.1
LUBRICANTS	15	1	1.7	1.7	45.8
GAS & OIL DISTRIBUTI	16	3	5.0	5.1	50.8
ELECTRICITY GENERATI	17	2	3.3	3.4	54.2
VEHICLE MANUFACTURE	18	1	1.7	1.7	55.9
OIL REFINING	19	1	1.7	1.7	57.6
OIL COMPANY (MINING)	20	3	5.0	5.1	62.7
BUILDING MATERIALS C	21	1	1.7	1.7	64.4
TEXTILES PRECISION E	22	1	1.7	1.7	66.1
CONSTRUCTION	23	3	5.0	5.1	71.2
STEEL MAKING	24	1	1.7	1.7	72.9
MANUFACTURING FOOTWE	25	1	1.7	1.7	74.6
ANALYTICAL INSTRUMEN	26	1	1.7	1.7	76.3
AEROSPACE	27	1	1.7	1.7	78.0
TRADING PRECIOUS MET	28	1	1.7	1.7	79.7
MANUFACTURE & SALE O	29	1	1.7	1.7	81.4
ENGINE DESIGN /MANUF	30	1	1.7	1.7	83.1
PRODUCTS FOR AUTOMOT	31	1	1.7	1.7	84.7
CHEMICAL & LUBRICANT	32	1	1.7	1.7	86.4
QUARRYING	33	1	1.7	1.7	88.1
TELECOMMUNICATIONS	34	1	1.7	1.7	89.8
MANUFACTURING OIL PR	35	1	1.7	1.7	91.5
FABRICS AND COATINGS	36	1	1.7	1.7	93.2
COMPLIANCE WITH REGU	37	1	1.7	1.7	94.9
CIVIL AND POWER ENGI	38	1	1.7	1.7	96.6
DEFENSE & AEROSPACE	39	1	1.7	1.7	98.3
PACKING	40	1	1.7	1.7	100.0
	0	1	1.7	Missing	
Total		60	100.0	100.0	
Mean	17.712	Median	16.000	Mode	2.000
Std dev	11.190	Minimum	1.000	Maximum	40.000

TURNOVER COMPANY'S ANNUAL TURNOVER

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
4.1 BN	1	1	1.7	1.8	1.8
35 M	2	1	1.7	1.8	3.6
27 M	3	3	5.0	5.4	8.9
300 M	4	3	5.0	5.4	14.3
25 M	5	1	1.7	1.8	16.1
1 BN	6	4	6.7	7.1	23.2
52 M	7	1	1.7	1.8	25.0
500 M	8	1	1.7	1.8	26.8
4 BN	9	4	6.7	7.1	33.9
17 M	10	1	1.7	1.8	35.7
2.1 BN	11	1	1.7	1.8	37.5
1.1 BN	12	1	1.7	1.8	39.3
8 BN	13	1	1.7	1.8	41.1
9700 M	14	1	1.7	1.8	42.9
10 BN	15	1	1.7	1.8	44.6
550 M	16	1	1.7	1.8	46.4
80 M	17	1	1.7	1.8	48.2
2 BN	18	5	8.3	8.9	57.1
2.5 BN	19	2	3.3	3.6	60.7
60 M	20	2	3.3	3.6	64.3
50 M	21	1	1.7	1.8	66.1
31 M	22	1	1.7	1.8	67.9
65 M	23	1	1.7	1.8	69.6
5 BN	24	2	3.3	3.6	73.2
400 M	25	2	3.3	3.6	76.8
120 M	26	1	1.7	1.8	78.6
85 M	27	1	1.7	1.8	80.4
9 BN	28	1	1.7	1.8	82.1
640 M	29	2	3.3	3.6	85.7
700 M	30	1	1.7	1.8	87.5
2.7 BN	31	1	1.7	1.8	89.3
450 M	32	1	1.7	1.8	91.1
13 BN	33	1	1.7	1.8	92.9
960 M	34	1	1.7	1.8	94.6
100 M	35	1	1.7	1.8	96.4
33.116 BN	36	1	1.7	1.8	98.2
160 M	37	1	1.7	1.8	100.0
	0	4	6.7	Missing	
	Total	60	100.0	100.0	
Mean	16.982	Median	18.000	Mode	18.000
Std dev	10.379	Minimum	1.000	Maximum	37.000

APPENDIX 4

QUESTIONNAIRE UNSTRUCTURED RESPONSES

5. (157):-

Obviously environmental reporting can be of great use for the right industries/companies. The opposite is also true.

8. (98):-

It is essential to integrate environmental issues with Health and Safety and Quality as good working practice. For that reason it is essential that Production Line Management takes a lead in these matters and is aware of the costs particularly of waste.

10. (178):-

Why separate environmental information from other forms of information.

If you integrate environment with the business, you aim to ... on issues which are environmentally significant and hence commercially relevant to your company.

19. (9):-

In a large organisation with different sectoral interests and is difficult to have a hierarchical management information system. Effects/Impacts are site specific in most instance and judgement has often to be made at site level. In other cases data can be aggregated to give a meaningful picture at the top.!

22.(xx):-

In reality environmental reporting in some businesses is crucial, thorough and conducted by specialists, in others it has a lower priority. Issues like minimizing waste and reducing costs are "unlikely" to receive greater attention because they are already well controlled and form a key business objectives to keep them that way.

34.(96):-

The production department are the group who create the environmental impact from the site and it is they who collect and get most benefit from environmental information.

40.(142):-

We have achieved BS 7750 status and are continually raising the level of importance to the company. In a cost driven business it is important to look at longer term savings through environmental efficiency, not short term cost.

50.(174):-

In conclusion, I feel that environmental and social accounting are seriously needed in today's world, but I acknowledge that my view is very much in the minority.

58.(102):-

You might wish to identify how companies distribute environmental information to stakeholders, ie. AGM's, annual report, internal newsletters.

Q.5. Board members receive (quarterly) information about environmental matters.

A: Some

12. (76).

Q.5. Which levels of management receive frequent information about environmental matters?

A: Dependent on area of responsibility.

16. (92).

Q.5. Which levels of management receive frequent information about environmental matters?

A: Different information to different levels of the organisation"

15. (177):-

Q.5. Which levels of management receive frequent information about environmental matters?

A: As required" "not all in all groups"

50. (50):-

Q.5. Which levels of management receive frequent information about environmental matters?

A: Frequency depends on job function.

20. (197):-

Q.5. Which levels of management receive frequent information about environmental matters?

A: Middle managers "specific to their areas of responsibility.

Q.6f. Environmental reports for internal management serve no useful purpose.

A: Too broad a classification. Some may, some may not. Depends on the objectives of the report.

Q.6h. Environmental accounting will encourage continuance of the present social order by legitimating destructive actions and producing political quietism.

A: sounds good but not sensible.

Q.6j. I am satisfied with the manner in which environmental activities are internally reported within my organisation.

A: But room for improvement!

14. (154).

Q.2 ALL, COLLECT ENVIRONMENTAL DATA.

"We seek the deletion of O.B.A's in own factories, the reduction of energy and water in own factories and offices, and the promotion of route planning and safety and really controlled vehicles in distribution. Notable improvements have been made in all factories".

22.

Q.2h. The company presently collect environmental data on impact of the company's production processes on local communities

A: New sites only.

Q.6c. Eco-management and environmental internal reporting practices allow businesses to gain competitive advantage over their competitors.

A: Marginal as competition also going down same route

Q.6k. There is a need for radical changes to be made in our existing accounting systems with regard to internal environmental reporting.

A: Environmental reporting takes place in separate systems and it is not appropriate to bring them into the accounting system".

Q.6i. Environmental reporting can protect management from financial liability regarding environmental damage.

A: By itself no, but it can be used to limit mitigate environmental damage"

APPENDIX 5
CROSSTABULATIONS

TURNOVER COMPANY'S ANNUAL TURNOVER
by MARKET IMPORTANCE OF ER IN TERMS OF - MARKETING

Page 1 of 3

	Count	MARKET					Row Total
		NO IMPOR TANCE 1	VERY LIT TLE IMPO 2	SOME IMP ORTANCE 3	IMPORTAN T 4	VERY IMP ORTANT 5	
TURNOVER							
4.1 BN	1	1					1.8
35 M	2			1			1.8
27 M	3		1	2			5.5
300 M	4		1	1	1		5.5
25 M	5		1				1.8
1 BN	6		1	2		1	7.3
52 M	7			1			1.8
500 M	8			1			1.8
4 BN	9	1	2	1			7.3
17 M	10			1			1.8
2.1 BN	11				1		1.8
1.1 BN	12			1			1.8
8 BN	13			1			1.8
9700 M	14				1		1.8
(Continued)	Column Total	6 10.9	11 20.0	19 34.5	17 30.9	2 3.6	55 100.0

TURNOVER COMPANY'S ANNUAL TURNOVER
by MARKET IMPORTANCE OF ER IN TERMS OF - MARKETING

Page 2 of 3

TURNOVER	Count	MARKET					Row Total
		NO IMPOR	VERY LIT	SOME IMP	IMPORTAN	VERY IMP	
		TANCE 1	TLE IMPO 2	ORTANCE 3	T 4	ORTANT 5	
10 BN	15				1		1.8
550 M	16		1				1.8
80 M	17	1					1.8
2 BN	18	1	2	1	1		5.1
2.5 BN	19			1	1		2
60 M	20	1			1		3.6
50 M	21				1		1.8
31 M	22			1			1.8
65 M	23		1				1.8
5 BN	24	1		1			3.6
400 M	25				2		3.6
120 M	26				1		1.8
85 M	27			1			1.8
640 M	29		1		1		3.6
(Continued)	Column Total	6 10.9	11 20.0	19 34.5	17 30.9	2 3.6	55 100.0