

Exploring Corporate Practices in Management Accounting for Sustainability

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Publication date:
2013

Document Version
Publisher's PDF, also known as Version of record

[Link to publication](#)

Citation for pulished version (APA):

Bennett, M., Schaltegger, S., & Zvezdov, D. (2013). *Exploring Corporate Practices in Management Accounting for Sustainability*. Institute for Chartered Accountants of England and Wales (ICAEW).

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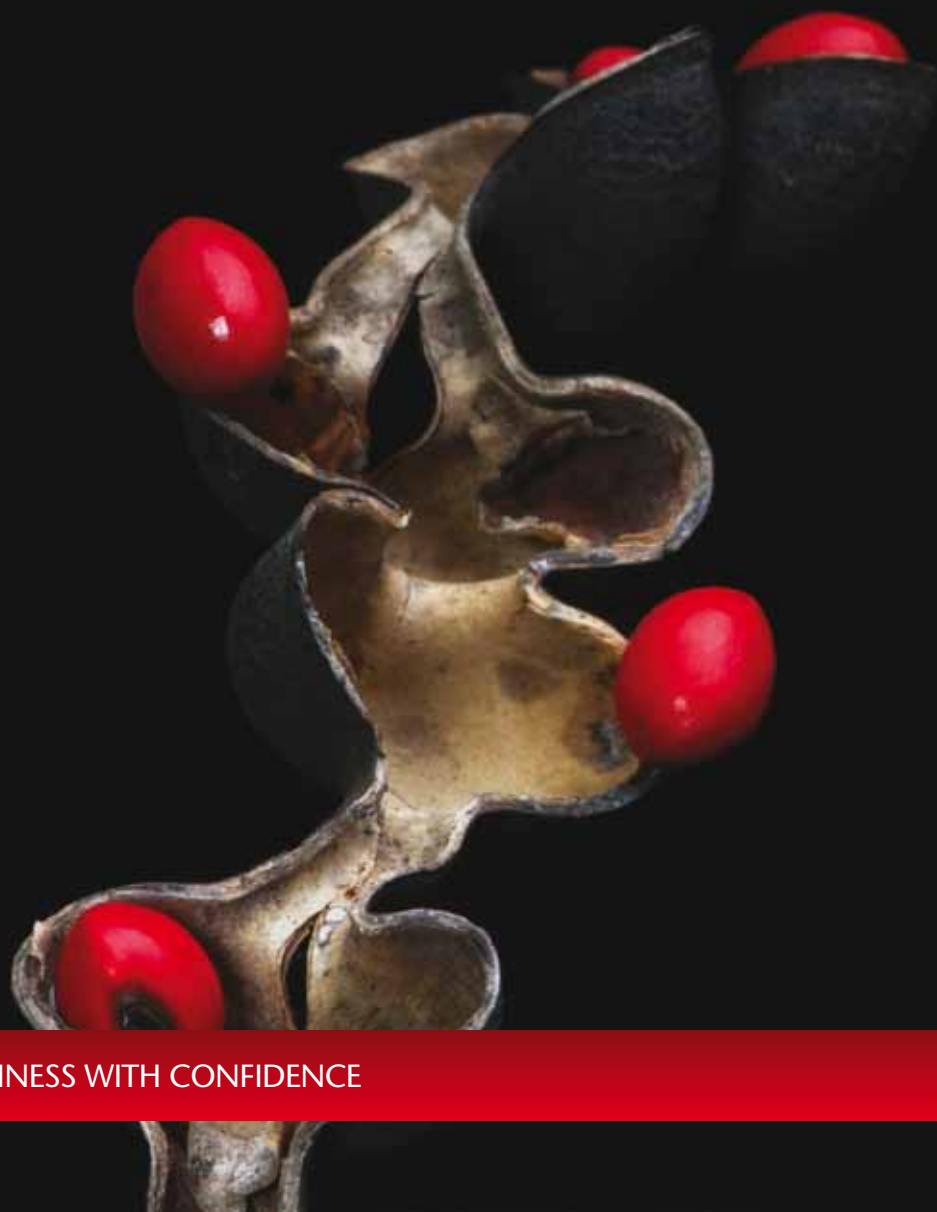


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EXPLORING CORPORATE PRACTICES IN MANAGEMENT ACCOUNTING FOR SUSTAINABILITY

Martin Bennett, University of Gloucestershire

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ISBN 978-0-85760-299-2

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ACKNOWLEDGEMENTS

The financial support of the ICAEW's charitable trusts through its grant reference 5-429 is gratefully acknowledged.

The research team would also like to thank the companies that actively participated in this research and the interviewees in these companies who generously provided their time, and those who kindly supported us by providing contacts and suggestions. We have not identified people by name in the text but have listed the companies and individuals in Appendices I and II.

We would like to add particular thanks to Gillian Knight and Richard Spencer of ICAEW and several of their colleagues for their continuing support and advice, and Professor Macve and the anonymous practitioner reviewer for their valuable comments on earlier drafts of this report.

EXECUTIVE SUMMARY

Interest in sustainability and its implications for business has increased steadily since the issue first became topical two decades ago. It is increasingly recognised that sustainability not only poses ethical issues but also has direct implications for economic performance. The development of the regulatory framework of markets, technical and organisational innovations, and new societal and consumer perceptions, have changed the business context and the determinants of corporate success.

This has implications for the professions that support business, and sustainability management has generated demands for new information and for adaptations of conventional accounting to support this. There has been substantial research on a range of issues of sustainability accounting, but less is understood of actual practices within companies and how these are developing over time. Answers are needed to questions such as 'what is understood by sustainability accounting in business practice?', 'how is sustainability accounting carried out?', 'who within companies uses the information which is generated, and for what purposes?', and 'what expectations are there of future developments?'.

ICAEW therefore supported this project to build on previous research on sustainability accounting which it has either carried out or supported, by researching into the status of sustainability accounting in business practice. Given the relative youth of the subject, an exploratory study was made of practice in 16 leading companies in the UK and Germany, based on a total of 54 interviews with 41 managers and other staff involved to explore current practice.

This report provides an opportunity to examine the processes involved in generating business information, as distinct from the outputs that these processes generate. It also throws some light on how some leading companies are dealing with the additional information needs required in order to manage the increasingly topical issue of sustainability.

It also has further implications. As sustainability-relevant information is largely non-financial in content, it also represents a specific instance of a broader current trend. This is the expansion of the generation and use in business of non-financial information to supplement the traditional financial information flows, both for external audiences through narrative reporting and for internal managements through balanced scorecards and similar systems.

As this report shows, designing and managing non-financial information flows in practice is frequently handled by non-accounting specialists, particularly when this is in a new area that has not yet been systematised. This can be interpreted in either of two ways. It could be seen as a potential threat to the position of accountants as the leading practitioners in managing business information processes; however it can alternatively be seen as an opportunity to improve the processes involved by systematising them and incorporating the types of checks and controls to ensure integrity that are usually taken for granted in conventional accounting information, but which may be much less frequent with more novel non-financial information.

The exploratory nature of the research means that the results can be only indicative rather than definitive, but they suggest a wide variety of practice which is still developing rapidly, with a number of emerging trends becoming apparent. These include a tendency for sustainability accounting in a company to become more systematised over time, and an increasing need for sustainability-related information of the same quality and reliability as is expected of other business information, including financial. This suggests a number of areas where further research can support the accountancy profession in adapting to this new challenge, including the development of a framework for sustainability accounting, ways in which sustainability accounting can be institutionalised and linked with conventional accounting, and the further development of new sustainability accounting tools.

1. INTRODUCTION

1.1 Sustainability

The terms 'sustainability' and 'sustainable development' are increasingly used, though often only loosely and without precise definition which means that they can then be interpreted in a number of different ways. The most frequently cited definition is provided by the Brundtland Report on environmental responsibility: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN 1987, p46). This derived from the concept of sustainability in forestry management which was developed three centuries ago (Laws et al. 2004), that only as much timber should be removed from a forest as is replenished by nature, thus 'living from the interest and not from the capital'. This is clearly an implicit reference to the capital maintenance concept and a notion of intergenerational equity that is increasingly referred to, such as in the 'Five Capitals' model developed by Forum for the Future (Porritt 2007). This defined five distinct types of capital (natural, human, social, manufactured, and financial), and pointed out that only the last two categories were normally recognised by business and its accounting systems, and therefore routinely taken into account in decision making and assessing performance. The consequence, it argued, is that a sustainability crisis is imminent because stocks of natural, human and social capital are being consumed faster than they are being replenished.

1.2 Corporate sustainability

The term 'corporate sustainability' has been used for over a decade (Atkinson 2000) but there is still a wide divergence of opinions over what changes this requires of business. At one extreme is the argument that corporate sustainability is an entirely new paradigm within which business must operate rather than pursuing traditional profit maximisation models (Dyllick & Hockerts 2002; Wilson 2003). Schaltegger and Burritt (2005) by contrast define corporate sustainability as a process which aims to integrate the systematic management of the environmental and social aspects of business together with the economic aspects, both to achieve sustainable business development for the company¹ itself and also to contribute to the sustainable development of the wider economy and society (see also Hopwood et al. 2010).

This reflects an evolutionary and adaptive perception of corporate sustainability of which economic performance (see eg, Burritt et al. 2002) is an integral part, rather than in competition with environmental and social performance; and also a more realistic view of economic interactions than Friedman's (1970) argument that 'the social responsibility of business is to increase its profits'. Proponents of corporate sustainability argue not merely that companies have an ethical obligation to be responsible, but that the environmental and social aspects of performance are also essential for a business's success in conventional terms, ie, that integrating environmental and social performance into business management can also result in improved financial performance (eg, Burritt 2012; Schaltegger & Wagner 2006; van Osterhout & Vishwanathan 2012).

1.3 Sustainability management

Environmental and other sustainability issues can affect business in several ways. Stricter environmental legislation and regulation has imposed an additional compliance burden and a need to monitor activities and outputs more closely, as has pressure from stakeholders, including watchdog groups such as non-governmental organisations and the media. Increasing shortages of natural resources including increasing energy costs are reflected directly in market prices, which is encouraging companies to review their products and processes to recognise and respond to changing cost structures and risks. More positively, stricter environmental and social legislation has also created new markets and opportunities for business which are therefore an increasingly motive for corporate sustainability projects (Porter 1990; Porter & van der Linde 1995).

1 The term 'companies' is used throughout this report in an inclusive sense to cover all the entities on which the research was based, which also included non-corporate public sector and not-for-profit bodies.

Part of the response by most companies which have recognised the need to manage sustainability as a business issue has been to create an additional organisational function which is made primarily responsible for coordinating sustainability management across the company (for simplicity these are referred to here as 'sustainability departments', led by 'sustainability managers'). The size, status and composition of these functions can vary widely as can their responsibilities, which can range from relatively novel issues such as carbon emissions to long-established areas such as occupational health and safety, and invariably also include at least the coordination of the management of sustainability-related information.

The corporate sustainability department has been described and defined widely in the academic and practitioner literature (eg, Quinn & Dalton 2009; GRI 2006; Steger 2004), albeit often under a variety of alternative titles such as environmental, corporate social responsibility (CSR) or corporate responsibility (CR) departments (cf. Hansen 2010). The function has usually (though not invariably) been developed from another department or function whose initial purpose might have been (for example) responding to increasing legal compliance requirements, communications, or strategic planning. With the increasing added value of pursuing improved social and environmental performance (Schaltegger & Wagner 2006) however, an increasing number of companies have allocated resources to establish specific focused sustainability teams or departments.

Depending on how the sustainability department is integrated in existing corporate structures, Epstein (2008) proposes three generic forms of such departments: a decentralised, an additional, and a separate external structure. In the first case, sustainability is an add-on task delegated to existing departments and functions, whereas in the second case a separate department is established to focus on sustainability performance. The third case represents an additional, external organisation (such as a dedicated foundation) and is not considered for the purposes of this report. It is also possible that a company might adopt a mixture of these three forms eg, organisations with a separate sustainability department but which still regard sustainability challenges as the responsibility of line management (eg, Hansen 2010).

As a logical starting point in this project, the research team established initial contact with the head of the sustainability department in each company that collaborated. We then followed the information upstream (providers) as well as downstream (recipients), which led on to further interviews with other participants who were also identified as important actors in the company's sustainability management information processes. These further contacts differed from company to company, as did their titles and functions. A study conducted by the Economist Intelligence Unit (2007) on the functions involved in sustainability management which surveyed over 1000 companies found that usually either a chairman or a CEO was the formal head of corporate sustainability, followed by no specific function being explicitly in charge of managing sustainability issues. A more recent study in Germany (Schaltegger et al. 2013) examined the departments which are most closely involved with corporate sustainability. These are the sustainability department, and the environment, health and safety (EHS) department, followed by corporate communications. Accounting and finance departments on the other hand are least involved in corporate sustainability management.

1.4 Sustainability accounting

The term 'sustainability accounting' is used here to refer to the process of the collection, analysis and communication of sustainability-related information (see Schaltegger & Burritt 2000, 2010). This is any information that is needed for, or that is related to, corporate sustainability management. It can include both new types of information and sometimes also information which may already have been generated and used for some time before the term 'sustainability' became common usage (eg, on legal compliance with employment laws).

The notion of sustainability accounting has emerged from a combination of philosophical discussions on the nature of accounting (eg, Bebbington 2001, Gray & Bebbington 2001; Gray 2010) and conceptual developments in accounting (eg, Burritt & Schaltegger 2010). It can be seen as either a new development based on an entirely new system of accounting or as an extension of conventional accounting, depending in part on which person within a particular company is responsible for its sustainability accounting and the type of information that is collected. In both cases this is either implicitly or explicitly based on recognition that most companies' current accounting and other information systems do not yet adequately recognise the environmental and social aspects of their business, and these may therefore not be fully taken into account in decision making and assessing performance.

The type of information that is considered to be sustainability-related can vary widely depending on several factors. The most important of these is the particular company's main sustainability-related objectives, including how far these derive from external stakeholder pressures and therefore drive a need to generate information to be reported externally, as opposed to an intrinsic motive to manage sustainability performance as part of overall business strategy for conventional business reasons of profitability and value.

The primary focus of this study is the generation and use of sustainability accounting information internally within an organisation, rather than for external reporting. However, like financial and management accounting, external reporting is a significant part of the context as it frequently corresponds (as it should) with what is measured and reported internally (Bennett et al. 2011). There are at least as yet no mandatory requirements on companies in either the UK or Germany imposing a responsibility to provide a comprehensive disclosure of their sustainability performance of the kind already given as supplementary information by many leading companies (although at the time of writing the UK Government was consulting on proposals this for at least a limited number of companies, BIS 2012). Many companies, especially larger organisations, have chosen to make voluntary disclosures, usually in the form of a stand-alone report and often aiming at complying at least in part with guidelines such as those of the Global Reporting Initiative (GRI 2007) or the Equator Principles. The effects of the latter on improving sustainability performance have however at best been difficult to measure (Macve & Chen 2010). A survey of practice in 2008 across 22 countries (KPMG 2008) found that nearly 80% of the Global Fortune 250 (the largest 250 companies internationally) were issuing a stand-alone report, as well as usually providing information on a more flexible basis and in more detail through their websites. The proportions in the UK and Germany were slightly higher than the international average. Given the research design, this was also the case with the companies examined in this project.

In 2003 the EU's Modernisation Directive gave further impetus to sustainability accounting and reporting. In the UK this was enacted in s417, Companies Act 2006 which requires all companies except those classified as small to publish a Business Review as part of their annual reports. The Act requires that the directors should provide a 'fair review' of the business and its principal risks and uncertainties, including where appropriate information on environmental matters and employee matters, including relevant key performance indicators. For UK quoted companies there is a stronger requirement that the Business Review must, to the extent necessary for an understanding of the development, performance or position of the company's business, normally also include information about environmental matters (including the impact of the company's business on the environment), the company's employees, and social and community issues, including information about any policies of the company in relation to those matters and the effectiveness of those policies. If the Review does not provide information on each of these, it must state which are omitted. The main target audience still appears to be investors, as it is for the rest of the annual report, with the aims of explaining the context in which the financial results were generated, how investors should assess the company's future potential (including significant risks and uncertainties), to provide a forward-looking framework, and to provide a balanced and comprehensive analysis of the business including its social and environmental aspects. However, the decision on the actual information to be disclosed is inherently judgemental so that the selection of the information to be reported is inevitably up to the discretion of the directors of each company, and practice predictably varies widely (see Mio & Venturelli 2012; PwC 2007 for a survey of recent practice by FTSE 350 companies).

The Directive has similarly influenced the annual reports of German companies. Current German law, enacted through the German Commercial Code (HGB), requires that both listed companies and those with either a balance sheet total exceeding €16m, sales revenues exceeding €32m, or more than 250 full-time employees, must report performance indicators on sustainability-related issues that can affect company results (BMU 2009). Examples of such issues include environmental protection and employee interests such as appropriate working hours.

Although the two countries have implemented the Directive in a similar way, there appear to be significant differences in scope and coverage of sustainability issues (FEE 2008) which can be attributed to differences in sustainability awareness as well as to cultural and legislative dissimilarities. German companies tend to focus on environmental issues whereas the reports of British companies tend to consider economic, social and environmental issues to a similar extent. Bracke and Albrecht (2007) found that in countries characterised by a more societal organisation of authority (such as the UK), private alternatives to national regulations like ISO 14001 are welcomed and adopted with enthusiasm. In countries characterised by a rather more statist organisation (such as Germany), such alternatives are looked upon with more suspicion resulting in delayed uptake.

Furthermore, voluntary environmental management standards such as ISO 14001 and EMAS can act as a form of regulation or governance, especially as they become institutionalised and internationally recognised. They can become coercive when third parties demand that organisations comply with them (Brunsson and Jacobsson 2000). As examples of ‘pieces of general advice’, both EMAS and ISO 14001 serve the purpose of helping companies implement environmental management systems that fulfill certain criteria.

Neugebauer (2012) distinguishes between the external and internal factors which drive corporate decisions on the implementation of standards, which are likely to interact (Perkins and Neumayer 2010). Neugebauer (2012) identifies (1) the organisational field, (2) the institutional environment of a firm, and (3) complementary standards such as ISO 9001, as the most relevant external factors for adopting ISO 14001 or EMAS. The most relevant internal factors are identified to be (1) the availability of win-win possibilities (or the perception thereof), and (2) leadership by individuals in the company management.

The process of external reporting is still distinct from both the objectives that each company decides to pursue, and the means that it adopts to achieve them. Companies differ in both of these aspects – not only in their objectives, but also in how they choose to pursue these objectives and their preferred approach to management control, with some companies being ‘managed through the numbers’ more than others (eg, Chenhall 2003). This is likely also to be a function of the stage to which a company’s sustainability management has developed. Results-based control systems pose challenges at several levels: defining objectives and therefore desired performance, devising appropriate indicators, and then generating these to an acceptable standard of quality while still within reasonable cost limits. As these can take some time to be developed, it is reasonable in the early stages of a company’s sustainability management to expect a reliance primarily on behavioural and social controls, with these increasingly being supplemented with results-based controls over time as information systems are developed.

Bennett et al. (2011) provide a comprehensive review of the wide variety of different activities and techniques that can be termed ‘environmental accounting’ (its focus is specifically environmental rather than broader sustainability issues which are relatively more recent as a concern, but the principles can be extended). The development of thought over the past two decades, since first environment and subsequently sustainability became generally recognised as mainstream issues for accounting, can be understood by an examination of early seminal publications such as Schmidheiny and BCSD (1992) and EPA (1995). The former provided an early recognition of the potential importance to business of environmental issues and the implications of this for accountants, and an analysis of how conventional accounting might need to be adapted. The EPA’s 1995 introduction to environmental accounting primarily focused on the need to adapt conventional costing systems in order to make cost relationships transparent and guide appropriate decisions on process and product design. On a methodological level, probably the most remarkable development in the area has been materials flow cost accounting (Jasch 2009) which has influenced companies and regulators as far as Japan (Kokubu & Nakajima 2004). In addition special issues of *Accounting, Auditing & Accountability Journal* (1991) and *Greener Management International* (1997) have served as landmarks for the academic discussion. Other subsequent publications include the ICAEW’s 2004 publication on the role of accountants which identified a number of different ‘mechanisms’ through which the issue could affect business in ways relevant for accountants and financial managers, and its 2009 guide (in collaboration with the Environment Agency) on the implications of environmental issues for external financial reporting (ICAEW 2004; 2009).

These early publications largely focused on the likely relevance of the environment to business and ways in which this could be relevant for the role of accountants, and alternative ways in which data can be processed (such as the Total Cost Assessment model). The question of where and how the information to support these would be derived was not an immediate issue, but as sustainability accounting has developed further and been introduced into ongoing business systems, companies have increasingly had to deal also with the practical operational issue of the various processes needed to make sure the necessary data was available when needed in the first place, from initial data capture through collation and aggregation to its eventual provision to decision makers and analysts. It is this which is the focus of this project.

The concept of a ‘Triple Bottom Line’ (Elkington 1997; 2004) has become widely accepted as one approach to sustainability accounting at company level, to reflect the argument that businesses should be concerned with not only their financial performance but also their environmental and social performance, and should therefore aim to manage and account for all three aspects. This multi-faceted concept of sustainability is also reflected in the Sustainability Reporting Guidelines which the Global Reporting Initiative (GRI) has developed (GRI 2007) to reflect and promote

good practice in companies' reporting to external audiences on their sustainability performance. These recommend a total of 79 performance indicators, which the GRI suggests companies should consider reporting (in addition to the information already provided in their conventional financial reports) to reflect their economic, social and environmental performance respectively.

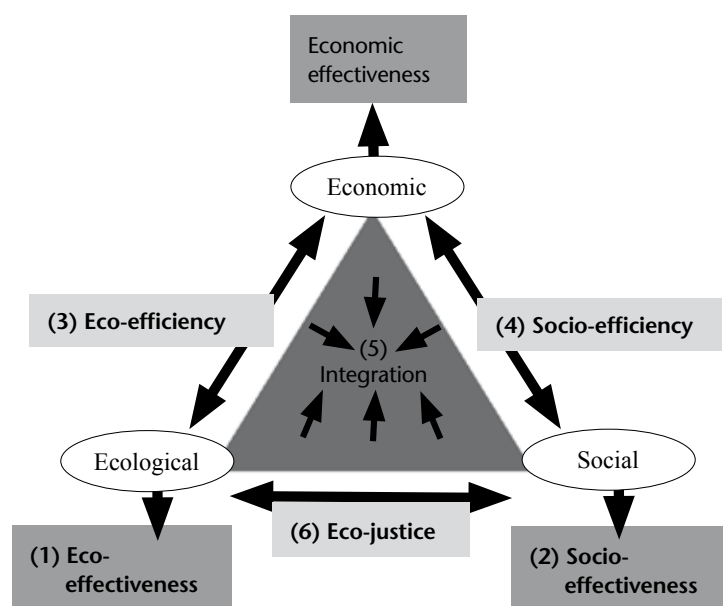
Schaltegger and Burritt (2010) have suggested a number of different motives which might encourage companies to use sustainability accounting to support their sustainability management:

- in response to the examples of other companies and industry pressure eg, dealing with fashionable issues such as greenhouse gas emissions, voluntary reporting on child labour, etc;
- legislative pressure, stakeholder pressure and maintaining the company's 'licence to operate', such as voluntary commitments to government targets, and responding to an increased demand for green products, etc;
- self-regulation such as reducing expenses by cutting down on travel or heating, or finding more resource-efficient and lower-cost methods;
- corporate responsibility and ethical reasons, including the personal motivation of management or staff, and to have a positive impact on the company's reputation and image; and
- to provide information which could be relevant in sustainability-related decisions and thus make it possible for those responsible for sustainability management to 'make the business case for sustainability' (Schaltegger et al. 2011, who also argue that this is necessary in order to develop an integrated approach to sustainability). This is a particularly strong argument when opportunities can be identified to realise both economic and sustainability benefits simultaneously, such as through energy efficiency and waste minimisation projects (Bennett & Mabbett 2009).

1.5 Core challenges in sustainability accounting

The 'sustainability triangle' (Figure 1) represents the concept of sustainability which has informed this project. It is designed both to help explain the three generally recognised components of corporate sustainability – the social, environment and economic perspectives – and to identify where a contribution is needed from sustainability accounting to support management with relevant information (Schaltegger & Burritt 2005; Schaltegger et al. 2006). Its purpose is to explain each component individually, and the interrelationships between them.

Figure 1: Structuring the information needs of corporate sustainability with the sustainability triangle



Source: Schaltegger and Burritt 2005, p189.

In the triangle, each component is represented by one corner, whereas the interrelationships are represented by the lines which connect the corners. The corners represent the company's effectiveness in achieving each component individually and are measured in absolute terms, whereas the lines represent different ways in which eco-efficiency, socio-efficiency and eco-justice can be defined, by taking different combinations of the three perspectives and expressing the results as relative indicators.

The conventional aim of business management is economic effectiveness. This is already supported by conventional management accounting so it is not considered further here. The challenge for sustainability accounting is rather to provide management with information on the other aspects.

A company's eco-effectiveness (ie, ecological effectiveness) reflects how successful it has been in reducing its impacts on the natural environment. This is usually expressed in terms of the absolute amounts of physical quantities such as CO₂ emissions (see eg, Heijungs et al. 1992), ecological footprints (Wackernagel & Rees 1996), or simply the total mass of materials which is involved in a product's life cycle.

Socio-effectiveness reflects how a company has taken account of the diversity of social and cultural demands to ensure its acceptance by the society within which it operates, and this can encompass a wide range of different factors. Notwithstanding the criteria suggested by organisations such as the World Health Organization (WHO 2008) and the OECD (2007), a universal definition of social performance and information requirements is difficult since this is value-laden and will differ between cultures.

The traditional economic challenge facing business is to maximize its efficiency in terms of financial returns (profits) relative to financial resources such as capital invested. An equivalent challenge to sustainability management is to achieve the maximum environmental and social performance as economically as possible, and these are measured by eco-efficiency and socio-efficiency respectively. Eco-efficiency is defined as the relative proportions of an economic (monetary) measure and a physical (ecological) measure (Schaltegger & Sturm 1990; Schaltegger & Burritt 2000; Schmidheiny & BCSD 1992; von Weizsäcker et al. 1997; von Weizsäcker 2009). It can be defined as the ratio of value added to environmental impact added per unit, where environmental impact added is equivalent to the sum of all environmental impacts which are generated directly or indirectly by a product or activity eg, value added per tonne of CO₂ emitted. Similarly, socio-efficiency can be defined as the relative proportions of an economic measure and a social impact eg, value added relative to the number of accidents suffered by staff. Eco-justice reflects the ratio between environmental and social objectives.

The main challenge for any company is to integrate all these different aspects. This requires both the simultaneous pursuit of all aspects, and the integration of accounting for sustainability-related information with conventional accounting and information systems.

1.6 The EMA framework

Sustainability accounting has been influenced substantially by environmental management accounting (EMA), which has been developed and applied for nearly two decades (Parker 2011) and can draw on a wide range of different methods.

Management accounting uses not only monetary data, usually drawn from the same database as that which supports published financial reports, but also non-monetary (physical) data as this often reflects the drivers of monetary results (Schaltegger & Burritt 2000). Interest in non-monetary information has increased in recent years and is reflected in models such as the Balanced Scorecard (Kaplan & Norton 1996). It is especially relevant in sustainability management, particularly to the extent that this is influenced by external drivers such as environmental legislation and the need to demonstrate legitimacy, much of which can be generated through EMA.

Burritt et al. (2002) proposed a framework in which different EMA methods can be categorised, based on the attributes of the information and the uses to which the information is to be applied:

- whether the information is monetary or non-monetary;
- whether the time frame is past or future. This depends on whether the purpose for which the information will be used is to measure past performance or to make decisions for the future;
- whether the length of the timeframe is short term or long term, distinguishing between decisions involving strategic information over several years and more operational information covering shorter time periods;

- how routinely the information is provided, and whether this is regularly for a recurring purpose or on an ad hoc basis for a specific and non-recurring need.

These four dual attributes provide the basis for a framework of 16 categories (Table 1) in which different EMA methods can be positioned and understood in terms of their purpose and data source (see Burritt et al. 2002 for a full description of these different methods).

Table 1: Framework of decision situations

Environmental Management Accounting (EMA)					
		Physical		Monetary	
		Short term	Long term	Short term	Long term
Past-oriented	Routinely generated	x	x	x	x
	Ad hoc	x	x	x	x
Future-oriented	Routinely generated	x	x	x	x
	Ad hoc	x	x	x	x

Source: Burritt, R.L., Hahn, T. and Schaltegger, S., 2002, p43.

The framework provides a taxonomy of various combinations of decision situations and therefore the uses of the information which will be required in each situation. It is not intended to suggest that actual practice will necessarily be spread evenly across all cells in this framework. On the contrary most EMA literature to date, particularly practice-oriented publications, has tended to focus on environmental cost accounting which includes a number of different costing approaches such as environmental process costing, activity-based environmental costing, environmental job costing and materials flow cost accounting (Bennett et al. 2011). These monetary EMA methods often rely on corresponding physical information about materials and energy flows and are past-oriented, although they can also provide managers with an informed overview of inefficiencies in the use of materials and energy which can be useful in identifying and analysing potential opportunities for improvement.

Although research has been ongoing for at least two decades (eg, Carey & Macve 1992), our research indicates both that sustainability is still increasingly being recognised as a very significant variable in the strategic context within which business operates, and that the topic continues to pose a challenge for most companies. Even leading companies appear to struggle to design and follow appropriate practices, and an overall, systematic approach to sustainability accounting was not observed in any of the researched companies. However although many companies experienced a wide range of difficulties in dealing with sustainability accounting, they still reported that they had been able to devise ways to achieve their aims and were actively seeking to expand them.

This would suggest that in most companies past-oriented EMA methods such as environmental cost accounting are still likely to be found more frequently in business practice than future-oriented, though once management has realised that efficiency improvements and other business benefits are possible then future-oriented information will also be needed. This might for example be to project whether materials and energy wastes will continue to cause costs into the future, which would require information on expected wastes, emissions, energy, and materials flows. It is also likely that in the early stages of the development of sustainability accounting in a company, ad hoc information will be predominant since the ongoing systems that would be needed in order to generate recurring information will not yet have been developed.

These 16 categories of decision situation can also be related to different information users and their specific information needs (Burritt et al. 2002). Senior managers are more likely to be concerned with strategic, long-term and highly aggregated accounting information which is needed to plan and control activities at a corporate level, so that long-term information is likely to be most relevant. Operational managers by contrast are more likely to need short-term past-oriented information that can help them to identify quickly and tackle inefficiencies and to improve processes.

Each decision situation will require a correspondingly appropriate method of sustainability accounting. Burritt et al. (2002) suggest appropriate methods for each of the 16 cells, some of which (eg, environmental cost accounting, and materials and energy flow accounting) have already been of interest to both researchers and practitioners (eg, Jasch 2009). However, to date there have been few examples cited of other potentially valuable approaches such as ecological budgeting for individual projects, and planning future physical impact developments (Bennett et al. 2011).

1.7 Core questions and structure of the report

The preceding sections have developed from a discussion of sustainability generally and its implications for companies, through to the consequent requirements for information – both its subject and its properties. This raises several questions about how companies currently manage the process of meeting these information requirements, ie, their sustainability accounting, such as:

- Who is in charge of organising information flows?
- Who is involved in these flows?
- What information is needed, collected and communicated?
- How is it used?

In the early stages it may be expected that a company's sustainability accounting will be managed predominantly, perhaps even exclusively, by its specialist sustainability function in coordination with the operating departments in which the data is initially captured. However, it is likely to find that increasing quantities of information are needed on a regular basis as part of a systematic process of management control and this suggests a potential role for accounting functions, which was part of the motivation for this study.

There has been a broad and diverse literature on the various developments in sustainability accounting, many of an experimental nature, in both its external accountability and internal management support roles (eg, Parker 2005) although it does not necessarily always follow that innovations then become embedded and have a lasting effect on practice (Bennett 2008). However despite a high number of case studies of claimed good practice, there has to date been relatively little systematic research into the development over time of how sustainability accounting is managed in companies (and other organisations), or how far those companies' accounting functions are involved in this.

The development of sustainability accounting in companies is potentially highly relevant to the accountancy profession, as those responsible for maintaining high standards of quality and integrity in what for most companies is their central and most formalised information system. Just as the development of non-financial indicators for aspects of performance such as customer service and product quality developed first in those areas, but has subsequently been absorbed into accounting practice as it has become more well-established and central in business management, a similar evolution might be expected with sustainability information too. It might be expected that the need for relevant sustainability information will usually be identified first by a company's sustainability department, and largely addressed on an ad hoc basis by pragmatically making use of whatever data is already available; however as this evolves and becomes more established and routinised, it is more likely to become embedded in mainstream systems and processes, and in particular those for which the company's accounting function is responsible.

The primary focus of this project is the processes which businesses follow to capture, collate and process relevant data to support internal management, and how far this is becoming systematised and if so, how. To keep this focus we have had to resist the temptation to digress into a number of other related areas which are part of the overall context and well worth studying in their own right, but which would be tangential to this project. These include the well-developed critical literature challenging the motivations of companies in how they approach their sustainability management. This project takes a consciously pragmatic management stance and takes management motives as real and relevant, and asks what courses of action have those companies actually taken which have decided (for whatever reason) to develop sustainability accounting, and what has been their experience?

There is also an ongoing debate over the relative primacy of different groups of stakeholders – in particular, whether equity investors should necessarily always be considered to be a company's principal stakeholder so that consideration of other stakeholders merely reflects an enlightened approach to traditional shareholder capitalism and companies' recognition of the need to provide evidence of their broader societal value in order to establish legitimacy (see 2.6.3 below), or alternatively whether other stakeholder groups have legitimate rights in principle, independent of shareholders. However this question is distinct from the subject of this study, which is the processes through which information is generated in the first place, before any question of the uses and users of the information which is ultimately generated. This means that for this project any question of how potential conflicts between shareholders and other stakeholder groups can be resolved is therefore redundant.

Finally, a further tangential issue is how innovations such as new developments in sustainability accounting are created and disseminated. There is a well-developed institutional theory literature on this which identifies a number of different 'mechanisms' by which companies can identify and implement innovations (see eg, Abrahamson 1991; 1996). In some cases they may work these out for themselves from first principles, but more frequently they will be prompted by ideas imported into the company through a number of different possible channels (or 'isomorphisms'; see eg, Powell & DiMaggio 1983). The most relevant of these for the spread of sustainability accounting practices are 'mimetic isomorphism' (or simply 'mimicry') ie, prompted by observing new developments in other companies which can be cross-fertilised in a number of ways; and 'normative isomorphism' in which the initial stimulus is some outside expert. These can include professional institutes and universities, and particularly for innovations in business management, also those external consultants whose business model is to develop new innovations and then seek to persuade as many clients as possible to adopt them. However this was not part of this project's main focus, and although the influence of external consultants was mentioned in passing by some interviewees, it was apparent that most of the systems in which we were interested have been developed internally. This perhaps reflects the difference between receiving external advice on how information can be used through new decision tools and analytic methods, where external consultants are more likely to be relevant, and developing systems to generate the information which these tools and methods will use as an input which is more likely to be managed internally.

The rest of this report is structured as follows:

- Chapter 2 explains how the project was carried out and why, and outlines its theoretical background.
- Chapter 3 presents the findings.
- Chapter 4 draws some conclusions and inferences which may help to guide future practice and research.

2. RESEARCH APPROACH AND METHODS

2.1 Motivation and scope

This project was designed to fill a gap in the existing research by exploring developments in the practice of sustainability accounting in a number of leading companies in each of the UK and Germany. Its focus is on the use of information to support management, ie, sustainability management accounting, although at the same time also recognising that companies generate information not only for this purpose but also to report externally; and that in practice this can often be a significant determinant of the information that is generated, which can then be available for internal use too.

Sustainability accounting, encompassing accounting for both environmental and social performance, is emerging both conceptually and in practice. Given its novelty the project did not aim to identify established, generally accepted good practice, but instead to identify companies which might be expected to be in the lead and to ascertain emerging trends in these companies, and discernible factors which may influence corporate sustainability accounting practice. A grounded theory approach was applied to generate indicative findings that could both inform practice elsewhere and indicate potential areas for further research.

This report does not attempt to develop critical arguments as to the motivations of the companies' managements. As Adams and Larrinaga-González (2007) conclude, '... the extant literature in the field of sustainability accounting and reporting, in contrast to the fields of management accounting and management, has largely ignored practice within organisations. The lack of "engaging research" is found to be due to concerns about increasing the breadth of participants in the social accounting agenda and "managerial capture" ... further research engaging with organisations is needed in order to identify how accounting and management systems might reduce their negative sustainability impacts.'

2.2 Grounded theory

Grounded Theory (Glaser & Strauss 1967; Glaser 1978) is a research method in which data of observable phenomena is collected and analysed in order to find indications, and to develop inductively theories and hypotheses that might explain the behaviours that have been observed. This is in contrast to statistical research through a deductive 'scientific method' which starts with a theoretical framework, or a number of hypotheses, and then tests these through the collection of data by observation or experimentation. The two approaches are complementary rather than in conflict since theories, hypotheses and explanations which have been developed inductively through grounded theory and similar inductive methods can then provide the basis for subsequent deductive research to test and refine them.

This means that as a method Grounded Theory is positioned between two more frequently adopted and more familiar research methods: on the one hand, deductive research based on large samples of observations from which statistically valid conclusions can be drawn and then generalised to larger populations; and on the other, in-depth case studies of the experiences of a specific company to develop a sufficient understanding of its business and the people involved so that its practices can be put into context. The former method was not considered to be appropriate for this project in the absence of any existing background theory on sustainability accounting practice; and although a Grounded Theory approach might not have the potential to provide the same insights as case studies, the questions and hypotheses that its results suggest are less likely to be unique to only a single company. In essence, it attempts to 'reach a theory or conceptual understanding through a step-wise, inductive process' (Banning 1995, p57). This means that findings derived from this process are only indicative, at least initially, and need further testing before they can be considered as definitive.

2.3 Companies and interviewees

A number of companies were approached and invited to participate in the project. Since the aim was not to develop a representative picture of practice generally but to identify emerging practices and trends, we approached companies which could be expected to be among the leaders in sustainability accounting in the expectation that they should be able to provide early examples of what may then develop into management practice more widely. Broadly, this meant companies with a positive reputation for their sustainability management, which would usually be reflected in their publication of a good sustainability or corporate responsibility report which might be presumed to indicate a strong sustainability accounting infrastructure within the company. We therefore approached several companies whose reports had been positively rated by assessment schemes such as the Association of Chartered Certified Accountants' Sustainability Reporting Awards and the Institute for Ecological Economy Research (in Germany), and companies whose reports had been rated highly for their conformance with the GRI reporting scheme, as well as companies which were already generally recognised as having a strong reputation for their sustainability management.

An initial discussion was held with the first point of contact in each company (this was usually the sustainability manager) to discuss its possible participation and provide a screening process to assess whether it was likely to be worth proceeding further. However several of the companies which were approached were not further considered further after the first early discussions when it became apparent that the purpose of their sustainability information was for external reporting rather than for internal management purposes, as the focus of this study is specifically how sustainability information is managed to support companies in their management.

Eventually, eight leading companies in each of the UK and Germany were chosen (see Appendix I). These included companies from across different sectors of the economy, from multinationals to charities and public sector organisations, and with varying motivations for their interest in sustainability management. The UK and Germany were chosen as two leading industrial economies in which accounting is well established in business management (albeit in quite distinct ways – see Ahrens & Chapman 2000), and where sustainability is already a major issue in public policy and business.

Following background research, between two and five interviews were conducted in each company. The objective was to identify and understand the company's sustainability information management practices so we aimed to identify those persons who were managing or using sustainability-related information at a number of different points along the information chain, from initial data capture through to the eventual reporting of the final information to those who required it or who were expected to use it to support them in their work. The first interview was typically with the initial contact in each company, usually its sustainability manager, who identified what he/she perceived to be the key issues in that company. From that point, information flows were traced in both directions, upstream and downstream, and further appropriate interviewees were identified (see Appendix II).

2.4 Interviews

Each interview followed a semi-structured format, based on a common agenda to ensure that all the main issues were considered and that the results would be in a consistent format to allow for comparisons while still allowing flexibility (Barriball & While 1994). Interviews are particularly useful for getting the story behind a participant's experiences since the interviewer can interactively pursue in-depth information around the topic (McNamara 1999) and therefore develop an understanding of the meaning of what is said by interviewees (Kvale 1996). They are therefore particularly suitable for exploring new topics whose scope is not fully known prior to the interview, particularly in a project with a diverse range of companies and interviewees.

An agenda was developed (see Appendix III) with a framework of themes to be explored. This provided a core structure for the interviews which could be adapted as appropriate for the particular discussion and interviewee, while still maintaining some degree of comparability between companies. The main topics covered were the management and the use respectively of sustainability information. Regarding the former, the research aimed to identify the existence of the various aspects described in Section 1.5, and used the EMA framework (Burritt et al. 2002)

described in Section 1.6 to explore the properties of the sustainability information that was generated in each company. It also looked at how far sustainability information management had become part of conventional accounting in each company and whether there could be any barriers impeding this.

Questions on the use of sustainability information aimed to reveal how this was being used and the resulting benefits for both the individual respondents and the company as a whole, and what changes in behaviour and improvements in performance had resulted.

Interviewees were asked what aspects of social and environmental performance were considered relevant by their company and how these were dealt with, based initially on the structure of the GRI's Sustainability Reporting Guidelines (GRI 2007). This covers 34 distinct aspects of sustainability, grouped into 6 categories, which for this project were condensed into 14 groups in order to simplify the interviews. These are: materials usage, energy consumption, water consumption, waste management, water/soil/atmospheric emissions, greenhouse gas emissions, landscape and biodiversity degradation, environmental impact of products and services, legal compliance, workforce, health and safety, human rights, social performance, and product responsibility.

Interviews were not recorded since this might have inhibited open discussion, but detailed notes were taken and written up immediately afterwards. These then provided the main tangible output from the research process and the basis for analysis.

2.5 Data analysis

In exploratory research, a "researcher does not begin a project with a preconceived theory in mind ... [but] ... with an area of study and allows the theory to emerge from the data" (Strauss & Corbin 1990, 7). To achieve this, the outputs from the interviews were repeatedly analysed to identify where interviewees had made references to a number of aspects of interest. These were determined partly from prior expectations of what was likely to be of interest, which could then be extended with further points that the process of analysis has itself suggested. The former were defined in terms of the different stages of the generation and use of information, and the various individuals within the company who were likely to be involved:

- who is involved in the process of sustainability accounting;
- what information is collected and how it is used; and
- how the process is organised and how responsibilities are shared.

2.6 Theoretical framing

Unlike much sustainability accounting literature to date which includes a substantial normative element, this project takes a pragmatic exploratory approach which aims to understand better why certain practices are carried out rather than to attempt to argue a case for what could or should be done.

As explained above in Section 2.2, the project followed a grounded theory approach in its overall design, and the process of data collection through the interviews was therefore designed to be open rather than based on any specific theoretical approach. However, when we subsequently analysed the results generated from these interviews against each of the questions defined in Section 2.5, we used a number of well-established theoretical frameworks in analysing the findings in order to help to interpret them and relate them to the context of existing understanding. These theoretical frameworks were:

- information economics
- agency relationships
- legitimacy
- contingency
- transaction costs.

Each of these theoretical frameworks is briefly summarised and explained below, focusing on how they relate to the subject of this research.

2.6.1 Information economics

Information economics (Theil 1967; Birchler & Bütler 2007) is a branch of microeconomic theory that focuses on the effects of information on both corporate economic decisions and the economy as a whole, and argues that its value is defined by information-holders' ability to make choices that yield greater benefits than if this information had not been available.

It recognises that information is fundamentally different in kind from other economic goods whose value is primarily determined by their scarcity (Arrow 1996). Information by contrast is 'non-rivalrous' since its use does not thereby cause others to be deprived of it (ie, consuming information does not mean that someone else cannot also consume it), and has almost zero marginal cost once it has been initially created. The quality of information is also often difficult to assess which can reduce potential users' confidence in its usefulness and therefore its value, although processes such as audit and assurance can help to address this.

Information economics theory is potentially relevant to sustainability accounting since sustainability information is more comprehensive and diverse than conventional financial information (Schaltegger & Burritt 2000), so its users are likely to be more sceptical of its value. In consequence, new assurance approaches conducted by specialists trained in environmental and social information issues may be needed.

2.6.2 Agency theory

Agency theory (Ross 1973; Jensen & Meckling 1976; Eisenhardt 1989) deals with the frequent situation when one person (the agent) acts on behalf of another person (the principal), for example between managers and their subordinates, between shareholders and management, and between management and the wider public (Friedman 1970). It points out that in these situations the usual assumption of rational self-interest implies a potential problem of moral hazard (Holmstrom 1979) since the agent may be motivated to take actions that are not in the principal's best interest; and that this can easily occur if the agent is privy to information which is not equally available to the principal (information asymmetry). Agency theory is therefore closely related to information economics since both are concerned with information asymmetries between a principal and an agent.

Agency theory is concerned with identifying such problems and minimising information asymmetries while also minimising 'friction', ie, incurring the lowest possible cost for the involved parties (Hill & Jones 1992). One response might be to design incentive systems which ensure that principals' and agents' interests are aligned. Another is to address information asymmetry by ensuring that both sides are so far as possible equally well provided with adequate relevant and reliable information. Much of the function of accounting, in both an internal and an external context, is so far as possible to reduce information asymmetries and thus minimise problems in principal-agent relationships.

Stakeholder-agency theory (Hills & Jones 1992) extends agency theory by putting this into the context of a wider range of stakeholders than only those with a direct contractual or fiduciary relationship (such as trading partners and shareholders). In the context of sustainability accounting, it would recognise a responsibility by management to provide information which serves the interests of a number of different stakeholder groups. This may therefore represent one of the main responsibilities of a company's sustainability manager who would then be in the position of an agent (Schaltegger & Wagner 2006). Furthermore, senior management may also be faced with internal information asymmetries within the company so that sustainability accounting systems need to be established to address them.

The sustainability department may be in a somewhat invidious position within its organisation, even if the company's motive for establishing it in the first place was for business rather than purely altruistic reasons (the legitimacy of directors spending corporate funds on any purposes which cannot be argued to be in shareholders' interests, at least in the long run, is considered dubious under English law, see eg, Davies 2005; Macve & Chen 2010; Mio & Venturelli 2012). If the sustainability department is mainly focused on issues and objectives that are not directly related to the success of the business in conventional financial terms, there is a risk that it may be perceived by other functions as either a "charity organisation" within the company (Friedman 1970; Galaskiewicz 1991), or as a "police organisation" whose purpose is to check internal compliance with social and environmental requirements. In either case, it may be perceived as fulfilling little more than a hygiene function which might be worthy and necessary but is separate from the rest of the organisation and is not directly economic value-adding. This may lead to conflicts with other functions whose own objectives are defined in financial terms, which could present a barrier towards developing information flows that integrate the physical indicators

which are likely to be needed by the sustainability department with the monetary and other indicators used elsewhere in the organisation.

Interpreting empirical findings in the light of agency relationships (Waddock & Graves 1997) can therefore explain why socially and environmentally positive actions may not necessarily be taken in practice even if they offer benefits in conventional business terms. Sustainability accounting therefore needs not only to measure social or environmental performance but also its economic impacts, and existing accounting practices have to be re-thought in order to serve economic, social and environmental objectives simultaneously (Schaltegger & Burritt 2010) and to link different departments and information bases.

2.6.3 Legitimacy and stakeholder theory

Legitimacy theory starts with the premise that businesses are bound by an informal social contract or 'licence to operate', in which a company's continued existence is dependent on the approval of various societal stakeholders and acceptance by the society of which it is a part that the company's continued existence is in fact desirable. As Kaplan and Ruland argued (1991, p370), 'Underlying organisational legitimacy is a process, legitimation, by which an organisation seeks approval (or avoidance of sanction) from groups in society'.

Legitimacy theory is closely related to stakeholder theory, which throws light on the complex relationships both between actors within the same organisation, and between the organisation and its social environment (Freeman 1984; Donaldson & Preston 1995; Suchman 1995). Stakeholder analyses have been widely applied to explaining sustainability-related phenomena (Lankoski 2008). Legitimacy has been identified as important in securing stakeholder support for a company (Dimaggio & Powell 1983). Suchman (1995, 57) defines legitimacy as 'a generalised perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions'.

Given this dependence by a company on its stakeholders, its management will be motivated to legitimise its actions (Rawls 1999; Deegan 2002). Information on social and environmental performance can be crucial in this, particularly if it is perceived as relevant and reliable (Guthrie & Parker 1989; Campbell et al. 2003, 559; Tilling 2006). This indicates possible reasons for, and aims of, establishing sustainability accounting in a company.

Although the relevance of legitimacy is most obvious in an external context referring to the relationships between the company and its external stakeholders, it is also relevant internally within an organisation in legitimising managers' activities and projects, particularly in justifying the positions of junior and middle managers to their seniors.

2.6.4 Contingencies influencing sustainability accounting

Contingency theory postulates that there is no single best way to organise or lead a company, or to make decisions; instead, the optimal course of action is contingent (dependent) upon the particular circumstances in each case and upon relevant factors such as the company's environment, technologies, and culture (Otley 1980). This implies that it is also unlikely that there will be a single best approach to sustainability accounting that is equally optimal for every company, but that the approach which is taken in each case will depend on the specific situation.

Contingency theory is well established in accounting and has been applied to explain various accounting phenomena and suggest ways of dealing with them (eg, Caplan 1966; Gordon & Miller 1976; Waterhouse & Tiessen 1978; Hayes 1977). Waterhouse & Tiessen (1978) for instance investigated the contingency factors on which the structure of an organisation depends. More recent research (eg, Reid & Smith 2000) has broken down previously identified aspects to more isolated subjects of analysis, thus examining eg, the introduction of management accounting systems against the timing of contingent events such as cash flow crises.

2.6.5 Transaction cost theory

A transaction cost is one which is incurred in preparing, negotiating or securing a transaction or an economic exchange (Williamson 1981). 'Transaction costs' in this context do not include the direct costs incurred such as the purchase price of the product or service which is acquired, but the costs of setting up and then executing the transaction such as search, information generation, bargaining and negotiating, and policing and enforcement. Its most well-known application is in explaining why in some cases it may be in a company's best interest to manage a certain function within its organisation, whereas in other cases it may be more efficient (ie, lower transaction costs in total) to do this through a market transaction with another party, such as by outsourcing.

Transaction cost theory was developed by Williamson (1981, 1985) who built on earlier work by Coase (1972), and has frequently been applied to accounting (eg, Macher & Richman 2008).

Because of the relative novelty of sustainability management and accounting, there is limited experience of dealing with sustainability information in companies. It can therefore be expected that such a complex and multi-dimensional topic could incur high transaction costs in identifying, collecting, analysing and communicating information. Second-order transaction costs could also be incurred in establishing sustainability accounting systems. The existence of transaction costs like these would provide an incentive to search for more cost-efficient ways of creating social and environmental information, and might explain the motive to improve sustainability accounting and why certain methods prevail while others decline into disuse.

3. EMPIRICAL RESULTS: THE PRACTICE OF CORPORATE SUSTAINABILITY ACCOUNTING

3.1 Introduction

This section presents the results of the exploratory research on sustainability accounting practices in eight leading companies in each of the UK and Germany. As explained in Section 1.7, the questions are structured as follows:

- **Who within the company is involved** with the process of sustainability accounting (Section 3.2)? This covers all stages of the generation and reporting of information, from the original decisions on what information is needed, physical collection of the initial data and its processing, and its final reporting and use. This can be either a single individual such as the company's sustainability manager, a group of people such as the sustainability department as a whole, or another department such as accounting or quality management.
- **What kind of sustainability information** is generated (Section 3.3)? The type of information that is generated can be expected to vary between different companies, depending on both each company's own priorities in its sustainability management and its existing information systems. This includes the issue of how far linkages are made between information on the different aspects of sustainability (environmental, social and economic). This part of the analysis is based upon the 14 groups of sustainability aspects which were defined for this project and described in Section 2.4.
- **Why** is the sustainability information generated (Section 3.4)? The types of information that are generated in each company will depend largely on the purposes to which it is planned to be put in order best to support that company's goals. These can vary substantially between companies, ranging from internal optimisation goals such as increasing energy efficiency to externally driven goals such as reacting to media inquiries. This section analyses both the purpose of collecting and using such information, and the reasons that prompted it.
- **Who uses** sustainability information (Section 3.5)? This question aims to identify the recipients of the information generated in each company. These could be either the final recipients who would use the information to support a business decision or judgment in the course of their work, or intermediate recipients who then pass this information on to others, perhaps after first further processing or combining it with other data. This question also considered whether the actual use that was being made by information users was consistent with what had been anticipated by those providing the information.
- **How** are data collection and information creation **organised** (Section 3.6)? This section looks at the internal organisation of the process within each company and the respective roles of the various parties involved: for example, the extent of centralisation (or decentralisation) of the information system, and the regularity with which sustainability information is generated.
- **What** sustainability management accounting **methods** are applied (Section 3.7)? This question asks how far the various methods defined in the environmental management accounting framework introduced in Section 1.6 were found to be actually applied in practice.

Each of these sections first presents the results obtained from the research, and then goes on to analyse them from a managerial perspective and to relate them to the theoretical framework presented in Section 2.6.

3.2 Who is involved in sustainability accounting?

The question 'who is involved' covers those involved at all stages in the process; in sequence:

- those making the original decisions on broadly what information is needed as an eventual output;
- those then specifying in more detail what this should represent in terms of specific information items;

- those collecting the information within the organisation, on either a regular or an ad hoc basis;
- those who are then providing or presenting the final output of this process to others.

Issues of particular interest in analysing the results included:

- Which individuals and functions were primarily involved?
- How similar or diverse was practice between different companies?
- Whether any apparent reasons that might suggest possible contingency factors could be identified to explain any differences between companies.

Table 2 summarises the initial analysis of the results of the interviews. The columns represent the various stages of information generation as defined above, and the rows represent the different functions involved (some columns add to more than 16 since in some companies there were several responsible persons). As well as the sustainability manager, these included operational managers in functions such as production and distribution which were responsible for the business activities which generated or were particularly susceptible to sustainability impacts, and accounting specialists. This latter group was defined as not only those directly located in the company's formal accounting function, but also those in operational and other functions whose job content was mainly comprised of accounting activities such as the collection, collation, analysis and reporting of data and information. The absence of senior management in the first column, although possibly counter-intuitive, is consistent with a perception that its concern is with more with overarching activities rather than the details. It does not necessarily suggest that senior management is not engaged, but that it is up to the first two groups to identify what aspects are important to achieving targets which have been defined by senior management. The responsibility of senior management is then to ensure that the targets have been met rather than to decide which indicators would best reflect this.

Table 2: Actors involved in sustainability information generation and provision

	Who decides what aspects are covered?	Who defines what information items to generate?	Who collects the data?	Who provides the final output to others?	Who uses the information?
Sustainability managers	11	12	6	1	12
Operational managers	9	6	2	8	7
Accounting specialists	2	2	-	5	-
Senior management	-	-	-	-	5
Others	3	3	10	2	3

Table 2 shows that a wide variety of different individuals and functions can be involved in a company's sustainability accounting, and it was apparent from the interviews that this variety reflected differences both between different companies and also within individual companies. One frequent example of the former was the generation of social performance indicators such as of the effects of corporate responsibility programmes on employee motivation, which in some companies were generated by the human resources function, in others by the sustainability department.

There were also frequent indications of some apparent duplication of effort within a single company with the same information being collected separately by more than one function, one frequent example being information on carbon emissions (see Example 1). However, there could be good reasons for this apparent duplication, and in some cases even positive benefits. In one company this information had for some time been collected by the legal department for legal and regulatory purposes, and the sustainability department had then also become involved. However, on investigation it transpired that whereas the legal department aimed to collect only the minimum required by law, the sustainability department by contrast was extending this by carrying out a more comprehensive collection, including some impacts along the supply chain.

In other cases the involvement of the sustainability department meant that the information collection being done by other departments was supplemented rather than duplicated, where this suggested ways in which improvements in performance could be made which had not previously been apparent. In some cases it appeared that the apparent duplication of effort in fact reflected some internal competition between departments to make visible contributions to the company's performance (see Example 1).

Example 1: Differences in the collection of information on energy consumption

Energy consumption was one area in which frequent examples were observed both of differences between companies in dealing with a specific area of information, and also of some apparent duplication within a single company. In some companies this was measured by the accounting function as being routinely responsible for recording and processing suppliers' invoices, whereas in other companies it could be a different function such as facility management or production management. In several cases it was the sustainability department itself that collected such information.

Conversely, differences were observable in the collection of information within a single company. In one company data on electricity consumption was collected by the accounting department as part of the process of financial control in settling suppliers' invoices, while at the same time the facility manager was simultaneously collecting the same information based on meter-readings in order to control and improve the efficiency of his/her facility. In addition, the sustainability department was also making its own estimates of actual consumption in order to identify any potential opportunities to improve sustainability performance by reducing CO₂ emissions and electricity consumption.

One frequent pattern was of senior managers delegating to the sustainability department the responsibility of specifying, identifying and deciding exactly what information should be collected, with the sustainability department then discussing the exact format of the information with the appropriate operational managers and accounting specialists and requesting the necessary data from them. Since this usually did not already exist in established formal accounting and other information systems, in practice the process of collecting and then collating this data was then usually carried out by the sustainability department itself who would finally report the resulting information to senior management.

3.2.1 Who decides which aspects of sustainability performance information should be covered?

Table 2 shows that the main parties deciding on the information that is needed are sustainability managers and operational managers respectively. Initially this seemed surprising since some items of sustainability information such as the usage and wastage of raw materials and consumables, and occupational health and safety, can be diverse and are important for several different reasons (eg, legal compliance, productivity performance and financial performance), and therefore might be expected to be of interest to several different departments. However, on investigation it transpired that although this information was frequently already being generated elsewhere in the organisation, it often had to be supplemented with additional information, or the quality of the existing information improved (see Example 2), and this responsibility was usually taken on by the sustainability managers.

Example 2: Extending the range and scope of previously collected information

An interesting example of the involvement of the sustainability department in day-to-day information management activities was observed in one manufacturing company. In this case, the sustainability managers were interested in the physical information behind the manufacturing process. As this was not available in sufficient quality for their needs, the sustainability manager required more detailed information to be collected. Once this had been done and the information was made available to the production manager too, he realised that it would also be useful in identifying and avoiding production inefficiencies on a daily basis.

The same production manager was also presented with sustainability information which identified a link between the quality and the price of a major input material. The conclusion drawn from this was counter-intuitive as it revealed that more expensive input materials were actually used more efficiently so that production was actually less costly with the higher quality input material, as well as the final product being of a higher overall quality.

It is not surprising that sustainability managers are heavily involved in deciding on the information to be generated, since their departments are still a relatively new function which in many companies has been 'added on' to the existing organisation and are still to be fully integrated, so that the necessary information frequently has to be generated on an ad hoc basis. However, several sustainability managers' accounts of their experiences suggested that a more systematic approach would have benefits for the company. Several experiences were recounted in which sustainability managers had been able to make positive suggestions on projects being carried out by colleagues which they had learned about only by happenstance. In some cases it had become apparent only too late that an opportunity to improve the design or execution of a project had been missed (for example, in the building of a new facility or refurbishment of an existing one), as they had not been aware of plans in sufficient time to be able to use the information available to them to suggest possible improvements that would be reflected in subsequent performance. However since evaluating past performance on the other hand does not depend on timely action, it can be done at almost any time.

3.2.2 Who defines the specific information to be collected?

A decision on the aspects of performance for which information is to be generated needs to be followed up by the specification of the particular information item, such as the design of an appropriate performance indicator. Table 2 shows that the party which was usually found to be responsible for this was the sustainability department. This is probably unsurprising since development of sustainability management is still relatively recent, so some self-reliance is needed of sustainability managers in developing new practices including new streams of information. However, it does prompt the question of whether a more cooperative process, with managers in other functions also being involved in this stage, might increase the potential benefit to other functions too.

3.2.3 Who collects sustainability information?

When the information item to be generated has been defined, responsibility needs to be allocated for collecting the required data, either routinely or on an ad hoc basis as and when needed. This was found to be handled in a number of different ways, each with its own advantages and disadvantages, with most companies adopting a combination (Example 3).

In some cases it was found that the information that had been identified as necessary for sustainability management was already being generated elsewhere in the organisation for other purposes. One example was information on staff satisfaction which was often already available in the human resources function. This could then be used by the sustainability manager as well to relate it to the involvement of staff in corporate citizenship projects to measure the additional benefit that these generated.

In other cases those individuals or departments who were already responsible for collecting and providing other information were also charged with the task of collecting the additional information had been decided to be needed for sustainability management, where this related to their responsibilities. For instance in one company the car fleet manager was required to provide information on car accidents, which the sustainability manager then analysed to try to identify the likely causative factors in order to reduce their incidence. This approach had the benefit that it involved in the process a number of different departments, each with its own skills and knowledge, which could make suggestions on the design of performance indicators (see Example 3). It also meant that since those providing the data were familiar with the relevant processes, they could apply their own 'reality checks' to the data that they were sending and help assure its quality, and suggest possible reasons if the reported level of a particular item seemed unusually high or low.

Example 3: Identification of performance indicators

In many of the companies which were interviewed, the present sustainability department had developed out of an initial environmental team which had often been originally set up with the objective of securing legal compliance or reducing production costs. Although in the early stages of a company's sustainability management a single person might be able to cope with the required information management (eg, to comply with a limited number of regulations requiring compliance), a growing understanding of managing the interrelatedness of sustainability issues meant that large amounts of information needed to be identified, collected, analysed, communicated and used. This in turn requires the involvement of a large number of departments and their experts in the collection and provision of sustainability-related information.

In other cases, in the absence of anyone else the responsibility of collecting the information remained with the sustainability department. In some companies this function had developed from the initial formation, when they had first become concerned for their sustainability management, of small focused teams to collect the data and generate the information. In some cases they found that this provided an opportunity to generate sustainability-related information which was relevant for other functions too (see Example 4). On several occasions this was for pragmatic reasons of efficiencies in information generation, particularly where those other functions did not have sufficient spare capacity to do this themselves. In other cases it was only the sustainability department which was in a position to carry out certain tasks, such as linking information on the activities of a number of other departments.

However, in those companies where sustainability management was more long-established and had become more developed, the growth in the sheer volume of information that is required to be identified, collected and analysed was found to be overloading this sustainability function. In these cases the task of collecting sustainability information had usually evolved into a responsibility which is shared between the sustainability department and other functions such as human resources or facility management.

Example 4: Growing need for competencies and involving more actors

In one company the responsibility for identifying performance indicators (PIs) to measure social performance was assigned to the sustainability department. This task had originally been done by the company's public relations function, which had defined the most appropriate indicator for measuring the performance of social projects in schools and local communities to be the absolute number of people and families who had been helped. However, after generating and using this indicator for a year, it was concluded that this was inappropriate as it did not provide adequate support for performance evaluation and decision making so that other indicators had then to be developed. This was done by the sustainability department. The new PIs adopted a new approach which was to measure performance by splitting each project into a series of 'milestones' of progress, and for each such milestone then comparing actual achievement against what had been projected at the outset.

3.2.4 Who provides the final output to others?

Table 2 shows that in nearly every company, the sustainability manager has little or no role in providing or presenting the information to others (eg, senior management, investors, etc), which was usually done by operational managers or accounting specialists. Considering that sustainability managers are heavily involved in the collection and use of sustainability information, this could be interpreted as implying some degree of isolation of sustainability activities and information from day-to-day business activities if, despite the potential contribution that many sustainability managers might be able to make to improving corporate performance, they are either unable to communicate this information in an appealing way to other managers or those other managers are unable to make use of it and therefore disregard it.

3.2.5 Theoretical relevance of the observed results

The observed results reported above can be interpreted from a number of theoretical perspectives, as described in Section 2.6. An agency perspective suggests that junior management (the data providers in this case) serve as agents to provide information to the sustainability department, who in turn are agents of senior management, and that there can be two types of information asymmetries: firstly between senior management and lower management, and secondly between different departments. Whereas the first might be predictable, the latter may be less expected. This suggests that one role of the sustainability department is to reduce both of these types of information asymmetries.

From a transaction cost perspective, engaging existing providers of information to provide information to other departments is likely to reduce the total costs of providing information (since it is already available), supporting its analysis (since the relevant departments are familiar with its structure and peculiarities), and communicating it. Although involving a number of different actors increases the transaction costs of interaction, on the other hand sustainability accounting that involves various actors, each with their own specific expertise, is likely to reduce the transaction cost of collecting information and the risk of misinterpretation and low information quality, so that an interdisciplinary and interdepartmental approach to sustainability accounting may in fact reduce the total transaction costs.

3.3 What sustainability information is collected?

3.3.1 What are the objectives of collecting sustainability information?

A broad spectrum of different kinds of sustainability information was apparent across the companies in the study, but with a clear tendency towards physical rather than monetary information. This suggests that in the terms of the sustainability triangle (Figure 1, Section 1.5), the main emphasis is usually on environmental goals and eco-effectiveness, which could be explained by the core goal of environmental and sustainability departments being to reduce negative environmental impacts.

Much of the information which is collected however is then passed on to other managers and departments for their own purposes. These often include attempting to relate this large and newly collected set of physical data to a few monetary key indicators which already exist in the company, to identify linkages between social and economic performance, and between environmental and economic performance. Further analysis of the information flows shows that the main final focus of corporate sustainability accounting appears to be on eco-efficiency and socio-efficiency ((3) and (4) in Figure 1). Although there were several examples of corporate attempts to improve environmental and social performance in absolute terms, the physical information was usually compared against the effort which would be required to reduce the impacts, indicating that efficiency is a core issue in communicating with middle and operational management. One reason may be a need (or perceived need) to legitimise the collection and use of physical information in terms of the company's economic goals, and frequently also to satisfy senior management's requirement that calculations of cost-effectiveness and impacts on profitability be carried out for all activities including those which are sustainability-related to support the setting of targets and the monitoring of performance (Example 5).

Example 5: A systematic approach to managing sustainability information

One example was a company which was aiming to improve its carbon efficiency (this is often one of a sustainability department's main targets). This can be achieved through a number of different measures and activities, but the usual stipulation is that they must not impede the company's operations. These measures included:

- Reducing the fuel consumption of the car fleet through more advanced technology, offering driver training, optimising collection routes, etc.
- Reducing buildings' energy consumption by using waste incineration to generate energy, improving insulation, and altering buildings to take advantage of natural sources of heat and light.
- Producing heat and electric energy from non-fossil and therefore carbon-neutral sources such as wind energy.

Whereas some of these measures (eg, driver training) can be applied at almost any time, other measures require some prior planning. Improving the thermal insulation of buildings for example may be beneficial but usually involves some disruption to normal business activities if it means that the building cannot be occupied while the improvements are being carried out because of noise or dust, unless this can be done during a break in operations for other reasons (eg, to install a new machine). However, because of failures in flows of the relevant information, this is often not possible so that it can be difficult to coordinate sustainability-related activities with conventional business. In this particular instance, the sustainability manager had in fact learned that a planned break was about to take place but had been unable to include actions to reduce carbon emissions within this period since this would have required a detailed business plan to assess what measures were possible, how much they would cost, what their payback period would be, etc. This would have required information on past performance (on the energy consumption of the building, how much the changes would cost, etc.), but this was not already on hand and could not be collected within the time available. A more systematic approach to managing sustainability information might make it possible for opportunities such as these to be realised more frequently, and be helpful in developing business cases to support potential improvements.

Interviewees reported that accounting information which is related to social and/or environmental effectiveness was needed mainly for reporting purposes, either for publication in a sustainability report or to fulfil requirements made by business partners. There were also several instances where sustainability information was used to support more complex and sophisticated analyses such as life-cycle assessment (see Section 1.6).

3.3.2 The relevance of reporting guidelines

As expected of a set of companies which had deliberately been selected as likely to be in the lead in sustainability accounting, all were either already publishing externally an annual sustainability report (and in several cases had been doing so for many years) or were currently planning to do so in the imminent future. It might therefore have been expected that the type of information that was being generated within the company might be largely influenced by this, and by external reporting guidelines such as those published by the GRI (see Section 2.4).

However, most companies in fact reported that this currently had little influence on their sustainability accounting practice, which was instead mainly driven by what was needed for internal management. An explanation for this might be that precisely because these companies are likely to be at a more advanced stage of sustainability management than most, they have therefore developed beyond the stage at which the main purpose is to support external accountability rather than internal management; and that although external reporting guidelines might have provided a necessary support for deciding what information to aim to generate in the early stages, these were no longer needed as the companies were now able to define their own relevant performance indicators to suit their own specific needs.

3.3.3 Spectrum of information

The results from the interviews were analysed to identify the balance of information between the environmental and social aspects of sustainability, and the typical breadth of the spectrum of what was being measured and monitored in each company based on the 14 types of information defined in Section 2.4. We found a wide range of practice for both of these aspects, with few common patterns being apparent.

When asked about the balance between environmental and social aspects, most reported that they were covering at least some issues under each of these headings, although five companies reported that information was collected on only environmental issues (none reported the converse, ie, only social issues). This did not necessarily mean that social performance was not of concern, but that the companies considered that since most aspects of social performance tend to be more intangible and difficult to define than for environmental performance it was therefore less useful to attempt to define social performance indicators, so that some issues were not tackled quantitatively at all.

In some cases quantitative indicators were in fact developed to reflect some of these more intangible aspects, but the difficulty of defining them (and often also of defining the issue and what represents good performance) meant that there tended to be less consensus on the most appropriate way to do so, and a wider variety of different indicators. For example, whereas the indicators which were developed to reflect a more tangible issue such as the amount of carbon emissions or kWh of electricity consumed tended to be common across all companies, a less tangible issue such as employee satisfaction was reported to be measured in a variety of different ways. Examples of these included employee satisfaction as captured through surveys, the number of days lost due to health problems, or the number of days spent on employee volunteering projects.

Although the results of the project do not indicate any significant national variations between the UK and Germany, there was at least a weak suggestion of a possible difference in regard to priorities. This is consistent with some past research (see McSweeney 2002; Hofstede 1984). The results suggested a rather stronger inclination by German companies towards measurable, engineering-related themes (such as production optimisation and energy efficiency), in contrast to a slightly stronger focus by UK companies on softer aspects such as employee satisfaction. The difference is however only marginal.

There was also little indication of any more deep-seated institutional differences between the UK and Germany in how accounting and financial management within organisations is carried out, and the position and prior qualifications and experience of those carrying it out, such as those identified by Ahrens and Chapman (2000). This may have reflected the research design which focused largely on the processes of generating the information, the bulk of which is in practice still located within specialist sustainability functions. Although there were differences in job titles between those we interviewed, our results did not suggest any systemic differences which could be generalised.

We also distinguished between information which focuses primarily on a company's impacts on the environment and on society, as distinct from that which conversely focuses on the impacts of the environment and on society on corporate performance (Schaltegger & Burritt 2000).

Although the latter might have been expected to dominate the former, in practice this was not found as one of the main influences on companies was increasing stakeholder pressures and the consequent need to increase public awareness of their social and environmental performance. This had the effect of both making it necessary for companies to generate information on their impacts on the environment and society for reasons of accountability and legitimacy, and also of tending to increase over time the range of aspects which companies found it necessary to monitor.

However despite this variety of practice, it was notable that nearly all the companies (with only one single exception) identified one particular issue as relevant – carbon management. Even companies with non-energy intensive businesses recognised this as increasingly important in view of its current topicality in public and political discourse (and in the UK, also an issue of financial significance with the impending introduction at that time of the CRC Energy Efficiency Scheme), and were quantitatively measuring their carbon impacts. However there was little consistency between companies in the specific metrics that were used to measure this.

The motive for this was not entirely sustainability-related however, since most companies had already been monitoring their energy efficiency and looking for potential improvements for some time for reasons of conventional cost management and profit maximisation, with this being managed outside the sustainability department (and in most cases, before it had been established). However, it was apparent that the increasing importance of carbon management and therefore the additional interest by the sustainability function was resulting in an expansion in recent years of information collection, in particular through more detailed data such as the division of total energy costs between different fuel types and responsibility centres.

3.3.4 Types of decision situations

The information which the companies reported that they were generating was also analysed in terms of the four dimensions of the EMA framework (see Section 1.6), representing four distinct information properties:

- the type of information, specifically whether physical or monetary;
- the time frame of the information, specifically whether future-oriented or past-oriented;
- the time frame of the decision situation which the information was being used to support, specifically whether short term or long term; and
- how routinely the information was being generated, distinguishing between ad hoc and routinely generated.

Table 3 on the next page presents the results which were found:

Physical or monetary: Most companies generated both types of information, though there was a clear predominance of physical over monetary.

The need for monetary information was explained by its importance in communicating the effects of sustainability-related activities across the organisation, including to people with a financial background. Physical information however was invariably reported to be essential. This was not only to support external accountability, but also as the drivers of costs and therefore essential for understanding how monetary aspects can be influenced, and as the basis for estimating future monetary costs for environmental resources such as energy which can be forecast to increase disproportionately in price in future. However, some impacts such as water consumption are significant in environmental terms and could potentially become of interest to some stakeholders, but since the current monetary costs are usually negligible for most companies in both the UK and Germany, the need and opportunity to minimise them might not be apparent from an analysis of only those costs.

Time frame of the information (future-oriented or past-oriented): both future and past orientations were reported, though with a predominance on the latter. This might be explained by the need for compliance with regulations requiring companies to report on their actual recent past performance, whereas the main use of future-oriented information is likely to be exclusively for managerial purposes such as planning and decision making.

Time frame of the decision situation (short term or long term): defining the distinction between short term and long term was left up to interviewees since the length of the normal planning horizon varied between companies depending on the nature of their businesses. The understandings of what ‘short term’ meant in practice were found to vary over a range from one week to three months, whereas long term was considered to be any period over one year (in

some cases up to ten years). Unsurprisingly short-term uses dominated, though there was also clear evidence of the use of information to support long-term decisions such as on actions to meet national commitments on carbon emissions reductions, with target dates several years into the future.

Ad hoc or routinely generated: The fourth dimension is between information which is regularly generated from a routine process, and ad hoc information which is collected as needed for a specific need, possibly one which may never recur. Even in well-established areas of management which are well served by formal information systems, there can still often be a need for ad hoc information exercises for special situations which are not expected to recur and therefore do not justify the design and maintenance of a permanent system. It was anticipated that the need for ad hoc information to support sustainability management would be even greater than the norm since this is both more recent and still fast-developing.

The interviews confirmed this, with a balance between both ad hoc and routinely generated. The experiences reported suggested that this depended on how recently the company had identified what sustainability information was needed. However, interviewees also reported that for most of the information that they were collecting for which they could foresee a continuing relevance, they were deliberately working towards developing systems to generate this on a regular basis rather than having to depend on repeated ad hoc processes. This is a development which is consistent with experience in other management areas such as product design, which have only relatively recently become more recognised and formalised (Hertenstein & Platt 1998).

Table 3: Overview of the decision situation focuses which were found

Company	Monetary	Physical	Short term	Long term	Past	Future	Ad hoc	Routinely
A		X	X		X		X	X
B	X	X	X		X			X
C		X	X	X	X		X	
D		X	X		X		X	
E		X	X	X		X		X
F	X	X	X	X	X		X	X
G		X	X		X			X
H		X		X	X		X	
I	X	X		X		X	X	X
J	X	X	X	X	X	X	X	X
K		X	X		X			X
L		X	X	X	X	X	X	
M	X	X		X		X	X	X
N	X	X	X		X	X	X	X
O		X	X		X			X
P		X	X		X		X	X
Total	6	16	13	8	13	6	11	12

3.4 Why is sustainability information collected?

The next theme in the analysis was to inquire into the companies' motives in their sustainability accounting and what benefits had resulted.

There was evidence of each of the different types of motive that were described in Section 1.4 for companies to be interested in sustainability accounting. A particularly high level of companies had responded to the examples of other companies ('mimicry', a frequent mode of dissemination of innovations: Rikhardsson et al. 2005; Bennett et al. 2004) which was often found for topical issues such as carbon accounting and reporting. Several companies reported that although they had been unable to identify any immediate benefits that this might bring, they had been encouraged by the example of other companies as well as by the prospect of more demanding legislative requirements in future (especially in the UK), and had considered it prudent to set up their own systems, at least experimentally.

Other motives were also mentioned including stakeholder pressure from trading partners and others; as a means of identifying energy-efficiency and therefore cost-saving opportunities; and in order to generate decision-relevant information. This was also evident in the type of information collected which comprised indicators of results (such as the number of kilos of CO₂ per employee) more often than possible contributors to those results (such as the resources invested in order to improve CO₂ performance).

However, it appeared that the sustainability information which was generated was often discretionary rather than core to the needs of the companies, since when asked what benefits had been realised, only slightly more than half the respondents described it as having been essential with the remainder more modestly describing it as 'nice to have'. The reason was sometimes because when the results were reviewed, it was not always clear how they should be interpreted or compared against other companies. As one interviewee explained, when a certain (small) number of instances of child labour had been identified among the many firms in their international supply chain, on what basis could this be evaluated as either reassuring or concerning in the absence of any clear benchmarks against which to compare it? In some other companies however, issues such as human rights and legal compliance were not defined as part of the responsibilities of the sustainability manager, who therefore had to take it for granted that they were being dealt with properly by the functions directly involved such as procurement.

Even when direct cost savings had resulted from information that had been collected only for sustainability reasons and which otherwise would not have been available, most obviously in energy efficiency and waste minimisation, in operations that were already reasonably well-run the relative improvements that this could stimulate were usually modest in scale, at least in the short-term. However, this does still suggest that some further opportunities for improvements to realise economic benefits can be achieved through the additional information and the involvement of the sustainability department, and these may be more significant over a longer-term perspective.

Although interviewees were aware of the requirements for a Business Review (see Section 1.4), this had not been a significant influence on the information that was collected and used internally. This may in part be a result of the research design and its implications for both the types of companies which had been approached and the types of people within them who were interviewed. The companies were already among the leaders even before this legislation was introduced, and most interviewees were from the specialist sustainability functions described in Section 1.3. These functions had primary responsibility for data collection across their organisations and for the preparation of any voluntary corporate sustainability report; however the annual corporate financial reports were invariably seen as the property of the accounting function which would liaise with the sustainability function to obtain whatever information needed to be included in the Business Review.

Since these companies were already well established in their sustainability management this was rarely a problem, and there were no instances where interviewees reported that the requirement for disclosure in a Business Review had in itself prompted new information which would not otherwise have been generated. However it is recognised that this may be a result of the basis of selection of the sample, and that the Business Review requirements may have more effect on companies who are less advanced in their sustainability management and accounting and are therefore starting from a lower base.

Similarly, the effects of ISO 14001 certification were not reported to have had a significant role in shaping corporate sustainability accounting practice, and interviewees generally considered the collection of social and environmental information for certification purposes to be merely a hygiene factor rather than a strategic driver.

3.5 Who is sustainability information generated for?

Closely related to the reasons for generating sustainability-related information is the issue of who are its ultimate recipients within the company, ie, those who will use the information to support a decision or to help form a judgment that could potentially be decision-relevant. Table 4 summarises the results here.

Table 4: For whom sustainability information is generated

Primary addressee:	Sustainability manager	Senior management	Operational management	Others
	12	5	7	3

There is an interesting discrepancy between these results and those presented in Table 2 (Section 3.2) on who provides the final output to others. Table 2 showed that this was rarely the sustainability managers, whereas Table 4 shows that the ultimate recipients are often general managers. This could be because the sustainability managers were often using different channels than their colleagues were, since the latter were more likely to be doing this on a stand-alone basis (ie, using communication approaches other than conventional information management systems, such as emails). This may suggest that an opportunity for economies of scale in the process, and perhaps also synergies, is being missed.

Although it is not surprising that the sustainability department was identified as the major recipient of information, this raises the question of whether this could imply a lack of interest and involvement by other functions. However the fact that sustainability managers were not the sole recipients of the information could also indicate that the management of a company's sustainability performance is not the responsibility of the sustainability department alone but is also shared with other and more long-established departments such as production and sales. It could also indicate that a significant quantity of information which is both business-relevant and sustainability-related was being generated even before sustainability became topical, but is now being referred to as sustainability-related in external reporting for reputational reasons.

The sustainability department's information requirements frequently meant an expansion of the total set of information beyond what companies had previously been generating, not only internally but also to include a number of aspects outside the company's own boundaries. These included for example the company's engagement in local and regional development, the proximity of its facilities (and potential new facilities) to protected natural areas, and information on environmental and social impacts by trading partners along its supply chain.

Much of the practice which was reported can be understood in terms of a need for internal legitimacy (see 2.6.3), from two different perspectives. The first is the need for the sustainability management function to justify its own existence and its continued expansion in order to be allocated resources. The second is a need on the part of operational managers to provide retrospective evidence to senior management of the benefits of actions that have already been taken, to justify their legitimacy.

3.6 What is the process of sustainability accounting?

There was a similar diversity between companies in the ways in which the sustainability accounting process could be organised. The results of the interviews were analysed to identify current practice and any apparent emerging trends in four aspects:

- the extent to which the process is centralised around a single department and/or a single information system, as opposed to being spread across several departments and/or systems;
- the extent to which the information generation process is formalised;
- the number of different people who are involved;
- the extent to which the accounting function is involved.

3.6.1 Centralisation of the approach

A tendency towards centralisation was observed, with the usual department in the central position predictably being the sustainability department. Several companies also reported that they anticipated an increasing trend towards increased centralisation into the future on the basis of their assessment of the balance of its net benefits and costs.

Advantages and disadvantages were reported for both approaches. One advantage was that organising information around a single department or system simplifies the information flows, helps to ensure consistency of how data is captured and input, and increases transparency. This can also improve data integrity by taking advantage of centralised data assurance processes, and provide an opportunity to identify linkages between separate information items. A single system is also more efficient in resources as it avoids duplication of effort, not only in the original data capture and processing but also in subsequently assuring that these had been done correctly,

consistently and completely; and it means economies of scale in inputting and retrieving data. A further advantage was that it made it possible to gain quickly an overview of the information that is available at any time, and by whom it had been provided.

On the other hand, reliance on a single department or system could mean failing to benefit from specialist knowledge in a number of functions across the organisation. It could also be inflexible to change since dependence on a single system serving the needs of a wide range of users could mean that when changes to the system are considered, not only would their prior consent be needed but subsequently also a wide provision of post-implementation and support. For this reason companies which had adopted a centralised system reported that they also relied on other tools as well (such as Excel spreadsheets) to provide interim solutions between changes to the main system. Table 5 describes three of the most common approaches here. Although these are not necessarily inferior to mainstream or dedicated information management systems, many interviewees reported that they had moved on from such temporary solutions and that the benefits of doing this had outweighed the cost and effort.

Table 5: Alternatives to and additional means of managing sustainability information.

Information management tool	Description
Templates	Several companies reported that they used standard templates to collect data from different points across their organisation. Their main advantages were reported to be that they unified the data format across the organisation and made it easier to input the correct data. However, it could be difficult to assure the quality of information generated through templates, data input could be time-consuming, and they were of less value when the required data was relevant in only a few parts of the organisation.
Spreadsheets	Many companies used spreadsheets, both instead of and in support of dedicated information management solutions, and found their functions of collecting and aggregating data, and analysing and reporting the resulting information valuable. In several cases this was a deliberate choice of method which the companies intended to continue using, though in some cases spreadsheets were being used only to compensate for the limited capabilities of central information systems – for example in extracting information relating to a non-routine period, or for a specific part of the organisation.
Informal communication	All companies relied to differing extents on information obtained through informal communications such as email and telephone to supplement what was provided through the main systems, if only as temporary solutions, even though these were recognised to be less than ideal. However, several interviewees reported that procedures that had originally been introduced as only temporary measures had then survived and persisted for several years.

In practice, a frequent reason for the use of additional information management tools such as those described in Table 5 is that information may often be available from the main systems in only an aggregated form, and this lack of detail can conceal various important aspects (eg, Example 1 in Section 3.2). In one instance a company was purchasing similar quantities of two different raw materials at a similar price but with very different environmental impacts, and these were of interest to the sustainability department which wished to make an analysis. The accounting system could provide aggregated information on quantities and costs but not in the necessary granularity, so the sustainability department had to refer directly to the production manager and then to the original source data such as invoices.

This is not uncommon and indicates a gap in communications between information providers and users, where providers are often unaware of the importance of granularity and therefore report only what is requested, whereas users on the other hand are unaware that the information could be provided in this granularity and therefore do not request it. The effect is that the management of sustainability performance is carried out based on only a limited set of information.

3.6.2 Formalisation of the process

The next question was how far the sustainability accounting process in each company is formalised. At one extreme might be a process in which procedures are clearly defined in a written form and are included in the official responsibilities of identified people, with most information generation being done as a matter of routine. At the other extreme would be a system with no clearly defined responsibilities or targets, and information provided on a case-by-case basis by whoever is available and charged with this on each occasion. In this latter situation the sustainability department might find it necessary to appoint additional people to take care of this, or do it themselves.

In assessing the extent of formalisation in each company, we considered a number of aspects:

- whether responsibilities for information generation were included in job descriptions;
- how clearly and specifically these responsibilities were defined;
- whether specific information flows were formally defined, such as in flow-charts;
- whether the company had established a separate function to provide support to other departments (eg, on how to provide certain information, in what format, how to input it in the system, etc.) to other departments;
- how well aware those generating information were of the ultimate purpose and use of what they were generating; and
- clear targets and milestones for the provision of information.

The companies varied from the very formalised to those where there was little formalisation (the latter being more numerous), with most showing a mix of both approaches.

3.6.3 Number of people and functions involved

The extent to which sustainability accounting is centralised within a company (see 3.6.1) has a direct implication for the number of people and functions who are involved. One disadvantage of centralisation is that this imposes an increased responsibility on the sustainability department which may lack the specialist knowledge required to understand specific issues, and this could result in the omission of relevant information. Involving a large number of people on the other hand appeared to reduce the load on the sustainability department and meant that since its resources were no longer being consumed in generating information, it could now pay more attention to its analysis and to drawing conclusions, and on linking different information items to develop strategic insights.

3.6.4 Common challenges

A number of challenges were found to be common across several companies:

- **Aggregating information without losing informational value.** One company cited as an example conversation. This could be crucial for a facility operating in an area of water shortage, but when total water costs are reported only in aggregate across the business as a whole its importance is obscured and the potential for efficiency improvements is overlooked.
- **Obtaining granular data to a consistent definition,** especially for international companies with sites in several different countries. Several cases were reported where apparently anomalous results which had been reported to the centre by a facility were found on investigation to be due only to a change in measurement.
- **Balancing different social and environmental impacts,** when a particular project or activity affects a number of different aspects. One company for example had been considering a closed-loop system to recycle water in its production process. This would reduce water consumption, but it would also require a modest increase in electricity consumption to power the system. This would therefore require a decision on an appropriate level of trade-off, but there was no clear way in which this could be assessed.
- The difficulty of **evaluating the significance of sustainability information when relevant and reliable benchmarks are frequently unavailable.** This was felt strongly by those companies, and units within companies, which felt that their performance was under-recognised by 'vertical' trend comparisons over time precisely because they had already been operating at a high level of efficiency and therefore had already collected whatever 'low hanging fruits' were available, so that any further sustainability projects could yield only more modest marginal improvement.

- **Identifying where information is already available and accessible** to an acceptable level of reliability and on a timely basis from established systems, and then obtaining this as needed on either a regular or an ad hoc basis.
- **Integrating sustainability management with mainstream business activities**, for example to ensure that capital decisions on plant and equipment take into account environmental considerations as well as conventional accounting information, so that a wider range of options and scenarios can be considered.
- **Conflicting incentives** – a perception that although colleagues might express support for a company's sustainability activities and those responsible for managing them, this might not always be genuine if they were also concerned that bonuses or other compensation could be negatively impacted by sustainability performance. This was compounded by a more general feeling (especially though not only among sustainability managers) that although sustainability was recognised as of increasing importance it was still under-regarded compared to conventional business objectives, and this could mean that the resources available to set up new sustainability information systems were limited.

3.6.5 Involvement of the accounting function

Of all the parties in a company that might be involved with its sustainability accounting, we were particularly interested in how far its accounting functions had become involved in the various aspects of information management that were needed. This relates to the capture of data and generation of information for internal use, and is distinct from the selection of information such as performance indicators from an existing database for inclusion in published external reports (see Section 1.4). To analyse how they were contributing to sustainability accounting in each company, we applied a framework developed by CIMA (1981) which identifies seven discrete elements in the accounting process:

- identification;
- measurement;
- accumulation;
- analysis;
- preparation;
- interpretation; and
- communication.

Table 6 summarises the results. These are inevitably approximate and require some judgement, and the size of the sample and how it was selected preclude attempting to draw any firm conclusions, but several observations can be made.

Table 6: The involvement of accounting functions in sustainability accounting

Element	Identification	Measurement	Accumulation	Analysis	Preparation	Interpretation	Communication
Number of companies (out of 16)	5	6	13	8	8	7	8

The first element is to identify what information is available, or can be or needs to be made available, to develop performance indicators and support one-off decisions. There was some accounting involvement in this (though still only in a minority of companies, since this was usually the responsibility of sustainability managers), with examples including the design and development of performance indicators and the use of accounting experience in the design of systems to manage non-financial information. Respondents reported that accountants' expertise could be valuable, for example in helping to assess whether data was available in sufficient granularity for the purposes for which it was needed, or if not then whether it could be obtained from alternative sources.

There was also some accounting involvement in the measurement of information, particularly where direct measurement was not possible so that information had instead to be generated by calculation from other data (for example, calculating carbon emissions by applying conversion factors to primary data on energy consumption). As there can often be a number of different ways in which some data can be measured, accounting expertise was sometimes found particularly useful in providing solutions to challenges that could otherwise have overtaxed those responsible for collecting the information. For example, the measurement (by calculation) of a company's CO₂ emissions when it shares premises such as an office with other organisations requires that some judgmental decisions are made on what portion of the total is attributed to the company, and in situations when it is relevant an already established technique such as activity-based costing can offer a solution.

However, the element where accountants were most frequently reported to be involved was in the accumulation of data through information systems, in their role as 'gate keepers'. Accountants' experience of managing existing information flows and designing new ones helps to simplify the process of data collection (which several companies reported to be a challenge), and increase the efficiency of the system since the underlying data did not then need to be repeatedly collected or verified. Where information was being processed through an accounting system rather than through another information system, respondents reported that this could help both to improve control over the data and improve accessibility, and facilitate linking with other relevant information items.

The analysis of information helps to achieve:

- formal correctness, to ensure that the base data is valid;
- completeness, to ensure that the required information has been provided in full and on time;
- consistency, to ensure that data drawn from different sources is not in discrepancy; for example, carbon emissions data generated by the facility manager's calculation of energy consumption and the equivalent data generated from calculations based on the company's energy bills;
- content validity, to ensure that the indicator provides a fair representation of the attribute which it is designed to reflect.

In the preparation element of the process, information is generated from the data in the format which is needed. For example, a widely-spread international company, after accumulating data on legal compliance in different sites across its organisation, would then aggregate and analyse this to identify how it relates to events and activities. A typical accounting function's contribution to this process was the preparation of information to suit the different purposes and different needs to which it was to be applied.

There were also several instances of accountants' involvement in data interpretation, such as in helping to identify cause-and-effect links between improvements in energy consumption (for example) and the actions that had led to them such as investments in new equipment, or simply better housekeeping.

Finally, accountants were frequently involved in communicating the final information, which was reported to be helpful in dealing with both formal and content-related issues. The former refers to the array of different reporting tools such as annual reports and management reports, which serve different purposes and therefore need to be differentiated. Accountants' knowledge of the users who needed the information, and how different users' needs varied, was reported to be valuable here.

Overall, there was a significant involvement by accounting functions in their sustainability accounting, though this varied widely across companies with no single approach being followed uniformly. This might suggest that rather than attempting to follow any externally prescribed model of good practice or to mimic other companies which are perceived to be exemplars, the companies were instead trying to find solutions to their own specific problems by using the accounting resources at their disposal.

Although several benefits were reported from the involvement of the accountants and accounting function, there were also some doubts about whether these benefits were sufficient to compensate for accountants' relative unfamiliarity and lack of expertise with sustainability, at least for relatively simple applications. However, in more complex applications the accountants' expertise was reported to have been found increasingly valuable.

Although there was no single common approach across all companies, two patterns were apparent which might indicate possible contingency factors. Firstly, it was clear that the accounting functions of large companies were much more likely to be closely involved in their companies' sustainability accounting than in small and medium-sized companies.

Secondly, it appeared that those companies in which the accounting functions were more heavily involved tended to be those which were undertaking more ambitious projects, with increased demands on the information required and its analysis. These might be projects which sought to integrate social and environmental performance into core business activities, to measure the impact of social programmes on target groups, or to identify the links between a company's social performance and its performance in conventional business terms. By contrast, companies which were less ambitious in their sustainability activities had lower information requirements, which could be met without needing to widen the range of functions involved to include accounting.

Finally, two of the sixteen companies in particular (both from the UK) offer clear examples of how the positive involvement of a company's accounting function can transform how it manages its sustainability accounting and add value. The first company, a large international group, was concerned that although its sustainability management and accounting were generally at the forefront of good practice, since this had evolved separately in each business unit there was little commonality of approach. This made it more difficult to aggregate data from different units in order to report its sustainability performance at a corporate level; it also made it more difficult to compare different units, and to be sure that any under-performing units would always be quickly identified.

It therefore set up a system at the level of the company as a whole which brought together both its sustainability accounting and other key non-financial indicators. A 'process owner' was appointed from within the accounting function who was held responsible for that indicator at corporate level and for ensuring that its integrity could be assured by both internal and external auditors, and therefore by extension for the integrity of the data on which it was based from across the corporation. This was supported by formalised protocols and timetables for generation and reporting of the information, and audits of both the quality of the system and of the resulting information.

The second company similarly appointed a section within the finance function to collect, process and report its key non-financial information at a corporate level as well as its conventional financial information, and these were both made subject to the same rigorous process of definition of information, system design, and assurance and internal audit. This was reported to have resulted in high information usability due to its reliability in both its content and its availability.

3.7 Decision situations and methods applied

The decision situations for which interviewees reported that the information was targeted can be analysed in terms of the EMA framework (see Section 1.6), which distinguishes between past-oriented and future-oriented information, monetary and physical information, short-term and long-term information, and ad hoc and routinely generated information.

The interviews showed that most of the 16 possible decision situations had occurred across the set of companies as a whole and had been addressed with appropriate methods with all these dimensions being represented, though the detail also reveals several further insights which are explained in the following sections.

3.7.1 General observations

Although in aggregate across all companies all types of decision situation had occurred, in most of the companies considered individually only a small selection of sustainability accounting methods had been applied. Table 7 provides an overview of the most common situations as reported earlier in Table 3 (Section 3.3.4).

Table 7: Types of decision situations reported

EMA Framework							
		Monetary accounting		Physical accounting		Σ	Σ
		Short term	Long term	Short term	Long term		
Past-oriented	Routinely generated information	4	2	7	1	14	28
	Ad hoc information	3	2	7	2	14	
Future-oriented	Routinely generated information	1	2	1	2	6	11
	Ad hoc information	1	1	2	1	5	
	Σ	9	7	17	6		
	Σ monetary/physical	16		23			
	Σ short	26					
	Σ long term	13					

Table 7 summarises the main methods which were reported to be used. A comparison between this and Table 3 shows that although the latter appears densely populated, in fact several of the 16 possible cells are only lightly populated and there is a predominance of past-oriented, short-term, and physical information, which can be either routinely generated or ad hoc. A number of inferences can be tentatively drawn, and these are reported in Sections 3.7.2 to 3.7.7.

3.7.2 Coupling monetary and physical information

It appears that in some companies there can be a clear (sometimes even a strict) separation between different dimensions, in particular between monetary and physical information, which can prevent the full potential of sustainability accounting from being realised. A focus on physical information can help in designing ways to improving environmental performance on a specific aspect, but if this is applied strictly it can make it difficult for decision makers to assess the impact on economic performance (see Schaltegger 1998). The implication of this is that although using monetary information alone could mean that opportunities to realise 'low hanging fruits' are missed, conversely an excessive focus on physical information could result in an inefficient allocation of resources with only a marginal contribution to improving corporate sustainability performance (see Example 6). However, physical information also serves further purposes by supporting compliance with regulatory requirements and providing information for voluntary reporting to secure legitimacy.

Example 6: Linking physical and monetary information

There were a number of examples of the drawbacks of focusing on only a single type of information. For example, several companies were able to identify from a focus on physical information alone that their water consumption was excessive and could be reduced cost-efficiently. This opportunity had previously been overlooked since water costs represented only a relatively small fraction of their total costs.

On the other hand, an excessive focus on physical information risked over-investing in water-saving projects at the expense of other opportunities which might have greater potentials for economic and environmental benefits, such as in energy saving. This can be avoided by linking physical and environmental information more systematically. For example, another company's sustainability department identified that the electricity consumption of one of their office buildings was abnormally high, and an investigation revealed that this was due to outdated and thus less efficient electronic appliances. However, when the investment cost that would be needed to replace them was evaluated against the potential benefits, it was apparent that an alternative investment (in improving paper consumption) could be expected to generate higher benefits, both economic and environmental.

3.7.3 Moving towards regular information collection

The results showed that most companies used both regularly collected and ad hoc information. While it may appear intuitive that a regular collection is likely to be more efficient, there are situations where information needs to be provided only once eg, for an investment appraisal. The results however showed that although most companies collected sustainability information mainly on an ad hoc basis, only a few others focused on routine collection alone, and it was reported that much sustainability information is currently produced only on request. The consequence can be that sustainability accounting comes to be seen as an additional effort which can cause conflicts and frictions, and repeated challenges to the need for the information and its cost-effectiveness. A further problem with relying on ad hoc information is that this can often result in the information not being provided in the requested form if different providers use different methods to generate it, and the time periods used by the information providers were often found not to match those of the recipients. Unsurprisingly many interviewees, particularly those from companies which are currently depending predominantly on ad hoc collection, reported that they had started to move from this towards regular data collection and they expected this to result in improved information quality and an improved basis for decision making.

On the other hand, there can be decision situations for which ad hoc information at a specific point is invaluable, such as environmental appraisals when designing a new facility or launching a new service. Another situation that often requires ad hoc information is the ex-post evaluation of environmental and/or social projects, to identify which have been successful. Properly managed, routine and ad hoc approaches to collecting information can supplement each other.

The wide range of situations in which regularly collected information is used can be interpreted either positively or negatively. Positively, if this is interpreted as reflecting a high level of integration of sustainability in normal business, but negatively if this means that attention is then concentrated on issues that can be tackled by information which is already available so that those aspects for which information is not already available are thereby neglected or overlooked.

3.7.4 Planning for the future

The framework distinguishes between methods to support performance measurement, which require past-oriented information, and methods to support planning which require future-oriented information. Although most companies reported that they were making use of both types, there was a stronger focus on past-oriented. Many interviewees however reported that their experience of using this had made it apparent that the decision makers in their companies also needed more future-oriented information in order to improve performance further, and were therefore working to develop further their sustainability accounting systems to achieve this.

Several of the examples provided by companies which were focusing on monetary past-oriented information can be understood in terms of a search for internal legitimacy, with sustainability managers seeking to legitimate projects and activities by presenting an aggregated ex-post summary to senior management in order to secure resources for the next period, or to highlight the contribution of sustainability activities towards improving corporate performance. An external effect can be observed too by demonstrating that certain aspects of sustainability performance have improved over time. This has the advantage over the disclosure of plans for future

improvements that the numbers are more resistant to challenge (provided that they have been documented properly) and are not vulnerable to possible changes in business conditions.

3.7.5 Day-to-day business and planning

Many decision situations in sustainability management were reported to be related to planning for the future, including budgeting, although targets for future performance were mainly determined based on past performance. Examples included planning for future carbon emissions, and for social targets such as employee satisfaction and improving working conditions at suppliers' sites.

In many cases the predominant focus of sustainability information was reported to be the support of short-term operational needs and to meet ad hoc demands by senior management. However increasing demands for information and the systematisation of its provision mean that the use of sustainability information, both for planning purposes and in day-to-day business management, is increasing. For example, one company reported that it had recently started to generate on a regular basis a set of performance indicators on resources consumption to help to control operational aspects of its business such as energy and water consumption, as well as company-specific consumables such as paper and vehicle fuel. Similarly, Example 2 showed that sustainability-related information can also be used on a daily basis to monitor the physical performance of production processes. The interviews indicated that an increasing use of sustainability information for planning and in daily operations is envisaged.

The strong tendency towards decision situations which require short-term monetary and physical information can be explained in terms of their implications for conventional management, since measures to improve efficiency such as by reducing energy consumption are not new and therefore are not necessarily considered to be sustainability related.

3.7.6 Summary of the decision situations and methods applied

The sustainability accounting practiced by the companies with which we spoke is predominantly of physical information, which is consistent with academic literature (eg, Bennett et al. 2011). The above sub-sections also demonstrate that:

- Few companies made use of more than a few decision situations.
- Across the companies as a whole, there were examples of most decision situations.
- There was a tendency towards past-oriented and ad hoc information.
- Future developments are likely to include a trend towards more routinely collected and future-oriented data which is used both for planning purposes and to support daily operations.

3.8 Summary of the findings from a theoretical viewpoint

The following section summarises a selection of the findings reported above in terms of the theoretical perspectives which were introduced in Section 2.6 and then referred to throughout the findings (Chapter 3). These facilitated the analysis of the findings and can help to explain some findings that might initially appear counter-intuitive. For brevity, we have identified in brackets the theory that is relevant to explain each finding (for more detailed explanations, see Sections 3.2– 3.7).

The diversity of different information providers can largely be explained as an attempt to reduce existing information asymmetries and imperfections (information economics). These can require management to signal to stakeholders that the sustainability aspects of the business are being considered and do not pose a threat to its profitability (agency theory). This can also be interpreted as a managerial attempt to legitimise activities, to both internal and external actors (legitimacy). Companies which have been involved with sustainability management for a longer time tend to be those which also have more well-established information management systems (contingency theory). A greater involvement of the accounting function is likely to result in more efficient and effective information management practices as these can benefit from the accountant's expertise (transaction costs).

The information collected will vary in accordance with its purposes, though particularly topical information such as climate-related information was reported by all companies to be used due to its higher signalling potential (information economics, agency theory) even though there may be little immediate practical application for it. The range and scope of information collected in each company varied widely, but information which did not consume too many resources in its collection and management such as that which was already being collected in another form for other purposes such as invoicing, was reported to be dominant (transaction costs) even if not necessarily as useful.

The diverse reasons for collecting information which were reported can also be explained from several theoretical perspectives. In many (though not all) cases, diverse information was collected for producing indicators for various purposes (information economics) in order to improve the efficiency of core activities (eg, energy management), increase corporate value (agency theory), or improve corporate reputation (legitimacy). Using sustainability information can also be perceived as a more cost-efficient alternative to other channels of communication, both internally and externally (transaction costs). Several cases of 'thematic coincidence' are also suggested by the results: those departments in whose areas certain sustainability issues are most directly relevant would tend to be in charge of managing them (contingency theory), resulting in a focus on information specifically related to them. For instance, industries that have been particularly exposed to risk arising from suppliers (such as textile and foods) are more likely to involve the procurement department in the task of managing sustainability performance related to these risks.

The users of information can be split into several categories. Typically general and sustainability managers tend to be the ultimate users of information, in order to reduce information asymmetries between them and their subordinates and to legitimise their activities to both senior management and external stakeholders (agency theory). The pursuit of legitimacy, particularly externally, was also an important reason for the department responsible for communications to use such information (legitimacy). The research also found that the activities of the sustainability department within each company are likely to vary depending on its organisational location (contingency theory) – for instance, those which were located in their company's communications department tended to focus on the presentation of information (legitimacy, agency theory) rather than on providing information for input into business cases.

The processes by which information was collected can similarly be aligned with established managerial theories, for example the natural inclination to try to generate information at the lowest possible cost given some uncertainty on how useful it was likely to be (information economics theory). Whereas sustainability information whose potential value was clear (such as that which might support more cost-efficient energy generation) showed a trend towards regular collection, information collected for communication or legitimacy purposes tended to be produced mainly on an ad hoc basis (contingency theory). The involvement of accounting specialists may not only help to reduce overall costs as existing resources are used (transaction costs) but also to improve the quality of information by reducing information asymmetries between users and providers, since in many companies accountants are the main gatekeepers of the information provided to senior management (agency theory). The results also suggest that sustainability information collection is carried out in accordance with existing information management approaches in each company (contingency theory).

Finally, the decision situations described in Section 3.7 can be summarised as follows. The relative proportions that were observed of past-oriented and future-oriented information respectively can be explained from several theoretical perspectives. Whereas the former is generated to demonstrate that activities and products are aligned with management objectives (agency theory), future-oriented information serves planning and budgeting purposes and thereby signals what the company's next steps will be (legitimacy). A focus on past-oriented information can also be explained from a transaction cost perspective: in order to minimise the overall costs of sustainability information management, use is made of information which is already known. The predominant emphasis on physical information can be explained by the need to inform different parties of the actual impacts of corporate activities on the natural and social environment and thereby justify projects and budgets (stakeholder theory, legitimacy), whereas the related monetary information is used to justify the company's activities to stakeholders such as shareholders, senior management and the wider public (legitimacy).

3.9 Limitations

Information collected within companies often has a dual function of supporting both external reporting and internal management, and external requirements are likely to influence management action. However the scope of this report does not include external reporting so we have not attempted to look in detail into the effects of external reporting, neither mandatory nor voluntary, although we have included unprompted mentions by interviewees. There was little to suggest that regulatory developments were a significant influence on the internal use of sustainability information, at least for the companies in our sample; for example, the implications

of the UK Companies Act 2006 for environmental and social impact information were not mentioned at all during the interviews.

Another interesting and potentially relevant research question is whether a “shareholder-only oriented” societal and regulatory environment would lead to the collection and use of a different kind of sustainability information in a company than a business environment which was oriented towards broader stakeholder interests. However this too was outside the focus of this study, and since several of the companies are very international in orientation it would in any case be difficult to isolate the influences of national business environments. The interviewees did not explicitly raise this topic unprompted either.

There is as yet little literature that sheds light on the aspects discussed in this report, so in view of the exploratory character of this research any tentative conclusions which may be drawn from it need closer investigation before they can serve to inform management decisions. Although 54 interviews were conducted, these were drawn from a relatively small sample of only 16 companies, so whether the practice of sustainability accounting in other companies is similar cannot be answered with the available data and further research would be needed to assess whether the exploratory results also apply more widely. Further contingencies that are likely to have an effect on the observed practice include:

- **The researched countries.** For the reasons explained in Section 2, we chose the UK and Germany. Results from other countries may well differ for reasons of differences in corporate cultures, accounting traditions, governance, etc.
- **Focus on reporters with acknowledged reports.** There may also be companies which, although their sustainability management and their use of relevant information are advanced, nevertheless have chosen not to report publicly. By the nature of the design of this study (see Section 2.3), companies like these would not have been included in our sample.
- **As for all research into corporate practice,** this report assumes that interviewees answered accurately (though where possible the research also extended beyond solely relying on the respondents’ perceptions, to look also into examples that supported what interviewees had said and to sources of further data in order to triangulate the data from the interviews themselves).

4. CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

Contrary to popular stereotype, the accountancy profession has historically often been adaptive and entrepreneurial in identifying changes in the business world and then responding to them (Matthews et al. 1998). However it is not always immediately obvious how best to respond to a new challenge where practice is continuing to develop, such as sustainability which is still a relatively new issue in the business environment. This research shows that practice in companies is already providing frequent examples of how mainstream accounting skills can be applied in addressing this challenge, and indicates some likely future developments.

This section draws together the main conclusions and makes some suggestions for further developments. These include some practical implications for both companies and the accountancy profession, and some possible directions for further research.

4.1 Sustainability accounting in business

Given the relative novelty of sustainability as a serious issue for business and the new and evolving nature of sustainability management in companies, it was not surprising to find a high level of variety in their sustainability accounting. However, some patterns were apparent, suggesting possible contingent variables which might help to explain how practice is developing: differences, for example, between companies in different sectors or of different sizes, with different motives for their interest in sustainability, with differing approaches to management control, or between the two countries which were represented.

Each company had established a specialist function to lead its sustainability management, although these rarely had any significant line authority within their organisations so their role was largely to coordinate the activities of others and cooperate with them. This function was invariably the main driver within the company of its sustainability accounting, on both the supply and demand sides: both identifying the information that was needed, and usually then having to generate this either from existing sources or by capturing new data. Although it may be possible to envisage a time when sustainability has become so well-established and integrated into the business mainstream that this role has become superfluous, this seems unlikely in the foreseeable future so it is likely that the central role will continue to be taken by a specialist sustainability function.

In the early stages of a company's sustainability accounting most information collection will probably be done on an ad hoc basis, with a strong element of experiment and innovation as new information needs become apparent. These may be either recurring or one-off, and to the extent that the company's information needs become stable over time, the process is likely to become increasingly systematised. This suggests an opportunity for the accounting function to take an increasing role, which is already developing in many companies (as reported in Section 3.6.5 above). This is likely to develop further as the current topical concern for carbon emissions and climate change becomes more embedded in legislation that affects business, especially if this either requires increased disclosure or imposes additional costs on business. In any case, the quantifiable nature of data on energy consumption and the consequent carbon emissions (in contrast to the less tangible nature of many aspects of social performance, for example) suggests that methods of accounting control are likely to be particularly relevant here.

Depending on circumstances and needs, the extent of the accounting function's involvement might take any of a number of different forms. An extensive role could mean taking primary responsibility for the collation and processing of sustainability-relevant data and information as an integral part of the mainstream accounting system, by creating fields within accounting systems to capture physical as well as monetary data and helping to integrate these, which several companies reported they had found problematic. It would also make it more likely that the company could take advantage of sustainability expertise when this could help the business such as in the planning of new projects, rather than (as several companies had reported) only when the sustainability manager had learned of it by happenchance, sometimes too late to be of any practical use.

Even if sustainability information systems remain distinct from conventional information systems, there would still be an argument for their management to be located within the accounting function so that they are subject to the same processes of checks and controls as are routinely applied to monetary data, and covered by the same internal audit and assurance systems. This could be particularly valuable where data is to be collected across a large organisation, especially one that is diverse or internationally spread, either for external reporting at corporate level or for internal management. Inconsistencies in data capture at source can invalidate the eventual results, so that clear data definitions and internal assurance processes are needed. These could still be possible outside the accounting function but are more likely to be successfully achieved there, as well as offering both a more efficient process and enhanced credibility of the resulting information. At the other end of the information processing system, a more limited but still value-adding role might be to leave the responsibility for capturing and processing the data to others but then to collate the outputs from this into a composite 'dashboard' of indicators which would reflect the company's performance as a whole.

Involving the accounting function would still leave a role for ad hoc developments by sustainability managers and others. These could be either to provide inputs into one-off analyses, or in experimentally developing potential new recurrent information flows as new issues arise and as the company develops its sustainability accounting over time.

This could also be expanded into a further service to the organisation which would require the collaboration of both the sustainability and accounting functions. The sustainability-related information relevant for a company can include external as well as internal information, since many of the immediate pressures on companies are imposed by governments and other external stakeholders. This suggests a further possible value-adding information management activity, to set up and maintain an ongoing database – effectively serving the function of an in-house library to support the information needs of managers as they arise. Given the speed with which sustainability issues can change, this would require both relevant sustainability expertise and a continuing proactive scanning of the organisation's external business environment, together with accountants' information management skills. This would offer the added benefit that since the quality of the data could then be assured at the point of its input, users could rely on its quality and consistency and therefore its fitness for purpose. Given the short timeframes within which many business decisions have to be made, would be valuable in helping to avoid unnecessary delays.

Which particular aspects of sustainability are most relevant will vary between companies, depending on each individual company's activities and the pressures on it. It is clearly important that at any time each company should be able to define a reasonably clear idea of what sustainability means or should mean for its own business, while keeping the door open for this to develop over time as new issues emerge. However the frequent reports by companies that had generated sustainability-related information on issues such as energy consumption, that this had identified opportunities for savings which had not previously been apparent even though their costs were already being monitored and controlled by conventional methods, suggests a further consideration in deciding on the information to generate – to use these as positive examples within the company to develop the profile of sustainability accounting and thus prepare a receptive audience for further developments.

4.2 Implications for the accountancy profession

Sustainability first started to become generally recognised as a business issue only some two decades ago, and business practices are still developing in response. It is widely perceived as potentially a very significant variable in the strategic context within which business operates. On its own this is not necessarily sufficient for accountants to be involved, but the results of and examples provided by this research suggest that there is a clear opportunity to develop a systematic approach to sustainability accounting, which the profession can either accept or decline. This has implications for those leading developments in practice, in particular for professional institutes.

Sustainability accounting requires the linking of two distinct areas of competence: sustainability (which itself is inter-disciplinary) and accountancy. This raises the question of whether accountants' expertise might be enhanced by acquiring an appropriate degree of sustainability awareness. The main potential vehicles for achieving this are the syllabi of professional accountancy institutes' qualifications, which not only define the core knowledge and skills which those qualifying will take with them through their careers but are also influential in shaping many universities' syllabi too.

This is already fully recognised by many professional accountancy institutes. However those responsible for maintaining and keeping up to date the quality of the professional qualification are also acutely aware that there are limits to what can realistically be included and a strong case is required before any new content can be included, whether this represents a net addition or a replacement for existing content. It is generally accepted that integration with existing mainstream content is preferable to attempting to cover issues such as sustainability in separate modules and risking its isolation, but this still leaves to be defined how this can actually be best achieved. The experience of the companies in this study suggests that several different examples are already available to show how generic accounting skills can be applied to help organisations to manage sustainability, and these are also available for use in the teaching and assessment of conventional accounting skills.

Professional institutes can of course also ensure that their members and others are kept up to date by providing a flow of information on new developments and examples of practice through seminars and publications to support continuing professional development. Many are doing this already and many members are receptive, although also understandably curious about what this implies for their own practice, and often rightly sceptical of proposals that are not adequately defined and explained. Exchanges between practitioners, academics and students could also be facilitated through joint seminars, lectures and teaching programmes.

4.3 Contribution to existing literature and potential areas for further research

This report provides detailed insights into sustainability accounting practice in several leading companies which could potentially be influential in informing subsequent adopters and further developments of good practice. It differs from earlier studies of sustainability reporting practices since there has not previously been any comparable study which has focused on the examination of companies' internal practices in their management of sustainability information, ie, who collects, decides, uses and communicates data and information, and how these processes take place. This research on the other hand has identified several examples of sustainability information management practice such as who is involved and the extent to which these include accountants, the kind of information that is collected and used, and for what purposes.

The results suggest a number of opportunities for further research in which the accountancy profession can take a lead. It would be premature to suggest any attempt to standardise practice in an area that is still developing: however the widespread adoption of the GRI Guidelines for external reporting suggests that there may also be scope for some general definitions of possible approaches to the systematic development of sustainability accounting within companies too, to provide models of practice that go beyond single projects. The area with the most obvious potential for this is the currently highly topical area of carbon emissions, where a limited number of possible standard methods of accounting could helpfully be defined. Further areas may include social diversity, water, and biodiversity, and these are already gaining increasing attention in some countries.

On a more conceptual level there is an opportunity to develop a framework of sustainability accounting and sustainability management control, to capture the increasing number and diversity of social and environmental challenges facing companies. Such a framework could help managers to deal with the complexity and multitude of different sustainability issues, deal with trade-offs, and prioritize areas of action.

The findings reported in Section 3 indicate that although several methods are in use across the sample of participating companies as a whole to support different types of decision situation, the range of different methods within each company considered on its own was usually very limited. The explanation may of course be simply that for each company there are only a few situations in which it finds it needs sustainability information, and there is little overlap of these needs with those of other companies. However, an alternative suggestion could be that a more widespread dissemination of different approaches and techniques might be valuable. This raises the research question of what method of dissemination may be most suitable and how the further academic and professional development of methods could be organised. These approaches might be structured on the basis of the environmental management accounting framework described in Section 1.6, to develop a comprehensive toolkit of different methods for different purposes in a practically applicable form. Further developments could also helpfully include the provision of a number of standard templates and spreadsheets that have already been developed and found to be effective in practice (see Section 3.6.1).

The practical value of this would be further enhanced if each company were then able to access comparable data from other companies against which it could benchmark its own performance, which as the findings reported in Section 3.6.4 suggested is frequently found to be a challenge (Bennett et al. 2006). This suggests a further possible potential opportunity, to maintain a continuing database of such information, and perhaps also to facilitate periodic structured inter-company comparison exercises along similar lines to those which are already well established with financial data.

Finally, the research indicated a clear trend within each company for its sustainability accounting to become more systematised as it becomes more well established. This suggests that research may be worthwhile into alternative ways in which this can be achieved, including how closely systems to generate sustainability information can be linked with accounting and other established information systems.

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APPENDIX I: RESEARCHED COMPANIES

UK

Aston Villa Football Club

BP

BT

Environment Agency

EDF Energy

Marks & Spencer

The National Trust

Vodafone

Germany

Adidas

Allianz SE

Axel Springer Publishing

Heidelberg Cement

Hamburg City Cleaning Service

WestLB

RWE

DHL

APPENDIX II: INTERVIEWEES

Mr Alberto Coppo	Dr Klaus Hufschlag
Mr Andreas Türk	Dr Lisa Drewe
Dr Astrid Zwick	Mr Manfred Lebmaier
Dr Brigitte Fickel	Dr Marcus Scholand,
Mr Chris Knight	Mr Mathieu Bernard
Mr Christian Ising	Dr Nathali Jaenicke
Mr Daniel Wendler	Mr Ned Hobbs
Mr David Ferguson	Mr Nick Medlicott
Ms Diane Biggs	Ms Nicole Sieverding
Ms Donna Young	Mr Peter Stanley
Mr Duncan Riddle	Mr Richard Feil
Mr Florian Nehm	Mr Rob Jarman
Mr Foster Deibert	Mr Thomas Rüdtenklau
Mr Frank Henke	Mr Stefan Freigang
Dr Hans-Peter Meurer	Mr Stefan Holz
Mr Holger Grawe	Mr Stefan Konhäuser
Mr Ingmar Lippert	Mr Stefan Martin
Ms Iris Langer	Ms Stefanie Kaufmann
Dr Jens Traupe	Dr Ute Bardelmeier
Mr John Klagge	Dr Winfried Haeser
Ms Katherine Series	



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