Analysis of the quality of environmental disclosures made by Australian resources sector companies

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ABSTRACT

Despite its contribution to the economy, the resources sector faces growing pressure from stakeholders, including investors and regulators, for managing the environmental impacts of its operations. Being an environmentally sensitive sector, resource sector companies should provide disclosures of their environmental footprint in their annual and/or sustainability reports. However, it is claimed that, given that environmental disclosures in annual and sustainability reports are largely voluntary, the quality of those disclosures are questionable with respect to their relevance and faithful representation. Therefore, the overall objective of this thesis was to explore the quality of environmental disclosures by Australian resources sector companies. This was undertaken through an assessment of quality based on existing reporting frameworks and assessment of investors' perspectives on the quality of disclosures.

Thus, the aim of the project was twofold: first, to identify the extent to which corporate environmental disclosures align with the quality attributes suggested in established regulatory guidelines and frameworks; and second, to obtain investors' perspectives regarding corporate environmental initiatives and environmental disclosures. A mixed quantitative-interpretative approach of content analysis was adopted to analyse the extent to which the sample companies provided environmental disclosures across the quality attributes in their annual and sustainability reports. A connotative analysis of the disclosures, including the Chief Executive Officer (CEO) messages provided in the reports, was also performed. A questionnaire including hypothetical case-based scenarios was prepared to survey a group of investors to ascertain their preferences with respect to the undertaking of environmental initiatives and communicating environmental disclosures.

A number of theories were used that underpin the underlying assumptions and methods used for this investigation. It is envisaged that the findings of this study would establish the extent of support, if any, for these theories. These are: legitimacy theory, natural resource-based theory (NRBT), signalling theory and decision-usefulness theory. In addition, Prisoners Dilemma model of game theory is used for structuring a mathematical framework for analysing the survey responses.

The findings of the content analysis suggest that environmental disclosures of the majority of the resource sector companies fall short of relevance, materiality, faithful representation, comparability and understandability. The findings also reveal that companies that fall below regulatory thresholds did not provide environmental disclosures. The prevalence of legitimacy and competitive appeal revealed by connotative analysis suggests that the managers assumed a middle ground position along the spectrum of environmental ideologies. The findings of the survey suggest that, investors preferred high quality environmental disclosures from large entities compared with small entities. Compliance with existing and potential regulations is regarded as the most important reason by investors for undertaking environmental initiatives and providing disclosures.

These findings indicate that environmental disclosures are regarded as a risk management tool rather than as a means of discharging accountability for the environmental impacts of a company's operations. It is suggested that specific regulations should be implemented through a consultative process with relevant stakeholder groups to improve the quality of environmental disclosures.

Doctor of Philosophy Student Declaration

I, Salina Siddique, declare that the PhD thesis entitled – 'Analysis of the quality of environmental disclosures made by Australian resources sector companies' is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work".

Salina Siddique Date: 14/8/2015

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List of acronyms

ABS	Australian Bureau of Statistics
ACF	Australian Conservation Foundation
AFBI	Australian Food and Beverage Industry
APS	Annual Performance Statement
ASA	Australian Shareholders' Association
ASX	Australian Securities Exchange
BHP	BHP Billiton Limited
BREE	Bureau of Resources and Energy Economics
CC	Coding for content
CCA	Carbon capture and storage
CCRF	Climate Change Reporting Framework
CDSB	Climate Disclosure Standard Board
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CO2	Carbon-dioxide
CO2e	Carbon-dioxide equivalents
CONQUARF	Content and Quality by Reporting Framework
CPRS	Carbon Pollution Reduction Scheme
CQ	Coding for quality
CSIRO	Commonwealth, Scientific, and Industrial Research Organisation
CV	Coefficient of variation
EEO	Energy Efficiency Opportunities
EMS	Environmental management system
EPA	Environmental Protection Authority
EREC	European Renewable Energy Council
GCDF	Global Climate Disclosure Framework
GFC	Global financial crisis
GHG	Greenhouse Gas
GICS	Global Industry Classification Standard
GRI	Global Reporting Initiatives
IASB	International Accounting Standard Board
IIED	International Institute for Environment and Development
IIGCC	Institutional Investors Group on Climate Change
IIRC	International Integrated Reporting Council
IIRF	International Integrated Reporting Framework
IPF	Iterative proportional fitting
IRF	Industry-specific reporting framework
IUCN	International Union for the Conservation of Nature
JORC	Joint Ore Reserve Committee
LCA	Life-cycle analysis
MCA	Minerals Council of Australia
MEU	Metals and mining, Energy and Utility

MW	Megawatt
NASA	National Aeronautics and Space Administration
NGER	National Greenhouse Energy Reporting
NGOs	Non-government organisations
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrogen Oxides
NPI	National Pollutant Inventory
NRBT	Natural resource-based theory
NSW	New South Wales
PD	Prisoners' dilemma
PET	Political-economy theory
PM	Particulate matter
RBP	Resource-based perspective
RBT	Resource-based theory
RET	Renewable Energy Target
RIAA	Responsible Investment Association of Australasia
SER	Social and environmental reporting
SOx	Sulphur Oxides
US	United States
USEPA	US Environmental Protection Agency
VOC	Volatile organic compounds
WWF	World Wildlife Fund

CHAPTER 1: INTRODUCTION

1.1 Research background

Sustainability reporting represents an organisation's disclosure to stakeholders about how they manage social and environmental issues (Lodhia and Hess, 2014). Alongside economic and human development considerations, maintaining ecological quality (in the natural environmental) forms the 'triple bottom line' reporting of 'sustainable development' (Bebbington et al., 2014). This project focuses on the environmental dimension of sustainability reporting. Increasing awareness of the natural environment in relation to global warming and the diminishing supply of natural resources, has directed community attention towards the environmental impacts of businesses in Australia and internationally. Continual efforts by environmental groups, such as Friends of the Earth, Greenpeace Australia and the Australian Conservation Foundation, during the last few decades have also increased public awareness about the importance of environmental well-being (Wilmshurst and Frost, 2000). This heightened attention on the environment has been paralleled with increased environmental regulation in Australia. The recent government policy and regulatory interventions – namely, the *National Greenhouse Energy Reporting Act 2007* (NGER, 2007), the revised Corporate Governance Principles and Recommendations (particularly Principle *7,* Australian Securities Exchange (ASX), 2007) and the ratification of the Kyoto Protocol (December 2007) - indicate that the environment is a crucial issue in Australia. In response, companies have been developing the practice of reporting environmental disclosures in corporate annual and sustainability reports for the past few decades (Gibson and O'Donovan, 2007; KPMG, 2008).

However, disclosing environmental information in corporate reports remains largely a voluntary exercise. Often the quantity and content of environmental disclosures seem to be influenced by events such as the catastrophic consequences of poor environmental management or negative media attention (Deegan and Rankin, 1996). Therefore, examining the quality of environmental disclosures as provided in corporate reports has become a burgeoning interest for the research community (Guenther et al., 2007; Guthrie et al., 2008

and Brammer and Pavelin 2008, Fonseca et al., 2014). Whilst there have been several research studies investigating the quality of corporate environmental disclosures in annual reports, they have been limited by applying arbitrary determinants of quality (for example, general non-verifiable versus specific verifiable) when referring to the nature and extent of disclosures (Hahn and Kühnen, 2013, Clarkson et al., 2011). Consequently, we still know little about the *quality* of these disclosures. Qualitative characteristics are recommended in the established regulatory frameworks and guidelines, such as the Global Reporting Initiatives (GRI) and the International Accounting Standard Board (IASB) Framework (Guenther, et al., 2007).

Research studies investigating the content and quality of disclosures demonstrate two contrasting types of corporate environmental disclosures. First, the companies that are subject to negative media attention because of their poor environmental performances provide a greater volume of disclosures – mostly positive or 'self-laudatory' in nature (Deegan and Gordon, 1996). Such a finding supports the broad notion of legitimacy theory in that these companies tend to use environmental disclosures as a legitimation tool for covering up their poor environmental performance and deflecting societal attention away from the main issue of concern. Second, it is also suggested in the literature that the companies that have undertaken innovative environmental initiatives are also the ones that provide enhanced environmental disclosures (Toms, 2002). This finding corresponds with the resource-based theories (RBT) of firms, which suggests that a firm derives a competitive advantage if it is able to develop resources and capabilities that their competitors would find difficult to imitate. According to RBT, the companies that undertake environmental initiatives seek to provide information to demonstrate their excellence in managing environmental issues. Such information is used as a vehicle for gaining competitive advantage over firms that do not undertake environmental initiatives (Freundlieb et al., 2014). These contrasting perspectives suggest that the quality of environmental disclosures cannot be explained by a single theory; rather, the choice of theory depends on the motives that drive an organisation to choose whether to disclose and what to disclose.

Further, it is acknowledged in the literature that a decision to provide disclosures on the environmental impacts of an entity's operations is not straightforward (Tanimoto, 2005;

Mason et al., 2014). Confessing harmful environmental impacts can affect an entity's reputation (Mutti et al., 2012). Alternatively, undertaking pro-environmental initiatives can result in immediate cash outlays, which may affect a firm's short-term returns. Therefore, the decision to provide environmental disclosures is often complicated by a dilemma that involves uncertainty in making predictions about the economic return of environmental investments. It is stressed in Louche and Lydenberg (2011) that even though responsible investors are willing to ignore short-term returns, the dilemma for them is that quantifying the long-term financial benefit of their sacrifice for social and environmental investments is not easy. The environmental dilemma becomes more complex in the presence of opposing environmental ideologies/views of the wider public. While exploring expectations for mining from an Australian perspective through a series of workshops, Mason et al. (2014) found that the views of a single participant may change significantly depending on the contexts that generate an environmental problem in the first place. For example, an individual may choose to ignore the harmful environmental effects of an entity's operations if the impact is of low magnitude and they may not expect the entity (or entities in the similar situation) to take any immediate preventive measures. In this case, the individual may not consider the cumulative harmful effect of entities' operations on the natural environment. However, the same individual could be alarmed if the entity's operation is solely responsible for an obvious and serious environmental incident. In this later context, the individual may require the entity to adopt necessary steps to prevent such damage.

Therefore, it is important to consider the existing environmental ideologies and the context within which environmental decisions, including disclosure decisions, are made while investigating the quality of environmental disclosures. Such a consideration contributes to an understanding of what environmental information is disclosed, how it is disclosed and why. Thus, the overall aim of this thesis is to explore the quality of environmental disclosures through the lens of existing frameworks applied to annual and sustainability reports. A secondary objective is to assess the investors' perspectives on the quality of disclosures.

1.2 The research questions

As indicated above, the research studies that have investigated corporate environmental disclosures have their limitations; applying only arbitrary measures in examining the *quality* of those disclosures. Some of the measures used refer to whether disclosures are descriptive or expressed in terms of units of measurement (tonnes, kilograms); some studies include an emphasis on whether disclosures are expressed in monetary terms or whether the disclosures are impact-specific or generalised (Wiseman, 1982; Deegan and Gordon, 1996; Toms, 2002 and Clarkson et al., 2011). While such classification informs the broad nature of disclosures, it tends to be deficient in identifying the quality of disclosures in line with the quality attributes suggested in the existing regulatory guidelines and frameworks. Hence, a composite disclosure instrument is prepared in this project based on the environmental indicators and quality attributes suggested in existing regulatory frameworks and guidelines. The disclosure instrument consists of two parts:

a) Environmental disclosure categories and sub-categories as listed in the GRI (2006); and
b) Quality attributes suggested that are in common with the GRI (2006), the Climate Disclosure Standard Board (CDSB) and the IASB Framework (2010).

The quality attributes help to devise a coding tool for investigating the quality of disclosures against each environmental category and sub-category.

The inclusion of quality attributes in the disclosure instrument is inspired by the notion of competitive advantage as advocated by natural resource-based theory (NRBT) and the signalling theory (Hart, 1995; Toms, 2002). The NRBT posits that when firms are exposed to constraints, such as increased environmental awareness and regulations, they are forced to undertake pro-environmental initiatives to sustain their position and stay ahead of the competition. According to the NRBT, such pro-environmental initiatives may include pollution prevention, resource conservation, innovation and stakeholder engagement via communication. It is assumed that these initiatives will lead to cost-savings and competitive advantage (Freundlieb et al., 2014). Under the signalling theory, it is argued that firms are likely to signal high quality environmental information if users are able to appreciate such

signals positively in their decision-making process about firms. According to the signalling theory, the firms that are undertaking environmental initiatives are compelled to provide disclosure to inform the market about their pro-environmental actions in an attempt to build reputation and thereby create value. It is also assumed that such disclosures hold more quality attributes as they are inimitable and cannot be produced by the entities that do not undertake any pro-environmental actions.

In examining the quality of environmental disclosures, the focus of this investigation is the Australian resources sector, which includes three sub-sectors: metals/mining, energy and utilities (MEU). This sector was chosen because exhaustible natural resources and the diverse environmental and social impacts of company activities mean that this sector has the potential to provide a large volume of social and environmental information (Jenkins and Yakovleva, 2006; Lodhia and Hess, 2014). Further, given the contribution of the mining industry to the Australian economy (e.g., in 2014-15, the forecast export earnings from the minerals and energy commodities in Australia is estimated to be $176 billion (Department of Industry, 2014)), mining remains an industry of national importance (Mason et al., 2014; Ford et al., 2014).

In order to examine whether the quality attributes suggested in established regulatory frameworks and guidelines could be applied as a benchmark to determine the quality of environmental disclosures, the following research questions were developed:

1. To what extent can additional quality attributes be reconciled through a single disclosure instrument for Australian resources sector companies?
   a) To what extent do disclosures vary across different environmental disclosure categories?
   b) Does the quality of disclosures vary across the MEU sub-sectors?

As discussed in Section 1.1, the content and quality of environmental disclosures can also be influenced by the environmental ideologies of the report preparers and users. It is suggested by Rupley et al. (2012, p. 611) that,

> Most corporate environmental disclosures are voluntary and ultimately decisions of whether and how much to disclose are managerial, as influenced by the board of directors and shareholders.

Environmental ideology is defined as a '*way of thinking about the natural world that a person uses to justify actions toward it*' (Corbett, 2006. p. 26). Based on a range of beliefs about the natural environment, environmental ideologies are usually placed on a spectrum of beliefs (Jones and Hollier, 1997; Corbett, 2006). On one end of the spectrum lies the extreme ecological belief, on the other extreme lies technology-centred belief. In between these two extremes, other ideologies reside, generally grouped as the moderate equivalences of the two extreme beliefs. It is important to obtain an understanding of how environmental disclosures are communicated in corporate reports, as this would indicate the underlying environmental ideologies of the report preparers.

It is argued that corporate perspectives on business operations and the notion of sustainability are likely to be mirrored in the rhetoric used in a range of business communications, including social and environmental reports (Higgins and Walker, 2012). It is acknowledged in the literature that the rhetoric used by corporations, within their reports, may '*have significant influence on public affairs and … [the] social decision making process'* (Cyphert, 2010, p. 347). Therefore, it is important to consider how managers (e.g. chief executive officers (CEOs) or managing directors) use language and imagery to put forward their perspectives on sustainability and environmental well-being when communicating environmental disclosures. Therefore the second research question developed for this project is:

2. Along the spectrum of environmental ideologies, how is a manager's positioning communicated in the management section of their sustainability report?

The extent and quality of environmental disclosures are also influenced by the expectations of stakeholders, including investors, in relation to firms' environmental management abilities (Cotter and Najah, 2012). Drawing on reflections from signalling and decision-usefulness theories, it can be argued that firms are likely to provide information if their stakeholders are able to interpret such information as useful in their decision-making about firms. However, how stakeholders interpret environmental disclosures in terms of

evaluating them as 'useful' also depends on their underlying environmental philosophy. Therefore, it is imperative to draw on stakeholders' perspectives of environmental philosophies in analysing the quality of environmental disclosures. In this research, with respect to the understanding of the environmental ideologies of stakeholders, the focus was narrowed down to a particular group of individuals –investors. This is because investors are regarded as the primary stakeholders of business organisations. In line with the decision-usefulness theory, it is assumed that firms will not provide environmental disclosures if such disclosures are not deemed to be important to the investors' decision-making process. Therefore, investors' preference of corporate environmental activities may affect the quality of environmental disclosures. Hence, the following research questions were also developed:

3. What are investors' preferences with respect to the undertaking of environmental initiatives in a given context?
4. What are investors' preferences regarding the incorporation of quality attributes within corporate environmental disclosures?

The research design on which this project was built is shown in Figure 1.1. The model shows that the ultimate quality of disclosures is a product of three main components: quality attributes suggested by regulatory frameworks; investors' preference for environmental disclosures; and managers' representations. It is assumed that '*what* to disclose' in relation to environmental issues is guided by regulatory frameworks and guidelines. However, '*what* to disclose' and 'how to communicate' are also influenced by investors' preferences as well as managerial discretion. Both the investors' preferences for disclosures and the managers' chosen way of communication are presumed to be guided by their environmental ideologies.

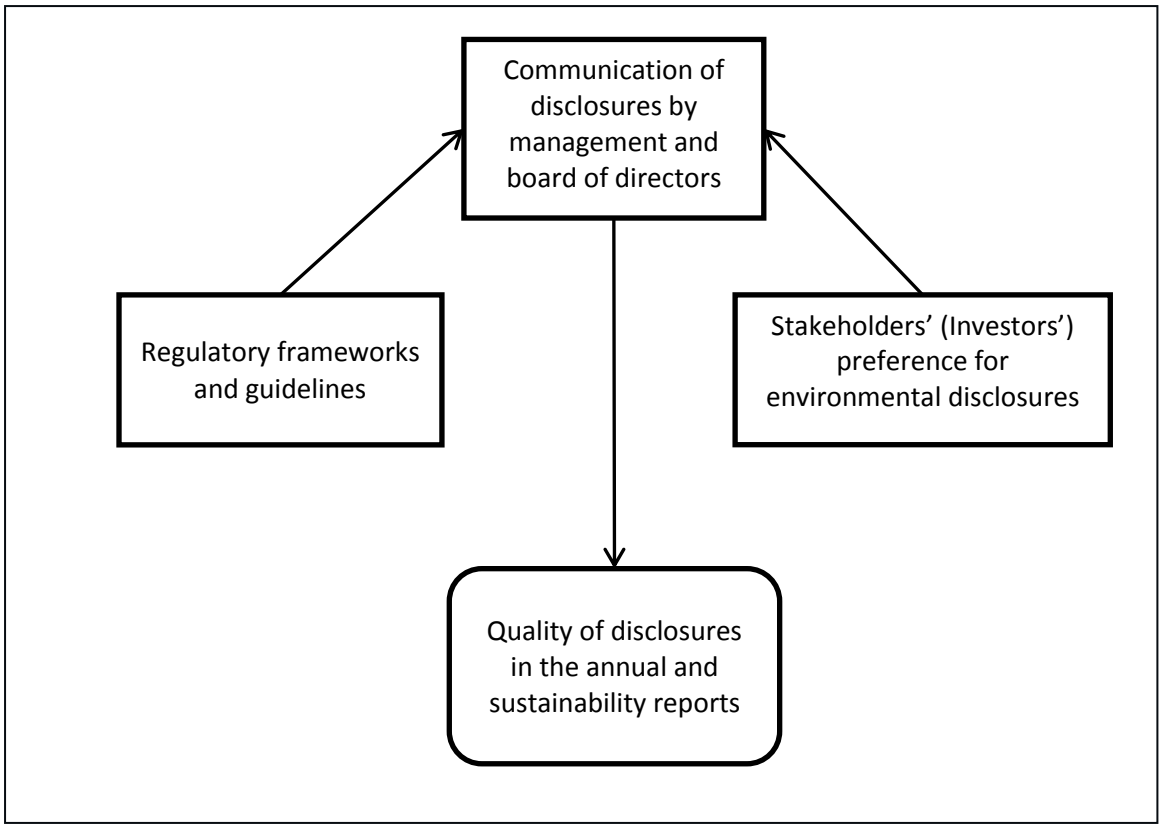


Figure 1-1: Research model

1.3 Justification for the research

Environmental accountability is a critical issue for the business community because of the heightened public scrutiny of firms' environmental performance and related disclosures (Al-Tuwaijiri et al., 2004). Institutional investors are increasingly willing to scrutinise environmental risk factors in assessing the investment risk of mainstream portfolios above and beyond ethical investment funds (Julie and Muftah, 2013). These changes require firms to provide greater levels of environmental disclosures to enable a comprehensive assessment of a firm's environmental risk and performance. Therefore, it is imperative to analyse the quality of such environmental disclosures in accordance with the benchmark prescribed in the existing regulatory frameworks and guidelines.

Answering Research Question 1 enables identification of the variety of disclosures across environmental disclosure categories, as well as the quality attributes set for those categories. The findings will assist in identifying shortcomings in environmental disclosures with respect to their reliability and comprehensibility. In ascertaining the quality of

disclosures it is also important to consider what managers are trying to accomplish, in other words, what messages or appeals they are attempting to make in communicating disclosures. This is important because, given that environmental activity disclosure is largely voluntary, the content and nature of disclosures are largely dependent on managerial discretion (Rupley et al., 2012). Therefore, it was envisaged that the findings obtained by addressing Research Questions 1 and 2 would provide greater insight for regulators in determining specific guidelines, not only with regard to 'what' to report but also 'how' to report.

Research Questions 3 and 4 were designed to explore investors' perspectives, using hypothetical scenarios, with respect to firms' environmental initiatives in different contexts. Such perspectives can also be associated with the investors' preferences in terms of the level of quality of environmental disclosures. It was assumed that obtaining the investors' perspectives would draw upon their environmental ideologies. The findings will inform and add to the continuing debate around the enactment of more stringent legislation and/or provision of specific guidelines for companies to provide disclosures that conform to content and quality attributes.

1.4 Methodology

The research methods were selected based on the research objectives identified in this study. The project consisted of two distinct stages. The first stage involved a cross-sectional analysis of the quality of environmental disclosures. This stage utilised content analysis to analyse the quality of these disclosures. A composite disclosure instrument was developed to identify both the content (with reference to a particular disclosure category/sub-category) as well as the quality attributes identified in the environmental and other reporting frameworks and guidelines. The instrument is referred to as CONQUARF, where CON stands for *content*, QUA for *quality* and RF for *reporting frameworks*. It was envisaged that CONQUARF would extract several quality attributes of environmental disclosures over and above those identified in previous studies. Analysing disclosures using CONQUARF was limited largely to denotative content analysis, which focuses on the obvious meaning of information. Therefore, to supplement the analytical procedure, a connotative analysis of

environmental disclosure was also undertaken. The analysis focused on extracting the implicit appeals driven by managers' environmental ideologies as communicated via the environmental disclosures. The annual reports and separate environmental or similar reports (e.g., the environmental section of sustainability reports) produced in 2009 by a sample of Australian resources sector companies were used as the basis for the content analysis.

The second stage of the study involved determining investors' preferences, through two hypothetical scenarios, with respect to a range of environmental initiative choices and the provision of environmental disclosures. This stage of the research project involved conducting a survey of investors. The findings of the content analysis from the first stage of the project were used as the basis for preparing the survey questionnaire. The data was collected using a web-based survey accessible via the website of an investment fund. The scenarios and environmental action options therein were presented in such a way that the respondents would face a dilemma in making their choice. These dilemmas involved 'individual action' versus 'actions of other entities' and 'disclosures' versus 'no disclosures' when faced with the uncertainty associated with environmental and financial risks and benefits. Therefore, dilemma theories, such as game theory, were used to analyse the survey data. Game theory explains the preferences of a decision-maker in an interactive situation in which that decision-maker maximises their own benefits while interacting with others. It provides an analytical foundation to structure decision-makers' beliefs in an interactive situation through a mathematical framework (Deng et al., 2014).

1.5 Definitions

The scope or meaning of certain terms may vary between researchers. Hence, a researcher's position with respect to the critical terms used in a study should be stipulated clearly. Consequently, the following definitions provide the meaning and/scope of terms as frequently used in this research project.

Environmental disclosures: environmental disclosures are defined by different authors individually or as part of sustainability disclosures (Gray et al., 1987; Mathews, 1993; Salomone and Galluccio, 2001). The common theme with respect to environmental disclosures that is prevalent in these definitions is: effects of organisational operation on the natural environment. Therefore, in this project, any information that relates to an aspect of an entity's operational impact on the natural environment is considered an environmental disclosure. Such aspects include environmental strategies, risks, impacts and management of such impacts.

Annual reports: An annual report of a listed company includes all the documents that the company prepares as per the requirements of the *Corporations Act (2001)*. Additional reports are also included as per the requirements of the Australian Securities Exchange (ASX) Listing Rules and Corporate Governance Principles and Recommendations. The sections of the annual reports that were investigated in this project included: directors' reports, CEO's message, corporate governance statements and financial reports. Annual reports were obtained from the archive sections of the relevant companies' websites.

Environmental and sustainability reports: Companies may provide environmental information in separate reports, commonly termed as sustainability reports under a heading of *environment*. Therefore, any report other than the annual reports that contained disclosures about the organisational impacts on the natural environment was considered an environmental or sustainability report and was examined through content analysis. These reports were also obtained from the companies' websites.

Resources sector: the scope of the resources sector is defined as per the Global Industry Classification Standard (GICS) followed by the ASX. The sector includes companies that are classified as belonging to the Metals/Mining, Energy and Utilities industries. Hence, for the purpose of analysis in this project, and as outlined earlier, the resources sector companies are grouped under three sub-sectors – metals/mining energy and utilities - known in this study collectively as MEU. The metals/mining sector companies are involved in mineral exploration, development and production (ASX, 2010a). Energy sector companies are involved in the exploration and development of coal, uranium, oil and gas and renewable

energy assets. The utilities sector operates in the generation and/or distribution of electricity, water and gas (ASX, 2010b).

Quality of environmental disclosures: The quality of environmental disclosure refers to the quality attributes prescribed by the commonly used environmental and accounting regulatory frameworks and guidelines. These include guidelines suggested by the GRI (2006), the CDSB (2012) and the IASB Framework (2010) which are further elaborated in Chapter 4.

1.6 Delimitations of scope and key assumptions

In this research project, the scope of analysis was narrowed down to the investigation of annual and sustainability reports of a single financial year (2008-2009) only. However, the volume of disclosures investigated (approximately 30 pages of disclosures per company x 103 companies = 3,090 pages) was assumed to provide adequate data to achieve the purpose of analysis. Further, adding to the weight of data gathered and for the purpose of cross analysis, a survey was also conducted in this project in order to obtain investors' preferences relating to corporate environmental actions and disclosures.

The resources sector was selected because it plays a crucial role in the Australian economy. This is one of the largest market sectors by number of companies in Australia (44 per cent of all ASX listed companies in 2009), which is intensively reliant on equity markets to provide capital for mineral explorations (ASX, 2010c). However, because of the extensive deteriorating impacts of its exploration activities, this sector is often subject to political scrutiny. The financial year 2008-2009 was selected for two reasons: environmental and economic. First, Australia signed the Kyoto protocol in December 2007, coming into effect in March 2008. Further, Australia enacted the *NGER Act 2007* in September 2007, which required the corporations that meet a certain threshold of carbon emission to report their greenhouse gas (GHG) emissions, GHG projects and energy use and production (Lodhia, 2013). Second, during the same period, the economy was hit by the global financial crisis (GFC) from 2008. Therefore, it is argued, both the resources sector and the time-period

chosen are characterised by an environmental versus financial dilemma – one that is often confronted by corporations that are environmentally sensitive.

Another limitation of this research project is the selection of the survey population, which was confined to investors (current and prospective) only. This was justified on a number of grounds. Regulators prioritise the information needs of investors over other stakeholders in implementing new regulations (Deegan, 2004; de Villiers and van Staden, 2011). Also, shareholders are considered to be one of the primary users of the annual reports in regulatory frameworks (such as the IASB framework). Therefore, in making decisions regarding environmental management and disclosure, managers are more likely to consider shareholders and environmental regulations than the demands of other stakeholders (Wilmshurst and Frost, 2000; Stubbs et al., 2013). Hence, it is considered that the quality of corporate environmental disclosures is likely to be affected by the investors' preferences relating to those disclosures.

1.7 Outline of the thesis

This chapter (Chapter 1) has introduced the background of the research topic, objectives, methods and justifications for the study. It also presents (below) the position of the researcher with respect to the definition of some key terms. These are critical to the research. Chapter 2 provides an overview of the research literature in the area of corporate environmental accounting and reporting and highlights the gaps in relation to the analysis of the quality of disclosures. Chapter 3 presents an analysis of the theories used in this research, as well as the combined theoretical framework that was adopted for this study. Chapter 4 reviews the qualitative characteristics of disclosures as prescribed in a number of environmental and accounting reporting frameworks (for example, GRI (2006) and IASB). Chapter 5 provides a discussion of the content analysis method used to undertake the examination of the quality of environmental disclosures. The findings of the content analysis are discussed and interpreted in Chapter 6. The survey method, including the purpose, method, design, construction of the questionnaire and the implementation of the procedures, are described in Chapter 7. Chapter 8 provides discussion and interpretation, including theoretical implications, of the survey findings. Finally, the concluding chapter

(Chapter 9) summarises the objectives, contribution and limitations of the research project, including opportunities for further research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The aim of this chapter is to provide an overview of the Australian resources sector, the significance of incorporating environmental disclosures in corporate reporting, as well as different environmental ideologies. It also contains reviews of the environmental accounting research literature and identifies gaps in the extant literature in terms of the quality analysis of environmental disclosures.

In Section 2.2 the importance of the Australian resources sector from an economic, geographic and environmental point of view is explored to emphasise why environmental disclosures by the companies in that sector deserve in-depth research. In Section 2.3 it is emphasised that business organisations cannot be seen as part of economic or social domains alone, rather, they share and rely upon the natural resources of the physical environment of the planet. This section also outlines different, publicly observed, environmental ideologies and provides explanations about how these ideologies can influence the perception of the quality environmental disclosures. Section 2.4 provides an overview of the research conducted in the area of corporate environmental accounting and reporting. It highlights the need for improvement in relation to the theoretical understanding of the quality of environmental disclosures, the content analysis approach and the exploration of the perceived importance of the quality of environmental disclosures among investors.

2.2 The resources sector, environment and community

2.2.1 The resources sector in Australia

The GICS classifies components of the resources sector into three sub-sectors - defined in the previous chapter and referred to as MEU in this thesis. The metals/mining sub-sector includes explorers and producers involved in a range of minerals that can be broadly classified as base metals, gold and precious metals, mineral sands, diamonds, iron ore and

other steel-related ores (ASX, 2010a). Companies in the energy sector include oil or gas producers or both, gas distributors, oil and/or gas explorers and the newly developing coal-bed methane gas explorers and producers. The utilities sector includes companies that operate as independent producers and/or suppliers of electricity, water and gas (ASX, 2010b).

The resources sector is significant due to the nature of its environmental impacts on the one hand and its economic contribution on the other (Govindan et al., 2014). This sector plays a significant role in the Australian economy through its contribution to export income, employment, gross domestic product, government revenue and investment and new project development (Roarty, 2010). According to a media release by the Bureau of Resources and Energy Economics (BREE, 2014), the export earnings from Australia's resources and energy commodities are forecast to increase by an average rate of 8 per cent a year from 2013-2014 to $284 billion in 2018-2019. In a research bulletin published on the website of the Reserve Bank of Australia, it is indicated that the resources sector accounted for 9.75 per cent of total employment in Australia in the year 2011-2012 (Bishop et al., 2013). An ASX publication (ASX, 2010d) on market indices and sectors shows that the resources sector is the second largest industry sector by market capitalisation in Australia, following the financial sector.

While Australia has been blessed with a rich resource base and is currently one of the world's leading resource nations, natural abundance of resources alone is not enough for business organisations in any country to maintain sustained success. The resource-based theory (RBT) first speculated by Wernerfelt (1984) suggests that while a firm's success is largely determined by the resources it owns and controls, the use and development of resources are dynamic rather than static. The view adopted in the RBT is that the use of resources is a process of '*creative destruction'* wherein a firm continually renews its resources and abilities by remaining innovative (cited in Coates and McDermott, 2002, p. 437). Coates and McDermott (2002) empirically examined the view and indicated that the process in which the resources are used is more important to firm's success and survival than the mere abundance of resources. They stated:

> Resources change as a result of innovative managerial behaviour, as it is the use of the resources and not the resources themselves that are generating competitive advantage. This model emphasizes how human, physical and intangible resources combine over time to create value (Coates and McDermott, 2002, p. 437)

By taking the broader natural environmental perspective, NRBT, a sub-set of RBT, assumes that firms' strategic and innovative changes in the use of resources can be influenced by dynamic environmental hostility, including climate change and global warming. In a similar vein to NRBT, if the consequences of innovative strategies adopted by a firm in using natural resources fail to correspond with the environmental constraints it faces, the firm may lag behind competitively and its very existence may be threatened.

2.2.2 Environmental impacts

While the resources sector makes a significant contribution to the Australian economy, the intrinsic nature of the activities involved in this sector presents direct and potential risks to the environment and, hence, attracts heightened stakeholder pressure (Lodhia, 2007). The activities related to mine establishment, ore extraction and processing, waste disposal and associated transport activities have direct environmental impacts (Moran et al., 2014). Many of the minerals and metals mined for commercial markets or produced/concentrated during the process (e.g., arsenic, mercury, etc.) have inherent toxic properties leading to remote hazardous effects. Some of these effects include: the impact on flora and fauna in both aquatic and terrestrial environments (e.g., mercury contaminated fish); acute toxic and long-term chronic health effects in communities close to and/or downwind/downstream of operations; and the impact on environmental values that are critical to the long-term sustainability of local communities (e.g., bio-diversity) (International Institute for Environment and Development (IIED), 2002).

Although mining directly involves a relatively small area – less than 0.05 per cent of Australia's landmass (IIED, 2002), its effect on land usage is highly intense. It destroys the living organisms within the active sites and interferes directly with the quality of nearby ecosystem functions and processes, including salination, acidification and loss of soil structure, loss of flora and fauna, damage to heritage sites and destruction of adjacent habitat. It may also alter the hydrological functioning of the landscape with resultant

changes in the surface and ground water levels and flows. An analysis of National Pollutant Inventory (NPI) data sets conducted by Weng et al. (2012) showed that the trend of key pollutant burden in Australia has increased over the past decade.

Because of its heavy reliance on coal to produce primary energy, Australia is ranked the highest globally in terms of GHG emissions per unit of primary energy supply (4.7t CO2-e/tonne of oil equivalent) and the second highest in terms of GHG emissions on a per capita basis (26.5 tonnes CO2-e per person) among the Annex 1[1] countries (Riedy and Daly, 2007). In a recent interview (Whitmore, 2014), environmental experts expressed concerns about climate and water with respect to government approval of the Carmichael Coal and Rail Project in the South West Queensland region in July 2014. According to expert opinion, the total emissions from the Carmichael Mine alone could contribute to four per cent of global emissions by mid-century and add 0.011-0.027 degrees Celsius of warming towards the global target set to keep warming below two degrees Celsius. The mine would have significant impact on the regional groundwater levels and flow and the stream flow that is dependent on groundwater.

Given the widespread environmental impacts of the resources sector, it is important to understand the attitudes of the community in general towards the environment in Australia. As is indicated by Lothian (1994, p. 78), *'Community opinion is a major factor which influences the development of policy by governments and action by business and industry'*.

2.2.3 Australian attitudes towards the environment

A unique mix of circumstances makes environmental concerns one of the most crucial issues in Australia. Being bounded by three oceans and having most of its urbanised habitats condensed in the coastal strip, it has an intense impact on a vast area of the marine environment. An update from the Wilderness Society (2013) reported that in the last 200 years, about 126 species of plants and animals have become extinct in Australia.

[1] *'Parties include the industrialized countries that were members of the OECD (Organisation for Economic Co-operation and Development) in 1992, plus countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States'* (United Nations, 2014, n.p.).

As in most other countries, environmental issues began attracting public attention in Australia in the late 1960s and early 1970s. Lothian (1994) provided an overview of Australian community attitudes about the environment by analysing various surveys conducted by the Australian Bureau of Statistics (ABS), universities, the Australian Environmental Council and academics over the period 1975 to 1994. The author found that the surveys, including longitudinal ones and one-off studies, that probed in-depth over a particular environmental issue reflected a spectacular evolution of community and investor awareness towards the environment. Pollution and waste were identified as dominant issues by these surveys, followed by bio-diversity (deforestation and habitat loss) and the use of natural resources (e.g., land and water). It is noteworthy that all three of these issues link strongly with the activities of the resources sector.

A survey conducted by the (ABS, 2007) on how Australian householders put their environmental views into practice revealed that more than half (55%) of all Australian households use grey water, with the highest reported in Victoria (72%), and approximately one in five households had a rain-water tank. This gives an indication that Australians are aware of the scarcity of water resources and the existing water restriction laws and are gradually responding to the issue by taking active steps, such as the conservation and recycling of water.

A survey conducted by the ABS in 2008 on preferences when buying white goods revealed that Australian households ranked energy star rating (energy and water efficiency) as more important than price or brand when buying white goods like refrigerators, freezers or clothes dryers (ABS, 2009). This was a major shift from the findings of the previous survey conducted in 2002, which documented that price was the most important factor for the majority of those purchasing white goods. These results reflect the fact that people are concerned about the GHG emissions associated with energy consumption. Over half the householders (55%) in the Northern Territory used solar energy in 2008, with the lowest adoption (3%) reported in Victoria (ABS, 2009a). Another survey on environmental views conducted by the ABS (2009b) found that Australians believed that water shortage and climate change were the country's biggest environmental issues. A more recent survey

undertaken by the Commonwealth, Scientific, and Industrial Research Organisation (CSIRO, 2011) revealed that the majority of Australians (78%) believe that climate change is real and most (73%) believe that Australia should take action on it.

2.2.4 Community attitudes towards business organisations

The findings of the surveys discussed above indicate that Australians are concerned about the consequences of different environmental issues including pollution, global warming and bio-diversity. While life-styles change as people embrace different environment-friendly activities to address this concern, it is not surprising that they will also turn towards the business community to examine the environmental impacts of their activities and the subsequent management of those impacts. An interview-based study conducted by Lodhia (2014) indicates that responding to community expectations and community concerns is an important factor when Australian mining companies communicate their sustainability disclosures via the internet.

A survey conducted by the Responsible Investment Association of Australasia (RIAA) in 2007 showed that the market share of responsible investment portfolios has more than doubled over the past four years (0.7% in 2004 to 1.87% in 2007). The 2014 Responsible Investment Benchmark Report reveals that *'investment in ethical, socially responsible, impact investments, community finance and sustainability themed investment'* has increased in Australia by 51 per cent year on year to about $25 billion as at 31 December 2013 (RIAA, 2014, p. 4). The overall community attitude to responsible investment has also been reflected through the emergence and continual growth of environmental groups in Australia, such as Greenpeace, the Australian Conservation Foundation (ACF) and World Wildlife Fund (WWF)-Australia. These groups work to address environmental issues of concern by increasing community awareness and protesting against the anti-environmental activities of business organisations. In order to achieve their objectives, they create pressure by lobbying either the companies directly or through government bodies (Tilt, 1994).

In the 1960s and 1970s, while community and environmental groups were embracing the *'environmental movement'*, the reaction by companies internationally towards

environmental management was quiet *'indifferent'* and even *'hostile'* (Welford, 1999, p. 14). Most companies appeared to regard the community concern as a 'passing fad' and tended to adopt a 'do nothing' approach (Gray et al., 1993). Later on, in the face of an unwavering community stance towards the environment, companies eventually found themselves subject to increasing pressure to provide disclosures regarding environmental dealings (Henriques and Sadorsky, 1999).

Many companies started to provide environmental disclosures and adopt environmental management as a strategic tool to improve competitive advantage (Welford, 1999). In an Australian study carried out by Gibson and O'Donovan (2007) on corporate environmental reporting covering the period 1983-2003, the authors found an overall upwards trend in the volume of environmental disclosure in annual reports.

Wilmshurst and Frost (2000) conducted a mail survey of the chief financial officers (CFOs) of selected Australian companies and found that the factors perceived to be the most important in the decision to disclose environmental information by the CFOs were the shareholders' right to information, legal issues and community concern, respectively. Subsequent examination of annual reports in the study revealed that there was a positive association between management perception and the volume of environmental disclosures. This provides support for the legitimacy theory.

The KPMG Survey of Corporate Responsibility Reporting (2008) found that there has been an important shift in corporate sustainability reporting within the world's largest companies - from the 'exception' to the 'norm'. While an increase in corporate environmental disclosure in annual reports has been documented over time, in the absence of any explicit mandatory reporting standards, much of the disclosure has largely been regarded as discretionary, self-congratulatory and image creating rather than dedicated to accountability and transparency (Gray et al., 1993). The latest KPMG Survey (2013) revealed that there had been a *dramatic* increase (71% from 2011 to 2013) of sustainability reporting rates in the Asia Pacific region. The report concluded that the debate over *'to report or not to report'* is now over among the world's largest companies; however, the issue of *'what and how'* to report continues (KPMG, 2013, p. 11).

2.3 Accounting in socio-environmental contexts and environmental philosophies

2.3.1 Accounting in socio-environmental contexts

Goldberg (1965) as argued that there is always something beyond and behind measuring in the study and practice of accounting. While admitting that the purpose and the implication of accounting have not yet been fully realised, he emphasised that:

> The basis of accounting theory, as that of economic theory or legal theory lies not only in the institutional framework of a particular society, but also in social philosophy (Goldberg, 1965, p. 4).

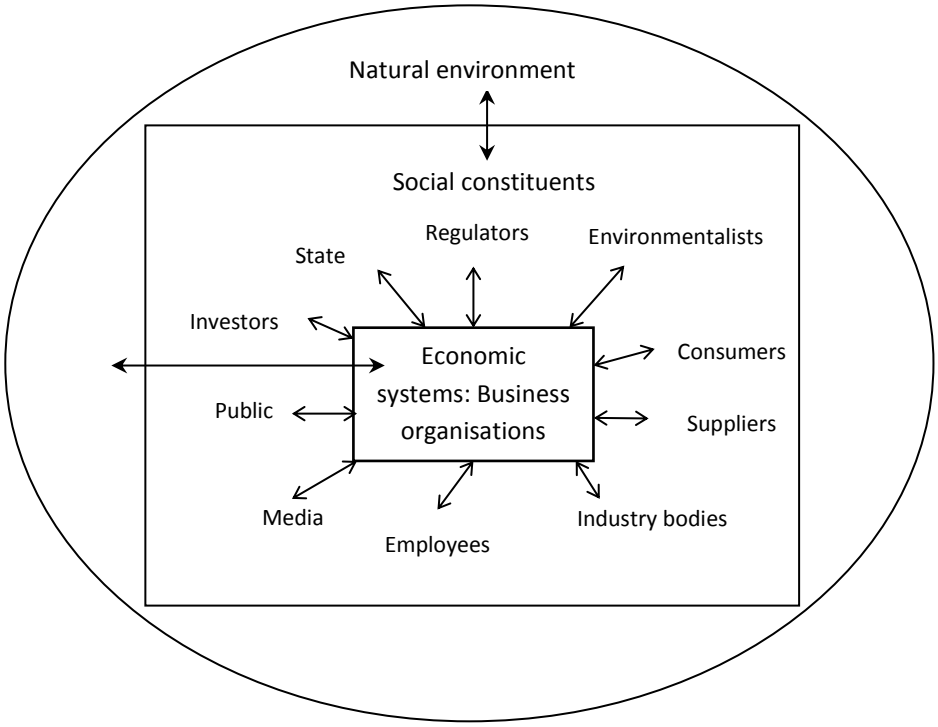
One of the important limitations of traditional financial accounting is its adherence to the 'entity assumption'. According to this assumption, an organisation is considered to be distinct from its owners/shareholders, other organisations and other stakeholders. The assumption also accepts the notion that any event or transaction not having direct impact on the organisation has nothing to do with accounting practice. Thus, the expenses related to the consequences of externalities (such as, air, water or soil pollution) are disregarded during the calculation of accounting profit.

The notion is further elaborated by Gray et al. (1996, p. 33):

> Traditionally, accounting attempts to restrict itself to a consideration of the relationships between companies and a very restricted set of stakeholders (typically, investors and other providers of finance).

However, accounting does not limit its interactions within the financial or economic domain alone. Rather, it goes through continuous human interactions with the systems that belong to social, political and ethical spheres and the system that includes elements of the natural environment other human being. Society, its culture and ethics impact on the structure and acceptable behaviour of the economic system considerably. And, both the economic and societal systems operate within the broader atmospheric system and share the natural

resources of the planet's physical environment (Gray et al., 1996). All of these interactions are depicted in Figure 2.1, which elucidates that the sound functioning of social and economic systems is not distinct from the safe existence of the natural environment.



Adapted from Gray et al., 1996, p.34

Figure 2-1: Interconnection between business, society and the natural environment

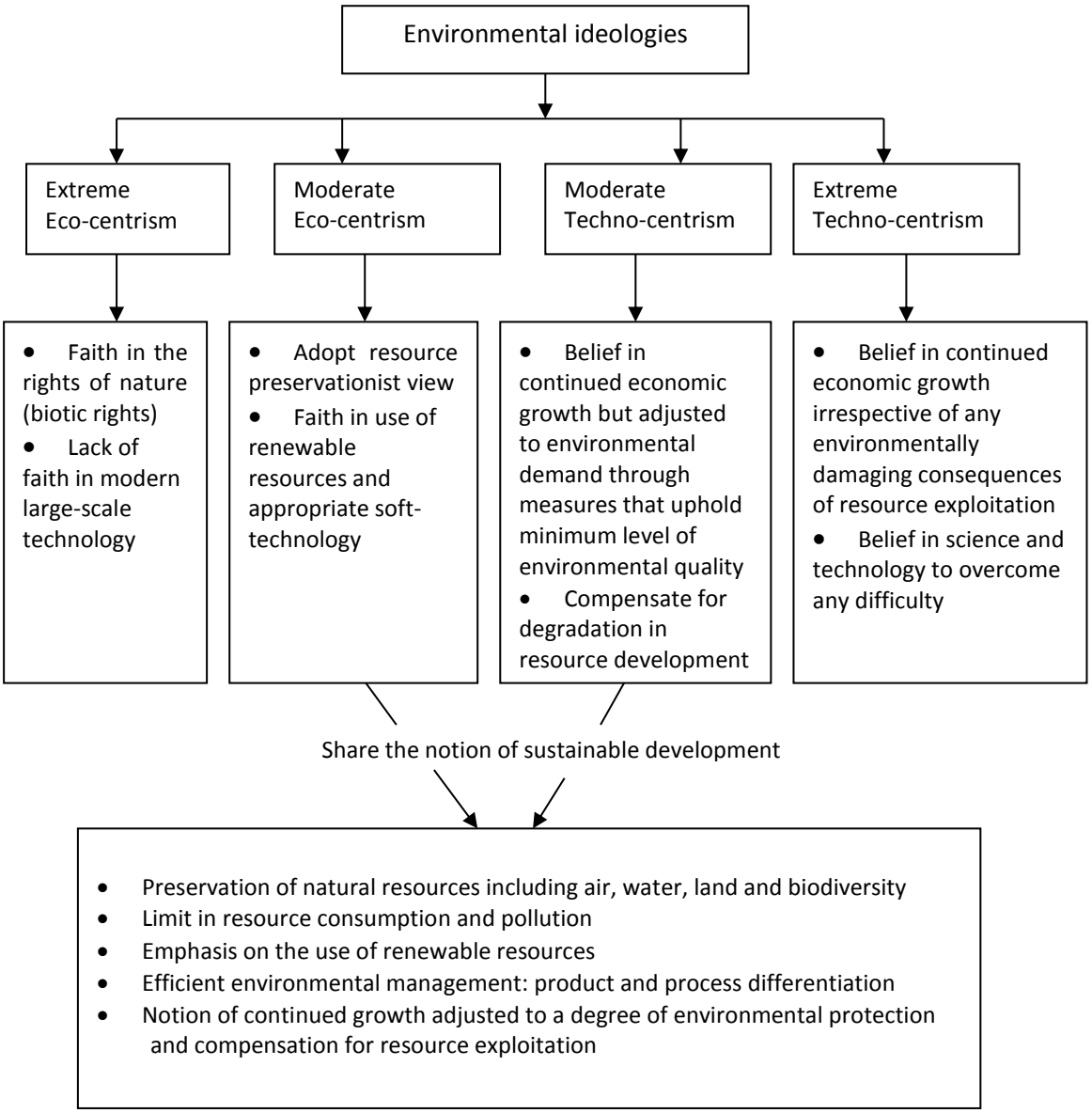
Organisations have to rely on the natural environment and social constituents to obtain the necessary resources and supports to continue operations. Ecological threats (such as resource depletion and climate change) and growing ecological awareness act as the main drivers for organisations to adopt eco-friendly innovative measures (Pellegrino and Lodhia, 2012; Przychodzen and Przychodzen, 2015). However, issues concerning utilisation of the natural environment and exploitation of natural resources in pursuit of business economic growth have not been addressed properly according to accounting standards and frameworks. This association warrants a philosophical understanding of environmental views as they currently exist, both in business organisations and in society as a whole.

2.3.2 Environmental ideologies and disclosures

People use their environmental ideologies while interacting with and justifying action toward the natural environment (Corbett, 2006). Therefore, it is assumed that such ideologies may have an impact on corporate exploitation of the natural environment and public expectations of organisations with regard to their environmental actions. There is no universally accepted paradigm of environmental ideologies about the usage of resources and the environment and the taxonomies of environmental beliefs also vary. However, environmental ideologies can be broadly located on a spectrum of extreme eco-centrism (also known as transformative ideologies) to extreme techno-centrism (also known as anthropocentrism). The moderate versions of these two extreme ideologies are grouped as moderate eco-centrism (also referred to as preservationist) and moderate techno-centrism (also referred to as conservationist) (Jones and Hollier, 1997; Corbett, 2006). The spectrum is shown in Figure 2.2, which is adapted from Jones and Hollier (1997).

Extreme eco-centrism entails deep faith in the rights of nature. The environment is the primary concern and eco-centrists see human beings as just one species in the ecological setting of Mother Nature. They demand recognition of bio-rights, the right of endangered species and unique landscapes to remain protected. This ideology does not have any faith in modern technological fixes of environmental problems; hence, eco-centrists reject the notion that survival is possible through minimal technological intervention. They urge for ‘de-development’ to bring the consumption pattern of the over-developed world in line with contemporary ecological realities. Extreme eco-centrists are referred to as radical reformists who believe in the redistribution of power in society; they insist on limits to growth.

As the extreme ecologists have a fundamental disagreement with the way businesses run their operations in the existing capitalist societal system, any subsequent performance disclosures derived from this system would be considered to be immaterial. Instead, they call for the adoption of a whole new approach to restrict the exploitative behaviour of corporations.



Adapted from Jones and Hollier (1997, p.4)

Figure 2-2: Philosophy of use of resources and environment

Extreme techno-centrism adopts a '*growth-oriented'* or '*resources-exploitative'* philosophy. Followers of this ideology view the scarcity of resources as a '*short-term disequilibrium'* while supply shortages lead to higher prices and stimulate a new round of innovative technological advancement, substitution or exploration of alternative sub-economic reserves (Jones and Hollier, 1997, p. 6).

However, it can be argued that market forces of demand and supply, or the techno-search for resource substitutes, require a substantial period of time to come into effect. By that time, extensive or irreversible environmental damage can occur. Because the extreme techno-centrists acknowledge the possibility of such environmental damage beforehand, it is assumed that the disclosures of environmental impact of business operation would be of little importance to them.

Moderate eco-centrists believe that the resource-base of the world has a finite carrying capacity beyond which it can no longer support its population and associated industrialisation and social welfare. They take a resource preservationist view and stress self-reliance and self-sufficiency. They urge adoption of new approaches to production, consumption, economic growth, technological development and the environment. Therefore, any environmental disclosure related to resources conservation, use of appropriate and soft technology, would carry significance for them. Information about the use of material from renewable and non-renewable resources, recycling activities including the use of recycled materials, product recyclability and recycling technology would be of importance to moderate eco-centrists.

Moderate techno-centrists, on the other hand, still believe in economic growth but in an environmentally accommodative manner. They believe in making concessions and necessary modifications in organisational operations, adjusted to the sensitivity of environmental concerns. They favour efficient environmental management systems and insist on more responsiveness and accountability of business organisations and political, regulatory and planning institutions (Jones and Hollier, 1997). Therefore, environmental disclosure on the efficient use of resources in terms of cost savings, product leadership in life-cycle assessment, damaging consequences of organisational operations, both in physical and financial terms, would be relevant to the moderate techno-centrist.

Within a pluralist society, individuals with different levels of environmental conscience and ideologies, ranging from extreme to moderate eco-centrists and moderate to extreme techno-centrists, have different levels of expectations from business organisations in relation to their environmental impacts. These expectations can be translated into pressures

or constraints imposed on firms, as individuals apply their environmental conscience as customers, investors, employees, voters, environmental lobby groups and regulators.

Thus, while the notion of sustainable development originally owes its intellectual roots to the 'limits to growth' doctrine described by Redclift (1987), both moderate techno-centrism and moderate eco-centrism share some notions of such a concept in terms of the emphasis on use of renewable resources and measures to protect the environment. However, it is clear that such a notion requires greater environmental commitment from industry and consumers, backed by tougher regulatory legislation and both financial and strategic support from the government (Jones and Hollier, 1997).

2.3.3 Examples of different environmental ideologies

Climate change is becoming a serious reality; *'no one in power wants to listen to climate sceptics any more'* (Ackerman, 2009, n.p.). It has been thought until recently that keeping the atmospheric concentration of carbon-dioxide (CO2) as low as 450 parts per million (ppm) would be enough to prevent dangerous levels of global warming. National Aeronautics and Space Administration (NASA) climate scientists (Hansen et al., 2008) claimed that according to paleo-climatic evidence, 450 ppm is the threshold or transition point for the earth to become ice-free, which means a catastrophic rise in sea levels and consequent flooding of all coastal regions.

According to the Global Monitoring Division of the National Oceanic and Atmospheric Administration (NOAA), in the United States (US) Department of Commerce (NOAA, Earth System Research Laboratory, n.d.), the atmospheric concentration of CO2 in January 2014 was around 398 ppm and rising. Since CO2 persists in the atmosphere for a long time, it is difficult to reduce the concentration in a short period. According to climate scientists, the world needs to stabilise CO2 concentration at 350 ppm to avoid any crisis in the future (Hansen et al., 2008). While the world is struggling to control its existing level of pollution, going back to 350 ppm would seem to be near impossible, as this would entail a massive reduction in industrial growth, with the associated downturn in the global economy.

Given such an environmental reality, individuals believing in different ideologies may respond differently. It might be the case that instead of sticking to a specific dogma (extreme to moderate eco- and techno-centrism), one might choose to move along the spectrum to take a more accommodative position, depending on the situation.

For example, scientists suggest that, *'a phase-out of coal use, massive reforestation and widespread use of technology could allow the world to achieve negative net carbon emissions by mid-century and reach 350 ppm by 2100'* (Ackerman, 2009, n.p.). Such a suggestion combines an eco-centric belief, in acknowledging a phase-out of coal use and massive reforestation, with a techno-centric focus by appreciating the necessity of widespread use of technology.

Under the *Clean Energy Act 2011*, the Australian government required that entities emitting more than 25,000 tonnes carbon-dioxide equivalents (CO2e) per year surrender emission permits (with the exception of transport and agricultural industries). However, the *Clean Energy Act* was repealed in 2014, taking effect on 1 July 2014. Nevertheless, it is stated that the repeal has no effect on the reporting obligations imposed by the *National Greenhouse and Energy Reporting Act 2007* on liable companies. These companies include those that are direct emitters of more than 25,000 tonnes of CO2e (Clean Energy Regulator, 2014). These actions suggests that, although the government is not adopting eco-centric views by phasing out the coal industries, by imposing a new tax system it is attempting to take some compensatory actions to reduce emissions. This demonstrates a moderate techno-centric approach.

However, the Australian Coal Association warned that the government's action will likely result in the closing of 16 mines prematurely, cost Australia about 3,300 jobs in New South Wales (NSW) and Queensland and a major portion of its $55 billion a year coal export revenue (Stevens, 2009). Being exporters, coal industries are, in general, price takers not price makers, so they are not able to transfer tax costs to their foreign customers unless the majority of international coal industries face similar constraints.

Considering this situation, the visiting CEO of Anglo American Metallurgical Coal, Cynthia Carroll, proposed that the 'fugitive gases' (emitted during digging up coal only apart from coal burning) should be excluded from the Carbon Pollution Reduction Scheme (CPRS) until technology allows the industry to abate them fully (Stevens, 2009). The CEO of MacArthur Coal, Nicole Hollows, also railed against the inclusion of fugitive coal emissions stating that there is no viable technology so far to reduce such emissions (Chambers, 2009). Such a 'do-nothing-but-allow-emissions' approach for the sake of the economy is an example of the extreme techno-centric perspective.

Further, the executive director of the Minerals Council of Australia (MCA), Miechell Hooke, holds a strong view in favour of adopting clean coal technology instead of the CPRS (Hextall, 2009). He stressed that clean coal technology would be the better answer to climate change rather than the CPRS, given that 85 per cent of Australia's electricity generation is coal-fired compared with 48.6 per cent in the US. Clean coal technology represents a range of processes being developed to reduce the environmental impact of coal-burning power stations and includes carbon capture and storage (CCS) and removing impurities before burning.

However, those technologies, including CCS, are not yet proven on a commercial scale. Although such technologies have been tested successfully on a small scale, air capture technology is at least five years away from being tested on a larger scale and, after that, could take at least two decades before it could be widely deployed (Biello, 2009). The effectiveness of such technologies also suffers through scepticism. According to John Shepherd, an Oceanographer who led the Royal Society study of air capture and other geo-engineering technologies, '*You need 30 years of development time and 100 years of deployment before you start to see the effect you're looking for*' (cited in Biello, 2009, n.p.). In addition, CCS requires enormous expenditure. Even after that, scientists will face a problem of 'what to do' with the CO2 captured by CCS during the process of energy production from coal (Biello, 2009). Hence, the idea of relying on such remote clean coal technology instead of any rapid action seems to represent an extreme techno-centric view.

Greenpeace International and the European Renewable Energy Council (EREC) refuted the idea of job losses, as claimed by those in favour of coal industries. They argued that a switch from coal to renewable electricity generation would not only prevent 10 billion tonnes of CO2 emissions, but would create 2.7 million more jobs by 2030 than if business continued as usual (de Morsella, 2009). A report on the prospect of 'green jobs', based on Greenpeace's Energy Revolution and research jointly conducted by Greenpeace International and EREC (2009), revealed that '*by 2030, 6.9 million people could work for the renewable power industry, and another 1.1 million jobs would be created due to higher efficiency in electrical applications*' (de Morsella, 2009, n.p.). Such findings demonstrate a combination of faith both in moderate eco-centrism and moderate techno-centrism. It promotes the prospect of the renewable energy industries through technological development as an alternative to the traditional coal-fired power stations. Further, it shows the hope of new job creation in the renewable power industry.

Finally, when it comes to government policy, a comment made by the Labour Resources Minister of Australia, Mr Martin Ferguson in 2009 is significant (Taylor, 2009). While talking about the prospect of using highly expensive and yet to be proven clean coal technology in several prospective sites in Victoria, Queensland and Western Australia, Ferguson stated that Australia had not '*put all its eggs in one basket'* and was also investing in the development of large-scale solar, geo-thermal, wave and biomass power in the process of trying to develop every possible reliable base-load energy option (Taylor, 2009, n.p.). Such a comment indicates that it is possible to adopt simultaneously different environmental ideologies along the spectrum, depending on the situation.

2.4 Overview of research in the area of corporate environmental reporting

During the past few decades, accounting researchers have been enthusiastic in analysing the annual report disclosures of environmental information from a number of perspectives. However, a review of literature on contemporary sustainability reporting undertaken by Hahn and Kühnen (2013, p. 14) suggested that research on reporting quality and stakeholders' perceptions is '*under-represented*' in the literature. In this section, an overview of research in the area of corporate environmental disclosures is provided under

four sub-headings: 1) the quality of environmental disclosures and theoretical underpinnings; 2) the use of content analysis in examining the quality of environmental disclosures; 3) the role of connotative analysis in exploring the quality of disclosures; and 4) user information needs relating to environmental disclosures.

2.4.1 The quality of environmental disclosures and theoretical underpinnings

Earlier studies in the genre of corporate sustainability reporting attempted to explain the nature and extent of the voluntary disclosure of sustainability information from an organisational legitimacy perspective (Trotman and Bradley, 1981; Guthrie and Parker, 1989; Deegan and Rankin 1996; Neu et al., 1998). Trotman and Bradley (1981) found that social disclosures, including environmental information, are influenced by company size, systematic risk, social constraints and management decisions. However, in this study, types of disclosure are not classified according to their nature, for example, financial/non-financial, quantitative/descriptive or environmental/community based. Instead, Trotman and Bradley preferred to adopt an aggregated approach. From an international perspective (the US, the UK and Australia) and focusing mainly on environmental, human resources and community disclosures, Guthrie and Parker (1989) concluded that high disclosures are made as reactions to economic, social and political pressure. In a longitudinal study analysing the annual reports of an environmentally sensitive company (BHP Billiton Limited (BHP)), Deegan et al. (2002) documented a positive relationship between the level of disclosures and the high volume of positive disclosures. The authors also claimed that despite the majority of the media articles unfavourably portraying the company's impact on society and the environment, significant quantities of the annual report disclosures were positive in nature, providing support for the legitimation motives in the company's social disclosures.

Focusing specifically on environmental disclosures in Australia, Deegan and Gordon (1996) investigated the objectivity and trend of corporate environmental disclosure practices and the association of disclosures with the concerns of environmental groups. The authors concluded that in an unregulated environment, management would be less than objective in their environmental disclosure practices. This lack of objectivity seems to increase as the community concern and environmental sensitivity of the industry increases. These findings

tend to provide support for legitimacy theory in that firms use environmental disclosures as a legitimacy tool in alleviating community concerns. Later, Deegan and Rankin (1996) undertook another study from a narrower perspective to investigate the environmental disclosures of companies that had a history of contraventions of environmental regulation and faced subsequent prosecution. The authors posited that the prosecuted firms provided more positive disclosures to divert public attention from the proven fines and, hence, attempt to offset, at least partly, any legitimacy threat resulting from prosecutions.

Meanwhile, based on the assumption that environmental disclosures result from the legitimation tactics chosen by the managers, O'Donovan (2002) examined: a) whether there is any possible link between a potential legitimacy-threatening environmental issue/event and managers' choice of legitimacy tactics with regard to environmental disclosures; and b) whether the purpose of the choice of tactics is to gain, maintain or repair legitimacy from an operational point of view. The choices of tactic used in the study are: '*avoid public debate, attempt to alter social values, attempt to shape perception of the organisation and conform to public values'* (O'Donovan, 2002, p.348). The legitimation disclosure matrix derived from the results of the study showed that *'attempt to alter social values'* was chosen by the managers as a legitimation tactic over the other three tactics irrespective of the significance of the issues/events given. The overarching conclusion was that environmental disclosure decisions were made based on the desire to present corporations in a positive light. As in prior studies (Deegan and Gordon, 1996; Deegan and Rankin, 1996), O'Donovan's work raised questions about the value of voluntary environmental disclosures in the annual report.

Gibson and O'Donovan (2007) focused on the practical analysis of the observed phenomena related to the annual report disclosure of environmental information in an attempt to plot a trend in reporting behaviour. Content analysis was used to measure the information provision. The information was categorised into financial, quantifiable non-financial and descriptive. The quantity of the total information and each category was measured as a proportion of each page, a method which the authors preferred to word counts and number of sentences. The study indicated that an increasing number of companies were disclosing environmental information and the relative volume of such information had increased

across all categories, with most in the descriptive category and least in the quantifiable non-financial information category. However, no attempt was made in this study to define and measure the quality of the disclosures.

The quality issue was addressed, although in a limited way, in a recent Australian study undertaken by Guthrie et al. (2008). In this work, the authors examined the quality of social and environmental disclosures of companies that belonged to the Australian Food and Beverage Industry (AFBI) in 2004. The quality of disclosures was measured against an industry-specific reporting framework (IRF). The IRF is developed on the basis of the social and environmental issues addressed in publicly available reports of AFBI associations and other relevant bodies, in addition to more universal reporting requirements (GRI, 2006). The authors concluded that the sample companies reported more on industry-specific issues than general social and environmental issues and tended to utilise corporate websites more than the annual report for their social and environmental reporting. The strength of this study is that it pointed out the limitations of using a general 'one-size-fits-all' framework and approach. Instead they devised a new method to analyse the quality of voluntary environmental disclosure by constructing an IRF. While the study was limited to a single industry, the suggested research method would help future researchers to examine the quality of environmental disclosures from a multiple-industry perspective.

The focus of the studies discussed above was on measuring the volume of the environmental disclosures based on their broad, arbitrary nature and types and on arguing that such disclosure represented a tool for explaining organisational legitimacy. Such an explanation provides support for legitimacy theory in that organisations provide increased amounts of environmental disclosures (which are mostly positive in nature) in an attempt to divert or alter societal perceptions and, thereby, tend to secure a social licence to operate. However, legitimacy theory is considered a broad, macro theory that can explain organisational legitimacy only to a certain extent (Tilling and Tilt, 2010). For example, at broad levels, the theory explains how institutional structures (e.g., governments and businesses) and organisations under such structures gain and maintain acceptance from their respective society at large. Hence, from a broad perspective, the theory can be used *'fairly loosely'* in explaining organisational behaviours (Tilling and Tilt, 2010, p. 57). However,

organisational legitimacy is not a static phenomenon. Instead, it can navigate through a number of phases. Such legitimacy phases include the *establishing, maintaining, defending* and *extending* phases of legitimacy; at any point in time, organisations may come across any of these phases. Lindblom (1994) suggested that an organisation can adopt the following legitimation techniques, depending on the phase of legitimacy in which it is positioned:

1. Change the organisational behaviour according to the societal expectation.
2. Change the societal expectation by creating a false impression but not actually changing its behaviour.
3. Divert the attention of society away from the main issue of concern to other activities that are perceived to represent good behaviour (e.g., philanthropy and employment).
4. Undermine the issue of social concern by highlighting its impracticality.

Most of the literature discussed earlier in this section revolved around the second and third techniques, using legitimacy theory to conclude that organisations provide more disclosures, which are mostly positive in nature, when faced with unfavourable media attention or litigation. These studies focused on the firms that are in the *defending* and/or *maintaining* phases of organisational legitimacy. Hence, the consideration of the *extending* phase of legitimacy is omitted in these studies. However, in more recent studies it is stressed that environmental management strategies are no longer limited to risk reduction and mere compliance to social licence (Berkhout, 2014). Instead, firms tend to show over-compliance to environmental regulation as a competitive strategy by developing innovative capabilities and thereby '*bolstering social licence to operate'* (Ford et al., 2014, p. 212). In an empirical survey study based on 290 firms operating in the upstream oil and gas industry in Australia, Ford et al. (2014) explored how regulation affects innovation in the Australian oil and gas industry. The findings of this study suggest that regulation drives product and service innovation. The findings also suggest that an increasing number of firms over-comply with regulation to gain a competitive advantage by '*innovating in an environmental manner, while performing well on projects'* (Ford et al., 2014, p. 212). Such a finding can be traced back to the *extending* phase of firms' legitimacy.

The *extending* phase of legitimacy incorporates the idea of legitimacy as a resource. In this phase, an organisation tends to out-perform its societal obligations through the adoption and implementation of environmentally friendly innovations and technologies. Such activities boost organisational legitimacy and, thereby, secure its long-term survival and growth. Hence, organisations in the *extending phase* intend to inform their relevant public of their environmental initiatives and performance by providing *specific* disclosures that cannot be imitated by a non-performing company. Communication of such environmental disclosures compared to the general reference to the claims of environmental commitment might not be limited to a mere legitimacy tool for dealing with legitimacy threats; rather, they might have a more specific motivation, for example, demonstrating the competitive value of the firm.

Hahn and Kühnen (2013) identified the failure to use theories of competitive advantage, such as RBT, in ascertaining the quality of disclosure as a current research gap. However, another stream of environmental literature has evolved that attempts to view organisational legitimacy as a resource and advocates the theory of competitive advantage in explaining the quality of environmental disclosures within the bounds of organisational legitimacy. For example, Menguc and Ozanne (2005) documented a positive relationship between natural environmental orientation and firms' economic performance. Relying on the natural resource-based theory of the firm, the authors proposed three constructs for natural environmental orientation: environmental entrepreneurship; corporate social responsibility; and commitment to the natural environment. They developed a survey questionnaire seeking feedback on these three constructs from the CEOs of 140 Australian manufacturing firms. The findings of their study revealed that environmental constructs have significant positive relationships with the net profits after tax and market share of the companies. The authors asserted that adopting a range of environmental initiatives through developing skills, knowledge and capabilities in managing environmental issues would give a firm a competitive advantage. Hence, in explaining the impetus for environmental initiatives, including disclosures, Menguc and Ozanne (2005) moved away from the broad notion of a legitimacy threat. Rather, they explained the *environmental orientation* of firms from a resource-based perspective as a competitive tool that creates firm value and eventually contributes to the enhancement of firm legitimacy.

With a sample of 195 United States (US) firms, Al-Tuwaijiri et al. (2004, p. 448) conducted a cross-sectional study to address the question of – '*is going green good for profits?'* The authors offered an integrated analysis of the inter-connectedness of environmental disclosures, environmental performance and economic performance through a simultaneous equation model. The environmental disclosures were examined by an index-based content analysis approach and the focus of the analysis was limited to the specific and quantifiable disclosures related to toxic waste release, clean-up responsibilities, fines and occurrence of spills. The authors found a positive relationship between environmental performance and quantifiable environmental disclosures. The study also showed a positive relationship between environmental and economic performance and, hence, provides supports for the notion that pro-environmental initiatives promote firms' competitive advantage. The authors concluded that the findings of their study are consistent with the argument that: '*innovative solutions to reduce the inefficiencies associated with pollution promote both environmentalism and industrial competitiveness simultaneously*' (Al-Tuwaijiri et al., 2004, p. 466).

In examining the relationship between the discretionary disclosures of firms and their environmental performance, Clarkson et al. (2008, p. 309) identified two types of disclosure: a) '*credible direct disclosures'* that are based on '*hard, objective measures'* (numerical and verifiable and, hence, contribute to reliability); and b) '*soft claims'* that refer to general claims of environmental commitment without any *objective* evidence of such commitment. The study involved a sample of firms from the five '*most polluted industries'* in the US. The analysis of the discretionary environmental disclosures was based on the criteria provided in the GRI. The environmental performance was measured by a ratio that was calculated as the amount of toxic release per thousand dollars of sales for each of the sample companies. The actual pollution discharge data obtained from the US Environmental Protection Agency's (USEPA) Toxic Release Inventory database were used to calculate the amount of toxic release for each company. The findings of Clarkson et al. (2008) revealed that firms with less toxic release ratio provide more '*credible*' discretionary disclosures than the firms with higher toxic release ratio. They concluded that such a finding provides support for economic incentive disclosure theory, as such *'credible'* environmental disclosures promote

competitive advantage by placing a reporting firm in an environmentally favourable position. Alternatively, they found that the '*soft claims of being committed to the environment*' are mainly made by firms that have high toxic release ratio and hence, '*whose environmental legitimacy was threatened*' (Clarkson et al. 2008, p. 325).

Based on the above literature review, it is suggested that the application of legitimacy theory at a broad institutional level can explain the motivation for environmental disclosures if the reporting firms remain in the *defending* and/or *maintaining* phases of organisational legitimacy. Such a theory also supports volume-based analysis of the quality of environmental disclosures using broad and arbitrary sets of qualitative criteria such as monetary/non-monetary, narrative/numerical, general/specific disclosures, among others. However, in order to understand the environmental disclosures of firms in the *extending* phase of organisational legitimacy, such an analysis is ineffective because firms in this phase of organisational legitimacy are likely to address and often outpace their environmental obligation by undertaking innovative initiatives and launching environment management systems. Therefore, these firms, as suggested in signalling theory, intend to provide specific disclosures on their environmental performance and management initiatives. However, a firm which does not undertake pro-environmental initiatives is not able to provide such disclosures. Because such disclosures are used as a competitive tool in terms of improving the reputation of firms, the motivations for providing these disclosures cannot be addressed only by the legitimacy theory at the institutional level. Instead, analysis warrants a more refined theory within the setting of organisational legitimacy where organisational capabilities of managing environmental issues can be deemed as an inimitable resource. The latter could address the quality of environmental disclosures in terms of *what* is disclosed in relation to environmental impacts of business operations (e.g., pollution and resource consumption) and their management (e.g., risk identification, setting targets and mitigation initiatives). Analysing environmental disclosures by addressing such issues is important as this denotes the quality of environmental disclosure in communicating effectively a firm's environmental performance. Providing disclosures that address such issues requires an entity to undertake environmental initiatives and implement environmental management systems for the assessment, measurement and monitoring of risks and preventative actions. Further, it is emphasised that in order to examine the quality of such environmental

disclosures, an enhanced content analysis tool is required to extract the data from the reported disclosures in terms of information content and quality over and beyond the volume-based content analysis approach. While information content and quality of environmental disclosures have been examined in many index-based studies (Wiseman, 1982; Cormier et al., 2005; Guenther et al., 2007; Guthrie et al., 2008; Brammer and Pavelin, 2008), none adopt an established disclosure framework of qualitative characteristics that is internationally recognised. Further, addressing the qualitative characteristics in environmental reporting in terms of relevance, reliability, comprehensibility, comparability and timeliness of the indicators has been identified as a significant gap in the existing literature (Guenther et al., 2007).

2.4.2 The use of content analysis in examining the quality of environmental disclosures

The majority of prior studies in environmental accounting research have adopted the mechanistic approach to content analysis, with some undertaking interpretative approaches. Other studies have used a mixed quantitative-interpretative approach where the interpretations are predominantly denotative. Table 2.1 provides a summarised sample of studies that have adopted such a mixed approach.

Table 2.1: Prior environmental accounting studies showing a range of approaches to content analysis

Article	Interpretative	Quantitative
Wiseman, 1982	Disclosure per 'categories and item of information', e.g., expenditures, litigation, pollution abatement and others Disclosure per 'degree of specificity' in each category	Frequency Frequency and scoring
Toms, 2002	Disclosure by a number of 'quality signals', such as general rhetoric, policy, implementation and monitoring with and without published results	Using a rating scale
Hasseldine et al., 2005	Similar to the method followed in Toms (2002)	Counting number of sentences
Cormier et al., 2005	Similar to the method followed in Wiseman (1982) Disclosure by categories Disclosure per 'degree of specificity' in each category	Frequency and scoring
Brammer and Pavelin, 2008	Disclosure per selected quality 'indicators', such as policy, initiatives, improvement, audit and target	Frequency
Beck et al., 2010	Content per theme, e.g., pollution, energy, environmental risk etc. Disclosure content per character (type 1, type 2 etc.)	Number of words per theme Number of disclosures per character

The mechanistic approach involving a frequency count through a dichotomous index as a basis of data capture was regarded as the simplest form of content analysis by Abbott and Monsen (1979). Here the presence of a disclosure item is recorded with a score of 'one' and those not present with 'zero'. Although such an approach is regarded as purely mechanistic, it is argued that it has at least some interpretative element in the ability to inform the level of disclosure at a more complex level through sub-categorisation of disclosure items (Beck et al., 2010).

Wiseman (1982) was one of the early researchers to consider the quality of environmental disclosure through the adoption of a mixed approach. Wiseman (1982) employed a disclosure index consisting of eighteen items grouped under four main categories. The presence or absence of disclosures was rated for quality according to the degree of specificity of each of the information items (e.g., quantitative/non-quantitative specific and general disclosure). The weighting used by Wiseman is shown in Table 2.2.

Table 2.2: Weighting by Wiseman (1982)

Disclosure type	Score
Monetary or quantitative	3
Non-quantitative specific	2
General	1
No disclosure	0

Freedman and Jaggi (1988) used a similar approach while analysing the quality of pollution-related disclosure, adopting an indexing and rating scheme. However, the introduction of arbitrariness to devise a scoring scheme and the subjectivity involved in interpreting the text to assign a score reduced the reliability and the resilience of the process in these studies.

Toms (2002) adopted a mechanistic approach to content analysis that was different to those looking at the amount of disclosure based on word/sentence/page counts in order to capture the quality of disclosure in corporate reports. The scoring system in Toms (2002) was based on the assumption that specific, quantified disclosures bear greater credibility than the 'cheap rhetoric' disclosures no matter how large their volume is, as the latter can be made without equivalent commitment or practice. Such an assumption reflects the work of Deegan and Gordon (1996) and Deegan and Rankin (1996), which indicated that in the absence of any environmental reporting legislation, companies' disclosures tend to be increased in amount and 'self-laudatory' even in the presence of negative environmental performance. Table 2.3 presents the scoring system for quality analysis used by Toms (2002).

Table 2.3: Weighting by Toms (2002)

Disclosure type	Score
No disclosure	0
General rhetoric	1
Specific endeavour; policy only	2
Specific endeavour; policy specified	3
Implementation and monitoring; use of targets, results not published	4
Implementation and monitoring; use of targets, results published	5

While Toms (2002) adopted quantitative content analysis to analyse the quality of disclosure, he completely ignored the volume of disclosures. This appears to be contrary to the main assumption behind the use of the quantitative approach as an empirical research

tool, which associates volume of disclosure with the importance of a disclosure (Unerman, 2000). Two major limitations restrict the strength and applicability of the method followed by Toms (2002). First, disclosures were identified with reference to the content of the whole report instead of individual items or categories of environmental disclosure. Second, the arbitrary setting of boundaries around some of the categories increases the level of subjectivity in scoring the disclosure. For example, the delicate distinction between concepts of 'policy only' and 'policy specified' would lead different coders to elicit the underling meanings from a narrative differently, and to interpret and score accordingly.

However, a major conceptual drawback appears to be associated with the rating of the disclosure along a numerical scale (Jones and Alabster, 1999). On a numerical scale, each two successive points has the same distance. But the variables (e.g., environmental disclosure categories) under study that are to be scored are categorical and hence, their importance or weight can vary unevenly. Therefore, using a numerical scale to score such variables is conceptually inappropriate for arithmetical addition or parametric statistical analysis (Jones and Alabster, 1999). Again, such scaling tends to create an average or ranking that fails to demonstrate specifically which qualitative criteria are missing or addressed (Kurt and Munis, 1998).

In a recent study, Beck et al. (2010) applied a modified approach, known as the 'consolidated narrative interrogation approach', which the authors claimed to be superior to the pure mechanistic or pure interpretative approaches. It involved three steps. First, each disclosure was interrogated for a sub-category of an environmental theme to which it belongs. The numbers of 'phrases' or 'clauses' were used as the unit of analysis and unit of measurement, which refers to a *'group of words containing a single piece of information that was meaningful in its own right'* (Beattie and Thomson, 2007, p. 142). Second, following categorisation the disclosures were evaluated for information content along an information content scale to indicate the depth or detail of disclosure. This is shown in Table 2.4.

Table 2.4: Coding on the information content scale by Beck et al. (2010)

Definition of each type	Disclosure type
No disclosure	0
Related to category definition; pure narrative	1
Related to category but provide details; pure narrative	2
Related to category in numerical way; pure quantitative	3
Related to category in numerical way with qualitative explanation; narrative and quantitative	4
Any numerical disclosure to the category including qualitative explanation demonstrating year comparison; narrative, quantitative and comparable	5

Unlike prior studies, where the disclosures were allocated scores based on the level of detail, this study coded the disclosures under specific types (e.g., type 1 or type 2). Thereby, Beck et al. (2010) overcame the conceptual drawback identified by Jones and Alabster (1999) as discussed above. In the final step of their study, volumetric counts were recorded in phrases per content sub-category, as well as aggregated word counts per coded sub-category.

While attempts have been made in the extant environmental accounting research to improve content analysis in order to examine the quality of disclosures, there is still considerable scope for improvement. The studies mentioned under this section analysed the quality of disclosures using arbitrary determinants for capturing quality, such as narrative versus numerical and general versus specific. Quality of environmental disclosures is not examined in these studies as per the quality attributes prescribed in the environmental and accounting regulatory frameworks. This has been identified as a significant research gap in the literature (Guenther et al., 2007). In this project, attempts have been made to address this gap through the development of a tool that incorporates common quality attributes as suggested in the established regulatory frameworks and guidelines.

2.4.3 The use of connotative approach in analysing environmental disclosures

In addition to the denotative-interpretative approach, the importance of connotative analysis or a meaning-oriented approach has also been documented in accounting literature (Merkl-Davies et al., 2011; Beattie, 2014). Such an analysis seeks to answer questions such as how managers communicate, what assumptions they make and what they try to

accomplish. Corporate reports are regarded as an important means of communication to inform stakeholders about organisational strategies and actions and to create a positive image of organisation (Merkl-Davies and Koller, 2012). Critical discourse researchers argue that managers tend to secure private interest by deliberate use of texts, graphics and pictures to communicate a favourable representation of organisational activities (Mäkelä and Laine, 2011). The types of corporate reports studied using a connotative interpretative approach include CEO letters addressing shareholders (Craig and Amernic, 2008; Mäkelä and Laine, 2011), stand-alone environmental and social reports (Higgins and Walker, 2012; Laine, 2009) and annual reports, particularly chairmen's statements within those reports (Merkl-Davies et al., 2011).

Prior research on impression management based on economic theories highlights that corporate narratives are used as impression management tools to serve managers' self-interest by advancing positive corporate outcomes and/or obscuring negative corporate outcomes (Beattie and Jones, 2000; Merkl-Davies and Brennan, 2007). However, using a social psychology perspective, Merkl-Davies et al. (2011) suggested that impression management techniques are also used in corporate narratives to provide a retrospective interpretation of events that have already occurred or of information already released in the market. Merkl-Davies et al. (2011) argued that because corporate reports are the outcome of managements' decision behaviour and reflect managerial actions, managers are likely to engage in impression management in corporate narrative documents to persuade shareholders and stakeholders in a favourable way. Taking a legitimacy and institutional theories perspective, Laine (2009) conducted a longitudinal study using interpretative content analysis of the environmental disclosures of a single company over 34 years. The study showed how environmental disclosures were used as rhetorical devices to represent the company in a certain light, thus conforming to social expectation. The author argued that corporate rhetoric changed over the period in response to the social and institutional pressure and stressed that '(*environmental) disclosures are not really about the corporate activities, but about representing these activities'* (Laine, 2009, p. 1048).

Mäkelä and Laine (2011) argued that improving the quality of corporate disclosures warrants exploring the underlying ideological positions of senior management. They

indicated that corporate disclosures and CEO letters in particular, would serve as *'ideological weapons'* in reinforcing a particular world view of major dominant social paradigms over the new environmental paradigm located in the ideological debate of 'environment' versus 'development' (Mäkelä and Laine, 2011, p. 228). The study showed that the CEO letters are permeated with the linguistic features of *'legitimation, dissimulation, unification and reification'* to represent the operations of their respective companies as *'beneficial to the society at large'* (Mäkelä and Laine, 2011, p. 228). Incorporating aspects of persuasion from impression management and strategic communication studies, Higgins and Walker (2012) undertook a rhetorical analysis of the social and environmental reports of three New Zealand companies. The study shows how persuasive strategies are constructed in activating the popular *'middle ground discourse of responsible and sustainable business'* in the rhetoric of social and environmental reports (Higgins and Walker, 2012, p. 194).

While analysing the visual disclosure strategies adopted by more and less sustainability-driven companies, Hrasky (2012) documented that those driven more by sustainability produce more graphs than those companies driven less by the issue, but each used a similar number of photographs. The Australian Sustainability Asset Management (SAM) Sustainability index (AuSSi) was used in Hrasky (2012) to distinguish the two groups of more and less sustainability-driven companies. The study conforms with the notion that graphs with more numerical data are likely to be more reflective of the underlying environmental activities and impacts. Consequently, they are regarded as a tool to construct a credible account of environmental responsibility (Dilla and Janvrin, 2010; Hrasky, 2012). Alternatively, the use of photographs by less sustainable groups follows the notion that imagery can be exploited '*in pursuit of legitimation … regardless of actual implementation of environmentally responsible actions*' (Hrasky, 2012, p. 154).

The studies discussed in this section highlight the importance of understanding managers' interpretations and representations of environmental responsibility in a range of corporate narrative documents. Therefore, a connotative analysis was undertaken in this study with a specific focus on linguistic features (e.g., types of phrases, tone and expression) and photographic features (e.g., graphs and pictorials). It was envisaged that a connotative

analysis would complement the content analysis (based on quality coding tools) by overcoming the predominantly quantitative nature of the latter.

2.4.4 User information needs relating to environmental disclosures

Motivation for providing high quality disclosures is also associated with the users' need and perception of quality for such disclosures (Solomon and Solomon, 2006; Iatridis, 2013). A number studies have investigated the users' need for environmental disclosures, including that of investors (Azzone et al., 1997; Deegan and Rankin, 1997; de Villiers and van Staden, 2010; Huang and Kung, 2010). Early survey studies conducted by Benjamin and Stanga (1977) (which included bank loan officers and financial analysts) and Buzby and Falk (1979) (which involved mutual fund presidents) indicated that respondents put little or no weight on the social responsibility information in their investment decision-making processes. However, studies conducted in the 1990s suggest that, in general, investors found environmental information important (Milne and Chan, 1999). For example, the survey results of Epstein and Freedman (1994) showed that individual shareholders demanded information relating to product safety and quality and environmental activities. More recent studies (Clarkson et al., 2010; Huang and Kung, 2010; Iatridis, 2013) have shown that the capital market values voluntary environmental disclosures. Using a sample of firms from the most polluting industries in the US, Clarkson et al. (2010) asserted that investors appear to use toxic emissions disclosures to assess risks and potential future environmental liabilities that are not disclosed in the financial reports. Examining a sample of Taiwanese firms, Huang and Kung (2010) suggested that managers of firms with a larger capital market share assume that shareholders pay attention to the environmental disclosures and, hence, are more willing to disclose environmental information to the public on a voluntary basis. While analysing environmental disclosure quality and how this relates to environmental performance and value relevance, Iatridis (2013) found that firms that provide high quality environmental disclosures have less difficulty in accessing the capital market.

In a survey-based study, Deegan and Rankin (1997) investigated whether various classes of annual report users considered corporate environmental information in their decision-making. Overall, a significant proportion of respondents believed that environmental issues

were material to decision-making, with the strongest support coming from oversight organisations (83%) and shareholders (72.4%). However, rankings of information items showed that, in general, environmental information was not considered to be of primary importance. Azzone et al. (1997) conducted open-ended interviews with eight stakeholder groups, including academia, local authorities, environmental non-government organisations (NGOs), businesses, financial institutions, regulators and employees. They concluded that local authorities, environmental NGOs, academia, businesses, the financial community and regulators prioritise information relating to environmental management systems, financial considerations and the health and safety aspects of a company. In a more recent study, de Villiers and van Staden (2010) extended their previous research by conducting a comparative survey of individual shareholders regarding corporate environmental disclosures in three countries: Australia, the UK and the US. The findings revealed that respondents preferred environmental information related to risks, impacts, policy, and performance against measurable targets and costs. The respondents indicated that they demanded these disclosures as they believed managers should be accountable to shareholders for the environmental impacts of company operations. The results of the survey also showed that in all three countries, shareholders preferred compulsory environmental disclosures mandated by regulations, with these presented in a separate section in annual reports.

Overall, the aforementioned studies indicated shareholder enthusiasm for corporate environmental information, their choice of reporting media and a call for regulation requiring mandatory environmental disclosures. However, little progress has been made in the existing survey studies to engage respondents by presenting event-based scenarios that would have allowed them to realise the dilemmas that managers usually confront in making environmental management decisions. While dilemma studies are prevalent in managerial decision-making studies (Woiceshyn, 2011; Litschka et al., 2011), few studies address the dilemma around the uncertainties associated with the risk and benefits of undertaking environmental initiatives (Aitken et al., 2011). It is argued that to provide a meaningful response about an environmental problem one should know the contextual factors that generate such a problem. This will allow one to answer the question: what does a person like me do in a situation like this? (Aitken et al., 2011). Hence, inclusion of contextual factors

in survey questionnaires is important as this allows respondents to analyse case studies and the context in which managers make decisions regarding the management of environmental impacts. It also allows respondents to deliberate over the dilemmas prior to indicating their preferences, instead of merely ticking 'yes' or 'no' in response to stand alone questions regarding the importance of particular environmental information. This is addressed by incorporating event-based scenarios while designing a questionnaire to explore investors' information needs and perceptions of quality in environmental disclosures.

2.5 Chapter summary

This chapter has highlighted the environmental and economic significance of the resources sector in Australia. It has been argued that individuals sharing the same environment may hold conflicting environmental philosophies and such philosophies affect the content and volume of corporate environmental disclosures. An overview of existing literature has elucidated a number of issues with respect to the analysis of environmental disclosure quality. In an *extending* stage of organisational legitimacy, theories of competitive advantages are applied to explain high quality environmental disclosures. Theories based on competitive advantage, such as RBT are used as a supplement to legitimacy theory, which is assumed to be the *'most prominent theory'* (Laine, 2009, p. 1048) in sustainability accounting literature. The discussion has also provided an overview of how content analysis has been used in a number of studies to examine the quality of environmental disclosures. However, there is scope for improving the content analysis tool, specifically by incorporating quality attributes such as relevance and reliability as suggested by the environmental and accounting reporting frameworks and guidelines. The importance of a connotative or interpretative approach to content analysis has also been emphasised to draw on managers' strategic use of linguistic and photographic devices in communicating environmental disclosures.

It is suggested in the literature that the quality of environmental disclosures is associated with the investors' demand for environmental information (Solomon and Solomon, 2006; Iatridis, 2013). The review of extant literature suggests that incorporating event-based scenarios in the questionnaire would elicit more informed responses from participants. Such

a questionnaire would inform the users' perception of environmental disclosure quality by presenting them with the context in which disclosures are generated. The next chapter (Chapter 3), provides a brief overview of the theories used in the existing environmental accounting literature. A combined theoretical framework is also proposed, incorporating both legitimation and competitive appeals of reported disclosures to analyse the quality of environmental disclosures.

CHAPTER 3: THEORETICAL PERSPECTIVES

3.1 Introduction

Several theories have been adopted in the corporate social and environmental literature to provide reasons for the existence and motivations for corporate environmental disclosures in annual reports. Mathews (1995) grouped arguments under three headings in favour of 'wider accounting' beyond its traditional emphasis on financial accounting and the entity assumption therein. The first incorporated market-based arguments based on the view that the provision of environmental disclosures will influence the market return and share price. This argument inherits its merit from the role of information and can be linked to decision-usefulness theory. The second, the organisational-legitimacy argument, is based on the premise that managers provide additional disclosures in an attempt to establish, maintain or enhance the legitimacy of the organisation with a specific target group or the general public. The third group of arguments is based on the company's ethical concerns that lie within the social contract of business organisations with society. While addressing the fact that the social and environmental literature lacks a coherent and systematic theoretical framework, Gray et al. (1995a) also categorised the theoretical perspectives used in the literature into three groups: decision-usefulness theories, political-economy theories (PET) and economic-based theories. The theories used in this project also belong to these three groups, namely, decision-usefulness theory, legitimacy theory under PET, and NRBT and signalling theory which are economic-based theories. These theories are used to explain different aspects of corporate environmental disclosures and the perceptions of the quality of environmental disclosures from investors' perspectives.

Other theories have been used in the environmental accounting literature, such as, stakeholder theory (Roberts, 1992; Laplume et al, 2008) and institutional theory (DiMaggio and Powell, 1983; Chen and Bouvain, 2009; Fortanier et al., 2011). The underlying assumptions of these theories are matched partly with those of legitimacy theory. For example, the need to meet the expectations of a wider group of constituents or stakeholders (stakeholder theory), following the institutional norms commonly accepted by

society (institutional theory) are partially overlapped with the basic premise of legitimacy theory (Lu and Abeysekera, 2014; Ervin et al. 2013; Hoque, 2006). However, the normative branch of institutional theory suggests that adoption of institutional practice is often influenced by the pressure arising from the norms and beliefs of senior management, such as CEOs (DiMaggio and Powell, 1983)

The theoretical approaches adopted in this project are explained in the following sections: political economy theories in Section 3.2; economic theories in Section 3.3; and decision-usefulness theories in Section 3.4. The final section (3.5) offers a combined theoretical framework indicating how each component of the framework is applied to explain different aspects of environmental disclosure quality.

3.2 Political economy theories (PET)

Political economy is defined by Gray et al. (1996, p. 47) as *'the social, political and economic framework within which human life takes place*'. PET takes the view that organisations cannot operate in isolation from their respective institutional, social and political frameworks. There are two broad variants of PET, which are viewed by Gray, et al. (1996, p. 47) as *'classical'* and *'bourgeois'*. The classical variant is associated with the works of philosophers like Karl Marx and views structural conflict and inequality within society and the role of the State as crucial issues for the purpose of investigating an economic action. Classical PET views accounting reports and disclosures as part of maintaining the legitimacy of the capitalist system as a whole in order to protect the interests of the latter.

Bourgeois PET, influenced by the works of economists like John Stuart Mills, embraces an essentially pluralistic view of the world. This means that society is composed of different groups of individuals with different interests who strive to predominate in social choices while no one group is able constantly to influence society. However, this pluralistic assumption is rejected by critical accounting researchers, such as Lowe and Tinker (1977, cited in Deegan, 2014 p. 342), who argued that:

> The pluralistic view ignores a great deal of evidence which suggests that the majority of people in society are controlled by a small but 'well defined elite' – an elite that uses accounting (as well as other mechanisms) as a means of maintaining their position of dominance.

Bourgeois PET takes 'class struggles' and inequality or disparity within the society as granted. Therefore, instead of questioning the existing sectional conflicts or inequalities within society, it tends to investigate the interactions between different groups in an *'essentially pluralistic world'* (Gray et al., 1996, p. 47). For example, company environmental disclosures can be explained by bourgeois PET as some sort of conciliation action between an organisation and environmentalists. Legitimacy theory and stakeholder theory, as used in environmental research literature for explaining corporate environmental disclosure, are derived from the bourgeois PET (Deegan, 2014).

3.2.1 Legitimacy theory

Legitimacy theory views organisations' interactions with society as a legitimation process through which organisations continually seek to ensure that their actions are congruent with the norms and value systems of their respective societies. It relies upon the notion of a 'social contract' between the organisation in question and its respective society. A good overview of the concept of 'social contract' was given by Shocker and Sethi (1974, p. 67):

> Any social institution – and business is no exception – operates in society via a social contract, expressed or implied, whereby its survival and growth are based on:
>
> 1) The delivery of some socially desirable ends to society in general, and
> 2) The distribution of economic, social, or political benefits of groups from which it derives its power.

A contract can be expressed (written or verbal) or implied (behavioural). Contractual relationships demand the existence of offeror and acceptor. By entering into a contract, the parties to the contract become obliged or responsible to comply with the terms of the contract. The assumption within legitimacy theory is that a 'social contract' exists between business organisations (acceptor) and society (offeror), whereby organisations agree to operate in a socially desirable manner in return for approval of their continued operation by society. This contract, however, can be implicit, and is assumed to exist because of the belief that organisations have no inherent right to resources, including natural resources.

They have to earn that right by becoming compliant with the terms of a social contract. As Mathews (1993, p. 26) stated:

> Social contract would exist between corporations (usually limited companies) and individual members of society. Society (as a collection of individuals) provides corporations with their legal standing and attributes and the authority to own and use natural resources and to hire employees. Organisations draw on community resources and output both goods and services and waste products to the general environment. The organisation has no inherent rights to these benefits, and in order to allow their existence, society would expect the benefits to exceed the costs to society.

This means that it is the demands, expectations and approval of society that determine corporate behaviour and response. Thus, organisational legitimacy does not refer to the actual behaviour of an organisation; rather, it is the perception of society about the organisation's behaviour that shapes legitimacy. According to legitimacy theory, organisations need to provide enough disclosures about their operations for society to review whether or not they are operating in a socially desirable manner or, in other words, in a legitimate manner. Legitimacy theory indicates that organisational legitimacy is threatened when the values of organisations differ from those of the society. The discrepancy between the values of organisations and those of society is referred to as the legitimacy gap. The four strategies suggested by Lindblom (1994) to reduce the legitimacy gap were described in Section 2.4.1 (Chapter 2).

A number of environmental studies (Deegan and Rankin, 1996; Gibson and O'Donovan, 2007; Guthrie et al., 2008; Clarkson et al., 2011; Summerhays and de Villiers, 2012) that examined the extent and nature of environmental disclosures, used legitimacy theory to conclude that firms with poor environmental performance provide a high volume of disclosures to mitigate a legitimacy threat (Hahn and Kühnen, 2013). Legitimacy theory has also been used to explain non-disclosure or a low level of environmental disclosure by firms that have less organisational visibility (Stubbs et al., 2013; Brammer and Pavelin, 2008). Therefore, in this project, in line with legitimacy theory, it was assumed that in the absence of an apparent legitimacy threat, companies are less likely to disclose specific environmental information. A legitimacy threat relates to perceived pressure due to the high demand for environmental information made by different constituent bodies in the community, including regulators (Stubbs et al., 2013).

Some authors (Gray et al., 1991, p. 15) consider the notion of a social contract '*too broad and imprecise*' and taking '*too little cognizance of the power wielded by the organisation*'. Gray et al. (1987) adopted a notion of 'accountability' as being useful in demonstrating the relationship existing between organisations and their respective societies. They defined accountability as:

> the onus, requirement, or responsibility to provide an account (by no means necessarily a *financial account*) or reckoning of the actions for which one is held responsible (Gray et al., 1987, p. 2).

The authors view the relationship between society and organisations as an agency relationship and identify a principal-agent contract between them, which implicitly sets out the rights and duties of the parties to the contract. Under the contract, society or the principal, grants the organisation or the agent the right to use resources and gives indications of what actions are expected of them. In doing so, the principal lays two responsibilities upon the agent: '*responsibility for action and responsibility to account for those actions, i.e., accountability*' (Gray et al., 1987, p. 3). However, in constructing a principal-agent relationship between society and organisations, the establishment of the terms of contract was identified by the authors as problematic (Gray et al., 1987). Vested private interests manifested in ownership concentration, levels of corruption and unethical business practices, the extent of government interference and foreign influence, specifically in developing economies, are likely to set the relevant contract terms rather than society at large (Mahadeo et al., 2011).

Another problem identified by Power (1991, p. 34) in articulating accountability in such a relationship is '*the very characteristic of the principal itself, i.e., who is it to whom 'agents' are to be accountable*'. This problem was explored more precisely by Tricker (1983, cited in Woodward et al., 1996, p.336) who argued that the agent owes an account *'only to those principals who demand and show an ability and willingness to enforce the contract'*. A similar view was taken by Stewart (1984, cited in Woodward et al., 1996), who suggested that accountability requires the capacity on the part of the principal to be able to call the agent to account.

Whether the organisational actions are inspired by organisational legitimacy based on a social contract or on the notion of accountability derived from the principal-agent contract, the problems of identifying the terms of the relevant contract, as well as, the question of 'who is it and to whom' organisations make themselves legitimate or accountable, remain. These problems expose legitimacy theory as inconclusive and imprecise. Therefore, while there has been widespread use of legitimacy theory within environmental accounting research (Deegan et al., 2002), Parker (2005) acknowledged its limitations and commented that legitimacy theory:

> … suffers from problems that include apparent conceptual overlap with political economy accounting theory and institutional theory, lack of specificity, uncertain ability to anticipate and explain managerial behaviour and a suspicion that it still privileges financial stakeholders in its analysis (Parker, 2005, p. 846).

Unerman (2008, p. 363) also acknowledged the call for a more refined explanatory framework in addition to the *'existing, well used and well developed'* theories like legitimacy theory and stakeholder theory. Firms may provide environmental disclosures of high quality, even in the absence of legitimacy threats, to signal their leadership in environmental management (Al-Tuwaijiri et al., 2004; Menguc and Ozanne, 2005; Clarkson et al., 2008). These firms reside in the extending phase of organisational legitimacy and tend to outperform the *social contract* which is the tenet of legitimacy theory. Therefore, legitimacy theory is found to fall short in explaining the disclosures of the firms in the extending phase of organisational legitimacy, where the legitimacy itself is deemed to be a firm resource. The enhanced quality of disclosures in this phase are considered *signals* in an attempt to indicate environmental innovation and a superior position over competitors and thereby '*ensure success in capital markets'* (Hahn and Lülfs, 2014, p. 403). Therefore, economic theories that can address the competitive appeals of firm disclosures can also be considered in explaining the quality of environmental disclosures.

It is argued that, eventually, it is organisational self-interest that incites management to follow different techniques to maintain or outpace the social licence to operate. As is stated by Guthrie and Parker (1989, p. 351), legitimacy theory, in fact, '*recognises the potential for management to tell its own story or refrain from doing so, according to its own self-interest*'.

Therefore, it is argued that economic theories, which are driven by the notion of self-interest, may prove to be useful in explaining corporate disclosures more precisely when used in conjunction with legitimacy theory. The next section explores the applicability of economic theories in explaining corporate environmental disclosures.

3.3 Economic theories

Some authors (Ness and Mirza, 1991; Shane and Spicer, 1983) have attempted to explain the motivation of corporate social and environmental reporting (SER) from an economic perspective using agency and positive accounting theory (PAT). However, Gray et al. (1995a, p. 51) rejected such an approach explaining that this perspective has *'little or nothing to offer as a basis for the development of social and environmental disclosure'*. They criticised the approach for having as its principal tenet on-average market efficiency, which runs contrary to 'market failure' and the desire to change current practice, which motivates SER. They also criticised the central assumption of PAT that all actions are motivated by self-interest as *'not only empirically implausible but also highly offensive'* (Gray et al., 1995a, p. 51). According to their view, stakeholder theory and legitimacy theory as drawn from PET have provided the most interesting and insightful theoretical perspectives so far in explaining corporate social responsibility and disclosures.

However, Toms (2002) claimed that economic theories have not been well explored to provide an explanation for corporate environmental disclosure; the governance-based theories of disclosure that address the governance issues arising from agency problems have not been fully engaged. Ervin et al. (2013) postulated that an economic approach would be a useful integration in the theoretical model for analysing and explaining motivations and barriers to corporate environmental management. Economic theory is able to explain '*motivation to decrease cost, increase revenue and improve manager'* utility (Ervin et al., 2013, p. 390). A number of studies (Toms, 2002; Branco and Rodrigues, 2006; Bebbington et al., 2014 Wagner, 2009; Forsman, 2013) have attempted to provide economic theory-based frameworks for corporate environmental disclosure, such as signalling theory derived from agency theory, the resources-based theory (RBT) and a utility maximisation approach. In this project, two specific economic based theories have been used, namely,

RBT and signalling theory. These are viewed as complementary and incremental to the legitimacy theory in assessing the quality of environmental disclosures.

3.3.1 An overview of resources-based theory (RBT)

According to Branco and Rodrigues (2006, p. 116) resource-based perspectives,

> … begins with Edith Penrose who suggested viewing the firm as a ‘‘pool of resources’’ (Hodgson, 1999). However, it was only with the contributions to the area of strategic management of more recent authors, such as Barney, Peteraf, Rumelt, Teece, Wernerfelt, that these perspectives have achieved prominence.

RBT emphasises the link between firm-specific resources, sustained competitive advantage and financial return (Mass et al., 2014; Wallenburg, 2009; Bowen, 2007). RBT suggests that it is a firm’s bundle of resources rather than a product deployment of those resources that determines a firm’s competitive position (Wernerfelt, 1984).

Resources are viewed as assets that firms use to accomplish their activities and these can be tangible (e.g., physical and financial) or intangible (e.g., corporate reputation, employee knowledge, skill and efficiency). While resources are the means through which firms perform their activities, they are not productive on their own (Branco and Rodrigues, 2006). Resources need to be used through the actions of the organisational processes of assembling, integration and production in a coordinated manner to achieve the desired objective of the firm. Such actions are referred to as capabilities. According to RBT, a firm’s capabilities are skill-based and people-intensive as they are developed through the learning skills of a firm’s people and their experience gained through the repeated practice of tasks.

While some proponents of RBT use the terms ‘resources’ and ‘capabilities’ interchangeably to refer to the tangible and intangible assets used by firms to develop and implement their strategies (Ray et al., 2004), others define resources broadly so as to include capabilities (Galbreath, 2005). Following Galbreath’s (2005) analysis, tangible resources include physical and financial assets and intangible resources and capabilities include intellectual property assets, organisational assets and reputational assets. Reputational assets are characterised by high levels of specificity and social complexity and thus create a strong resources-

position barrier. These assets cannot be bought and need to be built over time by developing networks of relationships among individuals through which information and influence flow. As is conceptualised in signalling theory, these assets,

> … can inform external constituents about the trustworthiness, credibility and quality of the firm. Therefore, reputational assets can be key drivers of external constituents' positive reactions toward a firm vis-à-vis its competitors, thus positively impacting on firm success (Galbreath, 2005, pp. 981-982).

Modern resource-based perspective (RBP) views each firm as a unique bundle of resources and capabilities, developed over time as the firm interacts with all its stakeholders (Branco and Rodrigues, 2006). Barney (1991) argued that a firm's resources and capabilities can derive sustainable competitive advantage when they become valuable, rare, inimitable and non-substitutable. While tangible resources are easy to imitate and substitute even if they are valuable and rare, intangible resources and capabilities are accumulated over time, they are path-dependent, socially complex and difficult to imitate or substitute. Therefore, it has been argued that intangible resources and capabilities are more likely to be the source of competitive advantage than tangible resources, which derives a positive outcome for the firm (Branco and Rodrigues, 2006; Escobar and Vredenburg, 2011).

3.3.2 Natural-resources-based theory (NRBT)

While the RBT of the firm establishes the connection among firm resources, capabilities and competitive advantage, Hart (1995, p. 986) argued that the theory has a *'serious omission'* in that '*it systematically ignores the constraints imposed by bio-physical (natural) environment*'. Given the growing magnitude of ecological problems, he claimed that such an omission can render the RBP inadequate as a basis for identifying important emerging sources of competitive advantage. Building upon the RBT, he proposed a natural-resources-based theory (NRBT) of the firm, which is a theory of competitive advantage based upon the firm's relationship to the natural environment. Hart (1995, p. 989) argued that,

> One of the most important drivers of new resources and capability development for firms will be the constraints and challenges posed by the natural (biophysical) environment.

The growing scale and scope of human activity and its potential for irreversible environmental damage on a global scale, have been identified as key driving forces in the NRBT. The increasing number of existing and emerging national and international environmental regulations and schemes (such as NGER and the Kyoto Protocol) resulting from an increased level of global awareness puts additional constraints on business organisations, especially those in the resources sector. These regulations or schemes impose (or have the potential to impose) restrictions on companies to use natural resources and to pollute the environment. Such restrictions call for efficient environmental management and product differentiation in line with pro-environmental attributes that, in turn, expose the companies to a new competitive market environment. Therefore, NRBT asserts that firms that are able to secure resources and develop capabilities such as waste minimisation, green product design and recycling technology in response to environmental challenges will eventually gain a competitive advantage. Hart (1995) proposed three strategic capabilities under NRBT. There are: pollution prevention, product stewardship and sustained competitive development.

The NRBT pollution prevention strategy

Hart (1995) proposed that a pollution prevention strategy should aim at reducing emissions, effluents and waste. The key resources involved in this strategy are continuous improvement methods that focus on reducing or preventing emissions rather than relying on costly end-of-pipe pollution control technology. The author argued that as less waste means better utilisation of inputs, the pollution prevention strategy may increase company productivity and efficiency. By offering the potential to cut emissions well below the required level, it also reduces compliance costs. Thus, the competitive advantage derived from the pollution prevention strategy is minimising cost, which would result in, *ceteris paribus*, improving cash flow and company profitability.

The NRBT product stewardship strategy

While reducing emissions is the principal objective of a pollution prevention strategy, product stewardship aims at reducing the environmental impact created by the product system from ‘cradle to grave’ by using life-cycle analysis (LCA). Life-cycle thinking entails minimising the use of non-renewable materials mined from the earth’s crust, using

renewable resources matched with their rate of replenishment and avoiding the use of toxic materials. LCA requires redesigning the existing product in a way that would enhance its ability to degrade, to be re-used or recycled at the end of its useful life. It also means taking innovative steps to devise new environmentally responsible products that have lower life-cycle costs (Hart, 1995). Product stewardship, including the LCA, has been integrated as a key component of the Australian Mineral Industry Code for Environmental Management (MCA, 2000). The competitive advantage derived from the product stewardship is the competitive pre-emption, which allows the firm to differentiate its product by establishing the firm as an early mover in the green product domain. It also provides a base for the firm to build up an environmentally friendly reputation.

The NRBT sustainable-development strategy

The sustainable-development strategy of NRBT is fostered by a strong sense of environmental commitment. Henriques and Sadorsky (1999) defined this as an organisation-wide recognition of the importance of the natural environment, one that influences organisations to develop and deploy low-impact technologies consistent with the interests of the natural environment. Hart (1995) indicated that such an environmental commitment or long-range shared vision of the future is considered the key in generating the internal pressure and enthusiasm needed for innovation and change. He suggested that, given the difficulty of establishing an organisation-wide consensus of purpose and action, such shared vision and practice can be considered as rare firm-specific and inimitable resources that few companies are able to establish and maintain. Hart (1995) proposed that a sustainable development strategy develops competitive advantage by enhancing the expectations for future performance of the firm relative to its competitors.

Using RBT, Escobar and Vredenburg (2011) argued that at an international level, compliance with regulations by undertaking pollution prevention measures only results in a short-term source of competitive advantage to multinational companies. For oil and gas industries, it is the organisational capabilities obtained through the sustainability-development strategies, specifically product refinement and process innovation, which offer a long-lasting source of competitive advantage (Escobar and Vredenburg, 2011). However, employing NRBT in an analysis of a sample of German third-party logistics industry, Mass et al. (2014) determined

that pollution prevention and service stewardship capabilities could help third-party logistics providers to improve competitiveness. In a recent study, Gallego-Álvarez et al. (2014) analysed the impact of carbon emission reduction on the financial and operational performance of a sample of firms selected from the Fortune 500 list of large international companies. This study provides support for NRBT, concluding that overall, greater environmental behaviour through emission preventive measures generates a positive impact on financial performance.

3.3.3 Signalling theory

Signalling theory stems from agency theory, which focuses on agency problems arising from the information asymmetry between the principal and agent. The process of signalling is deemed to reduce the information asymmetry between the signallers and the signal-receivers. The effectiveness of the signalling process depends not only on how signallers communicate information (signal) but also on how signal-receivers interpret such signals (Connelly et al, 2011). The theory suggests that managers (signallers or insiders) have incentives to signal (providing additional disclosure over and above mandatory ones) to potential investors (signal-receivers) in anticipation of obtaining higher returns for the disclosing entities (Connelly et al, 2011; Watts and Zimmerman, 1986). However, investors are not likely to add value to firms if they fail to realise the significance of the signals in their decision-making process. Signalling theory suggests that managers will provide signals when they have incentives to disclose, when the signal is difficult to imitate, and when it is cost-effective (Toms, 2002). Pro-active disclosures of *negative incidents* could also be regarded as *positive signals* in terms of enhancing transparency and managing future risks, particularly '*when accompanied by mentioning of measures taken to overcome these risks'* (Reimsbach and Hahn, 2015, p. 229; Hahn and Lülfs, 2014).

Figure 3.1 below illustrates that if management has made investments in projects that build up competitive advantage in the form of minimising cost, enhancing profitability, gaining competitive pre-emption and building reputation and future performance, then, in line with signalling theory, it can be argued that they clearly have compelling incentives to inform their stakeholders about their performance. It is suggested by Toms (2002, p. 261) that:

> In terms of environmental disclosures, it follows that specified, quantifiable and verifiable information will be perceived to be of higher quality.

Thus, in relation to the sustainable development strategy, information about corporate environmental planning and programs, their outcomes and environmental review reports would be perceived as possessing enhanced quality. Such disclosures demonstrate better environmental responsibility and accountability than the disclosures that are merely rhetorical and descriptive.

Toms (2002) conceded that it would be very difficult for a firm that is not pursuing environmentally responsible strategies to imitate a legitimate competitor if the latter followed a signalling strategy in providing disclosures. Thus, it can be argued that high quality corporate environmental disclosure has the ability to demonstrate credibility, trustworthiness and environmental responsibility, which, in the sense that it is hard to imitate, provides a crucial link to NRBT. By serving the purpose of enhancing the reporting entity's reputation and brand, high quality disclosures serve as an important source of competitive advantage (Welford and Frost, 2006; Freundlieb et al., 2014).

Based on the above discussion, the theoretical model provided in Figure 3.1 was developed for this project to explain company motivation for providing enhanced environmental disclosures. The model demonstrates how NRBT and signalling theory would be used to indicate the role of environmental disclosures as a strategic tool in gaining competitive advantage in today's environmentally constrained market.

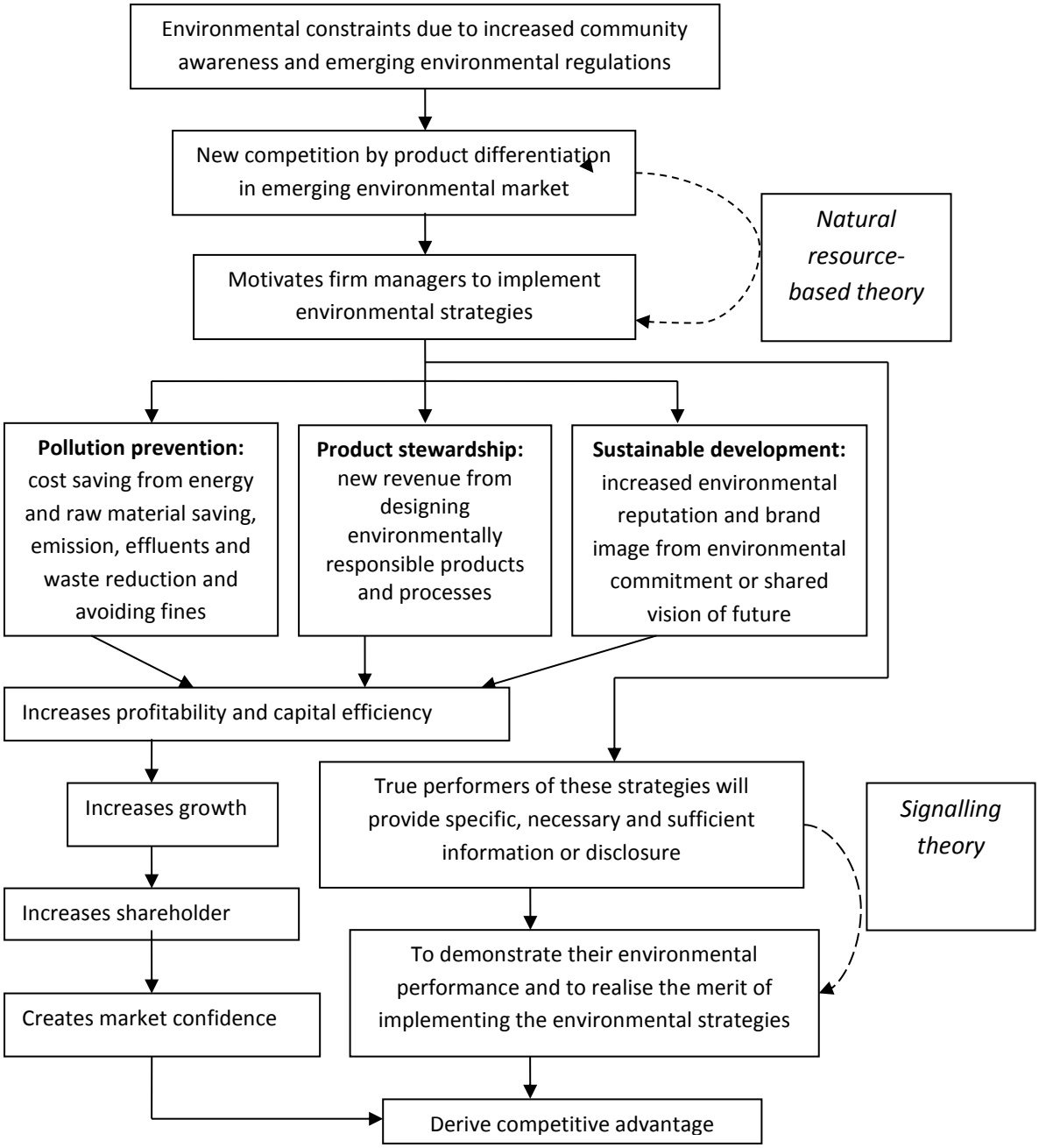


Figure 3-1: Role of NRBT and signalling theory in explaining environmental disclosures

In order to demonstrate the links between the model and corporate environmental disclosures, the Australian Government's Renewable Energy Target (RET) scheme[2] (2009) could be used as an example. This scheme sets the RET at 20 per cent of Australia's

[2] The Renewable Energy Target Scheme was introduced in 2001 and expanded in 2009 and 2010. It requires electricity companies to ensure that by 2020 at least 20% of Australia's electricity needs come from renewable sources (Department of Environment, Australian Government, 2010).

electricity supply by 2020 (Department of Environment, Australian Government, 2010). This regulation not only restricts the ability of companies to use exhaustible fossil fuels, but also compels them to find alternative sources to produce energy. Reviews of the 2009 sustainability reports of Australian Gas and Light Company Limited (AGL) and Origin Energy Limited (ORG), the two major developers and distributors of gas and electricity in Australia, showed that both companies provided detailed disclosures on energy generation and emission, including capital expenditures and production capacity of their renewable investment projects. These disclosures were provided voluntarily, consisting of scientific data, the methods used to prepare such data, descriptions (narratives with numerical data) and pictures of their renewable investment projects. According to the theoretical model, the motivation to provide such disclosures cannot be explained as mere legitimation techniques; such disclosures also signal the competitiveness of the entities in terms of demonstrating their organisational ability in managing the environmental constraints imposed upon them.

3.4 Decision-usefulness theories

Decision-usefulness theories postulate that organisations provide information on the basis of users' assumed decision-making needs (Holm and Rikhardsson, 2008). The underlying assumption is that users of information value a disclosure according to how useful it is to them (Martin and Hadley, 2008). This view is in line with the signal-receiver element of signalling theory in that for a signalling process to take place effectively, the signal-receivers need to realise what is it in that signal that assists their decision-making process. Similarly, the decision-usefulness theory presumes that companies provide environmental disclosures when stakeholders require such information for decision-making, in addition to the traditional financial information (Rikhardsson et al., 2002). A number of studies have been conducted to identify the presumed information needs of various stakeholder groups such as investors, financial analysts, environmental groups, consumer associations and others, by asking them to rank various disclosures in order of perceived importance (Deegan and Rankin, 1997; de Villiers and van Staden, 2010). Other studies (Belkaoui, 1980, Deegan and Rankin, 1997; Azzone et al., 1997; Rikhardsson and Holm, 2008) have shown that stakeholders seem to have considerable interest in environmental information and they rank it as *'moderately important'* and find it *'better than useless'* (Gray et al., 1995a, p. 50).

However, it has long been recognised in the psychology literature that people's decision-making behaviours might not be consistent with their perceptions and attitudes (Krosnick and Schuman, 1988; Fabrigar et al., 2006). Therefore, it is suggested in Dierkes and Antal (1985) that, while asking users about their perceptions is a useful initial step in assessing information usefulness, the ultimate test rests on measuring the impact of information in actual decision-making practice. Hence, in applying the decision-usefulness theory to examine the quality of environmental disclosures, identifying whether one may perceive environmental information as *important* is not enough. Instead, it requires establishing *why* information is deemed important. Therefore, it can be argued that strong demand for environmental disclosures for the purpose of decision-making is a pre-condition for presenting environmental information of high quality.

Thus, another stream of decision-usefulness studies attempted to investigate the effect of social and environmental information on stakeholders' decision-making; however, such studies mainly concentrated on financial stakeholders. Two approaches have been followed in these studies: capital market-based and survey-based. The capital market studies tend to assess market reactions (e.g., share price and risk) to social and environmental disclosures. However, the results of such studies are found to be inconsistent. While some of these studies have documented positive associations between disclosures and stock market variables (Anderson and Frankle, 1980; Shane and Spicer, 1983), others have documented no market reaction (Freedman and Jaggi, 1982 cited in Rikhardsson et al., 2002). Such inconsistency can be explained by the variations in the types of variable used, companies examined, time-period and macro-economic influences during the study period (Rikhardsson et al., 2002).

Survey-based studies analysing decision-making in experimental settings have also been undertaken, focusing on stakeholder reactions to social and environmental information (Belkaoui, 1980; Milne and Chan, 1999). Again, such studies have focused only on the investment decisions of stakeholders. For example, Belkaoui (1980) conducted a survey-based experiment among three groups of occupations (with 225 subjects), namely, students, accountants and bank officers, to investigate whether investment decisions made

by them vary with the addition of abatement costs of pollution. He found that while bankers and accountants reacted to the pollution control information, the students did not perceive the importance of the abatement cost at all. Another study conducted by Milne and Chan (1999) investigated the investment decision-making behaviour of investment analysts and accountants by presenting information packages with and without voluntary narrative social disclosures. Using control groups (who received only financial information and no narrative disclosure), the authors concluded that narrative social performance information does not have any significant impact on the short-term investment strategies; however, it does have some significance for longer-term strategies.

Recent studies have shown increasing evidence that sustainability or non-financial aspects of firm disclosures represent value-relevant information to investors (Reimsbach and Hahn, 2015; Dhaliwal et al., 2012; Berthelot et al., 2012). In an experimental design, Reimsbach and Hahn (2015) examined the willingness of a group of participants to invest in a company, first based on financial information only and then with the inclusion of sustainability disclosures of negative incidents. They found no significant difference in the investment decisions of participants relating to companies who provided negative disclosures in their reports. However, Reimsbach and Hahn (2015, p. 218) did find that the participants reacted negatively to those companies '*that were caught off-guard by negative NGO reports*' (that is, the companies did not report certain environmental misconduct in their sustainability reports, but they are accused of such misconduct by other organisations). Dhaliwal et al. (2012) reported that the non-financial information of corporate social responsibility reports is associated with more accurate earnings forecasts by financial analysts. Such an association is stronger in countries where the business culture is influenced by the interests of other stakeholders in addition to those of shareholders. This indicates that the characteristics of the information users (also referred to as signal receivers by Connelly et al., 2011) are also important in applying decision-usefulness theory to explain the quality of disclosures (Connelly et al., 2011). Such characteristics may include understanding the scientific background of information users in order to understand the importance and implications of environmental information. In addition, the view of users towards environmental well-being would also determine the level and quality of environmental disclosures. If the potential benefit of environmental disclosures is not assessed by the

information users, such disclosures are unlikely to affect their decision-making (Rikhardsson and Holm, 2008). Therefore, it is argued that if the benefit of the message conveyed from the environmental disclosures is not acknowledged by the investors, the disclosure would not represent a quality signal.

In this project, decision-usefulness theory was considered applicable based on the assumption that companies would not supply environmental disclosures of high quality if such disclosures were not deemed to be important in the decision-making process of users. A number of limitations have been acknowledged in some of the decision-usefulness studies (Chan and Milne, 1999; Rikhardsson and Holm, 2008; Reimsbach and Hahn, 2015) in relation to research design and method. For example, given the experimental setting of these studies, where students are used as a proxy for investors, the conclusions would be based on an over-simplified version of the decision-making process (Reimsbach and Hahn, 2013). Further, as Connelly et al. (2011, p. 54) indicated, users may not find sustainability related information useful if they do not know what to look for. In other words, why does that information need to be considered in decision-making? Therefore, it is suggested that simply giving out a list of information and asking users to choose from a set of possible decisions, based on the supplied information, does not adequately allow users to make an informed decision. Instead, it is imperative to provide the context in which the supplied information is produced and its possible implications in order to obtain more meaningful insights from the decision-makers. Therefore, in this project, a survey of investors was conducted, designed to seek their perceptions of the quality of a number of environmental disclosures within different contexts. The underlying assumption is that if investors deem such disclosures as useful, companies are expected to signal them via annual and/or sustainability reports. Therefore, decision-usefulness theory was deemed appropriate in this project in explaining the quality of environmental disclosures.

3.5 Chapter summary

Based on the above discussion, a combined theoretical framework was developed in order to undertake an analysis of the quality of environmental disclosures. The framework incorporates legitimacy theory, NRBT, signalling theory and decision-usefulness theory. The

framework is illustrated below in Figure 3.2, highlighting the motivations for providing high or low quality in environmental disclosures or no disclosure.

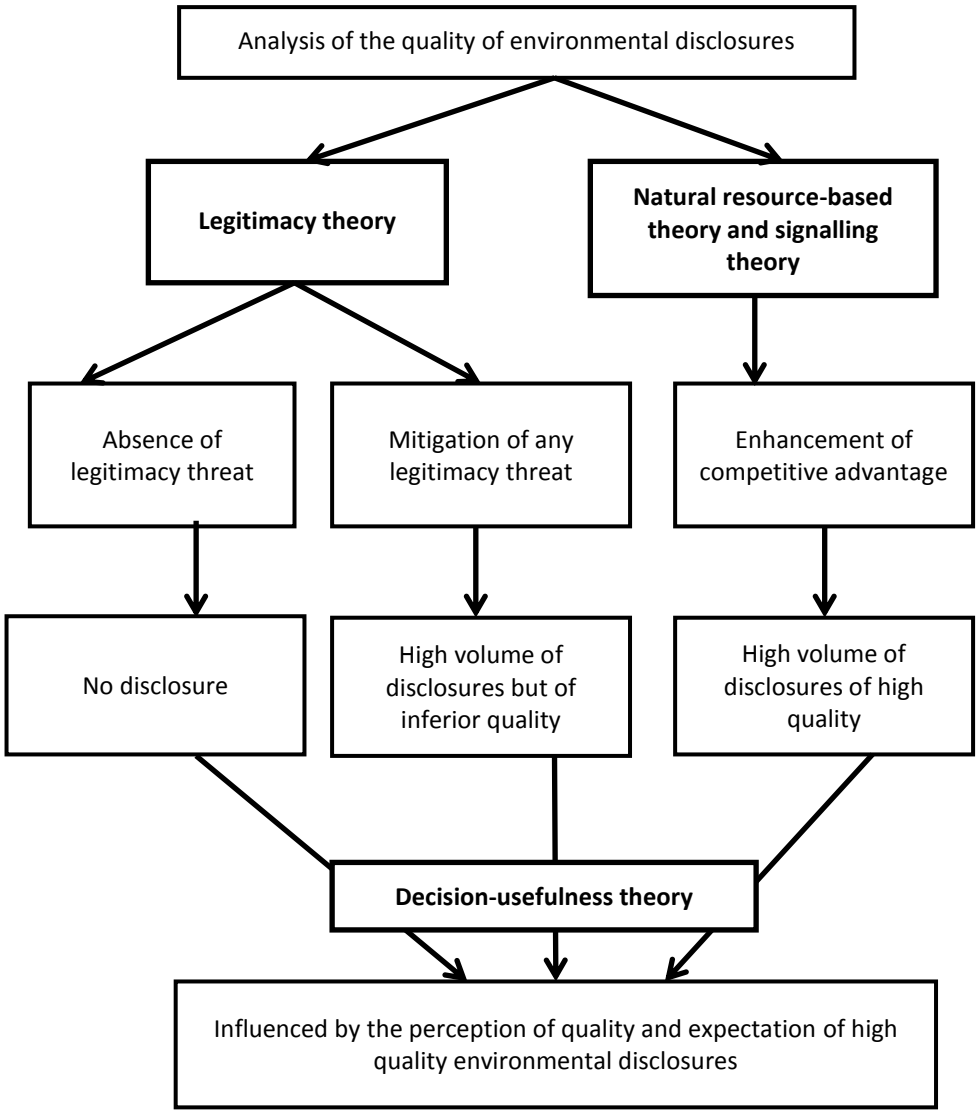


Figure 3-2: Combined theoretical framework for analysing the quality of environmental disclosures

The proposed theoretical framework, in line with legitimacy theory, asserts that companies are expected to provide a high volume of disclosures, which can be of lower quality, in an attempt to mitigate any legitimacy threat. It also anticipates that, in the absence of any legitimacy threat, companies would not be likely to provide any environmental disclosures. In line with NRBT, it is assumed that external pressures, such as environmental regulations,

would act as drivers for firms to undertake a range of innovative environmental initiatives, eventually contributing to cost reduction and profit maximisation. In this case, signalling theory would explain the enhanced environmental disclosures, which may consist of information related to environmental risks and the mitigation efforts implemented to overcome such risks, thus promoting competitive advantage. Finally, decision-usefulness theory suggests that a firm's non-disclosure or disclosures (of high or low quality) is also influenced by the perception of the quality of information and their significance in the decision-making process.

The use of the four theories in the theoretical framework underpins the main assumptions of the research questions. For example, the quality of environmental disclosures is assumed to be driven by an attempt to mitigate the legitimacy threat (legitimacy theory) or to gain competitive advantage (NRBT). Further, whether investors deem environmental disclosures useful for decision making would also influence the quality of such disclosures (signalling theory and decision usefulness theory). The research methods used in this study, namely, content analysis of environmental disclosures and a survey of investors are also driven by the theoretical framework. The quality of environmental disclosures would be revealed by undertaking a content analysis of the reported disclosures. Investors' perspectives regarding the quality of environmental disclosures would be obtained through a survey instruments. It is envisaged that the research findings of the content analysis and the survey would establish the extent (if any) of support for the theoretical framework used in this study.

CHAPTER 4: QUALITY OF ENVIRONMENTAL DISCLOSURES

4.1 Introduction

The aim of this chapter is to offer an explanation for identifying the attributes of the quality of corporate environmental disclosures. The chapter begins with a discussion about the definition of quality. An overview of the guidelines provided in the G3[3] guidelines (GRI, 2006), the GCDF (Institutional Investors Group on Climate Change (IIGCC) 2008), the Climate Change Reporting Framework – Edition 1.1 (CCRF) (CDSB, 2012)[4] and the MCA Code for Environmental Management (2000)[5] are discussed. These frameworks are referenced because their guidelines are based on feedback about the information needs of a wide range of stakeholders (G3 guidelines), investors (GCDF, and CCRF) and industry associations (MCA, 2000). These frameworks also share the underlying assumptions associated with the theoretical perspectives used in this project. These are the notions of 'social licence', competitive advantage and decision-usefulness that underpin the motives for disclosing corporate environmental information. Based on these guidelines, a comprehensive list of disclosure themes is presented in the concluding section of this chapter.

4.2 Defining environmental disclosures

Before identifying the *quality* of an environmental disclosure, it is imperative to understand the meaning of environmental disclosures. Authors have defined environmental disclosure in a variety of ways. In some of these definitions, environmental disclosure has a unique

[3] Although G4, the fourth generation of the Sustainability Reporting Guidelines was launched in May 2013, the G3 guidelines were used in this study, because, the 2009 annual/sustainability reports were the latest published documents when the analysis was undertaken. Hence, the G3 guidelines were active during this period.

[4] At the time of conducting the content analysis, the CDSB Reporting Framework Exposure Draft 2009 (CDSB 2009) was used to coincide with the 2009 annual and sustainability reports. The current version of CDSB framework, namely, the CCRF – Edition 1.1 (CDSB 2012) was examined for any revisions that may affected the analysis. The comparison reveals that the list of climate change disclosure categories and qualitative characteristics of disclosures are the same in both documents.

[5] The use of Code 2000 prepared by MCA is justified over the Enduring Value 2004 – The Australian Mineral Industry Framework for Sustainable Development because the focus of the study is on environmental issues rather than social issues.

focus, whereas in others, it has been defined as part of social and environmental disclosure. Gray et al. (1987, p. ix) defined it as part of social and environmental accounting and as:

> …the process of communicating the social and environmental effects of organizations' economic actions to particular interest groups within society and to society at large. As such it involves extending the accountability of organizations (particularly companies) beyond the traditional role of providing a financial account to the owners of capital, in particular, shareholders. Such an extension is predicated upon the assumption that companies do have wider responsibilities than simply to make money for their shareholders.

Here the environmental disclosure is considered to be an additional tool for discharging organisational accountability at large. Organisational accountability refers to providing an account of those actions for which an organisation is deemed responsible (Deegan, 2014). Hence, accountability is responsibility-driven rather than demand-driven. The underlying assumption of accountability is an individual's right-to-know information, irrespective of whether they use it or not. In Mathews (1993, p. 64), environmental disclosure is described as:

> Voluntary disclosures of information, both qualitative and quantitative, made by organizations to inform or influence a range of audiences. The quantitative disclosures may be in financial or non-financial terms.

Such a view also recognises the requirement to provide information to a broader group of stakeholders. Gray et al. (1993, p .6) further defined environmental accounting as:

> …it can be taken as covering all areas of accounting that may be affected by the business response to environmental issues, including new areas of eco-accounting.

Salomone and Galluccio (2001, p. 9) consider environmental disclosures as:

> Any information, expressed in qualitative or quantitative terms, physical or financial, connected to the impact that the company has on the natural environment and that can have consequences on the financial and economic structure of the company.

Despite some differences, the commonality observed in the above definitions resides in the meaning of environmental disclosures, which relates to information about the impacts of organisational operations on the natural environment. Hence, 'informativeness' or 'what to disclose' refers to the fundamental requirement for quality, based on which the other

aspects of quality evolve. The required content for quality environmental disclosure would be determined on the basis of two main factors – first, the connection of the information to the environmental impact of a firm's operations; and second, the significance of the information to a wide range of readers of annual reports and other relevant reports.

The distinct nature of activities in the resources sector related to mine establishment, ore extraction and processing and transport activities, have widespread direct and potential impacts on land use, bio-diversity, hydrological functioning of the landscape, energy use, waste generation and, above all, air and water pollution. Therefore, detailed information or facts, data or specific knowledge about a firm's activities related to each of these issues would be considered imperative for the purpose of quality environmental reporting. Provision of such information would make interest groups aware of the environmental implications, opportunities and consequences of organisational activities.

4.3 Defining quality

In Goldberg's (1965, p.25) view, defining a phenomenon itself has its own limitations:

> … a definition erects a wall around a field of discussion and, if one does not agree with the definition presented, one often finds oneself outside the wall, shut out from at least a large part of the discussion; alternatively, if one agrees in part with the definition, one may find oneself shut inside the wall with no means of getting out.

This problem is readily perceived in defining quality; due to its inherent subjectivity, it is difficult to find a universally acceptable definition of quality. The term has different meanings for different people, depending on their level of needs, preferences and expectations, which may vary widely between individuals.

In this research project, an attempt has been made to comprehend the scope or different well-known aspects of quality, rather than providing a formal definition of quality. The decision not to provide a formal definition of quality, however, does not necessarily prevent the investigation process; rather, investigation will closely focus on the underlying purpose of the definition. According to Goldberg (1965), the purpose of providing a definition is to communicate thoughts or arguments clearly to other parties so that the latter would be

able to interpret those thoughts correctly and assess them as to their validity. If that purpose is served without a formal definition then a definition may not only be unnecessary, it might also impose undue restriction on the process of inquiry.

In order to identify what would constitute different aspects of the *quality* of environmental disclosures by resources sector companies, the different expectations, visions or guidelines of different interest groups were considered, consisting of:

- The IASB Framework (2010)
- The CCRF developed by the CDSB (2012)
- The G3 guidelines (GRI, 2006)

However, the environmental impact of the economic activities of an organisation is not constrained by the boundary of the organisation, nor is it restricted to its financial stakeholders. It is assumed therefore that users of the environmental report would not only include current or prospective investors, but also a wide range of interest groups such as environmentalists, consumers, regulators and other community members, as they share the environment with business organisations. Therefore, from an accountability perspective, it can be argued that organisations should provide an account of the consequences of their activities on the natural environment irrespective of whether the information is demanded by all constituent parties. Positivist theories predict that firms are likely to provide environmental disclosures either to address any potential and existing legitimacy threat or to promote competitive advantage. Therefore, firms may consider the 'relevance' of environmental disclosures based on their ability to influence the decision-making of pressure groups, regulators and potential and existing investors.

Provision of information about every detail of organisational environmental performance to a wide range of audiences would produce information overload and involve additional costs. This is one reason why regulatory frameworks, such as the IASB and GRI adopt the notion of 'materiality', which is associated with the notion of 'what to report'. If information is considered of significance to interested parties in terms of making decisions about organisations, then, it would be deemed to be material. According to IASB Framework

(2010), materiality provides a 'cut-off point', rather than being a primary qualitative characteristic that information must have if it is to be useful. In the following section (4.4), further clarification of 'what to disclose' or what constitutes relevant information with regard to environmental activities is detailed.

4.4 Identifying what to disclose

In order to determine what constitutes relevant information in relation to the environmental disclosures of resources sector entities, this project drew upon four different frameworks and guidelines representing the information needs of different groups of stakeholders. These are:

- The G3 guidelines prepared by GRI using inputs from a wide range of stakeholder groups
- The GCDF prepared by national and international electric utility investor associations
- The CCRF prepared by the CDSB
- Code 2000, prepared by the MCA

These guidelines and frameworks were chosen as they guide resources sector entities in their environmental management and/or reporting. The GRI has been discussed widely in environmental literature in evaluating the quality of disclosures (Brammer and Pavelin, 2008, Clarkson et al., 2008; Freundlieb et al., 2014). Companies are also increasingly using the GRI (2006) in their voluntary reporting (Moseñe et al., 2013). The GCDF specifically provides guidelines to assist electricity companies in providing information that allows institutional investors to make informed decisions about the financial implications of climate change. The CCRF framework applies the same quality criteria used for the financial reporting framework prescribed by IASB for non-financial reporting, such as climate-change disclosures. The MCA Code 2000 represents industry expectations of environmental management by resources sector companies. Table 4.1 provides an overview of the background and required environmental disclosures suggested by these four guidelines and frameworks.

Table 4.1: Overview of the organisations responsible for environmental reporting guidelines

Organisations and reporting guidelines	Background	Required environmental information
G3 guidelines GRI (2006)	The GRI provides guidelines on sustainability reporting that were developed through a consensus-seeking process involving stakeholder groups from business, civil society, academia, labour and other professional institutions (GRI, 2006). The 'Indicator Protocol Set Environment' devised in the environmental dimension of the GRI G3 (2006) includes guidelines that assist business organisations in reporting their environmental performance.	a) Information regarding inputs used by organisations for which the natural resources base are relied upon: - material, energy and water b) Information regarding outputs of environmental significance generated during organisational activities and modes of impact an organisation has on the environment: - emissions, effluents, waste and bio-diversity and aspects of transport and products/services
GCDF prepared by Institutional Investors Group on Climate Change (IIGCC, 2008)	The GCD framework (2008) defines investors' expectations regarding climate change related disclosure by electric utilities and power generator companies. The framework was prepared by the Institutional Investors Group on Climate Change (IIGCC[6], Europe) in partnership with Ceres[7] which directs the Investor Network on Climate Risk (INCR, US) and the Investor Group on Climate Change (IGCC[8], Australia and New Zealand).	a) Disclosure on Climate Change Strategy - carbon reduction and adaptation strategies to manage climate change related risks b) Disclosure of quantitative data related to climate change - electricity production data by fuel type - emission data - emission allowances and credits under the existing Emission Trading System, if any.
CCRF prepared by CDSB (2012)	CDSB is an international organisation supported by business and environmental organisations committed to the integration of climate change related disclosures in mainstream corporate reporting. It introduced the Climate Change Reporting Framework (CCRF) in 2012 based on existing financial and non-financial standards, research and consultations with professionals in accountancy, business, standard setting and regulations bodies (CDSB, 2013). Taking a decision-usefulness perspective, the CCRF aims to promote greater standardisation of relevant and material	a) Disclosures about risks and opportunities associated with climate change b) Disclosures about emission reduction targets, initiatives to reduce emissions and an analysis of performance against those targets c) GHG emission disclosures in terms of absolute and normalised quantitative data, types of emission (scope I, II and III), methods or schemes followed to measure the emission data and comparative data over time

[6] The IIGCC is the leading group for collaboration among institutional investors in Europe, focused on addressing investment risks and opportunities presented by climate change with total funds and assets under management of around €10 trillion (, IIGCC, 2013).
[7] Ceres is the leading US network of investors, environmental groups and other public interest organisations working with companies to address sustainability challenges. It governs the INCR, which comprises 100 institutional investors who collectively manage about $11 trillion in assets (Ceres, n.d.).
[8] IGCC represents institutional investors in Australia and New Zealand with total funds under management of approximately AUS$1 trillion (IGCC, 2014).

	climate change related disclosures in mainstream reports in response to the demand expressed by investors, managements and regulatory bodies.	
Code 2000 (MCA)	Code 2000 (MCA, 2000) is the revised version of the original code launched in 1996, prepared by the MCA on behalf of the Australian minerals industry. The Code is a principle-based document which provides a framework to assist in improving the environmental performance of the signatories to the Code. All exploration, mining and minerals processing companies and contractors are eligible to become signatories to the Code.	Consists of 7 principles covering the following areas: a) Managerial commitment, allocating clear roles, responsibilities, accountabilities b) Community engagement about environmental impacts of organisational operations c) Integration of environmental management systems d) Pro-active approach to evaluate risks of exploration and mining projects and to minimise their immediate and long-term environmental impacts e) Resources conservation and product stewardship f) Continual improvement by setting targets and monitoring performances against the set targets g) Environmental disclosures

Based on the inputs provided by the G3 guidelines, GCDF, the CCRF and Code 2000, a list of common disclosure themes was prepared through a process synthesis. These guidelines and frameworks were used as they reflect the information needs of a range of stakeholders, including shareholders. Prior studies were also reviewed to check commonalities in the patterns and themes of the selected category contents (Cormier et al. (2005); Gray et al. (1995b); Guthrie et al. (2008); Guthrie and Abeysekera (2006); Yongvanich and Guthrie (2006)). The list is summarised in Table 4.2. It was used to address the issue of what to disclose in order to analyse the quality of environmental disclosures.

Table 4.2: List of disclosure themes commonly found in reporting guidelines

What to report	Disclosure themes	Frameworks/guidelines			
		GRI	CCRF	GCDF	MCA code
Disclosure on environmental strategy	Identifying challenges	√	√	√	√
	Identifying business impact, risks and opportunities	√	√	√	√
	Setting performance targets	√	√	√	√
	Corporate governance actions	√	√	√	√
Environmental expenditure		√		√	√
Specific disclosure	Materials	√			√
	Energy	√	√	√	√
	Water	√			√
	Biodiversity	√			√
	Emissions, effluents and waste	√	√	√	√
	Product and services	√	√		√
	Transport	√			
	Compliance/breach	√			√

An extended list of categories and sub-categories emerging from the list of common themes was established to cover the entirety of environmental disclosures (see Appendix 1). Implicit in the list is the notion that a company's environmental narrative is relevant when it provides information on the company's impact on the natural environment, as well as strategies used to identify risks and opportunities resulting from such impact. The final list consists of 11 categories and 34 sub-categories, as shown in Appendix 1. The issue of

eliciting the quality of environmental disclosures using a coding tool is clarified further in Chapter 5.

4.5 Identification of the quality attributes of disclosure under each sub-category

In order to identify the quality of disclosures, this project adopted a novel approach. In previous studies, arbitrary sets of criteria have been established based on the information content or the nature of the disclosure, to analyse the inherent quality of that disclosure. For example, studies have used criteria such as no disclosure, general description, specific disclosure, monetary or quantitative disclosure (Cormier and Magnan, 2003; Wiseman, 1982; Toms, 2002; Beck et al., 2010). In this project, a set of quality criteria was prepared based on an overview of the quality criteria presented in the accounting and environmental reporting frameworks and guidelines of the IASB, the CDSB and the GRI.

The reasons for using these reporting frameworks and guidelines are threefold. First, the observed commonalities across these guidelines indicate that there is more agreement than disagreement regarding the qualitative attributes of disclosure. As asserted in Freundlieb et al. (2014), despite the different backgrounds (such as accounting or environmental) of the frameworks and guidelines, the stated quality criteria are found to be quite similar. For example, although CDSB has an environmental focus, it relies on the *'experience'* of the members of the IASB to confirm the attributes of quality of disclosures. Thus CDSB has *'adapted IASB's qualitative characteristics for application to climate change-related disclosures'* (CDSB, 2009, p.20). Second, these frameworks and guidelines tend to incorporate various stakeholders' (including report readers) inputs, which add a sense that these attributes are important. Third, report preparers tend to follow these guidelines when preparing reports. An overview of the quality criteria described in these frameworks and guidelines is presented in Table 4.3.

Table 4.3: List of quality attributes addressed by different guidelines and frameworks

Attributes of quality				
	Explanatory attributes	*The Framework* (IASB)	CCRF (CDSB)	G3 (GRI)
Relevance		√	√	√
Materiality		√	√	√
Representational faithfulness/reliability	Verifiability		√	√
	Completeness	√		√
	Neutrality	√		
	Accuracy			√
Comparability		√	√	√
Understandability		√	√	√
Timeliness		√	√	√

Out of the six criteria shown in Table 4.3, five were selected to analyse the quality of environmental disclosures. These are: relevance, materiality, representational faithfulness, comparability and understandability. Timeliness of disclosure is identified as an enhancing qualitative characteristic of disclosures in IASB Framework. If there is an undue delay in disclosing information it may lose its capacity to influence decision-making. IASB Framework regarded timeliness as an additional aspect of relevance. Hence, instead of analysing separately, timeliness is considered under relevance in this project. Further, CDSB's (2009) interpretation of timeliness suggests that, environmental impacts of certain organisational activities can be long lasting. Hence, environmental information related to such activities may continue to be timely for longer periods as some users may continue to consider such information when making decisions. Further clarification of the quality criteria used in this project is presented below.

Relevance

For the purpose of this study, the criterion relevance refers to the ability of a disclosure to provide information in relation to the environmental impacts of an entity's operation and the entity's capability to manage such impacts. Such a notion extends the scope of relevance beyond the information needs of financial stakeholders (such as investors and creditors). It draws upon the interrelatedness and dependencies of organisational factors with the ongoing depletion of the amount and quality of the natural resources of the planet.

This view is also supported by the International Integrated Reporting Framework (IIRF) developed by the International Integrated Reporting Council (IIRC, 2013 p.16) under the notion of *'connectivity of information'*. Therefore, information about the environmental disclosure categories and sub-categories included in the extended list of disclosure categories and sub-categories (Appendix 1) were considered relevant for the purpose of analysis.

Materiality

Information is material if its omission, misstatement or misinterpretation could affect users who rely on such information to make decisions (IASB Framework 2010). However, it is acknowledged that '*it is not possible to specify a uniform quantitative threshold at which a particular type of information becomes material*' (CDSB, 2012, p.16). Instead, it is recognised that materiality is *'an entity-specific aspect of relevance and therefore, it will be different for each organisation'* (CDSB, 2012, p.16). However, CDSB (2012, p.17) suggests that *'materiality by size'* would be met if information is reported as absolute and normalised measurement units; whereas, *'materiality by nature'* would represent reporting of significant events and risks associated with the environmental impact of entities' operations.

Representational faithfulness

Information is representationally faithful when it represents the activity or action of the organisation without any bias; otherwise it becomes misleading and falls short in terms of quality (IASB Framework, 2010). This criterion represents a number of sub-attributes, namely, verifiability, completeness, neutrality and accuracy.

Completeness of information refers to the inclusion of all necessary descriptions (IASB Framework, 2010) comprising information about the size, nature and scope of likely impacts (GRI, 2006) of organisational activities for assessing the environmental performance of a reporting organisation. While the notion of 'free from error' with regard to the descriptive disclosures would be determined by the degree of clarity and detail information, for quantitative information, on the other hand, it may depend on the specific methods used to gather, compile and analyse data.

For the purpose of analysis, the notion of verifiability is considered to be a substitute for representational faithfulness in this study. It is assumed that if information is provided in a verifiable manner, an independent third party would be able to investigate the completeness and accuracy of the reported information. A disclosure is considered to be verifiable if any of the following criteria is met:

a) The disclosure should be quantified in units, where applicable, and it needs to be associated with a method of calculation or basis of assumption and preparation.
b) There should be a reference in the annual report that a company is required to provide environmental disclosure in compliance with a specific Act or protocol (for example, the *Energy Efficiency Opportunity Act 2006*). In that case, the company would be assumed to follow the calculation methods or bases prescribed under such Acts or protocols.
c) An independent third-party verification report should exist with specific reference to whether the disclosures on a sub-category are covered under the verification process.

Tied to the notion of representational faithfulness, it is suggested in the literature that 'specific', 'quantifiable' and 'verifiable' disclosures are deemed to have higher quality than disclosures of 'general policy statements' (Toms, 2002; Al-Tuwaijiri et al., 2004; Hammond and Miles, 2004; Clarkson et al. 2008). Toms (2002) stressed that numerical environmental disclosure would be considered high quality, assuming that preparation of such disclosures requires scientific measurement systems and procedures. The author further emphasised that firms that do not have any underlying measurement system are not able to imitate such disclosures, whereas they might easily provide general rhetoric on their environmental policy and commitment. Clarkson et al. (2008, p. 309) also implied that information provided in a quantifiable and verifiable manner represents '*hard*' and '*objective*' reflections of organisational performance. They asserted that organisations are less likely to make false claims with numbers given the possibility of being caught by an '*informed stakeholder*'. The authors provided '*anecdotal evidence*' in favour of their assertion, as follows:

> Greenpeace issued a press release on October 14, 1994 accusing MacMillan Bloedel of deliberately lying to the public by claiming that, in 25 years, the company had been convicted of only 15 environmental offenses. Greenpeace identified 26 convictions in the last four years (p. 309).

Comparability

According to IASB Framework (2010) comparability is the quality of information that enables users to understand and detect similarities in, and differences between, two sets of items. Information about an entity represents usefulness to users if they can compare it with similar information about other entities or about the same entity for other periods. Therefore, in this project, comparability is evaluated on the basis of whether information is presented in the form of ratios, comparative tables, charts or graphs, or even in narratives where comparison by year or by industry average is mentioned.

Understandability

According to IASB Framework (2010), understandability is the quality of information that enables users who have a reasonable knowledge of business and economic activities and financial reporting, as well as the ability to study information with reasonable diligence, to comprehend its meaning. It is emphasised that understandability is enhanced when information is classified, characterised and presented clearly and concisely. According to the GRI (2006), the use of graphics, comprehensive data tables and charts could enhance the understandability of disclosures. For example, company performance regarding energy use would be better understood if that usage is reported in terms of energy sources, like purchased energy, energy generated from gas, coal and other sources. Classified information on waste disposal, on the basis of toxic/non-toxic, would be more helpful in ascertaining a company's waste disposal performance. Therefore, understandability was sought in this investigation by ascertaining whether reported information was presented in a classified manner and/or using charts or tables.

A set of quality criteria was established based on the commonalities observed among the quality attributes suggested by the GRI, CDSB and IASB. In ascertaining the quality attributes, a number of frameworks and principles were omitted, such as that of the World Business Council for Sustainable Development (WBCSD), the International Organization for

Standardization (ISO) and the Bellagio Principles for Sustainability Assessment. Such an omission might be perceived as a limitation in setting out the quality criteria. However, the WBCSD is regarded as more *'general and recommendatory'* compared to the GRI and, while the ISO refers to a procedure for environmental communication, it does not provide any *'concrete suggestion regarding content or key performance indicators'* (Freundlieb et al., 2014, p. 23). Further, the Bellagio Principles do not yet constitute a separate framework; instead, they are used to evaluate existing frameworks (Fonseca et al., 2014).

4.6 Chapter summary

In this chapter, an overview and rationale for using a number of reporting frameworks and guidelines for ascertaining the quality of environmental disclosures is provided. Table 4.2 exhibits that some of the disclosure themes, such as, identifying business impacts on environment, risks and opportunities, setting performance targets, energy use and emission disclosures are commonly found among the G3 guidelines, GCDF, the CCRF and Code 2000. A review of the quality attributes suggested in the IASB, CDSB and GRI revealed five quality criteria, and these were used for examining the quality of environmental disclosures. The quality criteria are relevance, materiality, representational faithfulness, comparability and understandability. The discussion provided in Section 4.5 demonstrated that these criteria would be met if disclosures convey 'specific' and 'quantifiable' information substantiated with a 'calculation method' or a protocol reference and 'comparative data'. Such a discussion served as a basis for developing a coding tool for analysing the quality of environmental disclosures which is described in Chapter 5.

CHAPTER 5: RESEARCH METHOD - CONTENT ANALYSIS

5.1 Introduction

The research method employed in this project was driven by the research questions and the knowledge gap identified in the literature review. The research was conducted in two stages. Content analysis was employed in the first stage to investigate the quality of environmental disclosures of resources sector companies. The use of arbitrary quality criteria while applying content analysis in evaluating the quality of environmental disclosures was recognised as an important limitation. In order to address this limitation, established quality criteria, as set out in a number of environmental and accounting reporting frameworks and as shown in Table 4.3, were used to identify the attributes of quality information. An improved content analysis instrument was developed in this project, which was named CONQUARF, where CON stands for 'Contents', QUA for 'Quality' and RF represents 'Reporting Frameworks'. The instrument was named as such because it was assumed that CONQUARF would enable the examination of both the *content* and *quality* of corporate environmental disclosures. It was envisaged that the proposed instrument could be used to extract several quality attributes over and above the ones used in previously published studies. In order to obtain further insights about the intended message communicated within the reported disclosures, an interpretative (connotative) content analysis approach was also employed in a sample of companies. The techniques adopted in the interpretative analysis were guided by the theoretical framework, as discussed in Chapter 3.

The second stage of the research project involved undertaking a questionnaire survey to obtain an understanding of the investors' perceptions of the quality of environmental disclosures. The survey method, design and the construction of the questionnaire will be discussed in Chapter 6.

5.2 Content analysis

Content analysis is one of the most widely used empirical research techniques in social and environmental reporting studies (Guthrie et al. 2004). Krippendorff (2004, p. 18) defined content analysis as '*a research technique for making replicable and valid inferences from data (or other meaningful matter) to their context'*. It has several advantages over other research techniques, such as survey, experiments or interviews (Krippendorff, 2004). First, it is unobtrusive. The subject (individual/organisation) being observed is unaware of the fact; instead, the object in the form of text or already available audio or video records, becomes the material to be analysed. Therefore, the possibility of introducing bias, as a result of researchers' or subjects' influences or the stereotyping that might occur in some interactive situations, can be avoided. Second, unlike questionnaire surveys or interviews (which tend to take a definite structure), this technique allows the researcher to manage data in any form ('unstructured'), including corporate reports, brochures, website pages and advertisements. Third, it allows researchers to investigate a large amount of data over an extended period of time and enables a reduction of the data into manageable amounts for analysis (Krippendorff, 2004).

However, establishing reliability remains a critical issue and is particularly important for traditional content analysis because of the technicality and the inherent subjectivity involved in the method. As is explained by Krippendorff (2004, p. 21):

> Any instrument of science is expected to be reliable. More specifically, when other researchers, at different points in time and perhaps under different circumstances, apply the same technique to the same data, the result must be the same.

It is suggested in the literature that explicit rules governing the process, clear definitions of the categories and sub-categories involved in the process, and use of independent multiple coders are likely to increase the reliability of content analysis (Krippendorff, 2004; Milne and Adler, 1999; Guthrie and Abeysekera, 2006). These fundamental requirements are contested by the proponents of the alternative stream of content analysis, which adopts an interpretative approach (e.g., Feldman 1995 and Ahuvia, 2001). Supporters of this approach argue that '*content analysis is a method of interpreting the meaning of texts*' (Ahuvia 2001, p. 150). It is a method for quantifying the frequency of the interpretations of contents

rather than counting the contents of texts. Therefore, this approach considers that any attempt to analyse the texts under study against a set of pre-specified coding rules in enhancing inter-coder reliability could distort the meaning of the text. In the interpretative approach, the quality of coding is increased by collaborative work among researchers who have expertise in the relevant research matter in question. Alternative approaches are elaborated on further in the following section.

5.3 Approaches to content analysis

Beck et al. (2010) classified approaches to content analysis under two broad categories: mechanistic (or traditional) and interpretative. The mechanistic approach is structure orientated. It tends to evaluate data by identifying the presence or frequencies or description length of some predetermined words or concepts. This approach basically involves routine word counts (Deegan and Rankin, 1996; Campbell, 2003), sentence counts (Milne and Adler, 1999; Patten and Crampton, 2004), page proportion counts (Unerman, 2000) or frequency of disclosure (Ness and Mirza, 1991). Each has its own advantages and limitations. The mechanistic approach has been the dominant approach in most of the prior environmental research as its pure quantification character is argued to provide more valid and reliable results. However, it is also argued that this approach fails to satisfy any explanatory query within a hermeneutic-interpretative study, where the main focus is to identify the underlying meaning or message that a text is intended to convey (Beck et al., 2010). Instead, the approach is appropriate when the research question is more about the amount (high/low) of specific disclosure and tends to examine relationships among different variables with the disclosure pattern.

The interpretative approach, by contrast, is similar to the hermeneutic-classificatory content analysis discussed in Bos and Tarnai (1999). This is more meaning-orientated and focuses on the underlying theme of the text under investigation (Beck et al., 2010). This approach requires an understanding of both denotative (manifest) and connotative (latent) meanings of the text under study. Denotative meaning refers to the obvious meaning of a text or fact; whereas, connotative meaning refers to the inner meaning of a text as a whole through combining the understanding of its individual elements (Ahuvia, 2001). While traditionally,

analysis of the connotative meaning or latent content refers to the interpretative approach, Ahuvia (2001) stressed that because an act of interpretation means assigning meaning to abstract symbols, denotative meaning would also constitute interpretation. In his words:

> Denotative interpretations are so highly conventional and frequently practiced that we often create them without being aware that we are performing an interpretative act. This can create the illusion that the denotative meanings we perceive are parts of the physical text itself not interpretations (Ahuvia 2001, p. 142).

In general, the interpretative approach tends to capture the meaning of the text by first creating categories that share a commonality based on specific themes and then explaining the text contents under the relevant category (Graneheim and Lundman, 2004). The connotative interpretative approach specifically requires the collaborative conduct of coding by researchers who have high levels of expertise in terms of '*theoretical sensitivity*'and an awareness of the '*subtleties of meaning of the data'* (Ahuvia, 2001, p. 144). Under this approach, researchers would define criteria before analysing texts, but would not create a fixed set of coding rules to operationalise that definition. Instead, they would examine a text within the context of its preparation and perception to decide whether it could be categorised according to the definition.

The interpretative approach is criticised for its fundamental subjectivity as it largely depends on the researchers' preference to categorise the theme and to elicit the underlying meaning of the narrative. As the approach does not employ the use of rating or mutually exclusive categories, it leaves the data analysis with insufficient rigour and reduces the validity and the reliability inherent in the method's design (Boettger and Palmer, 2010).

However, such criticism was countered by Feldman (1995) who argued that the meaning of every text is context-dependent. For example, to interpret the meaning of the text: '*What do you mean*?' it is required to know in which context the text is produced. Based on the related context, the text can be perceived to be an innocent query; alternatively, it could be an angry response. As Feldman (1995, p. 11) stated:

> Because every context is unique and contexts are constantly emerging, there cannot be a set of pre-existing rules that are waiting to be followed.

Therefore, the fundamental requirement of having a specific set of coding rules in other approaches of content analysis (such as the mechanistic approach) is strictly contra-indicated in the connotative interpretative approach. As it assumes that while the mechanist approach attempts to fit the texts under study against some pre-determined rules to increase the inter-rater reliability, it may do so at the expense of losing the appropriate meaning of a particular text. In connotative content analysis, inter-rater reliability is substituted by '*public justifiability*'. As is explained by Ahuvia (2001, p. 146):

> To achieve public justifiability, the researchers include the focal texts, their codings, and, if necessary, a justification of their codings along with the manuscript when submitting it for publication. In this way, the quality of their coding can be directly assessed by the reviewers.

There is no simple way to decide which approach is the best to conduct content analysis; rather, it depends on the complexity of the tasks associated with the research in question. Where the research questions seek to find out the quantity or pattern of specific disclosures based on straightforward interpretation and where the research materials involve large amounts of secondary data, the quantitative approach would be the best option to follow. On the other hand, where the objective is to gain greater understanding of what is communicated through a text and how or where the research involves qualitative interview data, the interpretative approach would be the best option.

5.4 The content analysis approach used in this study

The content analysis approach adopted in this project was considered appropriate for addressing the research questions. In order to identify the extent to which environmental disclosures align with the attributes of quality as suggested in the regulatory frameworks, a mixed quantitative-interpretative approach of content analysis was employed. However, the interpretative element of the mixed approach was maintained as *denotative* at the outset. This would not enable the unearthing of the intended implicit messages communicated via the reported disclosures of the sample companies. In order to address this issue, an interpretative approach based on *connotative* interpretation was also carried out in the sustainability reports of a limited number of sample companies.

Krippendorff (2004, p. 97) recommended three distinct types of units when applying content analysis: sampling units, recording units and context units. Researchers using content analysis must distinguish between and identify these units.

5.4.1 Sampling units

Identifying the sampling units is the first step for researchers when undertaking content analysis (Krippendorff, 2004). Sampling units are defined as units that *'are distinguished for inclusion in or exclusion from an analysis, ideally in a way that acknowledges natural boundaries'* (Krippendorff, 2004, pp. 99-100). The selection of sampling units must also be connected back to the research questions (Boettger and Palmer, 2010). Table 5.1 presents some of the examples of documents used in environmental accounting research as sampling units.

Table 5.1: Documents used in previous environmental accounting research

Research	Documents studied
Freedman and Jaggi (1988)	Annual reports and 10-K reports*
Zeghal and Ahmed (1990)	Advertisements and brochures
Deegan and Rankin (1996)	Annual reports
Deegan et al. (2002)	Annual reports
Guenther et al. (2007)	Stand-alone sustainability reports
van Staden and Hooks (2007)	Annual reports, website information and other special reports
Guthrie et al. (2008)	Annual reports and corporate websites
Elsayed and Hoque (2010)	Annual reports
Cuganesan et al. (2010)	Annual reports
Lynch (2010)	Annual reports
Lodhia (2014)	Annual reports, sustainability reports and websites

*An annual financial report to the US Securities and Exchange Commission

While a range of disclosure media has been used in previous environmental accounting research, either individually or in combination, the annual report remains dominant throughout the research (Unerman, 2000). The main reasons for persistent use of annual reports as a primary disclosure medium are: first, this is the main form of corporate communication (Adams and Harte, 1998); second, this is produced consistently by corporations and attested by managerial personnel (Neimark, 1992); and third, it has been viewed as the primary means of dissemination of disclosures to stakeholders (Deegan and Rankin, 1997; Guthrie et al., 2008; de Villiers and van Staden, 2011).

However, recent studies question the use of annual reports as a prime avenue for disclosure analysis, as companies are increasingly making environmental disclosures in other forms, including separate reports and company websites (Frost et al., 2005; Guthrie et al., 2008). Other forms of corporate communication have also been recognised in the extant literature, including advertisements, brochures, press releases and videos (Zeghal and Ahmed, 1990). However, these forms of corporate communication, including corporate websites, are used in an ad-hoc manner depending on the manager's discretion over the timing of disclosure and the selection of medium. As noted by Unerman (2000, p. 672),

> They (managers) should have the comparative luxury of publishing such documents only when they are ready and willing to do so.

While using these ad-hoc documents would be suitable where the research query is about identifying trends in corporate reporting practices or stakeholder influence/management, for a number of reasons they may not be suitable for analysing the quality of corporate environmental disclosure. For example, these documents are not produced in a regular fashion in each accounting period by a particular company and may not be produced by a range of different companies in a particular period. Also, these documents are often not placed or conserved in the corporate archive (Unerman, 2002). Besides, large companies can produce a large number of documents compared to small companies (Zeghal and Ahmed, 1990). All of these issues have the potential to make any comparison inequitable and incomplete. Finally, as is stressed in Unerman (2002, p. 85):

> A limit must be set to the range of documents included in any research study … To set no bounds to the range of documents studied risks a researcher being overwhelmed by the number of documents.

However, if environmental disclosure is present in reasonable quantities in corporate reports other than annual reports (e.g., separate environmental or sustainability reports), exclusion of those reports might raise questions over the validity of using annual reports exclusively (Unerman, 2000). Therefore, annual reports as well as separate sustainability/environmental reports or other similar stand-alone corporate reports disclosing environmental information on corporate practice were used as sampling units in

this study. The selection of such documents is justified by the fact that they provide an appropriate vehicle for investigating the research objective: examining the quality of environmental disclosures by resources sector companies.

5.4.2 Population and sample

Population

A population is a collection of items under consideration from which a sample can be drawn (Collis and Hussey, 2009). In this study, the population consists of the resources sector companies listed on the ASX grouped under three headings: 1) metals/mining, 2) energy and 3) utility (MEU). As outlined in Chapters 1 and 2, metals/mining sector companies are involved in mineral exploration, development and production (ASX, 2010a). Energy sector companies are involved in the exploration and development of oil and gas products, coal, other consumable fuels (ASX, 2010b). The utilities sector comprises companies that operate as independent producers and/or distributors of electricity, gas and water (ASX, 2010b).

The MEU sub-sector consists of 939 companies, with 679 of those operating as metal and mining companies, 228 energy sector companies and 32 in the utilities sector. The lists of companies under the three different sub-sectors were obtained from the Trading Room and ASX websites (Trading Room, 2010; ASX, 2010a).

Sample

A sample is a sub-set of a population. A representative sample ought to show population characteristics in an unbiased manner (Collis and Hussey, 2009). In this study, a random sampling technique was used. A random sample is one where every member of the population has a chance of being chosen and this allows the results obtained for the sample to be taken as true for the whole population.

The sample size is determined as a function of a coefficient of variation (CV) and ratio of means (Belle and Martin, 1993). The CV is a dimensionless number (which does not measure any aspect, such as length, time or weight) that quantifies the degree of variability relative to the mean. The population CV is defined as:

$$CV = \frac{\sigma}{\mu} \text{ ..... (Equation 1),}$$

where, σ is the population standard deviation and μ is the population mean. Equation 1 is multiplied by one hundred so that the ratio of the standard deviation to the mean is expressed in terms of a percentage.

The CV method has been used historically in biological and medical science for sample-size planning. However, it is increasingly used in social science studies. A comprehensive review of social science literature shows that it is *'one of the most widely used ways of assessing group-based demographic differences'* (Kelley, 2007, p. 756).

The population of each sub-sector is ranked as per market capitalisation (Campbell, 2004). Market capitalisation represents the size and the extensiveness of a firm's activities. The previous environmental accounting research supports the view that firm size has a significant correlation with firm disclosure, as larger companies tend to disclose more than smaller ones (Trotman and Bradley, 1981, Brammer and Pavelin, 2008). The companies in each sub-sector were divided into a number of arbitrary quotas or groups where a noticeable size gap occurred. The mean and standard deviation were obtained for each group. Then the CV was calculated for each group by using the formula given in equation 1. The total CV for the whole sub-sector population was obtained by summing up the CVs of each group in that sub-sector. Then the group CV was weighted against the total CV to arrive at the fraction which would be used as a function of the sample size for each group.

The reasons for constructing the sample using the above method are:

a) the companies in the resources sector vary considerably in their size and activities, as is reflected by the market capitalisation, which could be as high as $126 billion to as low as $346,000. As CV represents the degree of inequality or variation in a given distribution, it would be considered an appropriate technique; and
b) stratification or grouping the population before determining sample size provides a sample large enough to include greater variation among the distribution so as to

address the research questions in the study. The sample size determined for each sub-sector using the CV method is shown in Table 5.2.

Table 5.2: Population and sample size

Sub-Sector	Population	Sample size in each sub-sector
Metal and Mining	679	59
Energy	228	36
Utilities	32	8
Total	**939**	**103**

The sample selection method involves stratified sampling (Collis and Hussey, 2009). A simple random sampling technique was used to allocate the sample size within each group or strata using the Microsoft Excel random generator function. It can be argued that systematic sampling could have been conducted where the population is divided by the required sample size to get a number 'n' and then, the sample can be selected by taking every 'nth' item. While the systematic sampling ensures that the selection process is free from any over/under representation of population items, its main drawback is that it would largely reduce the randomness of the selection process by selectively excluding (n - 1) number of companies from the population. By contrast, in the case of simple random sampling, its main strength lies in its randomness. The possibility of over/under selection of population might occur; however, it is considered to be highly remote (Collis and Hussey, 2009). The list of the sample companies drawn for this project is shown in Appendix 2.

5.4.3 Recording units versus context units

The term 'recording unit' is used in 'volume-studies' which refer to the examination of size or volume of disclosures as a whole (or in particular categories) by counting words, sentences or proportion of pages (Vourvachis, 2007). Recording units that are used in the content analysis based environmental literature include word, sentence, line and page counts. Each of these units has its own benefits and limitations. Words or page counts do not account for their over-use or under-use in disclosing information (Hackston and Milne 1996) or repetition of information (Patten, 2002). Some researchers prefer sentences over words as recording units as '*sentences are to be preferred if one is seeking to infer meaning*'

(Milne and Adler, 1999, p. 84). However, Wilmshurst and Frost (2000, p. 16) suggest that word counts seem to have more advantage over sentence counts in being *'the smallest unit of measurement for analysis and can be expected to provide the maximum robustness in assessing the quantity of disclosure'*. Another group of researchers studying corporate social responsibility (CSR) disclosure reject employing either words or sentences as the recording unit as '*this will result in any non-narrative CSR disclosures (such as photographs and charts) being ignored'* (Unerman, 2000, p. 675). This group lend their support to page counts (Cowen et al., 1987) or a percentage of pages dedicated to social and environmental disclosures (Unerman 2000; Gray et al., 1995a; 1995b; Guthrie and Parker 1989).

However, in index-based content analysis, recording units (referred to as units of measurement by Milne and Adler (1999)) are not used as the basis of coding; rather it is the context unit which needs to be identified. Index-based studies are also labelled 'contingency analyses' by Holsti (1969) and generally examine the presence or absence of a particular phenomenon, event or disclosure in the contents under study. Context units are defined as '*the largest body of content that may be examined in characterizing a recording unit'* (Koul, 2009, p. 282). Context units are more meaning-orientated, which is explained by Krippendorff (2004, p. 101) as:

> The meaning of a word typically depends on its syntactical role within a sentence. To identify which meaning applies to a word from a list of dictionary entries, one must examine the sentence in which the word occurs. How else would one know, for example, whether the word *go* is meant to denote a game, an action or a command? Here the sentence is the context unit and the word is the recording unit.

The interpretative element of the quantitative-interpretative method of content analysis leads the study to take an index-based approach instead of a volume-based one. It attempts to analyse the quality of disclosures on a specific theme by capturing the denotative or obvious meaning of an environmental narrative (hence, this constitutes a denotative interpretation). Therefore, this embraced the use and the definition of Krippendorff's (2004) context unit instead of recording unit. To illustrate the concept further, Krippendorff (2004, p. 101) elaborates that unlike recording units, context units '*are not counted, need not be independent of each other, can overlap, and may be consulted in the description of several*

recording units'. It is stressed that there is no prescribed limit for the size of context units, as Krippendorff (2004, pp. 101-102) explained:

> Sentences are the minimal context units for individual words, but sentences may not be enough … Analysts might need to examine even larger context units such as a paragraph or a whole speech … the best content analyses define their context units as large as is meaningful (adding to their validity) and as small as feasible (adding to their reliability).

Therefore, in this study, sentences, paragraphs, tables, graphs or charts were used as context units and attention was given to their underlying theme/message or individual piece of information while choosing them as a basis for coding. In other words, context units are identified through thematic distinction, which refers to '*unitizing freely generated narratives thematically'* (Krippendorff, 2004, p. 107). Then a context unit is split to extract an individual piece of information that matches with the individual quality coding attribute (Beattie et al., 2004). The theme or meaning is tied to the objective of content analysis: in this case eliciting the quality of environmental disclosures. The recording unit is the presence or absence (denoted by '1' or '0' respectively) of a piece of information with regard to a specific quality attribute in a context unit.

5.4.4 Coding

The coding process involves determining whether a piece of information in a context unit (such as narratives, charts or graphs) that corresponds to a quality attribute is determined by the obvious meaning of that piece of information. An operational coding tool (see Figure 5.2) was developed to clarify the process of eliciting the *meanings* commensurate with the quality attributes explained in the regulatory frameworks reviewed in this project. Thus, a composite, two-directional content-quality instrument was developed which was tied to the established reporting frameworks and established as CONQUARF. The instrument consists of two limbs, as is shown in Figure 5.1: the vertical limb shows the disclosure contents which refer to disclosure categories and sub-categories (CON); the horizontal limb shows the disclosure quality denoted by the elements of the quality coding tools (QUA).

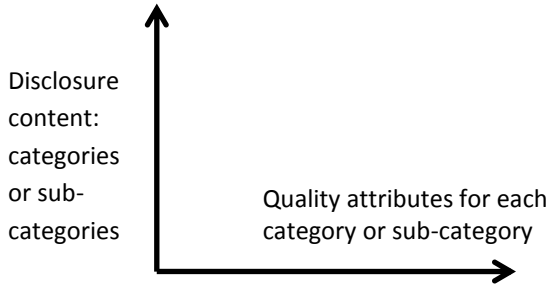


Figure 5-1: Illustration of CONQUARF

The process for identifying the categories and sub-categories relevant to the environmental disclosures for the resources sector and establishing quality criteria for such disclosures was described in Chapter 4 and summarised in Tables 4.2 and 4.3. The coding procedure used in the content analysis method followed three steps:

Step 1: Coding for content (CC)
Step 2: Coding for quality (CQ)
Step 3: Integration and measurement of quality of disclosures

These steps are explained below.

Step 1: Coding for content (CC)

Any disclosure that contains information about the companies' environmental impacts and strategies was considered for coding. The coding process involved a dichotomous recording of the presence or absence of disclosure under each sub-category, as shown in Appendix 1. This process had several advantages. First, it informed the *relevance* of an environmental narrative, as the sub-categories were selected in line with the sector supplement criteria provided in the G3 guidelines and the expectations of an industry code (MCA code 2000). Second, the classification of the theme categories into sub-categories allowed content diversity of the data to be captured. Therefore, even though the process involved a dichotomous selection, the coding resolution was enhanced; and it allowed interrogation of exactly what specific information was reported in a given category. Third, it avoided the limitation of using word, sentence or paragraph counts as units of measurement.

Step 2: Coding for quality (CQ)

In order to analyse *quality*, a coding tool was developed to represent the quality criteria summarised in Table 4.3. The link between the coding tool and the qualitative attributes is shown in Figure 5.2. The elements of the coding tool is represented typographically as follows: a) general disclosure on a specific category/sub-category; b) disclosures quantified in units; c) disclosures classified as source or nature; d) disclosure of comparative data in the form of table or charts; and e) disclosure of a calculation method or any regulatory protocol followed by the company or assurance information. The tool was used for CQ attributes of the *quantifiable* disclosure categories. Quantifiable disclosure categories refer to items that contain a unit of measurement such as mega-litres, megawatts, tonnes and joules. The link between the quality attributes and the elements of coding tool with their respective typographic symbols are shown in Figure 5.2.

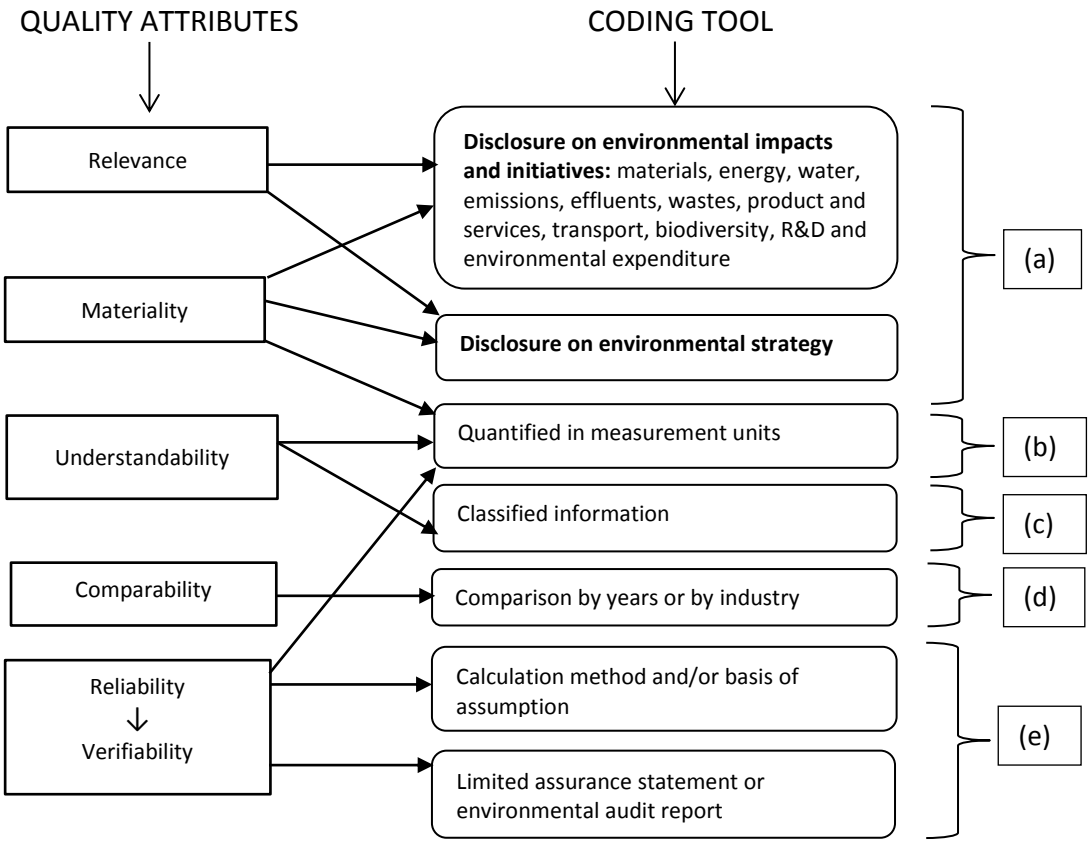


Figure 5-2: Coding tool for analysis of the quality of environmental disclosures

A dichotomous recording of ‘1’ or ‘0’ was used for the existence (coded as ‘1’) or non-existence (coded as ‘0’) of each qualitative tool in a particular disclosure category/sub-category. The dichotomous recording was performed by cross-tabulating the entries for the qualitative tools against each category and sub-category. Therefore, disclosures on a specific category/sub-category were analysed as follows: first, whether a disclosure is related to a specific sub-category listed in Step 1; second, whether the disclosure provides any quantified information; third, whether the information is presented in a classified manner; fourth, whether the disclosure provides comparative information; and fifth, whether the disclosure provides any reference to a measurement method or base. The reports were also reviewed for any assurance statement made by an independent third party.

An illustration of undertaking content analysis using the CONQUARF technique in evaluating the quality of emission disclosures in an ORG sustainability report (2009b) is provided based on the following extract:

> We report annually on our NOx and SOx emissions from the main production and generation facilities as part of Australia’s National Pollutant Inventory (NPI). In the reporting period, NOx emissions at our Generation sites increased by 93 per cent to 865,000 kg/yr (Origin Energy, 2009b, p. 24).

For this disclosure, whole sentences are regarded as the context unit. Individual pieces of information in these sentences would indicate the presence or absence of the elements of the coding tool and would be coded accordingly as ‘1’ for presence and ‘0’ for absence. Therefore, the coding for this disclosure would be undertaken as shown in Table 5.3:

Table 5.3: An illustration of undertaking content analysis using CONQUARF

Disclosure sub-category	**a** General disclosure	**b** Quantified in units	**c** Disclosures classified as source or nature	**d** Disclosures indicating comparison	**e** Disclosure of calculation method or any regulatory protocol
Nitrogen Oxides (NOx)	1	1	0	1	1
	'We report annually on our NOx'	'865,000 kg/yr'	Reason or source of increase in NOx emission is not given in this sentence.	'increased by 93 per cent'	'Australia's National Pollutant Inventory (NPI)'

Thus, it is argued that CONQUARF is able to elicit attributes of quality for each category or sub-category reported from the corporate reports, consistent with the requirements of the established reporting frameworks.

However, some disclosure categories cannot be expressed in quantified units and/or are predominantly descriptive in nature. For example, three categories: 'methods of effluents discharge and waste disposal', 'biodiversity' and 'environmental strategy' are predominantly descriptive and not disclosed in quantified units. The coding tool does not capture these items, which would be a limitation in the data collection process. For example, effluent related disclosures such as *'… acid rock drainage is treated using phytoplankton cell as part of a biological treatment system…*' (BHP, 2009b, p. 15), signals environmentally friendly effluent management, however, it does not coincide with any of the 5 codes ('a' to 'e') and, hence, would be omitted. The quality of disclosures of these categories was evaluated by the level of detail of information. For example, for biodiversity, disclosures were analysed at three levels:

1) The size of the area acquired or leased for mining and the level of their association with the protected area identified by the government;
2) Organisational impacts on the natural habitat; and
3) Specific initiatives to reduce such impacts.

Therefore, separate sets of quality criteria based on the G3 guidelines and Environment (EN) Indicator Protocol set were used for these three categories of disclosures (see Appendix 3).

A dichotomous recording of '1' or '0' was used again for the existence or non-existence of the individual information denoting quality for these disclosures.

Step 3: Integration and measurement of quality of disclosures

The final measurement of the coded data was represented by calculating the percentage of the sample companies that addressed the qualitative attributes in each sub-category. The results were represented under the scaffold of CONQUARF (Figure 5.1), where the vertical limb displayed the disclosure categories or sub-categories. The quality attributes of each disclosure were portrayed along the horizontal limb in terms of the percentage of the sample companies disclosing them. For non-quantifiable descriptive categories, the percentage of the companies reporting on the selected criteria to denote the level of detail in each disclosure category was measured similarly. The presentation of findings in this way, not only enabled identification of 'what is disclosed' in terms of content diversity, but also allowed for an understanding of the extent to which quality is embraced in such disclosures.

5.5 Reliability of content analysis

The concept of reliability involves consistency and reproducibility. As Zikmund (2010, p. 305) states, *'A measure is reliable when different attempts at measuring something converge on the same result'.* Reliability must be established in content analysis to ensure that if different researchers use the same technique on the same data set at different points of time, they will get the same results (Krippendorff, 2004).

Krippendorff (1980) described reliability at three levels: stability, reproducibility and accuracy. Each type differs in its strength in measuring reliability. Stability is defined as the degree to which a single coder can code data in the same way over time. Therefore, it refers to the intra-coder reliability. Milne and Adler (1999, p. 239) stated that stability is '*the weakest form of reliability'*. Krippendorff (1980) argued that one should not use stability as the only measure of reliability while conducting content analysis. Reproducibility is defined as the extent to which two or more coders produce the same results by using the same technique from the same data set. This is referred to as the inter-coder reliability, as it assesses the consistency or disagreement in the coding process among various coders. It

provides a higher level of reliability than stability. Accuracy is the strongest type of reliability, which assesses '*coding performance against a predetermined standard set by a panel of experts or known from previous experiments and studies*' (Milne and Adler, 1999, p. 239).

Several approaches were suggested by Holsti (1969) for increasing the reliability in index-based content analysis studies. First, providing a clear and complete definition of themes (categories/sub-categories) and sub-themes prevents overlapping or duplication of coding contexts. Some studies stressed this approach to ensure the reliability of content analysis (Gray et al., 1995b; Lynch, 2010). Second, aggregating different sub-categories with subtle differences into a single sub-category decreases the chance of disagreement, although this is recommended only if the differences in the sub-categories '*are not of major theoretical significance'* (Holsti, 1969, p. 137). Third, using a dichotomous coding technique and employing two or more coders enhances the reliability of content analysis. This study adopted all three approaches to ensure the reliability of the content analysis process.

The process of finalising a list of categories and sub-categories is explained in Step 1 above. Categories and sub-categories including the quality criteria (operational tools) under each sub-category were clearly distinguished and defined. The list of categories/sub-categories was then further refined. For example, it was considered that the inclusion of both items – 'research and development' and 'initiative to reduce impacts' - might confuse coders. In such a case, the former was excluded from the list whilst the item 'initiative to reduce impact' was maintained under a number of relevant categories (like energy use, water use, emission, effluents and waste). This ensured a more detailed examination of the disclosures and reduced the possibility of duplication and confusion that may have arisen during the process.

A second coder was employed to perform a proportion of the content analysis task in order to measure the level of inter-coder reliability. Milne and Adler (1999, p. 241) suggested that while involving multiple coders, construction of a clear classification scheme is not enough; the researcher should also require '*devising a set of rules about "what" and "how" to code, measure and record the data to be classified'.* Therefore, the second coder was provided

with a training session and a question-and-answer session prior to commencing the actual coding task. The training session involved providing an overview of tasks and materials, explanation of categories and sub-categories with examples, and a set of explicit instructions on how to perform the coding. The coder was then encouraged to go through a sample report to make sure that they understood the procedures involved. During the second session, the process was further clarified through answering a range of queries raised by the assistant coder.

Twenty (20) companies were selected randomly from 103 sample companies. Fifteen (15) annual reports and five stand-alone environmental or similar reports were selected to test for reliability. Both the principle researcher and the assistant coder faced 87 coding decisions per company with a total of 1,740 pair-wise decisions. As was suggested in Milne and Adler (1999), three measures of reliability were tested in this study: coefficient of agreement, Krippendorff's alpha and Scott's pi. For each of these three indicators, the calculation was based on the agreement of coding decisions between the two coders. The decision they needed to make was in the form of 'yes = 1' and 'no = 0' to indicate whether a disclosure provided information on a specific sub-category.

The coefficient of reliability was calculated as *'the ratio of coding agreements to the total number of coding decisions'* (Holsti, 1969, p. 140). The formula to calculate the coefficient of agreement is:

$$\frac{2M}{N1 + N2}$$

Where,

M = the number of coding decisions that the coders agreed upon

N1 and N2 = the total number of coding decisions made by each of the coders.

With 3,390 coding decisions agreed upon out of 3,480, calculation of the coefficient of reliability for 20 text coded reports resulted in a 97.4 per cent agreement.

Although a coefficient of agreement is the simplest way to calculate reliability, it has been criticised for ignoring the possibility that some agreements may occur randomly or by chance (Milne and Adler, 1999; Holsti 1969). As Krippendorff (1980) explains:

> Reliability is expressed as a function of the agreement achieved among coders regarding the assignment of units to categories. If agreement among coders is not better than chance, which might be observed when coders do not care to examine the units or instead throw a die to decide on category assignments, reliability is absent. Whether reliability takes the form of stability, reproducibility, or accuracy, it always boils down to measuring the agreement achieved among observers, coders, or judges regarding how they independently process scientific information.

As indicated earlier, in order to take into account the possibility of agreement as a result of chance, two more reliability coefficients, Krippendorff's alpha and Scott's pi were calculated. The level of reliability measured as 80 per cent or above by these measures is considered to be acceptable (Hackston and Milne, 1996).

The general formula for calculating Krippendorff's alpha is:

$$\alpha = 1 - \frac{Do}{De}$$

Where,

Do = the observed disagreement among values assigned to the unit of analysis

De = the expected disagreement that one would expect when the coding of units is attributable to chance rather than to the properties of these units.

The observed disagreement (*Do*) and expected disagreement (*De*) were calculated as 45 and 499.96, respectively. Therefore, the resultant alpha coefficient for disagreement becomes 0.09 and the Krippendorff's alpha for agreement was calculated as 0.91 (the full calculation is provided in Appendix 4).

Scott's pi was calculated to enhance the robustness of the test for reliability measures. The formula for calculating Scott's pi is:

$$\frac{\%\ of\ observed\ agreement - \%\ of\ expected\ agreement}{1 - expected\ agreement}$$

The percentage of observed agreement and the percentage of expected agreement were calculated as 97.4 per cent and 71.27 per cent. Therefore, the reliability using Scott's pi was computed as 89.65 per cent. The test results for computing reliability of the coding process are summarised in Table 5.4.

Table 5.4: Results of the reliability tests of the coding process

Number of coding decision each coder made	3480
Missing value	0
Number of coding decisions agreed upon with '1-1' pairs of values	560
Number of coding decisions agreed upon with '0-0' pairs of values	2830
Number of coding decisions disagreed with '0-1' and '1-0' values	45
Percentage of agreement	**97.41%**
Coefficient of reliability	**97.41%**
Krippendorff's alpha reliability	**90.99%**
Scott's pi	**89.65%**

Because all of the tests, including Krippendroff's alpha and Scott's pi, indicated high percentages (more than 80 per cent), the inter-coder reliability of the coding process used for conducting the content analysis in this project was considered reliable.

5.6 Interpretative approach of content analysis

An interpretative approach focusing on the connotative (implicit) meaning of disclosures was also employed to understand how an intended message is communicated in a disclosure by the use of certain language, graphs or pictorials. Such a connotative account seeks to go beyond the sheer quantitative measure of quality and analyse what appeals have been created in communicating environmental disclosures. The objective of the interpretative content analysis is to address the issue raised in Research Question 2. Its focus was on obtaining an understanding of how language and images are used to put forward managerial perspectives of sustainability and the environmental well-being therein. Such perspectives would indicate the underlying environmental ideologies of managers or directors. Obtaining an understanding of managers' environmental ideologies is important, as is stated in Chapter 1 (Section 1.2), the quality of environmental disclosures are influenced by managerial decisions (Rupley et al., 2012).

5.6.1 Sample

Five companies were selected from the sample companies in the three sub-sectors that were examined for the content analysis. The companies are: AGL, ORG, BHP, Newcrest Mining Limited (NCM) and OZ Minerals Limited (OZL). The selection was based on two criteria: a) the company prepared a separate sustainability or related report; and b) the report contained 'sufficient' environmental disclosures. In this study, 'sufficient' disclosures refer to the detailed disclosures related to environmental strategy, environmental performance and environmental audit. The analysis involved the narratives, including CEO messages, graphs, tables and pictorials related to the environmental disclosures provided in the sustainability reports prepared for the year 2009. The selection criteria ensured the presence of enough text to carry out the analysis, such as managers' understanding of 'sustainability', as often stated in the CEO messages or environmental strategy sections of reports provide some indication of the underlying intention or motivation for disclosures. Detailed environmental disclosures (that are audited or required to be submitted to the relevant authorities) provide insights about the environmental performance of the organisations.

5.6.2 Steps involved in interpretative analysis

The process of interpretative analysis drew on the qualitative analytical approach suggested in Ritchie and Lewis (2003). It is argued that interpretation in qualitative analysis involves three different contexts: 1) 'self-understanding' of the researcher of what participants themselves mean in narratives; 2) 'critical common sense understanding', where the researcher uses personal knowledge about the context of narratives in an attempt to fit them into general concepts; and 3) 'theoretical understanding', where interpretation can be explained by specific theories. The steps of the analytical approach adopted in this project are detailed below:

1) Generating themes

The identification of themes and concepts was driven by Research Question 2 in relation to what underlying messages are communicated through environmental disclosures. This step involved reading single transcripts to note comments and ideas and prepare a list of initial

themes based on such comments. The same process was repeated for the next transcripts and thus the initial list of themes was extended, refined and categorised around ideas so that a final list of themes could be prepared (Silverman, 2011).

2) Assigning meaning to themes

The second step involved clarifying themes or concepts for assigning meaning to them. The themes and concepts were clarified as per suggestions provided in the interpretative sustainability studies (Ogden and Clarke, 2005; Higgins and Walker, 2012).

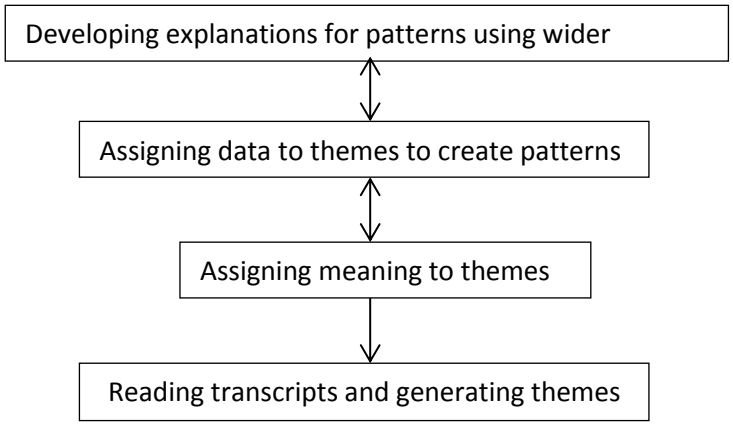
3) Assigning data to themes

The third step required assigning data to the themes or concepts according to their underlying meaning. This process involved sorting and grouping data as per themes, with particular attention paid to the use of texts, font characteristics, graphics and images used in delivering such data to reflect the meaning of themes.

4) Developing rationalisations to match with wider theories

The final step involved detecting patterns and developing explanations under wider theoretical perspectives to address the underlying research questions.

The first three steps required iteration throughout the process of analysis before making the inferences in relation to the relevant research question. The analytical structure of the interpretative analysis is depicted in Figure 5.3.



Adapted from Ritchie and Lewis (2003, p. 212)

Figure 5.3: Steps involved in the interpretative analysis

5.6.3 Theoretical underpinnings guiding the interpretative analysis

A number of theories seek to explain the motivation for providing environmental disclosures. For example, legitimacy theorists view disclosures as a tool for obtaining, maintaining and/or repairing legitimacy (Deegan, 2002; O'Donovan, 2002). This theory largely adopts a broad notion that managers do not provide a comprehensive account of the environmental externalities of their organisational operations. Instead, they provide disclosures so that their company is perceived as environmentally responsible while bringing little change in improving their environmental footprint. At a more refined level, the NRBT upholds the notion of environmental pragmatism and promotes the idea of '*win-win*' situations through the adoption of environmental management (Prasad and Elmes, 2005, p. 848). The theory assumes that if a company adopts environmental management systems to reduce its operational impact and provides disclosures to that effect, it would be able to gain competitive advantage in terms of surviving and thriving into the future (Hart, 1995). While the adoption of environmental management provides a *reasonable* solution to reducing a number of environmental impacts, it does not go to the root of environmental problems resulting from escalating consumerism. Instead, concerns are expressed that the rising popularity of environmental management, because of its ability to provide appealing solutions, essentially marginalises the other radical eco-centric viewers and proves them to be absurd for denouncing growth and development (Prasad and Elmes, 2005). In one way or another, both these theories promote the view that disclosures have an impression-building

or image-setting role rather than providing disclosures of environmental impacts and management.

In undertaking the interpretative analysis of environmental disclosures, the environmental literature draws on a number of techniques, including impression management (Ogden and Clarke, 2005) and persuasion techniques (Higgins and Walker, 2012). Under the impression management technique, the underlying tone of a message tends to be *'assertive',* which in turn tends to *'establish a particular identity or reputational'* image that enhances the value of the organisation in the long-run. Alternatively, the underlying tone tends to be *'defensive'* where the purpose is to avoid or reduce the negative exposures *'in order to retain the positive identity and reputation'* (Ogden and Clarke, 2005, p. 322). The assertive impression includes *'ingratiation'*, *'self-promotion'*, *'exemplification'*, *'entitlements'* and *'enhancements'*. In contrast, the defensive impression comprises *'dissociation'*, *'apologies'*, *'excuses'* and *'justifications'* (Ogden and Clarke, 2005, p. 322).

In line with the impression building and persuasion techniques, themes were identified under the two abstract concepts of legitimation and competitive appeal, which it was expected would be subsumed in the reported disclosures, including CEO messages. Defensive and justification seeking disclosures were grouped under the legitimation category. Alternatively, assertive and credibility seeking disclosures were clustered under the competitive category. Table 5.5 summarises a refined list of themes established under the two main categories following an iterative process of reading reports and taking notes and comments.

Table 5.5: List of themes by nature or type of disclosures

Legitimation appeal Protective or Defensive:	**Competitive appeal** Endorsing or Assertive:
Accounts Dissociation Apologies Excuses Justifications	Ingratiation Expertise Entitlement Claim Exemplification

The themes are defined with the example of relevant disclosures in Chapter 6 (Section 6.5.2), to explain how disclosures were assigned to particular themes according to their underlying meaning.

5.7 The limitations of CONQUARF

As is common in content analysis studies, there are a number of limitations in this study. There was a degree of subjectivity and a lack of precision when identifying some of the quality attributes. For example, to identify a disclosure category as 'classified', no distinction was made in terms of being identified in either of three ways: by 'source', 'nature' or 'scope'. Instead, the presence of any such disclosures was documented as 'classified', even when more than one of these three choices was required to understand the appropriate performance related to a specific category. The same lack of precision held true in examining the 'compared information' attribute. Whether a comparison was based on years or industry average was not distinguished. In addition, being a pure, index-based 'meaning-oriented' study, the content coding tool drew on counting the frequency of content diversity and content quality, but failed to take into account the volume of disclosures.

Moreover, CONQUARF was limited in its application in relation to categories that could not be expressed in quantified units and/or are predominantly descriptive in nature. For example, three categories - disclosures related to effluents discharge and waste disposal, biodiversity and environmental strategy - were predominantly descriptive, and were not disclosed in quantified units. Therefore, separate quality criteria were identified (see Appendix 3) for these categories which focused on the level of detailed information associated with these categories as per the G3 guidelines.

5.8 Chapter summary

Undertaking an arbitrary approach in selecting the quality criteria and not attempting to address the quality attributes suggested in the established reporting frameworks and guidelines as a benchmark represent important omissions in the literature (Guenther et al., 2008). In this investigation the quality aspect of environmental disclosures was examined using established quality criteria as set out in a number of accounting and environmental

reporting frameworks (e.g., IASB, CDSB and GRI). An enhanced content analysis instrument – CONQUARF - was developed to capture both the disclosure categories (CON: content) and the quality of those disclosures (QUA: quality) as suggested in the existing reporting frameworks (RF). By bringing together the two different aspects of disclosures - content and quality - in a two-directional format, CONQUARF allows for the presentation of relative percentage disclosures of companies across the quality criteria for each disclosure category and sub-category. This aspect of CONQUARF allows researchers to readily identify the areas of weakness in environmental disclosures in terms of exactly what quality criterion (or criteria) is missing in what specific disclosure category. Thereby it overcomes the limitation of previous studies where results are presented either by volume of disclosures or by quality of disclosures, without any specific reference to a particular benchmark quality attribute of each disclosure category (Wiseman, 1982; Brammer and Pavelin, 2008; Beck et al, 2010).

The 2009 annual reports and sustainability reports of a sample of resources sector companies were investigated. Being a context-based study, sentences, paragraphs, tables, graphs or charts were used as context units. The 'recording unit' referred to the presence or absence (denoted by '1' or '0' respectively) of a piece of information with regard to a specific quality attribute in a context unit. An illustration of applying CONQUARF was provided in Table 5.8. The percentage of sample companies disclosing in relation to each item of the coding tool for each disclosure category was calculated. The value of Krippendorff's alpha and Scott's pi confirmed the reliability of the content analysis procedure undertaken in this project. An interpretative approach of content analysis was undertaken to elicit the connotative meaning of disclosures and thus, to address the issue of implicit messaging in disclosures as raised in Research Question 2. The steps and techniques used for performing the interpretative analysis have been detailed. A list of themes or concepts was identified and grouped under two broad categories that could be explained by legitimacy theory and the NRBT.

Chapter 6 provides a discussion of the findings following the content analysis of the sample companies from the resources (MEU) sector.

CHAPTER 6: CONTENT ANALYSIS - RESULTS AND DISCUSSION

6.1 Introduction

This chapter presents the findings of the content analysis which was undertaken in two stages: first, a mixed quantitative-interpretative approach, where interpretation is denotative; second, a connotative account of environmental disclosures of the five companies identified in Chapter 5 (Section 5.6.1). The findings obtained in the first stage provide insight on the content and quality of environmental disclosure of Australian resources sector companies against the quality attributes as suggested in the regulatory frameworks and guidelines. The findings gathered in the second stage provide a connotative analysis of how texts and imagery are used, formatted and presented to communicate environmental disclosures in sustainability reports. Such an analysis provides insight on how managers position themselves along the spectrum of environmental philosophies and how such a positioning influences the communication of environmental disclosures in the sustainability reports.

The content analysis approach adopted in the first stage enabled the bringing together of two different aspects of disclosure: information content and quality attributes in a two-directional illustration format. The resultant presentation format showed relative disclosure frequencies not only among the environmental categories and sub-categories, but also across the operational tools tied to the quality attributes as explained in chapter 5. The results are presented under the three MEU sub-sectors of the Australian resources sector, to allow comparison of disclosure variations between the sub-sectors. As discussed in the method section, the disclosures were analysed under three groups: quantifiable (physical units), non-quantifiable (predominantly narrative) and quantifiable monetary disclosures.

6.2 Analysis of quantifiable disclosure categories across the MEU sub-sectors

6.2.1 Non-disclosure analysis: frequencies and categories

From the extended list of categories and sub-categories presented in Appendix 1, 20 were found to be quantifiable, as presented in Table 6.1. The overall sector analysis reveals that a large number of the sample companies did not provide any environmental disclosures except for the statutory statement about their performance regarding compliance with the environmental regulations (*Corporations Act 2001* s.299 (1) (F)). It was found that the companies that had a market capitalisation of $500 million or less did not provide any or little environmental disclosure. In order to ascertain the sheer size of the non-disclosing companies, the relative frequency of non-disclosure was measured separately across the three sub-sectors, as shown in Table 6.1. The relative frequency of non-disclosing companies is expressed as a percentage of the total sample companies.

As outlined, Table 6.1 includes a concise list of quantifiable disclosure categories and sub-categories. This listing was based on the criteria that a single category/sub-category was included if it is disclosed by at least one company in any of the three sub-sectors. Thus, of the 20 categories/sub-categories, three are electric utility sector-specific supplementary disclosures (GRI, 2009): these are ‘water use in processing’, ‘emission from generation and capacity’ and ‘emission from combustion’.

Table 6.1 also shows that, in general, metals/mining sector companies provided more disclosures than their energy and utility counterparts. Out of the 59 companies analysed from the metals/mining sub-sector, 53 per cent did not provide any information against any of the 17 categories (excluding the three electric utility sector supplement disclosure categories). For the energy sub-sector, out of 36 sample companies, 58 per cent did not provide any disclosures on any of these categories. However, if the disclosure on ‘production’ is removed from the list of the disclosure categories and/or sub-categories, then the percentage of non-disclosing entities would rise to 86 per cent and 89 per cent (the minimum percentage of non-disclosure) for the metals/mining and the energy sectors, respectively. For the utility sector, from the eight sample companies, 38 per cent did not

disclose at all; if the disclosure on 'production' is excluded from the list, this percentage rises to 88 per cent.

Table 6.1 also highlights (in bold font) the sector-wise non-disclosure of the categories and/or sub-categories. The highest number was documented in the utility sector with a total of seven categories that were not disclosed at all. These are: 'water use in processing and cooling', 'water recycled', 'direct GHG', 'indirect GHG', 'other emissions', 'emission from combustion power plants' and 'effluents discharge'. Three categories were not reported at all by any of the energy companies. These are: 'ozone depleting substance', 'other emissions' and 'product impact'. All the categories (excluding the three electric utility sector supplement disclosure categories) were disclosed by the metals/mining sector companies, at least to some extent.

Table 6.1: Variations of relative frequency of non-disclosure across the MEU sub-sectors

	Metals/Mining	**Energy**	**Utility**
Total number of companies	**59**	**36**	**8**
Disclosure categories/sub-categories			
1. Production	53%	58%	38%
2. Energy use	86%	97%	88%
3. Energy initiative	88%	97%	88%
4. Water Use	86%	92%	88%
5. Water use in processing*	100%	97%	**100%**
6. Water source affected	91%	94%	88%
7. Water recycled	90%	97%	**100%**
8. Overall GHG	86%	92%	88%
9. Direct GHG	95%	97%	**100%**
10. Indirect GHG	95%	97%	**100%**
11. Initiative reduce	95%	94%	88%
12. Ozone Depleting Substance (ODS)	97%	**100%**	88%
13. Nitrogen Oxides (NOx)	95%	97%	88%
14. Sulphur Oxides (SOx)	95%	97%	88%
15. Other emissions	95%	**100%**	**100%**
16. Emission from Generation and capacity*	100%	97%	88%
17. Emission from Combustion*	100%	97%	**100%**
18. Effluents discharge	95%	94%	**100%**
19. Waste and/or spill	88%	89%	88%
20. Product impact	97%	**100%**	88%

*Electric utility sector supplement disclosure categories, not relevant to metals/mining sub-sector

The analysis and findings of the relative non-disclosure frequencies reported in the sample companies raised a number of issues. The lowest level of non-disclosure was recorded in the 'production' category across all three sub-sectors. A possible reason is that managers may have found this disclosure category relevant to a number of stakeholders, including market participants. The companies that do not provide any disclosures in this category were found to be in the development stage of their mining operation; the rest were distributors and service providers in a number of mining-related operations.

With the exception of one company (Norton Goldfields Ltd) from the metals/mining sector, all the sample companies that had a market capitalisation of $500 million or less did not provide any disclosure in any of the quantifiable disclosure categories other than production. However, these companies provided a compliance or similar statement in the director's report sections stating that the management was not aware of any breaches of any existing environmental regulations. The companies mentioned securing licences from the relevant authorities, including the EPA and compliance with the licence conditions. They also indicated that their level of energy consumption and carbon emission was less than the regulatory threshold and, hence, they were not required to report publicly on the energy use and emission as per the *NGER Act 2007*. These narrative disclosures imply a number of suggestions that would explain the large percentage of non-disclosure in the quantifiable disclosure categories.

First, the size factor common to the non-disclosing companies made them less visible than their larger counterparts to any political scrutiny. Therefore, taking a broad perspective, as suggested in legitimacy theory, it could be argued that decreased political visibility essentially reduced the legitimacy threat for these companies and motivated them to produce adequate environmental disclosures.

Second, obtaining environmental licences from the relevant authorities, including the environmental protection authorities (EPA) involves undertaking environmental impact assessment studies and the submission of reports based on the outcome of those studies. As part of these processes, companies are required to provide a wide range of data relating

to the possible environmental impacts of a proposed mining project, such as usage and drainage of the surrounding water resources if a water licence is sought (Government of Western Australia, Department of Water, 2013). Also, in order to maintain the environmental licences companies, have to submit an Annual Performance Statement (APS). The statement must report on the companies' performances against each licence condition and provide an explanation for any non-compliance issue (EPA Victoria, 2014). Therefore, the companies might consider that complying with licence conditions is sufficient for the attestation of their sound environmental performance. They may find the additional voluntary disclosures an unnecessary and costly exercise.

Third, reduced regulatory requirements for public disclosure for some of the important disclosure categories (such as energy use and emission performance, if the companies do not exceed the prescribed regulatory threshold) diminish their scope of disclosure to a large extent. Taking a narrower perspective of the NRBT, it can be argued that lack of regulatory requirements for public disclosures weakens the competitive motives of the managers to come up with innovative environmentally responsive measures and subsequent reporting. In the absence of an observable competitive force, excelling in environmental management is not likely to bring any competitive advantage; rather, it might be deemed to be counterproductive (Carbon and Environment Daily, 2013).

6.2.2 Disclosure analysis: frequencies and categories

The relative disclosure frequencies of the sample companies in a range of quantifiable disclosure categories were analysed separately across the three sub-sectors. The aggregated results of the three sub-sectors are presented in accordance with CONQUARF in Table 6.2. As is shown in this table, the content analysis approach adopted in this study enables a summary of the results in two dimensions: the information content presented on the vertical dimension (the first column in Table 6.2); and the quality for each information content presented across the horizontal dimension (the rows in Table 6.2). The first column of Table 6.2 shows the 20 quantifiable disclosure categories and sub-categories denoting the information content or 'what is disclosed'. The second, third and fourth columns represent the three sub-sectors: metals/mining, energy and utility, respectively. The operational

quality coding tools denoting the quality attributes of the information content are organised in the second row across the three sub-sectors using typographic symbols: a, b, c, d and e. These symbols, used for each quality attribute, are denoted as:

a: General disclosure on a specific category/sub-category

b: Whether the disclosure provides any quantified information

c: Whether the information is presented in a classified manner (e.g., by source or type)

d: Compared information (e.g., by year or base year or by industry average)

e: Disclosure on calculation method, reference to any protocol or external verification

Table 6.2: Application of CONQUARF in presenting information (categories/sub-categories) and quality content

Disclosure categories and sub-categories	Metals/Mining (n = 59)					Energy (n = 36)					Utility (n = 8)				
	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
1. Production	47	41	19	9	2	42	33	11	25	17	63	63	13	13	13
2. Energy use	14	14	10	5	12	3	0	0	0	0	13	13	13	0	13
3. Energy initiative	12	7	3	3	5	3	3	0	3	0	13	13	0	0	13
4. Water use	14	9	5	7	2	8	6	3	6	0	13	13	0	13	0
5. Water use in processing*	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0
6. Water source affected	9	5	5	3	0	6	0	0	0	0	13	0	13	0	0
7. Water recycled	10	5	0	2	0	3	0	0	0	0	0	0	0	0	0
8. Overall GHG	14	12	10	7	9	8	6	3	6	6	13	13	13	13	13
9. Direct GHG	5	5	3	0	2	3	3	3	3	3	0	0	0	0	0
10. Indirect GHG	5	5	3	0	2	3	3	3	3	3	0	0	0	0	0
11. Initiative reduce	5	2	0	2	2	6	6	3	3	3	13	13	13	13	13
12. ODS	3	2	0	2	2	0	0	0	0	0	13	13	13	13	13
13. NOx	5	5	2	3	3	3	3	3	3	3	13	13	13	13	13
14. SOx	5	5	2	3	3	3	3	3	3	3	13	13	13	13	13
15. Other emissions	5	3	2	0	0	0	0	0	0	0	0	0	0	0	0
16. Emission from generation & capacity*	0	0	0	0	0	3	3	3	3	3	13	13	13	13	13
17. Emission from combustion*	0	0	0	0	0	3	3	3	3	3	0	0	0	0	0
18. Effluents discharge	5	3	2	3	0	6	0	0	3	0	0	0	0	0	0
19. Waste and/or spill	12	5	5	3	2	11	6	6	3	0	13	0	0	0	0
20. Product impact	3	0	0	0	2	0	0	0	0	0	13	13	13	13	13

Operational quality coding tools: a = general disclosures, b = quantified amount, c = classified information, d = compared information and e = calculation method. The rows in each sub-sector column are shown as shaded where a disclosure category is reported in all five elements of the coding tool.

*Electric utility sector supplement disclosure recommended by GRI, not relevant to metals/mining sub-sector

Summarising the findings and presenting the results in this manner helps to illustrate the variation of disclosure frequencies: a) across the sub-sectors; b) across the information content; and c) across quality. The relative disclosure frequencies of the metals/mining, energy and utility sector companies, as shown in Table 6.2, were also plotted in the form of bar charts in Figures 1, 2 and 3, for each sector. The information contents are shown along the y-axis. For each information content, six different bar patterns are used to indicate the five quality attributes (a, b, c, d and e), with a sixth one denoting 'no disclosure'. The x-axis

represents the relative disclosure frequency of the companies calculated as a percentage of the companies that provide disclosures to the total number of sample companies.

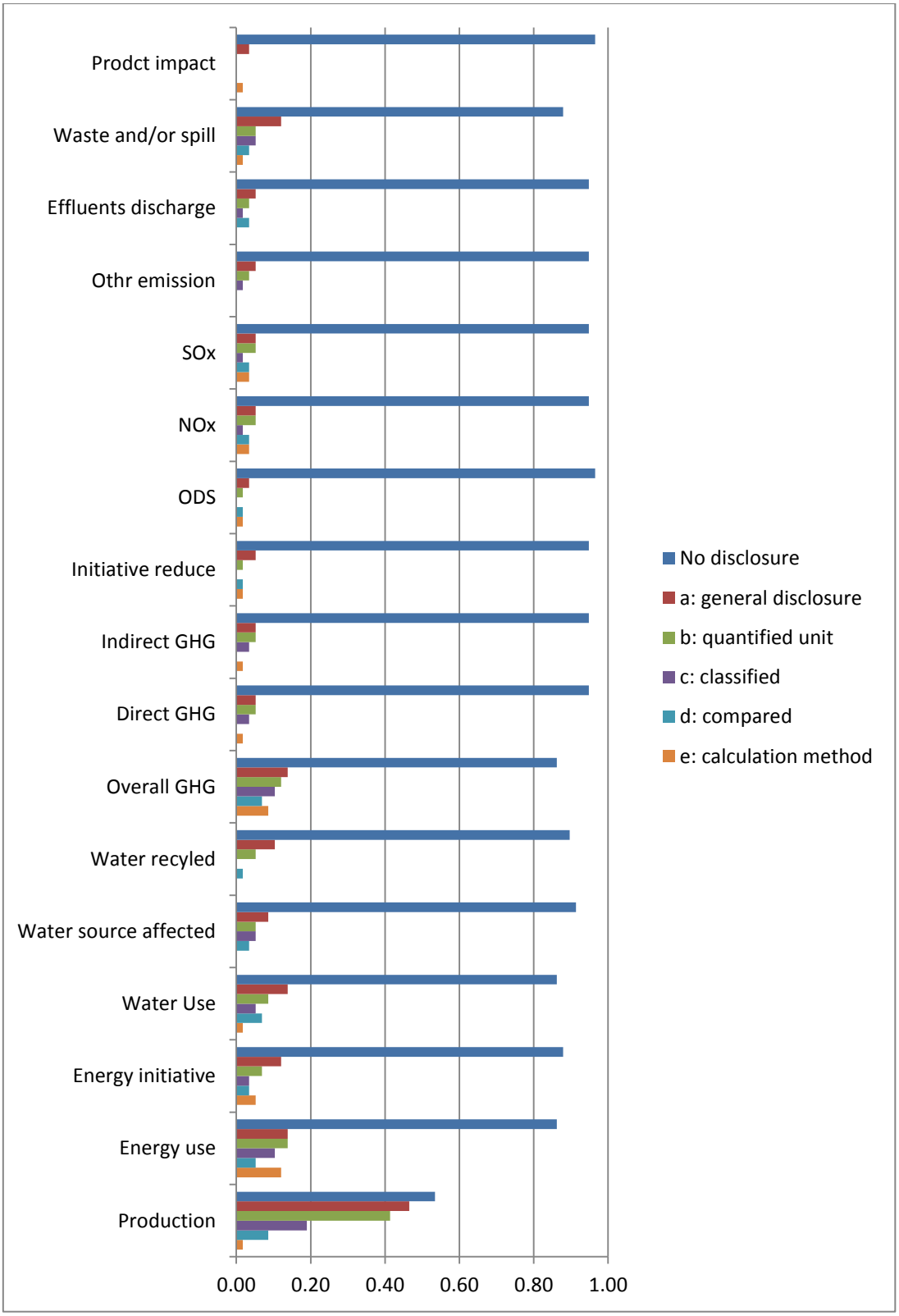
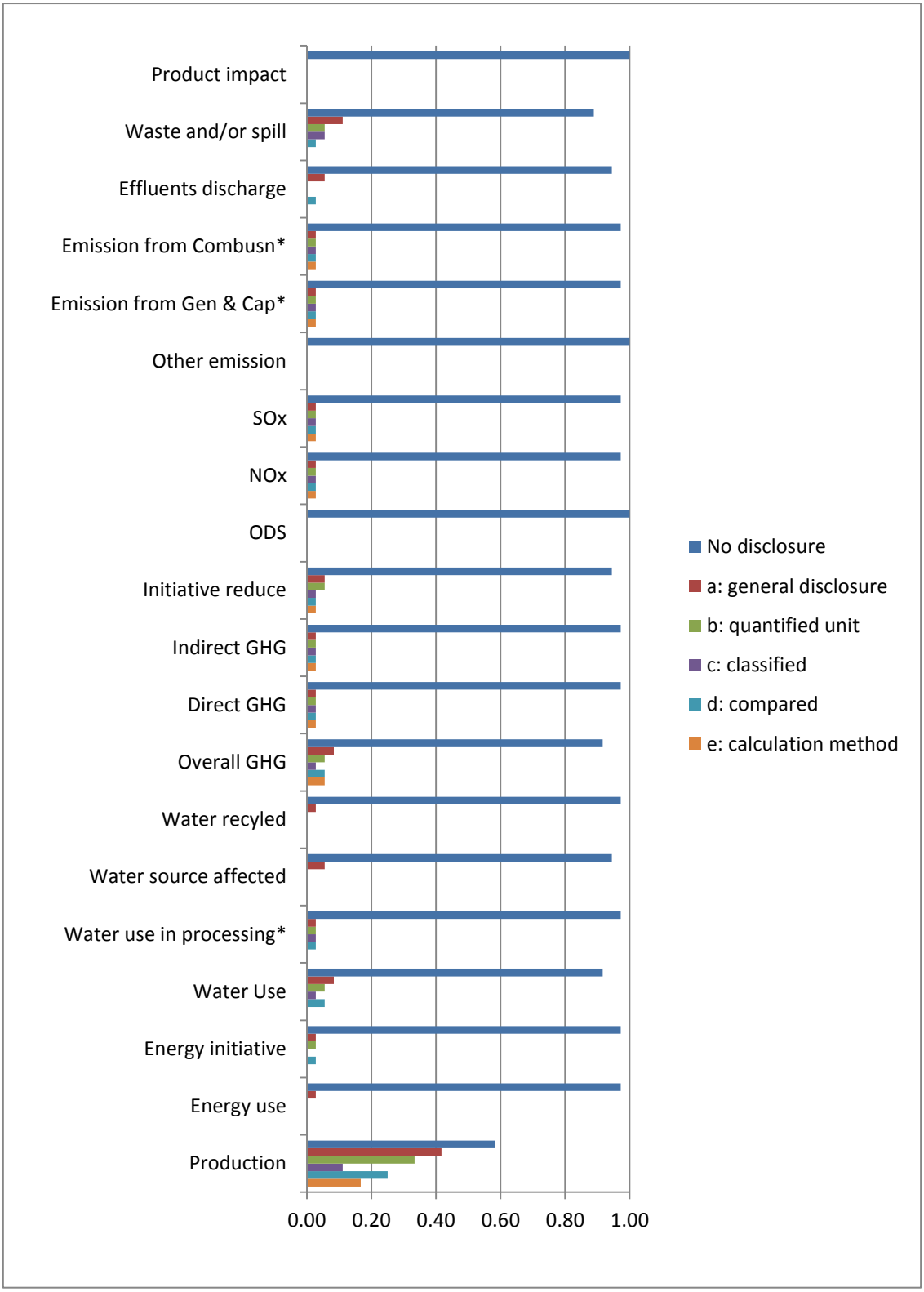
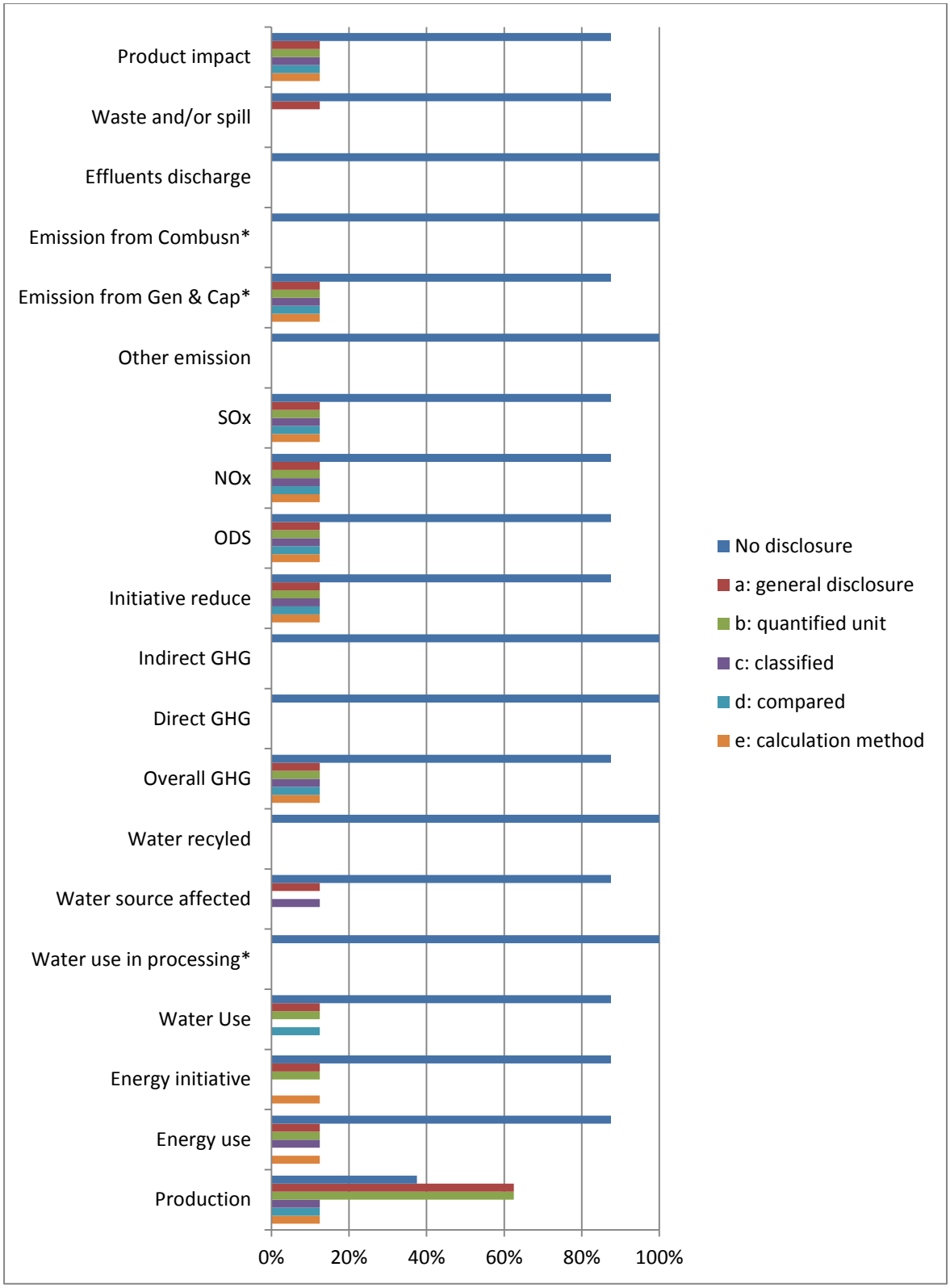


Figure 6-1: Metals/mining sub-sector: frequency of disclosures by information (categories/sub-categories) and quality content



*Electric utility sector supplement disclosure categories

Figure 6-2: Energy sub-sector: frequency of disclosures by information (categories/sub-categories) and quality content



*Electric utility sector supplement disclosure categories

Figure 6-3: Utility sub-sector: frequency of disclosures by information (categories/sub-categories) and quality content

6.2.2.1 Variations in disclosure across the sub-sectors

Table 6.2 reveals that, in general, metals/mining sub-sector companies provided more disclosures in terms of quantity and quality in all the categories (except for the electric utility sector supplement disclosure categories) than the energy and utility companies. Of the 17 categories for the 59 companies analysed in the metals/mining sector, eight categories were identified on which disclosure was provided across all the items of the quality codes by at least one company. These categories are 'production', 'energy use', 'energy intiatives', 'water use', 'overall GHG emission', 'NOx emission', 'SOx emission' and 'waste' (shaded in Table 6.2). The highest disclosure frequency was recorded in the 'production' category (reported by 47 per cent of companies). The category that was least reported by the companies is 'product impact' (reported by 3 percent of companies).

For the energy sub-sector, 36 companies were analysed (as shown in Table 6.2 and Figure 6.2); the relative disclosure frequencies were measured against 20 quantifiable categories. Out of these, 9 categories were disclosed in all the five quality codes by at least one company. These are 'production', 'overall GHG emission', 'direct GHG', 'indirect GHG', 'initiative to reduce emission', 'NOx emission', 'SOx emission', 'emission from combustion power plants' and 'emission from generation capacities' (shaded in Table 6.2). The last two categories are the sector-specific categories that were identified in the GRI (2009) for electricity generation companies; hence, they were not considered relevant for metals/mining sub-sector companies. 'Production' had the highest reporting frequency, with 42 per cent of companies providing disclosures on this category.

The companies in the utility sub-sector demonstrated the least disclosures across the disclosure categories and sub-categories. Figure 6.3 shows that no disclosure was provided in seven out of 20 disclosure categories. For the eight companies analysed, relative disclosure frequencies are shown in Figure 6.3 under the 20 categories as examined for the utility sub-sector companies. Of these 20 categories, eight were disclosed by at least one company in all five quality codes (a, b, c, d and e). These are 'production', 'overall GHG emission', 'initiative to reduce emission', 'ozone depleting substance', 'NOx emission', 'SOx emission', 'emission from generation capacities' and 'product impact' (shaded in Table 6.2).

The reporting frequency was the same for all these categories, at 13 per cent. This is the only sub-sector where full disclosure was provided on 'product impact'.

6.2.2.2 Variations in disclosure across the information content

There are four sub-categories that were reported by all three sub-sectors in all the five quality codes (a, b, c, d and e) of the coding tool. These are: 'production', 'overall GHG emission', 'SOx emission' and 'NOx emission'. The 'production' category had the highest level of disclosure across the three sub-sectors, followed by 'overall GHG'. The categories that had minimum disclosure are 'other emissions' and 'product impact'.

The 'production' category was used in this study instead of the 'material use' category indicated in the GRI. The rationale for this is that resources sector companies are involved mainly in exploring and processing primary materials (materials such as metals and minerals) rather than manufacturing new products or consumables. As such, disclosure on 'material use' is less relevant to them. The annual and/or sustainability reports of the sample companies did not provide any disclosure on 'material use'; instead, relatively high disclosure percentages (e.g., 47 per cent, 42 per cent and 63 per cent respectively, in the MEU sub-sectors (see Table 6.2) were recorded in the 'production' category. Such high disclosures correspond to the mandatory requirements by the Joint Ore Reserve Committee (JORC) code (JORC, 2004) and Chapter 5 of the ASX listing rules (ASX, 2008) set for the resources companies to disclose exploration results, mineral resources and ore reserves. Also, managers might consider such disclosures relevant in terms of signalling to their stakeholders the long-term viability of the mining operations. Most of the companies that did not provide information on the 'production' category are either not involved in the exploration activities (e.g., Pacific Mining Ltd, 2009) or not in the production phase of the mining operations (e.g., Rimfire Pacific Mining NL, 2009).

Following 'production', the category in which there was extensive disclosure in all quality codes is 'overall GHG emission'. Such high disclosure (e.g., 14 per cent, 8 per cent and 13 per cent respectively, in the MEU sub-sectors (see Table 6.2) was expected because of the enactment of the *NGER Act 2007*, which was implemented from 1 July 2008. The *NGER Act*

2007 imposes mandatory disclosure requirements for companies that meet certain energy and GHG emission thresholds. This Act also provides detailed guidelines and methodologies for reporting GHG emission and energy consumption and generation. Failure to comply with the obligations and the requirements of the Act results in substantial penalties (e.g., the inability to provide data is subject to 2,000 civil penalty units or $220,000 (NGER, 2007)). The sample companies that reported on the GHG emission mentioned in their annual reports that they were obligated to comply with the *NGER Act 2007* as they triggered the prescribed thresholds (ORG, 2009b). Alternatively, many of the non-reporting companies in the sample reported that their emission intensity did not call for separate disclosure as per the *NGER Act 2007* (e.g., Mindax Limited).

Disclosures in all quality codes were also documented in the 'initiative to reduce emission' category by energy and utility sub-sectors. These disclosures often overlapped disclosures on the 'initiative to reduce energy use' category. This is because most of the disclosing companies (e.g., AGL and ORG) sought emission reduction through the generation of energy from renewable energy sources. There are direct regulatory pressures on the entities to comply with the RET by 2020 and the proposed CPRS. These schemes have the potential to impose direct monetary constraints in terms of incurring taxes (e.g., via CPRS) or operational restrictions in terms of using exhaustible sources (e.g., coal and fossil fuel) for energy generation (via RET).

Therefore, such high quality disclosures on the 'initiative to reduce emission' category were expected from companies that exceed the regulatory threshold for GHG emission. Most of the companies that reported on this category provided detailed disclosures on the procedures undertaken to reduce emissions and the amount or percentage of the reduction of GHG emission obtained through these procedures. One of the site-specific emission-reduction disclosures by BHP is presented below as an example.

> A project team at BHP Billiton Mozal aluminium smelter … devised a start-up procedure designed to improve the smelting process and reduce per-fluorocarbon (powerful greenhouse gas) emissions … The procedure proved successful in eliminating the 'anode effect' thus reducing overall per-fluorocarbon emissions… With the implementation of the new start-up procedure, a safer system has been created with fewer emissions and much less heat dissipation. There has

> been a 20 per cent reduction in per-fluorocarbon gas emissions, corresponding to a three per cent reduction in total carbon dioxide equivalent emission … (BHP, 2009b, p. 12).

Such disclosures appear to outpace the regulatory requirement of providing numerical emission data. Instead, by providing additional explanatory narratives, the entity tends to indicate ownership of technological expertise and process and thus, signal competitive advantage in today's carbon constrained market.

NOx and SOx were also reported across the quality coding tool by a number of sample companies. NOx are produced as part of various stages of mining operations, such as extraction of oil and gas and manufacturing different kinds of metals and petroleum. Generating electricity is the largest source of emissions of NOx in Australia (Department of the Environment, Water, Heritage and the Arts, 2009a). SOx are emitted into the air during processes such as refining petroleum, smelting metals, especially ores containing sulphur and combustion of fossil fuel (Department of the Environment, Water, Heritage and the Arts, 2009b). These two elements are considered to be significant air pollutants as they form acids while combining with the water vapour in the air, resulting in acid rain (Kulp, 1990).

The companies that exceed the NPI reporting thresholds for NOx and SOx, are required to report to the NPI through the Department of Sustainability, Environment, Water, Population and Communities. These reports are then assessed by the relevant State or Territory EPA before being forwarded to the Department of the Environment, Water, Heritage and the Arts to be included in the NPI database. This is publicly available. Therefore, it was expected that companies that exceed the NPI thresholds would provide high quality disclosures on the emission of NOx and SOx. However, non-disclosure of emission information did not necessarily indicate that the emission levels of the non-disclosing sample companies are within the limit of the regulatory threshold. The non-disclosing companies might consider the reporting of the same emission information twice in two different public documents (once via NPI and again via annual/environmental reports) as redundant.

While most disclosures on 'energy use' were documented in the metals/mining sector followed by its utility counterparts, remarkably, only 3 per cent of the energy sector companies provided disclosures in this category. Those disclosures were largely limited to

general narrative disclosures such as*: 'Last year through the Carbon Efficiency Program, Origin's Upstream Oil and Gas business identified project opportunities capable of delivering energy savings'* (ORG, 2009b, p. 23).

A number of reasons could be suggested for the low percentage of disclosures on 'energy use' by the energy sub-sector companies. They may find it unnecessary to provide disclosure on organisational energy consumption separately from that on energy generation for commercial purposes. Further, disclosures on energy generation for retailing in terms of sources and at different points of the supply chain would be considered more relevant than that of energy consumption. For example, AGL provided detailed disclosures on the electricity generation portfolio in terms of megawatt (MW) and classified the disclosure based on the source of energy (e.g., gas, wind, coal and water) used to generate the electricity (AGL, 2009b, p. 9). However, no disclosure was provided on the energy usage by the entity itself.

Energy generation was often disclosed in combination with the disclosures on GHG emission. Such energy generation disclosures, in fact, play a complementary role in providing the emission disclosure rather than the energy disclosure on its own. This is the case when the amount of GHG emission (kilo tonnes CO2e) is presented as per unit of energy generation (Pico joule). With such disclosures, management may create an impression of synchronised disclosure on energy use and GHG emission; however, obtaining an understanding of the extent of the energy use by the companies from these combined disclosures remains incomprehensible to readers in general. For instance, in the GRI indexes section of ORG's Sustainability Report 2009 (p. 59), the page number referred to for its 'energy use' disclosure, in fact, contains no separate disclosure on the amount of energy usage in joules or watts. Therefore, the specific information related to the energy use remains ambiguous.

The regulation on restricting the energy use of entities, namely, the *Energy Efficiency Opportunities (EEO) Act 2006* is not as stringent as the RET scheme. EEO only requires the entities that exceed a regulatory threshold of energy use (0.5 peta joules) to register with the EEO Program, assess their energy efficiency opportunities, and enhance their energy

efficiency. It also requires the companies to report publicly on the outcome of their energy initiatives. However, no monetary or non-monetary sanctions are involved in EEO for exceeding the regulatory threshold of energy consumption.

High disclosure percentages (14 per cent, 8 per cent and 13 per cent respectively, in the MEU sub-sectors (see Table 6.2) were recorded in the category of 'water use' by the companies. The highest disclosure (14 per cent) was documented in the metals/mining sector followed by the energy and utility sectors. Water is an essential component used in different stages of mining operations, including exploration, ore extraction and processes, dust suppression and post-mining rehabilitation (Kemp et al., 2010). Although the mining sector accounts for a relatively small proportion (only 2-4 per cent) of national water use in Australia compared to the other industrial sectors, its impact on the regional water sources and community could be severe, especially in drought situations and in areas where water is scarce (Gunson et al., 2012). Therefore, mining companies often have to face resistance and competition from local communities and the agricultural sector in securing water licences from the local government (Evans et al., 2003). Water use also represents a large source of energy consumption in terms of pumping, treating, heating and cooling water. Therefore, as is suggested in the NRBT, mining companies are likely to take initiatives for efficient water management by reducing water consumption and recycling, and then providing quality disclosures. Most of the water disclosures provided by the sample companies contained detailed information in terms of the amount used measured in litres, source, treatment method and re-use or recycling of water. In relation to water consumption, source and re-use, OZL reported that:

> OZ Minerals' total water use during the reporting period was 5,253 mega litres … at Prominent Hill and sourced entirely from groundwater bores. Over this period, 3,922 mega litres of water was returned to the tailings dam at Prominent Hill. Our exploration operation in Cambodia sourced water from municipal water supply and surface water (OZL, 2009, p. 29).

In providing disclosure on water use, NCM stated in its sustainability report that water management is a critical issue for their Cardio Valley operations (NCM, 2009). The company provided disclosures on the consumption (in litres) and sources using tables and graphs. The company also provided descriptions of the specific projects that had been taken under their water management plan during 2008-2009. Such narratives also included numerical

information about water efficiency and the reduction of water use in terms of percentages and mega litres.

In relation to the 'effluents discharge' and 'waste and/or spill' categories, the metals/mining sector provided more quality disclosures, followed by the energy sector and the utility sector, respectively. Disclosures on 'effluent discharge' were often presented together with that of 'solid wastes' in the same table or paragraph by the sample companies (e.g., in the BHP Billiton Sustainability Summary Report, 2009). Disclosures were provided in a classified manner such as 'general wastes', 'hazardous wastes', 'waste water and effluents'. The amounts of different types of waste in kilo tonnes and effluents in mega litres were disclosed with comparisons to previous years.

'Other emissions' and 'product impact' were the two categories that have low disclosure percentages (e.g., for both categories: 3 per cent, 0 per cent and 13 per cent across the MEU (see Table 6.2). 'Other emissions' includes emission of persistent organic pollutants, volatile organic compounds (VOCs), stack and fugitive emissions and particulate matter (PM). While metals/mining sector companies provided some disclosures in any or all of these pollutants, their energy and utility sector counterparts did not provide any. The non-disclosing companies were assumed to have lower emission levels that did not exceed the regulatory threshold for these emissions or they had already reported through the NGER system and wished to avoid duplication. Further, they may also have considered that GHG emission disclosure was more relevant to stakeholders than these 'other emissions', as the former has direct association with climate change.

Only one company, AGL, which belongs to the utility sector, provided complete disclosure on the 'product impact' in relation to the GHG emission of its electricity generation and retailing at every step of the supply chain. A number of metals/mining sector companies also provided some disclosure on their product impact. For example, in relation to the extraction of copper, NCM stated:

> Copper can be transported as particles released into the atmosphere or as dissolved compounds in natural waters … the free copper ion is potentially very toxic to aquatic life… Its toxicity

> increases with decreasing water hardness … decreases with high concentrations of dissolved organic compounds (NCM, 2009, p. 45).

The products that the resources sector companies supply in the market are part of nature and are extracted from the earth directly, instead of being man-made or manufactured. This might suggest the notion that such products do not require separate product disclosures and, hence, this might account for non-disclosure in the environmental reports. However, the disclosures on copper by the NCM suggest that any naturally occurring metal, which seems harmless, may become toxic in changed circumstances and environments.

6.2.2.3 Variations in disclosures across the quality codes

Variations in disclosure in terms of the quality codes across the three sectors are shown in Figure 6.4. Each set of columns represents an item of the quality coding tool; thus the five sets of columns represent: a: 'general disclosures', b: 'quantified amount', c: 'classified information', d: 'compared information' and e: 'calculation method'. The three columns in each set represent the three sub-sectors: metals/mining, energy and utility (MEU). The diagram represents the percentage of disclosure for each qualitative code (a to e) for the 103 companies analysed. The percentages are calculated as follows:

$$\frac{\text{Total number of disclosures in each quality code for all the disclosure categories by all the sample companies}}{\text{Total number of disclosures in all the quality codes for all the disclosure categories by all the sample comannies}}$$

For example, the percentage of 'general disclosures' (a) of the metals/mining sub-sector shown in Figure 6.4 as 37 per cent was calculated as 101/276. This is because the total number of disclosures in all disclosure categories reported by the metals/mining sub-sector companies was computed as 276, out of which 101 was related to the 'general disclosures' (a). The figures calculated for Figure 6.4 are provided in Appendix 5.

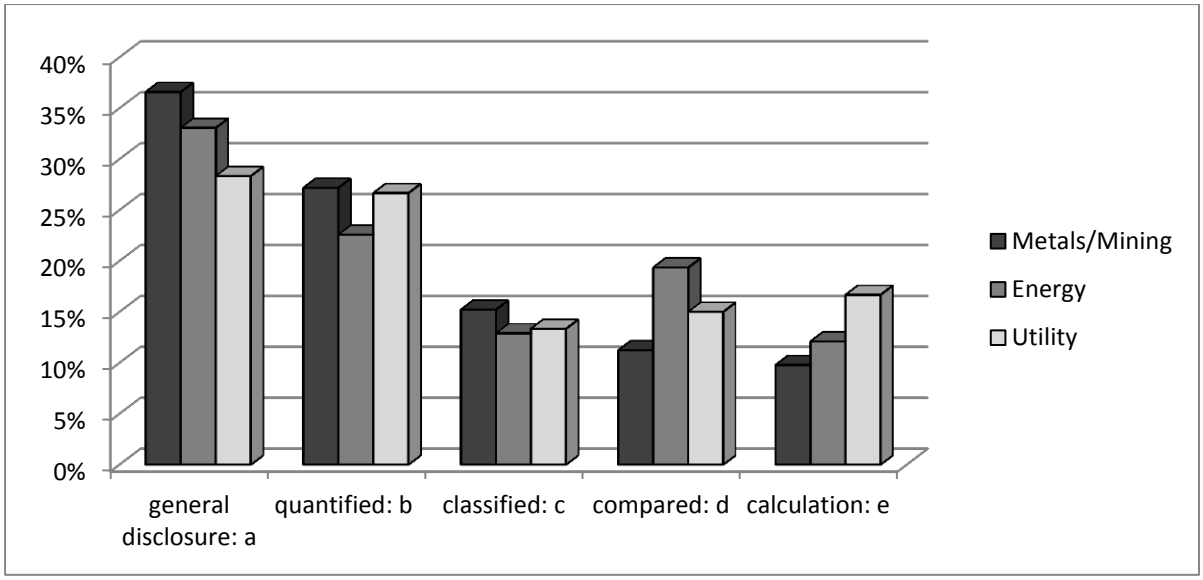


Figure 6-4: Variations in disclosures by quality codes across the MEU sub-sectors

Figure 6.4 reveals that 'general disclosures' were the pre-dominant form of disclosure for each of the three sub-sectors. The metals/mining sub-sector provided the highest level for 'general disclosures' followed by the energy and utility sub-sectors. In this research, 'general disclosures' refers to the narratives in the form of general comments/claims, commitments, practices and plans. Examples of 'general disclosures' on the 'GHG emission' category provided by a number of sample companies are presented below.

> Claims/comments: '*AGL has positioned itself early to maximise shareholder value in an emissions trading environment'* (AGL, 2009b, p. 8).
>
> Commitment: '*Business leadership and ingenuity is important to achieving lower carbon growth and as a major natural resources company we are committed to playing our part*' (BHP, 2009b, p. 13).
>
> Practice: '*We run programs to improve our environmental performance, set specific targets, such as for energy use and greenhouse gas emissions, and track our progress against our targets'* (BHP, 2009b, p. 13).

> Plan: '*Origin has committed to undertaking detailed engineering analysis of key projects at nominated sites to reduce the greenhouse gas emissions and energy consumption of our activities'* (ORG, 2009b, p. 23).

These types of general disclosures are related to the environmental impact of companies' activities. However, they are not helpful in assessing the significance of the risks and an entity's ability to overcome such risks.

The second highest quality code observed in the disclosures is provision of 'quantified information'. Twenty-seven (27) per cent of the total disclosures provided by the metals/mining and utility sub-sectors were quantified in units, whereas for the energy sub-sector this was 23 per cent. 'Quantified information' refers to the disclosures expressed in measurable units, like kilo tonnes for GHG emission, mega litres for water use, and megawatts or joules for energy consumption and generation. The amounts are expressed in absolute value (e.g., total emission in terms of kilo tonnes CO2e) and/or in relative value (emission in terms of kilo tonnes per peta joule). The highest percentages (41 per cent, 33 per cent and 63 per cent across the MEU - see Table 6.2) of 'quantified information' was recorded in the 'production' category in all three sub-sectors. This was followed by 'energy use' (14 per cent) and 'overall GHG emission categories' (12 per cent) in the metals/mining sub-sector; for the energy sub-sector, the next highest 'quantified information' was documented in both 'overall GHG emission' (6 per cent) and the 'initiative to reduce emission' (6 per cent) (see Table 6.2).

In general, the disclosure of 'calculation method' was low. Most of the companies failed to provide the underlying measurement basis or protocol for the quantified disclosures. Providing data in quantifiable units with the accompanying information on the underlying measurement method/bases/protocol used to reach such numbers enhances the reliability of disclosures. Such disclosures facilitate the verification process by independent third parties and also demonstrate that the reporting organisation has some sort of environmental data measurement system. Therefore, such measurement helps the perception that the reporting companies are sincere in tracking and managing the environmental impact of their organisational operations. It is noteworthy that an

independent audit/ assurance report accompanying environmental disclosures would also enhance the credibility of reported information. However, the analysis of assurance statements is outside the scope of the current investigation. Hence, it is argued, such disclosures send quality signals that might promote the competitiveness of the reporting entity.

The 'calculation method' is associated with the numerical data presented on the 'emission' and 'energy generation' categories. For example, AGL mentioned in its online version of the Sustainability Report (2009) that the GHG emission data presented in the report had been estimated in line with the NGER (Measurement) 2008 guidelines published by the Commonwealth of Australia on 25 June 2008. However, the 'calculation method' or reference for quantified disclosures related to categories such as 'water use' and 'effluent discharge' remained largely undisclosed. Calculation references were disclosed by 17 per cent of the utility companies and 10 per cent of the metals/mining sector companies (Figure 6.4).

The percentage of disclosure in the 'classified information' code was recorded as low (13 – 15 per cent) in all three sub-sectors. Different forms of classification criteria are suggested in the G3 guidelines (GRI, 2006) for different disclosures categories. Table 6.3 illustrates examples of classified disclosures in a range of disclosure categories by a number of the sample companies.

Table 6.3: Example of information presented in classified manner

Disclosure categories	Basis of classification	Examples
Energy use	Sources of energy: direct and indirect	The amounts of energy consumption in giga joules per tonne are summarised and presented in charts by source of energy (direct/indirect) use (e.g., NCM Sustainability Report 2009).
GHG emission	Sources of emission or types of emission (scope 1, 2 and 3)	'Emission from Origin-produced gas = 1.1 MtCO2 Emission from purchased gas = 1.3 MtCO2' (ORG, 2009b, p. 23) ORG also presented its emission disclosure based on scope 1, 2 and 3 in a Table in its Sustainability Report 2009.
Water use	Source of water use	'Cadia Valley obtains its water from four main sources: • grey water from Orange…; • dewatering from Ridgeway underground mine…; • surface water from Cadiangullong Creek dam; and • pumping from allocated water licences on the Belubula River …' (NCM, 2009, p. 30). The amount of water (in mega litre) obtained from these sources are also presented in a Table.
Wastes	Nature of wastes (e.g., hazardous/non-hazardous)	'Prominent Hill generated 234 tonnes of hazardous waste during 2009. Waste oil was the dominant component … 228 tonnes … A total of 1,305 tonnes of non-hazardous waste was generated at Prominent Hill during the reporting period, comprising mainly sample ore and general rubbish' (OZL, 2009, p. 30).

Different disclosure categories classified in the manner stated above help to understand the scope and magnitude of the impact of an entity's operation on the surrounding environment. It also aids in ascertaining the potential risks posed to a reporting entity from the community and the local government. Most of the sample companies failed to follow the classification guidelines suggested in the GRI (2006) in providing disclosures. Therefore, to a large extent, the 'understandability' of the reported disclosures remained deficient in ascertaining the nature and scope of the environmental impacts of organisational operations.

The percentage of disclosure of compared information was also documented as low with the lowest found in the metals/mining sector (11 per cent) and the highest in the energy sector (19 per cent). Compared information was primarily observed in the 'production' category, followed by 'overall GHG emission' and 'water use'.

Comparison was typically made by providing the comparative data of the previous year or years. None of the sample companies provided comparative information against an industry average. Disclosures were provided in the form of tables, bar charts with added clarifications or notes, and also in sentences. In some cases, comparative data were associated with additional information, explaining any increase/decrease in the reporting year of any environmental impact for a certain disclosure category. Comparative disclosures help to understand and evaluate a company's progress over a period of time in terms of its environmental impacts as well as the effectiveness of its initiatives to reduce such impacts.

AGL's overall GHG emission disclosure (AGL, 2009a) can be used as an example to illustrate the comparative value of the disclosure quality. The company presented its operational footprint of GHG emission (in metric tonnes) in the form of bar charts for three years, including the reporting year (2009). Each bar appears in different shades in the chart and represents a year. The bar chart is associated with an explanatory note indicating the types of emission (scope 1, 2 or 3) that are included in the graph. The chart showed that the emission of AGL had increased by 450 per cent from 2007 to 2008 and decreased by 17 per cent from 2008 to 2009. Information presented in such a manner has the ability to make any unusual peak or trend obvious and, hence, to trigger enquiries for further explanations. In explaining the variation of the operational footprint of the GHG emission, AGL stated that they had changed their calculation method in 2008 so as to be consistent with the requirement of the NGER reporting in September 2007. The decrease in emission in the reporting year is explained as a result of decrease in the requirement of energy generation.

6.3 Analysis of non-quantifiable disclosure categories

Three categories: 'method of effluents discharge and waste disposal', 'biodiversity' and 'environmental strategy', identified as predominantly descriptive (as discussed in step 2 of Section 5.4.4 in Chapter 5), are analysed in this section. Separate sets of quality criteria based on the G3 guidelines (GRI, 2006) were used for these three categories of disclosures (see Appendix 3). The inclusion of such criteria was based on the usefulness of disclosures in comprehending environmental management in detail and thus, enhancing the 'relevance' and 'understandability' of information. However, the analysis undertaken in such a way

could not address the 'representational faithfulness' of disclosures. Because of the descriptive nature of these disclosure categories, quantified information and calculation method/bases were not available that could otherwise be indicative of verifiability. While the presence of independent assurances or audit reports could be used for gauging representational faithfulness, very few companies included such reports. Further, it is specifically indicated in these reports that the scope of assurance is limited mainly to the verification of emission data. Therefore, disregarding the evaluation of 'representational faithfulness' of non-quantifiable information was recognised as a limitation in the analytical procedure.

A dichotomous recording of '1' or '0' *was* used for the existence or non-existence of each criterion under the categories. For each criterion in the categories, a percentage was calculated. The calculation involved the number of companies in a sub-sector that reported each criterion divided by the total number of the sample companies in that sub-sector.

6.3.1 Method of effluent discharge and waste disposal

The narratives on the method of effluent discharge and waste disposal were examined for the existence of four types of information: 'quality of discharge', 'treatment procedure', 'destination' and 're-use'. Each information type was considered relevant in further detailing the environmental impact of 'effluents and waste' beyond the quantifiable disclosures related to these categories as presented in Table 6.2. Hence, each of these disclosures signalled quality, assuming that entities were not able to provide such information without the existence of any underlying management system in place.

The percentage of disclosure for each of these four activities in each sub-sector is shown in Figure 6.5. The findings reveal that the utility sector did not provide any disclosure on any of the quality attributes of this category. In general, around 5 per cent of the metals/mining sub-sector companies provided information against all the four quality attributes. On the other hand, the level of disclosure by the energy sector companies was only 3 per cent, except for the 'treatment' attribute, where it was around 6 per cent.

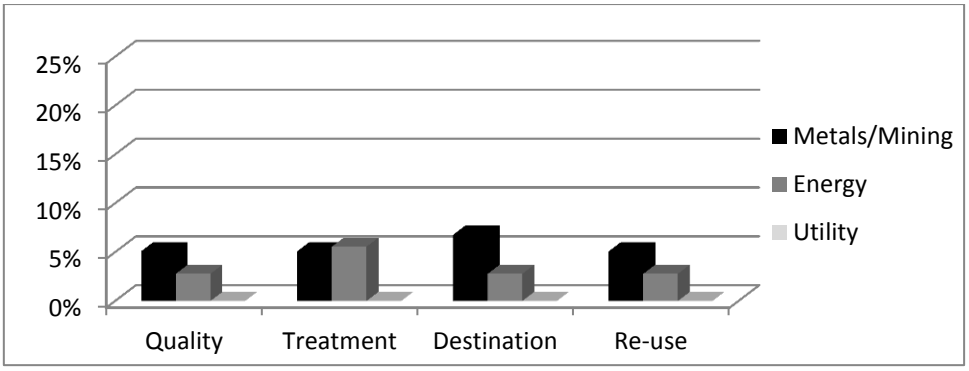


Figure 6-5: Disclosure of effluent discharge and waste disposal methods of the MEU sub-sectors

In explaining the 'quality' or nature of the wastes produced (expressed in tonnes), the metals/mining sector companies (e.g., BHP) categorised them into mineral and non-mineral wastes. Rocks, tailings and slags were grouped as mineral wastes. Non-mineral wastes were categorised as hazardous and non-hazardous and explained further. In terms of 'treatment method', 'destination of disposal' and 're-use or recycling', BHP asserted that they had recycled and disposed of some of their hazardous wastes in approved facilities and some were disposed of in landfill. They also stated that their onsite disposal facilities were *'designed and operated to well-established engineering standards'* (BHP, 2009b, p. 14).

6.3.2 Biodiversity

Three criteria were selected based on the indicators suggested in G3 guidelines (GRI, 2006) for analysing the quality of disclosures on 'biodiversity'. These are: 'area related to size and biodiversity value', 'impact on habitat' and 'reduction initiatives'. Most of the biodiversity disclosures were descriptive in nature, except for the land size or area which is expressed in physical units, such as hectares.

Figure 6.6 presents the percentages of disclosure on each of the three criteria in the three sub-sectors. All three sub-sectors provided some disclosures against the three qualitative attributes set for biodiversity. However, the metals/mining sub-sector companies had the highest level of disclosures across all the criteria and the energy sub-sector had the least amount of disclosures.

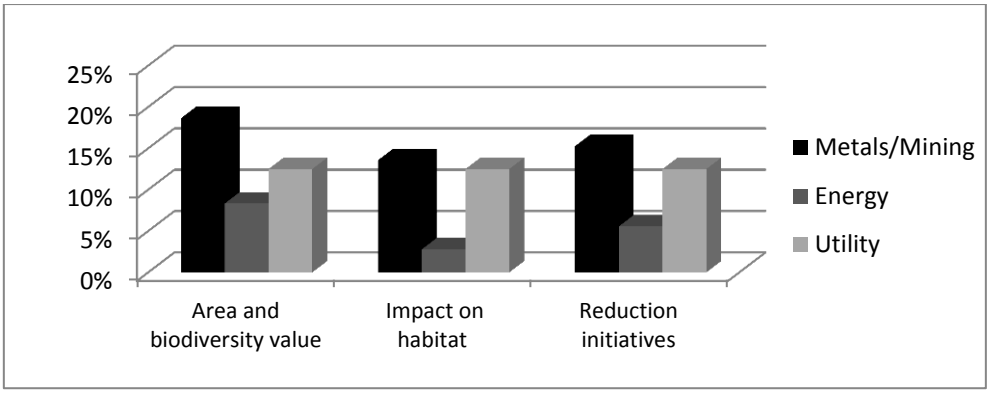


Figure 6-6: Disclosures of biodiversity by the MEU sub-sectors

Biodiversity is one of the categories where the disclosures among the sample companies were least consistent. The amount of disclosure varied from a quarter of an A4 page (e.g., BHP Sustainability Summary Report 2009) to six pages (e.g., NCM Sustainability Report 2009).

At a minimum level, the sample companies provided disclosures related to the total area (in hectares) under operations. Information about the area of biodiversity value rehabilitated is also provided. For example, in its Sustainability Summary Report 2009, BHP presented a table detailing comparative information of the area 'disturbed' and area 'rehabilitated' since 2004. BHP also provided classified information in terms of area disturbed due to exploration operations like mining, processing, smelting and petroleum activities and the area managed or leased, excluding exploration and development projects. Comparative information (compared with the previous year) related to the rehabilitation index (calculated as the total area rehabilitated divided by the total area disturbed) was also provided by BHP. Such information showed their improvement in relation to the rehabilitation activities from the previous period and their progress against a target plan set for a five year period from 2008 to 2012.

In terms of 'impact on habitat', the disclosing entities stated the biodiversity value of the managed and affected area. The biodiversity value is explained as whether the affected area falls within or near to the '*protected area categories'* as is defined by the International Union for the Conservation of Nature (IUCN) (Dudley, 2008, p.28). However, the specific impacts of organisational operations on these areas in terms of clearing of vegetation,

disruption of indigenous animal and plant lives, and impact on the ground and surface water, were not provided in detail. Instead, 'disturbance' and 'affect' are the terms that were used to describe the environmental impact on the surrounding region. For example,

> The intrinsic nature of the operation of Cadia Hill Open Cut and Ridgeway Underground mine will result in disturbance of large areas of land (NCM, 2009, p. 34).

In general, companies provided disclosures on the 'initiatives to reduce impact'. These disclosures included initiatives taken to comply with the requirement of the local government laws in relation to maintaining the biodiversity value of their area of operations. More detailed site-specific disclosures are also provided in relation to reduction initiatives. As an example, the following disclosure related to their Cadia Valley operation of NCM is cited:

> … entered into an agreement with Orange City Council to receive and store biosolids for rehabilitation and soil enhancement purposes … The biosolids storage area is … contained within a bunded area with a sump to collect any runoff from the site. The … surface water monitoring program has been modified to include the sampling for thermo-tolerant coliforms and E.Coli … During the 2008–09 reporting year, a total of 658.5 wet tonnes of biosolids were transported and stockpiled … relates to the Protection of the Environment Operations (Waste) Regulation 2005 (NCM, 2009, p. 35).

6.3.3 Environmental strategy

For analysing the quality of disclosures on the 'environmental strategy' category, four criteria were examined: 'governance', 'environmental challenges', 'risks mitigation initiatives' and 'measurable environmental target'. These criteria were developed based on the suggestions made in the G3 guidelines (GRI, 2006). It is argued that such criteria demonstrate the organisational commitment in managing the environmental aspects of operations. Disclosures on the 'environmental strategy' category were narratives, except those related to targets, which were expressed in numerical form.

Figure 6.7 shows that all three sub-sectors provided information in all four attributes selected for 'environmental strategy'. The highest level of disclosures was observed in the 'governance' section and the lowest in the 'measurable target' section across the three sub-sectors. The utility sub-sector provided the highest level of disclosures, with 88 per cent in

the 'governance' section. In general, the sample companies in all three sub-sectors provided more disclosures on the 'risk mitigation initiatives' than on the criterion related to 'environmental challenges'.

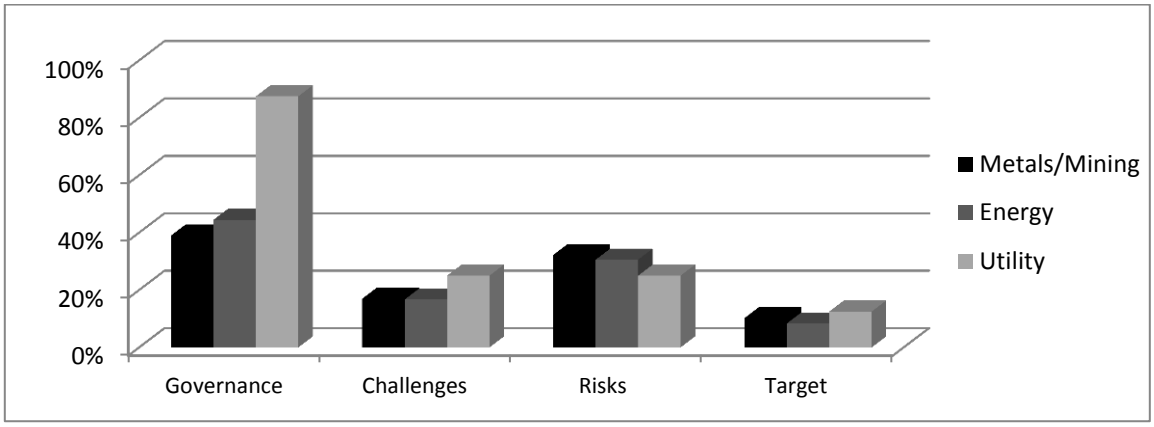


Figure 6-7: Disclosure of environmental strategy by the MEU sub-sectors

In the 'governance' section, the search criteria included the presence of a separate environmental or related committee and/or the reference of environmental concerns in any section of company statements of corporate governance. The disclosures related to this criterion were commonly found in the directors' report sections of the annual report. However, elaborate disclosures were also provided in the sustainability reports. For example, under the environmental responsibility section of their Sustainability Report, NCM stated that:

> The Company's senior environmental professional is the Head of Environment and Community, who is responsible for the Group's overall environmental performance, setting appropriate environmental standards and objectives, and for advising senior management and the Board on environmental matters … Newcrest has a Board Committee, the Safety, Health and Environment Committee, which monitors the Company's environmental management practices and ensures that the Company has appropriate policies in place. The Committee met four times in 2008–09 (NCM, 2009, p. 25).

The disclosures on 'environmental challenges' were related to the identification of specific operational impacts on the natural environment and their potential effects on the organisations. Such disclosures may have significance in providing signals in terms of the underlying risks associated with an entity and, hence, be considered relevant. The following quote form AGL's report is provided as an example:

> AGL recognises that climate change and air quality are critical issues facing the global community and accepts the scientific consensus that greenhouse gases … need to be stabilised to minimise dangerous climate change (AGL, 2009b, p. 8).

A more general form of disclosures was also considered as is observed in BHP's Sustainability Framework (2009b, p. 8):

> We own and operate a diverse range of businesses in different countries and ecosystems around the world. These businesses, by their nature, have the potential to affect the environment.

Disclosures on 'risk mitigation initiatives' refer to narratives about plans or schemes undertaken by management to reduce the environmental footprint of the entity's operations. Such disclosures were also found to vary from broad or overall policy statements to specific initiatives related to certain environmental aspects, such as GHG emissions. An example of broad form initiatives disclosure is provided by OZL, as follows:

> To achieve Zero Harm by Choice, we have established the following sustainability objectives:
> Protect the health, safety and wellbeing of our employees and contractors.
> Minimise impact on the environment… (OZL, 2009, p. 10).

Alternatively, a more specific example of disclosure is:

> AGL identified a need to review our approach to the management of water and biodiversity.
> During 2008/09 we conducted a review of our impact on the following areas:
> The natural environment and ecosystems of our operational sites and adjacent areas;
> Consumption of water as a resource;
> Emissions to water, including pollutants and thermal releases; and
> Non-consumptive use of water (i.e. hydro-electric power generation) (AGL, 2009a).

Disclosures on targets were provided in numerical form (e.g., number of years, percentages or other physical units). For example, BHP set targets of 6 per cent reduction in GHG emission and 13 per cent reduction in carbon-based energy use per unit of production by 2012 (BHP, 2009a, p. 11).

6.4 Analysis of monetary disclosure categories

Disclosures on 'environmental expenditures' were analysed under two sub-categories: 'environmental *protection* expenditure' and 'environmental *prevention* expenditure'. The 'protection expenditure' included disclosure on licence/permit/fines and hence, it mirrors the 'compliance/breach' sub-category included in the list of disclosure categories and sub-categories presented in Appendix 2. Alternatively, restoration or rehabilitation costs were considered 'prevention expenditure' for the purpose of analysis in this project.

Disclosures on 'environmental expenditures' are quantifiable in nature; hence, they could be analysed by applying the coding tool used for the quantifiable disclosure categories. However, two quality codes, namely, 'general disclosure' and 'calculation method' were excluded from the analysis criteria for examining the quality of disclosures on the 'environmental expenditures'. 'General disclosures' were excluded as they form part of the disclosures related to the 'risk mitigation initiatives' component of the 'environmental strategy'. The reference to the 'calculation method' was also excluded. With one exception (e.g., NCM includes environmental expenditure in its sustainability report), environmental expenditures disclosures were provided in annual reports, particularly in the 'Notes to financial statement' section. Therefore, it was assumed that the amounts presented there were calculated as per relevant Australian Accounting Standards[9] and were audited as part of the audit of the whole financial report. Therefore, no separate disclosure in relation to the calculation of 'environmental expenditure' was expected. The remaining three quality codes were used for analysing the quality of disclosure on environmental expenditures: 'quantified amount (dollar)'; 'classified information' (the purpose of the expenditure, e.g., acquisition of licence); and 'compared data' by year. The percentage was calculated as the number of the companies in a sub-sector disclosed in each quality code divided by the total number of the sample companies in that sub-sector.

Figures 6.8 and 6.9 show the disclosure percentages on the 'environmental protection' and 'prevention' expenditures of the sample companies in the three sub-sectors. The findings

[9] For example, AASB 116 Property, Plants and Equipment for incorporation of future restoration cost; AASB 138 Intangible assets for license, permits and research and development costs; AASB 6 Exploration for and Evaluation of Mineral Resources (Australian Accounting Standards Board (AASB), 2010)

highlight a considerable variation of disclosures across the three attributes ('quantified amount', 'classified information' and 'compared data') among the sub-sectors in the two sub-categories. The 'quantified amount' of expenditure were provided in Australian dollars. 'Classified information' refers to the key areas in which the expenditures were incurred. Environmental protection expenditures were classified as the cost or carrying amount of an environmental licence, permit or credit. Prevention costs are presented under the heading of research and development, rehabilitation and restoration. As for 'compared data', only comparative data for the previous year is provided.

In the 'protection expenditure' sub-category, 5 per cent of the sample companies provided disclosure in all three quality attributes. However, 6 per cent of the energy sub-sector companies provided the amount of expenditure along with comparatives. Utility sub-sector companies did not provide any information on the protection expenditure sub-category.

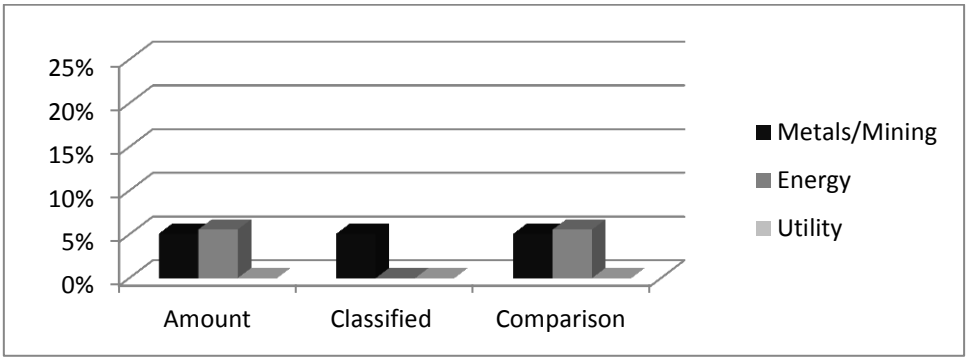


Figure 6-8: Disclosure of environmental protection expenditure by the MEU sub-sectors

In the 'environmental prevention expenditure' sub-category (see Figure 6.9), the utility sub-sector revealed the highest disclosure percentage in relation to the 'quantified amount' (38 per cent) and 'classified information' (13 per cent). In all the three quality attributes, metals/mining sub-sector companies provided some disclosures, to a varying extent, with the highest recorded in 'quantified amount' (19 per cent) and the least in 'classified information' (5 per cent). The energy sub-sector companies did not present their prevention expenditure in a classified manner.

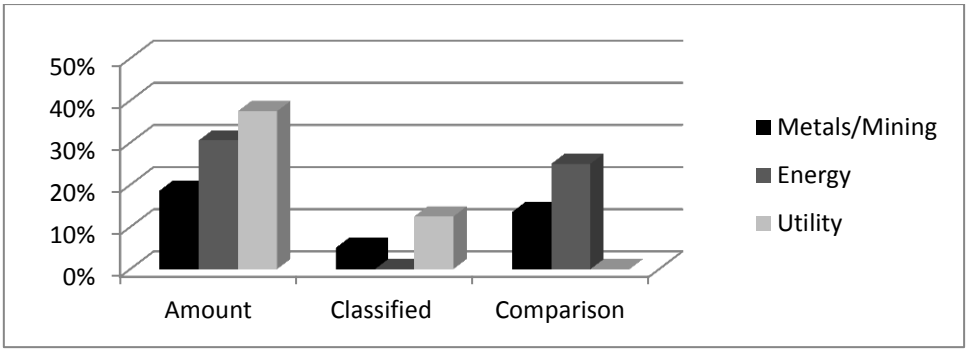


Figure 6-9: Disclosure of environmental prevention expenditure by the MEU sub-sectors

An example of separate disclosures on environmental expenditures provided in the Sustainability Report (2009, p.48) of NCM is illustrated below.

> The total amount of quantifiable environmental expenditure (operating and capital) for 2009 was $9.669 million. The numbers outlined do not reflect the full sum of expenditures on environmentally related initiatives, rather those that can be distinguished from our 'production' activities. Itemised in the table below are the estimated current environmental expenditures in a number of key areas.

Cost area	2009 ($'000)	2008 ($'000)
Research and Development	812	664
Rehabilitation	424	746
Monitoring	1,086	942
Heritage and Conservation	951	942
Environmental Management	4,539	5,169
Permitting and Licensing	326	212
Total	8,138	7,893

Source: NCM (2009, p. 48)

Information provided in such a manner has the ability to demonstrate a company's environmental commitment and undertakings. Such disclosures also help to understand the impact of environmental initiatives on operating costs. Therefore, disclosures on 'environmental expenditures' in a classified and compared manner have informative value in comprehending and evaluating a company's environmental cost and resource prospects.

Up to this point, the findings of the content analysis for all the sub-sectors under three main headings: quantifiable, non-quantifiable and monetary have been presented. A descriptive account in relation to the sample companies' disclosures in the relevant environmental categories and sub-categories has also been provided. In explaining the findings, emphasis is

placed on what is disclosed in terms of environmental disclosure categories/sub-categories by the resources sector companies and to what extent such disclosures correspond to the prescribed qualitative criteria suggested in the reporting guidelines and frameworks. Examples of disclosures from the sustainability reports and annual reports were included in the discussion to provide some insight as to the format in which companies are disclosing information on their environmental impact and management.

In the next section, the discussion is elevated to gain an understanding of how the tone of a message is set by report preparers in communicating environmental disclosure. An analysis of the nature or the types of disclosures is undertaken on the basis of the obvious message of the text and its construction through language. Such analysis has more connotative interpretation focus and is directed towards the understanding of the motivations behind various forms of disclosures.

6.5 Findings from the connotative analysis driven by possible motivations for providing quality disclosure

The term 'sustainable development' became popular via the Brundtland Report (United Nations, 1987) which referred to such development as that which meets current needs without compromising future needs (Kaidonis et al., 2010). Environmental well-being is one of the three components of sustainable development (the other two being economic and social). As discussed in the section on environmental ideologies in Chapter 2 (Section 2.3), corporate managers tend to position themselves in the middle of the spectrum of environmental ideologies by adopting the notion of sustainable development. Such a notion favours environmental innovations for pollution reduction, resource conservation and economic growth simultaneously. It was therefore expected that a middle ground discourse of economic growth and environmental well-being would be evident in the environmental or sustainability reports.

In formulating an integrated model for the decision-making process of CEOs, Woiceshyn (2011) argued that the application of a moral principle in any action is aligned to the underlying assumptions with which such a principle is rationalised in the first place.

Therefore, the analysis in this study began with eliciting how the meaning of sustainability is communicated in the CEO messages of the sustainability reports. It sought to find out how the notion of environmental well-being is captured within the scope of sustainability. The analysis helped in identifying the positioning of companies along the spectrum of environmental ideologies (as explained in Section 2.3.2), ranging from the eco-centric extreme on one end to the techno-centric on the other. It was anticipated that such ideological positioning would be apparent in the environmental disclosures sections of the companies' sustainability reports. Therefore, an understanding of how companies perceive sustainable development would help establish a broad philosophical context in which disclosures could be better understood.

6.5.1 Companies' understanding of sustainable development

A connotative analysis was conducted using the sustainability reports of the five sample companies identified in Chapter 5 (Section 5.6.1): AGL, ORG, BHP, NCM and OZL. In this section a brief background of each of the companies under analysis is presented. The analysis involves identifying the quotes referring to what constitutes sustainability/sustainable development in the CEO's (or managing director's) message section of the sustainability reports. This is followed by an account of how the meaning or the perception of sustainability is phrased.

Australian Gas Light Company (AGL)

AGL has been operating in Australia for 175 years as a major supplier, explorer and developer of gas and electricity. In 2009, AGL prepared two forms of report – an online only report 'AGL Sustainability Report 2009' (the report) and a concise report 'AGL Summary Sustainability Report 2009'. Both reports are considered for the purpose of analysis.

Under the *Business Strategy* section of the AGL Summary Sustainability Report 2009, it is stated that:

> At AGL, 'sustainability' is about recognising that if we want our business to be here, **successful** and **respected** in the **next 10, 20, or 50 years**, we need to do the **right thing** by **our**

> **Shareholders**, our employees, our customers, the community and the **environment** (p. 9, emphasis added).

Therefore, to AGL, sustainability is about ensuring the long-term survival, profitability and reputation of the company, while doing the 'right thing' by stakeholders and the environment is argued to be an adjustment to that process. It is also noticeable in the quote that shareholders come ahead of the rest of the stakeholders whilst the environment is placed last. An emphasis on the company's 'long-term value' in interpreting sustainability is reiterated in the 'Message from the Chairman and the Managing Director' section, as follows:

> We publish an annual sustainability report so that our stakeholders – our customers, investors, employees and the community – can gain an understanding of the social, environmental and economic **challenges** and opportunities we face, and the **steps we are taking** to address these to enhance the **long-term value** of our business (AGL, 2009b, p. 1, emphasis added).

The statement above illustrates the purpose of the sustainability reports. In the statement, management maintains a justifying tone by acknowledging 'environmental and economic challenges' as well as an endorsing appeal by mentioning 'steps' taken to address these challenges and ensure 'long-term value'. By providing detailed information on the environmental constraints and challenges posed by the company, AGL provides justification for their activities and performance and, hence, intends to impress upon their stakeholders a need to understand the company's circumstances.

Origin Energy Limited (ORG)

ORG has been operating as an energy provider, explorer and developer in Australia. It started business as ORG after its demerger from Boral in 2000. ORG is one of the leading energy providers to homes and businesses throughout Australia, New Zealand and the Pacific regions. ORG named its 2009 sustainability report, *Foundation for Future: Strategy, Performance and Growth*. With reference to sustainability, the Managing Director of the company stated in his message that:

> Continuing to **deliver attractive returns** while **building the foundations for future growth** will be at the core of Origin's sustainability over the coming decade, just as it has been over the last ten years (ORG, 2009b, p. 5, emphasis added)

Further emphasis is added in the Sustainability Report (2009) by highlighting the same statement a second time within the report, this time in isolation, using red, bold and bigger font. The '*explicit*' use of '*positive*' words (Merkl-Davies and Koller, 2012, p. 184) such as 'attractive returns' and 'future growth', signals economic well-being and competitive advantage. By making this statement, the company put forward the concept of economic sustainability instead of ecological sustainability.

BHP Billiton Limited (BHP)

This company was formed from a merger of BHP and Billiton in 2001; both companies had been operating for over 150 years as major explorers and developers of natural resources. This is one of the world's largest producers of major commodities, including aluminium, coal, copper, iron ore, manganese, nickel, silver and uranium and has substantial interests in oil and gas. Under the management section of the *BHP Sustainability Framework*, sustainability is articulated as follows:

> For BHP Billiton, sustainable development is about ensuring our business remains **viable** and contributes **lasting benefits** to society through the consideration of social, environmental, ethical and economic aspects in all that we do (BHP, 2009a, p. 4, emphasis added).

BHP identifies the need to address the complex operational issues related to their environmental performances as a critical success factor. In their words:

> We are well aware of the **costs** of getting it wrong; but more importantly, we recognise **the value** that can be created by getting it right. Consequently, we adopt a holistic approach to business strategy, seeking to realise value for our stakeholders through a sustainable business philosophy (BHP, 2009a, p. 4, emphasis added).

Therefore, a balancing tone is expressed in such messages where managing and reporting on environmental issues are considered to be a part of the business strategy towards the creation and realisation of long-term business value.

Newcrest Mining Limited (NCM)

NCM is the largest gold producer in Australia and one of the world's top five gold producers (until 1966, it was known as Newmont Mining Limited). The company has a long history of mining operation, involving exploration, discovery and development of gold mines. In the

CEO's statement in its 2009 Sustainability Report, it is stated that the company '*pursues a strategy of delivering* ***competitive shareholder return'*** (NCM, 2009, p. 2, emphasis added). In a combined message from the CEO and Managing Director, the purpose of providing the sustainability report is conveyed as follows:

> This sustainability report provides further insight into our sustainability performance and the programs we have in place to deliver on our vision of being the 'Miner of Choice' (NCM, 2009, p. 2).

In another instance, management mentioned that their strategy was focused on operating '*in line with* ***good environmental practices****, while at the same time protecting the company's* ***international competitiveness'*** (NCM, 2009, p. 2, emphasis added).

Therefore, a protective and an endorsing appeal are created at the same time by conveying the message that the organisation is committed to maintaining a safe environment without compromising the continued delivery of shareholders' returns.

OZ Minerals Limited (OZL)

OZL is an Australian based mining company formed from the merger of the former Oxiana Limited and Zinifex Limited in 2008. Its operations involve the exploration and mining of copper and gold. The company was faced with financial distress immediately after its formation in 2008 as it found it difficult to negotiate refinancing of some of its debts because of the ongoing GFC. Later, the company was able to overcome the situation by selling some of its overseas assets and developing a new business strategy (OZL, 2009).

The sustainability report of OZL (2009) starts with a section titled – *About This Report*, where it outlines the purpose, scope, data collection method and intended readers of the report. While the management perception of the meaning of sustainability is not specifically mentioned in the CEO letter, the aim of preparing the sustainability report is presented in the *About This Report* section as follows:

> Caring for our people, our neighbours and the environment is central to the way we do business. We see this report as an opportunity to demonstrate our commitment to transparent and accountable reporting of our sustainability challenges and our progress in managing them (OZL, 2009, p. 1).

This statement echoes a justifying tone in terms of making a commitment to provide accounts of business activities in relation to managing sustainability challenges. Any claim or promise to deliver attractive economic returns or long-term growth is restrained in the message.

6.5.2 Environmental ideologies of managers and communication of environmental disclosures

Analysis of the narratives provided in the CEO (or Managing Director) messages indicates a common style in using certain texts to demonstrate the managements' perspective of sustainability and, more importantly, to influence the readers' perception by putting forward the notion of environmental pragmatism. This, it is hoped, will help readers understand and appreciate managements' efforts. Words like 'challenges', 'risk', 'cost', 'right', 'understand' and 'viable' are commonly used in the messages and tend to create a legitimation appeal, highlighting the justification or reasonableness of certain activities. Simultaneously, words such as, 'value', 'benefit', 'success', 'return' and 'progress' are also prevalent in these messages, reflecting a competitive appeal. They tend to steer the readers' attention towards the hope for development and growth but in an environmentally responsible way. Together, these texts are used to position management in the middle ground along the spectrum of environmental ideologies. Such a discourse accepts the environmental obligations of organisations but, at the same time, upholds the importance of economic development in society. It was expected that this ideology would be imparted through the various environmental disclosures in the sustainability reports. Hence, in the next sections (Sections 6.5.2.1 and 6.5.2.2), the disclosures are analysed under the two main streams of appeal: legitimacy and competitive.

6.5.2.1 Legitimacy appeal

The legitimacy appeal was made in a variety of ways in the sustainability reports of the five sample companies. The commonly adopted method was to provide numerical accounts or actual measurements of the major environmental impacts (in physical units, such as tonnes, joules and litres) of the organisational operations. The most commonly reported environmental impacts related to issues that are subject to serious national and

international concern and debate, such as global warming and climate change as a result of GHG emission. In providing accounts of GHG emission and air pollution in general, all five companies supplied numerical data using tables and some of them also used bar or pie charts to highlight the sources of emissions. All five companies stated that they were registered with the NGER system and the preparation of the data followed the methods prescribed in the *NGER Act 2007*.

However, in order to understand the complexities associated with the technical terms, measurement units and the implications of the reported measures some background knowledge is required about the topics that are reported upon (Crowther, 2002). Without such knowledge the reported information has little significance for general readers in terms of evaluating the organisational environmental impact and management. Comparative data presented using bar charts or pie charts and tables are expected to enhance the understandability of disclosures to general readers. However, it is argued that the provision of the detailed technical information is also intended to '*create an impression of rigorous scientific control*' over environmental activities rather than conveying the impacts of such activities (Crowther, 2002, p. 202). Further, disclosing the fact that the organisations are required to submit the same data to the NGER system, enhances the reliability of the data in terms of their underlying assumptions, computation and compilation procedures.

Hence, providing detailed accounts of the environmental impacts of the organisation is not necessarily intended to demonstrate accountability. Rather, it might be considered as an impression-creating tool through which organisations assure stakeholders of their environmental commitment. Informing '*society at large about the real changes within the company's internal processes, systems, methods and outputs'* is also viewed as a legitimation strategy (Pellegrino and Lodhia, 2012, p. 74). Such information has the ability to create an impression that the reporting entity is sincere in gauging and monitoring its environmental impacts. Also an existence or ownership of the necessary scientific process or system for impact measurement in line with the relevant regulatory regime emanates from such information. Therefore, providing accounts for various environmental impacts of organisational activities is deemed to have a legitimacy appeal.

Other persuasion techniques were also applied in the reports through narratives and pictorials to create a desired image of environmental responsibility. These include dissociation, confession, justifications or excuses and scene-setting pictorials. These techniques are considered to be defensive and intended to protect organisational legitimacy.

Dissociation is a technique by which *'an organisation seeks to distance itself from an event which is undesirable or has negative implications'* (Ogden and Clarke, 2005, p. 322). An entity may make a declaration that it will not pursue a procedure or use a particular raw material in the future if it will have an adverse impact on the natural environment. By making such a statement, the reporting entity attempts to enhance its acceptability in society and reduce the risk of non-compliance in accordance with potential environmental regulations. For example, in relation to the continuing debate on climate change and the CPRS (proposed by the Commonwealth Government of Australia in 2008), it was stated in AGL's Sustainability Report (2009a) that:

> In this context and given current policy and market settings, AGL does not have any plans to invest in the development of new conventional coal fired power stations as the emissions profile is inconsistent with the achievement of these targets (p. 8).

A similar intention was announced in a separate message by the company's CEO, Michael Fraser, in the online version of its Sustainability Report (2009a), under the 'Greenhouse' section:

> AGL will not invest in new coal fired power stations unless they are fitted with carbon capture and storage technology (AGL, 2009a, n.p.).

Presentation of this message in an isolated text box with a large and coloured font indicates an attempt to draw the immediate attention of readers as management consider this message important in maintaining legitimacy. These pronouncements are made in the context of the significant transformation of the Australian Energy market engendered by the RET Scheme (2009) and the CPRS proposed by the Commonwealth Government of Australia in 2008. By making such declarations, the company sought to deflect the risk of reliance on carbon-based energy sources and thereby place itself in a safe position against the imminent challenges of a carbon-constrained energy market.

Statements containing a 'confession' such as, a declaration of guilt or admission of environmental damage caused by the reporting entities are also considered to have legitimacy seeking appeal. These statements are seemingly deemed to be *'counterproductive in pursuing legitimacy'* because of the prevailing negativity disseminated through them (Ogden and Clarke, 2005, p. 334). However, Ashforth and Gibbs (1990) argued that offering apologies might act in favour of enhancing legitimacy by an honest expression of the management concern about a negative incident and its consequences. Such confessions, often coupled with reassuring statements asserting that preventive actions have been put in place, are intended to communicate management's responsibility. Hence Ashforth and Gibbs (1990, p. 181) argued that:

> Apologies involve an acknowledgement of at least partial responsibility for a negative event and include some expression of remorse. Apologies serve to (1) convey management's understanding and concern regarding the consequences of the event, (2) garner sympathy from constituents, (3) reaffirm at least the appearance of managerial control and, implicitly, that management has learned from the event, and (4) maintain some managerial credibility (i.e. by accepting some responsibility, the claim that not all responsibility is deserved is more likely to be up-held).

However, the authors observed that the apologies are generally associated with the *'trivial events'* where the possibility of exposure to the charge of '*incompetence*' or to financial or reputational *'damages'* is less. (Ashforth and Gibbs, 1990, p. 181).

Confessions were not found in any of the CEO messages of the five sample companies. However, all of their reports contain admissions of shortcomings in the environmental management sections, specifically in relation to disclosures of waste management and spills. Such statements are brief and, in line with the observation of Ashforth and Gibbs (1990), relate to trivial incidents. The confessions are almost invariably associated with additional information conveying that the incidents mentioned are minor events that do not attract major fines or sanctions, and that necessary management interventions have been put in place. A typical example of a confession is found in the sustainability report of ORG (2009b, p. 24):

> In the largest reported spill at Denison's Rolleston operations (Qld), 13,000 litres of condensate leaked into an interceptor pond and the condensate was subsequently recovered. The

> environmental consequences of the reported spills were assessed to be minor, with the exception of a diesel spill at the Talinga drill site, where about 200 litres of diesel was spilled. The area was cleaned up and residual contaminated material is removed.

A more generalised form of confession is observed in the sustainability report of NCM (2009, p. 41):

> The problem of acid rock drainage (ARD) encompasses all issues associated with the actual and potential environmental effects of sulphide oxidation resulting from mining activities. Its significant potential for long-term environmental degradation makes it one of the biggest environmental issues facing the mining industry. Newcrest is actively managing ARD at each of our operations.

In this statement, the problem of acid rock drainage is represented as a generalised problem accompanying any mining activities, thus the problem is dispersed across the industry instead of being a company-specific problem. The simultaneous message of 'actively managing' communicates management concern and willingness to take the necessary preventive steps to safeguard the environment.

Excuses and justifications are often provided in the reports in order to establish an acceptable or realistic reason for any reported under-performance. For example, the sample companies were often found to link the increase in energy consumption or emission of GHG and other harmful gases with the increased production or expansion of the business. As ORG's Sustainability Report (2009b, p. 24) illustrates:

> In the reporting period, NOx emissions at our Generation sites increased by 93 per cent to 865,000 kg/yr. The increase is largely due to the acquisition of the Uranquinty Power Station, and a 223 per cent increase in gas usage at Roma Power Station from use of ramp up gas from Spring Gully.

Another justification technique involved highlighting the comparative benefit against the cost of a certain negative event, such as the impact of resource depletion on the surrounding community. Companies also justified the negative environmental impact of their own operations by pointing out the impact of competitor industries as bad or worse. An example of such a technique is observed in the biodiversity section of NCM's Sustainability Report (NCM, 2009, p. 33):

> Australia earns much more from minerals and energy exports than from rural products, yet the area of land affected by the whole energy and mineral sector is tiny by comparison (Australia State of the Environment Report 2001)… The Cadia Valley has been significantly impacted by agricultural practices, including clearing and grazing.

Scene-setting pictorials are often used in the reports to *'represent functional evidence of* performanc' and thus make the performance disclosure more evident and convincing (Breitbarth et al., 2010, p. 255). An interview-based study undertaken by Jill et al. (2010, p. 370), involving interviews with the CEOs of a number of companies, showed that according to one interviewee:

> Pictures are used to break up 'dry' sections of the report, (the financial statements and notes with lots of writing and figures), to make it more interesting, more readable and meaningful.

The findings of Jill et al. (2010, p. 369) reveal that management believes that '*figures are more effective than words'* and readers can recall figures easier than narratives.

Usually the pictorials included in the sustainability reports that used legitimacy appeals demonstrated day-to-day business activities with employees engaged in sustainable practices, happy faces of community people with a rural backdrop and, thereby, tended to create an impression of community acceptance. ORG, for example, provided its environmental disclosures in a section with a heading 'Our Community' associated with the following:

> Our Commitment: Respect the rights and interest of the communities in which we operate by working safely and being mindful of, and attentive to, the environmental and social impact of the resources, products and services we use or provide to others (ORG, 2009b, p.20).

This title statement is imprinted on the following picture with a caption explaining the picture itself.

Origin's Kevin Maloney at the Queensland Pongamia tree plantation

The picture shows an ORG employee inspecting and monitoring the growth of its Pongamia tree plantation, which is cited in the report as one of its environmental initiatives for efficient water use and recycling. The plantation is explained in texts as follows:

> In last year's Sustainability Report, we outlined details of the **journey** we had been on for managing water for our Spring Gully facility in Queensland. This year, we continued that journey by creating a first large-scale, self-irrigating crop of Pongamia trees. The Pongamia is a deciduous legume tree that grows to about 15-25 metres in height. It was **chosen** because of its ability to be fully utilised and recycled, down to the last leaf. Its potential uses include biofuel and as protein meal for stock feed. Other benefits of using Pongamia include its rapid growth and hardiness (ORG, 2009b, p. 26, emphasis added).

Apart from presenting the obvious message, the texts used within the disclosure were intended to serve other purposes. For example, by using the word 'journey', management indicates a continuing environmental progress (Higgins and Walker, 2012). Detailed information highlighting the rapid growth and usefulness of the Pongamia tree and the word 'chosen' indicate a selection process after substantial research underpinning the project. Above all, the message conveys the management concern and sincere commitment in managing environmental impacts. In addition, the deliberate display of such an initiative through images that identify the name of the employee in the photo-shoot, and the site where the activity is taking place, creates a sense of transparency and credibility. Such a display gives life to the narrative and creates a lasting impact in the readers' minds. By presenting the information in this way, management attempts to put forward the notion of pragmatism in managing the environment and insulating the entity from any criticism.

The above findings indicate how certain texts including pictorials are used to create legitimacy appeals by providing accounts, justifications, apologies and declarations that companies will not invest in pollution-intensive projects. By providing disclosures in such a manner, the reporting companies tend to inform that their operations are within the bound of societal norms and expectations. Therefore, such findings are argued to provide support for legitimacy theory.

6.5.2.2 Competitive appeal

Managerial studies have increasingly suggested that there is *a 'potential link between economic and environmental benefits'* (Marchi et al., 2013, p. 63). it is argued that activities that represent environmental innovations and improvements are regarded as sources of competitive advantage (Orsato, 2009; Lee and Kim, 2011; Elkington, 1994). Hence, companies are expected to provide disclosures that communicate competitive persuasions, including ingratiation, entitlement or ownership of certain environment-friendly infrastructure, exemplifications and organisational knowledge and expertise. Such disclosures tend to promote competitive appeal in terms of placing the reporting entities in a superior position, compared to their industry counterparts, in managing environmental risks and exploiting opportunities.

Ingratiation refers to actions or statements made to gain favour or approval of a certain group of people (Merriam-Webstar Online, n.d.). Ingratiation techniques involve deliberate efforts by management to win the favour of a particular audience, such as passing on the benefits resulting from efficient management actions to stakeholders. Hence, ingratiatory statements tend to offer enticements to certain groups of stakeholders to gain their support in terms of obtaining scarce resources. Also, such statements attempt to persuade others not to take any derogatory action against the entity. Either way, by making an attempt at securing benefit and reducing cost, such statements tend to propagate a competitive appeal.

Ingratiatory statements were presented in a more general form in the sample of companies investigated for this project, rather than specific plans for advancing benefits. For example, the promise of providing attractive returns to shareholders is mentioned in the CEO

messages (see Section 6.5.2) of the ORG Sustainability Report 2009, instead of any specific reference to the future dividend plan. Such a promise is extended to include stakeholders other than shareholders, as evident in another statement under a separate title in the Sustainability Report:

> We judge our success by the value we create from the resources that come under our control. We distribute this value to our stakeholders while being mindful of the sustainability of our business (ORG, 2009b, p. 0).

An example of contributing benefits to the local community is demonstrated by ORG as follows:

> We will be at the forefront of sustainable practices, contributing to a positive future for our communities (ORG, 2009b, p. 22).

That statement was accompanied by a picture of a local farmer captured near a farmhouse with rainwater tanks and set in a green landscape. The picture is captioned:

> Origin believes in engaging with landowners like Rex Smith, from Wallumbilla, to ensure that farming and grazing activities can co-exist with our energy projects (ORG, 2009b, p. 22).

By making such community initiatives evident in words and pictures, ORG signals their contribution to the local community and establishes the prospect of mutual co-existence between divergent social actors with competing goals.

A similar notion of sharing benefits is also stated in the CEO message of AGL, which mentioned mutual benefits and the passing on of positive outcomes to the community through a range of benefit projects. It reads:

> We believe that AGL has a responsibility to work with the community to develop mutually beneficial outcomes and to manage sensitively the environmental aspects of our individual projects. Over the past 12 months we have continued to consult with communities where we are developing projects, and we delivered a range of positive outcomes through the Energy for Life program (AGL, 2009b, p. 1).

Disclosures signalling entitlement or claim to the ownership of environmentally-friendly infrastructure also have competitive appeal. In the context of the NRBT, Hart (1995) asserts

that it is those companies that develop capabilities in managing pollution and conserving natural resources via innovations and technology that will be likely to operate business successfully in the increasingly competitive carbon-constrained market. In line with the NRBT, it is expected that companies that make substantial investments and progress in developing innovative solutions, in terms of reducing pollution and reliance on natural resources, are likely to disclose such improvements in order to signal competitive advantage.

AGL's disclosures under the heading *Climate Change Initiatives* are cited as an example. In the context of the implementation of the RET and emission trading scheme, AGL stated that:

> AGL currently manages the largest privately owned or controlled portfolio of renewable generation facilities in Australia. AGL's owned, operated and controlled renewable generation assets comprise around 26% of AGL's generation portfolio (by installed capacity).
>
> We had 353 MW of new renewable assets under construction as at 30 June 2009 and a further 2,000 MW of identified projects at various stages of development. These projects will leave AGL well placed to contribute towards the Commonwealth Government's expanded Renewable Energy Target (AGL, 2009b, p. 0).

While such statements are criticised in some literature (e.g., Crowther, 2002, p. 211), as the companies initiatives of making virtue out of the necessity, the competitive appeal implicit in them cannot be overlooked. By making disclosures that claim substantial ownership to renewable energy assets, AGL attempts to place itself in the midst of the volatility posed by climate change and the energy crisis. Disclosures using the entitlement or claim to innovative environmental initiatives and infrastructure are also observed in the sustainability reports of the other sample companies analysed. Some examples include an innovative mine closures plans in Canada (BHP), wind farms in New South Wales (ORG) and innovative land-form and closure design (NCM).

Exemplification advances the notion of competitive appeal by providing examples of unique environmental initiatives, promoting a perception of the reporting entity as an exemplar of environmentally responsive organisations. This technique was used by the sample companies through general statements that demonstrate leadership and also in the form of specific disclosures on managing certain environmental impacts like GHG emissions, waste

management and biodiversity. By presenting typical examples of distinct and successful environmental initiatives, the reporting entity also attempts to communicate the underlying research and development behind such initiatives. An example of the use of exemplification to indicate the overall success of the entity is contained in the following statement made by AGL:

> We consolidated our position as Australia's leading renewable energy company by investing in new renewable projects and development options. This year, AGL has made a number of strategic investment decisions that have consolidated our leading position and further reduced the greenhouse intensity outlook of our operations. 78% of AGL's capacity is now low or zero emission. With the completion of all assets under development, this figure could increase to 93% (AGL, 2009b, p. 8).

Such a statement not only communicates the present success of the entity but also assures the readers about the improved prospects of the entity in reducing emissions in the future. Specific innovative examples were also found in the sustainability reports of the sample companies. Such examples are often presented with accompanying pictures to substantiate the appeals made in the disclosures. For example, with a heading, 'Low Impact Exploration', ORG reported that they took an innovative approach, as part of their Land Seismic Exploration Programme, in order to minimise land disturbance. It is claimed in the report that:

> The survey was Australia's **first** Envirovibe seismic survey to be completed over a large region. With a weight of approximately 6,500 kg, the Envirovibe is smaller, more fuel efficient and more agile than the commonly used 20,000-40,000 kg vibroseis trucks (ORG, 2009b, p. 25, emphasis added).

Using the word '*first'*, the entity attempts to represent itself as a first mover and communicate its exemplary initiative in managing the impact of its exploration activities. In order to emphasise the appeal created in the disclosure, the following image is portrayed with the caption '*The Envirovibe in Action'*.

The entity also documented that the use of the Envirovibe not only reduced the environmental impact during the survey, but also doubled productivity compared with previous surveys.

Disclosures evidencing expertise tend to promote competitive appeal by drawing the readers' attention to *'organisational qualifications, judgement, experience, and first-hand knowledge'* (Higgins and Walker, 2012, p. 198). The notion of expertise was used by the sample companies on a number of occasions but mainly in the environmental strategy sections of their reports through the disclosures of the existence and implementation of an Environmental Management System (EMS) as per ISO 14001. An EMS is a structured system by which companies identify the environmental impacts of business activities, set objectives and targets, establish programs to achieve such objectives and monitor and review the progress against the targets (EPA, 2013). Such a system is established on a scientifically sound knowledge base that involves employment of experts and consultants and investment in the research and development project, especially in relation to emission reduction, effluent and waste management and biodiversity protection. As an EMS offers practical solutions to environmental problems that are understandable to both the report preparers and readers, it has a strong persuasive appeal (Newton and Harte, 1997). This is further described in Prasad and Elmes (2005, p. 850):

> Environmental Management receives widespread public support and governmental funding because it is seen as offering a hopeful set of techniques and solutions that take care of the

> environment and simultaneously produce as little disruption to our everyday lives as possible. It is also singularly *optimistic*, offering cautious warnings but supplementing these with hopeful prognostications for the future, and is conducted at a *reasonable* pitch, constantly proposing working solutions for seemingly insurmountable problems. The sheer pragmatics of Environmental Management is incredibly seductive.

Hence, it is not surprising that the companies in this study referred to their EMS in an attempt to make their environmental commitment more tangible as well as enhance the credibility of the environmental impact disclosures. For example, in the CEO messages of the NCM Sustainability Report (2009), '*harnessing expertise*' is mentioned as one the three strategic plans in pursuing the delivery of '*competitive shareholders' return'* (p. 2). Under the 'Policy' section of the report, NCM mentioned that:

> We have developed our environmental management systems in accordance with ISO 14001, and are progressively implementing these across operations. To this end an EMS audit was undertaken in July–October 2008 at our operations and minerals group. Corrective action plans to addresses areas identified for improvement have been developed and progress tracked over the year (pp. 25-26).

BHP also refers to its EMS in the Summary Sustainability Report (2009). The entity asserted its commitment to the development and use of organisational knowledge in its policy statement document as follows:

> We will spend US$300 million over the period 2008 to 2012 to:
> Support industry research, development and demonstration of low emissions technologies including collaborative research dedicated to accelerating the commercial uptake of technologies such as carbon capture and geo-sequestration (BHP, 2009a, p. 7).

AGL, under the section *Environmental Management* of its Sustainability Report 2009 stated that:

> Our long-term goal is to achieve excellence in environmental management and performance. This goal is underpinned by the **management systems**, organisational structures and **expertise** we have in place to manage our business for sustainable growth (AGL, 2009b, p. 8, emphasis added).

In the online version of the Sustainability Report (2009a), AGL provided a detailed explanation of the process and procedures involved in their EMS. AGL explains how, through its EMS, it is endeavouring to undertake actions in certain operational sites that exceed the licence obligations. Such disclosures indicate that AGL has the capacity to manage its

environmental impact above and beyond the existing regulatory requirement and, hence, enable the entity to couch itself in an advantageous position even during a time of potential stringent regulation. The reference to the existence and continued implementation of an EMS is also addressed in the sustainability reports of ORG and OZL.

These findings revealed that how texts and pictorials are used, particularly to convey competitive appeals via ingratiation, exemplifications of pro-environmental initiatives, declaration of ownership of environment-friendly infrastructures and expertise. Such findings provide support for NRBT which upholds the notion of competitive advantage by promoting the idea of environmental pragmatism.

6.5.3 Conclusion from the findings of the connotative analysis

Based on the findings of the content analysis, it is concluded that the meaning of sustainability as communicated in the reports relates more to long-term economic growth and business survival, over and above environmentalism. It is noteworthy that the regulatory frameworks (GRI, 2006) and the industry association (MCA) both adopt a notion of sustainable development that takes a middle ground position along the spectrum of environmental ideologies. However, the notion of sustainable development itself has been criticised for embracing an economic compromise at its very conception, as opposed to the ideology of ecological conservation (Murphy, 1994). Hence, the role of environmental initiatives, including environmental disclosures within the sustainability phenomenon, could be seen as a necessity in achieving the ultimate goal of economic success.

A connotative analysis of the sample reports, as presented in Sections 6.5.3.1 and 6.5.3.2, interrogated the texts, style and format of presentation, imagery and the association of texts with the imagery under two persuasion techniques: legitimacy and competitive appeal. The discussion showed how a deliberate use of texts and imagery could create legitimacy and competitive appeals with a view to influencing readers' attitudes towards the reporting entity. The analysis suggests that the disclosures are communicated to uphold the notion of transparency by providing actual scientific data and justifying operational activities by rationalising existing practice. Further, the texts and images are organised within the

disclosures to tell compelling stories of realistic environmental solutions, offering hope for safe environmental management and attractive economic returns. It is argued that inclusion of scientific accounts and innovative technologies have a strong influence on steering individual views about company operations and their proposed solutions to environmental problems. At the same time, such inclusions can counter the criticisms of environmental idealists, thus diminishing the impact of opposing views within the sphere of environmental debates.

Therefore, the findings of the analysis support the view that the reporting entities attempt to put forward the perspective of ecological pragmatism rather than ecological idealism, as discussed in Prasad and Elmes (2005). The findings also support those of Whitmore (2006, cited in Lodhia and Hess, 2014, p. 3) that disclosures of innovative initiatives tend to promote the idea that *'technical fixes can solve every problem'.* On one hand, managers hold out promises of attractive financial returns, on the other hand, they demonstrate their environmental concern by providing specific disclosures of managing environmental risks and exploiting opportunities. Such a balancing act, it is argued, places managers in a middle ground position between the extremes of eco-centrism and techno-centrism.

6.6 Chapter summary

Sample companies with a market capitalisation of $500 million or less produce minimal environmental disclosures other than the mandatory disclosure of regulatory compliance as required by the *Corporations Act* s.299 (1) (F). The reasons for the large percentage of non-disclosures suggested in Section 6.1.1 are: a) less corporate visibility due to the size factor reduces the legitimacy threat; b) companies may find environmental disclosure unnecessary as they comply with the licence conditions required by the local government; and c) the for non-disclosing companies, environmental disclosures may not bring any benefit compared to the cost of producing them. These suggestions are consistent with the findings of Stubbs et al. (2013), concluding that managers do not provide sustainability disclosures as they find it unnecessary or irrelevant due to minimal stakeholder pressure.

Analysis of sub-sector variations in disclosures (Section 6.2.2.1) revealed the relevance of disclosures to sector-specific operations. For example, disclosures were provided in the 'emission from generation capacities' category across all five quality codes in the energy and utility sectors (e.g., ORG and AGL), which is a disclosure specifically identified for electric utility companies. The application of the CONQUARF, among the quantifiable disclosure categories/sub-categories revealed that disclosures were significantly less in relation to 'effluents discharge' and a number of emissions sub-categories (see Figure 6.1, 6.2 and 6.3). Narrative disclosures (e.g., nature, destination and treatment method) in relation to effluent and waste disposal were also found to be significantly less (95 per cent of the sample companies did not disclose, see Figure 6.5).

A separate analysis of the quality of the reported disclosures (quantifiable) with respect to the items was conducted. This was discussed under Section 6.2.2.3 and is summarised in Figure 6.4. In general, the analysis showed that most of the reported disclosures were of the 'general disclosure' category. Some of these disclosures consisted of quantified information referring to the measurement of the environmental impact of organisation activities. The findings also revealed less disclosure on comparative data, which reduced the comparability of information and made disclosure less relevant in terms of assessing a company's progress in managing environmental impacts. In general, the findings of this investigation support the two important conclusions of the study on environmental reporting practices in the Australian oil and gas industry, conducted by Dong and Burritt (2010). First, there is a lack of quantitative information with regard to the environmental impacts of companies' operations and reduction targets in annual/sustainability reports. Second, companies do not provide comparative information against any quantified target, previous years or industry benchmark. In addition, applying CONQUARF, the findings of this study also report a low level of disclosures on 'classified information' and 'calculation method' which in turn further decreases the faithful representation and verifiability of reported disclosures.

Examples of disclosures of a number of sample companies, as outlined in Section 6.2.2.3, show that a number of companies have provided detailed information with regard to each of the five quality codes. Presentation of such disclosures indicates that:

a) It is possible to provide environmental disclosures that would address the quality criteria, such as relevance, representational faithfulness, understandability and comparability of disclosures as suggested in regulatory frameworks;
b) there is scope for other companies to improve the quality of disclosures, following such presentations as exemplars; and
c) such presentations would assist the decision-making process of stakeholders, including shareholders.

The findings of the connotative analysis suggest that managers uphold the middle ground position of sustainable development through which they tend to convey the idea that financial growth and environmental well-being can be maintained simultaneously. They attempt to put forward their view by making a range of legitimacy and competitive appeals through the deliberate use of texts, format and imagery. However, given the limited scope of the connotative analysis using five sample companies, it is acknowledged that the findings should be treated with caution. This is an area where subsequent research is possible.

Thus, environmental disclosures have been analysed from the perspectives of the quality of disclosures as suggested by the regulatory frameworks. An understanding of managers' philosophical perspectives has also been explored in terms of how this influences the content and presentation of environmental disclosures in annual and sustainability reports. However, as is suggested in the signal-receivers component of signalling theory and decision-usefulness theory, the content and quality of environmental disclosures would also be determined by the users' preferences for disclosures. Such preferences would be moulded by the underlying environmental philosophical understanding of those users. Therefore, the second stage of this project entailed obtaining an understanding of investors' preferences (being a sub-set of users) with regard to companies undertaking environmental initiatives and making disclosures. This objective was achieved by conducting an online survey of a group of investors using hypothetical case-based scenarios. The survey method is explained in Chapter 7 and the findings are presented in Chapter 8.

CHAPTER 7: RESEARCH METHOD - QUESTIONNAIRE

7.1 Introduction

The connotative analysis of the sample companies' environmental disclosures implies that environmental initiatives are undertaken as a requisite for long-term survival and growth. While small companies produce minimal or no disclosures, large companies signal a wide range of environmental initiatives, either to legitimate their ongoing survival or to secure a superior competitive position under the regulatory constraints posed by increasing environmental awareness.

However, this raises an important question as to whether investors, being a particular group of signal-receivers, would also subscribe to such positions. As per signalling theory, addressing such a question would further explain the findings of the content analysis conducted in this project with regard to the quality of the environmental disclosures. The signalling theory posits that signallers (report preparers) are expected to provide signals (disclosures) if such signals are deemed important by the signal-receiver. This notion also supports the view of the decision-usefulness theory which states that organisations provide information on the basis of users' assumed decision-making needs. Therefore, the objective of the second stage of this research project was to elicit the position of the investors along the continuum of environmental ideologies by conducting a questionnaire survey. The construction of the questionnaire was driven by the findings of the content analysis.

The questionnaire included two hypothetical case-based scenarios capturing environmental versus economic consequences associated with environmental initiatives and disclosures. Prioritising either environmental or economic consequences would be facilitated if a respondent has either a dominant eco-centric or a techno-centric view. However, a dilemma would arise in the prioritising exercise if a respondent is equally concerned about both environmental and economic consequences of environmental initiatives and disclosures. The questionnaire was designed so that the data gathered from the survey could help in understanding the environmental ideologies of shareholders. This could be determined

through a range of shareholder responses, including to what extent they require managers to undertake environmental measures and be ready to forego economic benefit for the sake of environmental well-being. The data obtained through the questionnaire would also be used to determine whether the shareholders' preferences for environmental disclosures vary with the size of the reporting entities. It was envisaged that the findings of the survey would contribute to understanding the quality of resources sector companies' environmental disclosures from the investor point of view. The findings would also provide an insight as to whether the investors' expectations mirrored the quality of disclosure as evident in the annual and sustainability reports.

The rest of this chapter is organised as follows. First, a justification of why the scope of the survey is narrowed down to investors is provided. Thereafter, the data population and data sources are discussed. This is followed by a description of the data collection method and the approaches taken to address the issues associated with such a method. Next, the construction of the questionnaire along with the background and the theoretical underpinnings are explained. Finally, the method for pre-testing the questionnaire and administration procedures involved in conducting the survey are presented before concluding the chapter.

7.2 Justification for selecting investors

Investors are considered to be one of the primary users of annual reports as attested in regulatory frameworks (such as the IASB). Regulators tend to prioritise the information needs of investors over other stakeholders in implementing new regulations (Deegan, 2004; de Villiers and van Staden, 2011). In making decisions regarding environmental management and disclosure, managers are more likely to consider shareholders and environmental regulations (Wilmshurst and Frost, 2000). Hence, it was envisaged that the quality of corporate environmental disclosures was likely to be affected by the investors' preferences for environmental disclosures. Therefore, the questionnaire survey conducted in this study is focused on investors' decision-making preferences with regard to the environmental initiatives and disclosures.

7.3 Population and data source

This section provides a discussion about the population from which respondents were drawn to complete the survey. The process of population selection was subjected to a number of changes as difficulties had been encountered in obtaining access to shareholders. Initially, the shareholders of resources sector companies listed in the ASX had been identified as the target population, given that one of the main objectives of the research was to understand the quality of environmental disclosures of Australian resources sector companies from the shareholders' perspective. Hence, a number of leading companies in this sector (e.g., ORG and AGL) were contacted and asked for permission to access their current shareholders' register. However, these companies refused to share their shareholders' register on the grounds that they believed that the purpose of the request would not be authorised under the *Corporations Act 1989*.

As an alternative, and in line with samples used in the research literature (de Villiers and van Staden, 2010), an investment fund - Morningstar Australasia Pty Limited (Morningstar) - with a large membership base (10,000 fee paying members) was contacted. Morningstar offers information to individual investors regarding stocks, managed funds, exchange-traded funds, and listed-investment-fund research, analytical reports, online portfolio tracking and analytical tools via their website. Thus, it assists investors to make informed financial decisions and to manage their funds. The population of the survey was therefore restricted to viewers and readers of the Morningstar website who were deemed to be current and prospective investors in the Australian and overseas share markets. Morningstar agreed to post an online article on their website (http://www.morningstar.com.au), which included the survey link, instead of e-mailing the survey to their members. The article remained on their website for three weeks. This approach is similar to the methods used in Deegan and Rankin (1997) and de Villiers and van Staden (2010) (although their surveys were e-mailed), in that the samples used in these studies were also selected from the members of an association of shareholders (e.g., the Australian Shareholders' Association (ASA)).

This population selection does have a major drawback in terms of meeting the imperatives required to ensure a representative sample. For example, a respondent can be anyone who

is able to complete the survey irrespective of being a shareholder. Hence, the resultant findings may not be representative of shareholders' preferences for corporate environmental disclosures. This issue was addressed by inserting specific questions in the questionnaire that would enable identification of a respondent as a shareholder.

7.4 The data collection method

An online survey method was adopted for collecting the data. With the rapid development of internet communication technology, online or web surveys have fast become a significant part of the trend in survey research. This method has largely taken the place of traditional surveys via mail, e-mail and interviews (Lavrakas, 2008). Web surveys refer to '*surveys that sample respondents via the Internet, gather data from the respondents via the Internet, or both*' (Lavrakas, 2008, p. 356). Couper (2000) classified web surveys under two major categories: probability-based and non-probability-based. The main distinguishing criterion between these two categories lies in whether researchers have the ability to control the exposure of the survey to their intended target population.

In probability surveys, the sample is selected by some probabilistic method ascertained by the researcher, for example, using list-based sampling frames or pre-recruited panel surveys (Fricker, 2008). Although this method does not ensure representativeness, with the knowledge of the population frame it permits the measurement of the source of non-response. By contrast, in non-probability surveys, a convenience sample is drawn, where the probability that various members of the population being included in the sample cannot be determined. In this method, the survey can be posted through a website; anyone who browses the website can access the survey and choose to participate in the survey (Fricker, 2008). An example of this category includes the unrestricted, self-selected survey where open invitations for participating in the survey are made via specific websites. While this is one of the '*most prevalent forms of Web survey today'*, addressing the issue of establishing the validity of this type of survey is found to be challenging (Couper, 2000, p. 479). This method was adopted in this study by making the survey link available via the website of Morningstar.

7.4.1 The advantages of using web-based unrestricted self-selected survey

The main advantage of this method is that it facilitates exposure to the participants without requiring access to any particular e-mail database. It avoids the confidentiality issue that arises with attempts to access the email database of prospective respondents. This method also avoids potential allegations of spamming or unsolicited email, which is common in the probability-based web surveys. The unrestricted self-selected survey also shares other advantages that are common to all web surveys, discussed as follows.

Low cost

Web surveys are relatively inexpensive and include only the cost of buying online survey services which '*can vary from very little to thousands of dollars depending on the features and services selected*' (Wright, 2005, p. 00). Using an online survey eliminates the cost of paper, printing and postage and return postage that are incurred in traditional mail surveys.

Time

Online surveys save time in terms of distributing questionnaires, collecting and interpreting responses (Andrews et al., 2003). Distributing the questionnaire only requires posting the survey link to the intended website. The web survey services create specific accounts for researchers where survey responses are immediately delivered as soon as a survey is completed by a participant. The basic features of the service providers also allow collection and entry of data in Microsoft Excel spreadsheets that can be used for further analysis and exported to a number of statistical software packages. Such an automatic data collection process eliminates the '*tedious and error-prone processes of data-capture, editing, coding and logical checks required in traditional data collection methods'* (Lavrakas, 2008, p. 357). These features also expedite the researchers' ability to monitor the progress of data collection and undertake preliminary analysis before obtaining the desired number of responses (Ilieva et al., 2002).

User-friendly format

Careful application of a wide range of formatting features allows researchers to design the questionnaire in a way that the task of completing the online survey becomes user-friendly

(Lavrakas, 2008, p. 357). These features include using colour coding, click boxes or buttons, drop-down menus, the ability to refer to hyperlinks or explanation boxes, skip options and survey completion bar-codes.

7.4.2 The disadvantages of using a web-based unrestricted self-selected survey

This survey method suffers a number of disadvantages. As discussed above, this mainly stems from its unrestricted nature of exposure, whereby anyone who browses the website containing the survey link is able to complete the survey.

Coverage of the population frame

One of the biggest problems with web-based surveys is the absence of researcher control over who participates and preventing multiple completions by the same participant. Therefore, it is difficult to obtain a representative valid sample in this type of survey. This, in turn, substantially reduces the generalisability and validity of the survey results.

Response bias

Online surveys only cover the population using the internet. However, it has been claimed in the literature that internet users often differ from non-users with respect to many socio-economic variables such as education and income. Hence, the extent of internet coverage in a population can impact the process of making valid inferences based on the collected responses via an online survey (Lavrakas, 2008, p. 357).

Non-response bias

Because of the absence of a defined population frame, it is difficult to measure non-response bias as there is no information or control to find out who chose not to participate (Fricker, 2008).

7.5 Approaches taken to address the issues of using unrestricted self-selected web surveys

Because of the difficulties encountered in obtaining a probabilistic sample list, this study shifted towards a non-probability-based web survey for obtaining data. However, the

following approaches were adopted to reduce the magnitude of the shortcomings associated with the method.

Use of a specific website

The survey link was posted on a website that is specifically focused on offering a range of stock information in order to facilitate investors' decision-making processes. Further, the link was included in an article that was written by the editorial staff of Morningstar, based on the information provided by the researcher. The article was titled '*Are resource companies environmentally responsible?*' (the article is presented in Appendix 8). While the title of the article was presented in the home-page of the website, the main article (including the survey link) was accessible under the 'Stock' section of the website. Therefore, it was envisaged that individuals with an interest in investing in the resources sector would be willing to complete the survey rather than any one who simply browsed the website out of curiosity.

Use of an online survey service provider with advanced features

In order to prepare the online questionnaire and for collection of data, the 'Gold plan' service of the online survey software provider, SurveyMonkey, was purchased for one year. One of the features of this plan is to block multiple entries from the same Internet Protocol (IP) address. This prevents the possibility of multiple completions of the survey by the same individual.

Specific demographic questions

Inclusion of specific demographic questions such as whether the respondent has shares in the stock markets also helped to filter out non-investors from investors within the total data set collected.

Use of statistics expert opinion

A statistician was consulted to obtain possible solutions for addressing the sampling issue. It was suggested that the raking ratio estimation method could be applied in this case. This method is applied where a sample is taken from a segment of a target population '*in proportions that do not match the proportions of those segments in the population itself*'

(Battaglia et al., 2004, p. 4740). The method improves the relationship between the sample and the population by adjusting the sampling weights of different variables in the sample so that '*the marginal totals of the adjusted weights on specified characteristics agree with the corresponding totals for the population'* (Battaglia et al., 2004, p. 4740). The method purports to reduce the non-response and non-coverage bias and is discussed in more detail below.

7.5.1 Raking ratio estimation

Measuring non-response bias has been identified as an issue of concern in the unrestricted self-selected web survey method. It occurs when data are not collected from the entire sample (unit non-response) or individual survey question (item non-response) (Fricker, 2008). Because of non-response bias, the observed survey results would be substantially different from what would have been obtained if the entire sample had responded to the questionnaire. In addressing the issue of non-response bias, the response rate is often calculated as a measure of '*how well the survey results can be generalised. Higher response rates are taken to imply a lower likelihood of non-response bias'* (Fricker, 2008, p. 6). However, because the exact sample size is not known in the unrestricted web survey method adopted in this study, '*it is not possible fully to compute the response rate as there is no denominator*' (Callegaro and DiSogra, 2008, p. 1010). It is suggested in the literature (e.g., Brick and Kalton (1996); Cervantes and Brick (2008); Cohen (2008)) that a number of statistical methods such as cell weighting and raking ratio estimation are adopted as commonly used approaches by researchers to compensate for '*unequal selection probabilities, non-response* and *non-coverage'* from known population values (Kalton and Cervantes, 2003, p. 82). In order to address such issues in this study, the raking ratio estimation method is applied so that the non-coverage and non-response bias would be offset. The entire statistical test was performed using sophisticated statistics software (Statistical Analysis System - SAS), which is explained in the following section. The correspondence details with the expert are provided in Appendix 6.

7.5.2 Definitions and the procedure to apply the raking ratio estimation method

The raking ratio estimation method is defined as '*a post-stratification procedure for adjusting the sample weights in a survey so that the adjusted weights add up to known population'* (Cohen, 2008, p. 3). The raking ratio '*has been widely used for many years for benchmarking sample distributions to external distributions'* (Kalton and Cervantes, 2003, p. 87). This method is preferred to the cell weighting method in that it is able to benchmark the sample response to the population distribution even when only the marginal population distributions of the auxiliary variables (e.g., age, gender and levels of education) are available. In contrast, to apply the cell weighting method, joint distribution population data are required, such as the numbers of males and females in every age group in a population frame. Further, the raking model leads to less variability in the distribution of weighting adjustments and, hence, inflates the variance of the survey estimates far less than occurs with the cell-weighting method (Kalton and Cervantes, 2003).

Calculation of raking weights involves a mathematical procedure termed as iterative proportional fitting (IPF). The process starts with the preparation of a cross-table (showing two variables in rows and columns, respectively), which is prepared to demonstrate the sample joint distribution data of auxiliary variables. The sample data refer to the data obtained in the survey. The marginal distribution of population data also needs to be arranged in a cross-table. The first step of raking iteration involves adjusting the sample row totals to the population row totals. This is achieved by multiplying each data-cell in the sample cross-table by the factor calculated as the population row total divided by the sample row total. Then the column totals of the adjusted sample obtained in the first step are forced to conform to the population column totals by applying the similar calculation method. The row totals are then readjusted to conform and repeat the procedure until convergence of the sample distribution is calibrated to the population distribution (Battaglia et al., 2004).

7.5.3 Calculation of raking ratio or weight

The auxiliary variables (gender and age profile) of the population data was requested from Morningstar. Such data served as the source for the population distribution information as

the population frame in this study is limited to the members of the Morningstar who are deemed to represent a group of ongoing and potential investors. As requested, Morningstar supplied a histogram of the demographic profiles of their members.

Using the histogram, it was estimated that 11.3 per cent of Morningstar's audience was between 18–35 years, 17.6 per cent were between 36–45 years, and 71.1 per cent were 46 years or older. 88 per cent of Morningstar's members were male and 12 per cent female. These data are shown in Table 7.1.

Table 7.1: Demographic profile of Morningstar members: gender and age group

Gender	Age group
Male: 88%	18-35: 11.3%
Female: 12%	36-45: 17.6%
	46 or older: 71.1%

A cross-table showing the joint distribution data of the respondents in terms of age and gender is shown in Table 7.2. The percentages shown in the last column refer to the marginal age distribution, which was calculated as the number of respondents in each age group divided by the total number of respondents. Similarly, the percentages shown in the last row indicate the marginal gender distribution calculated as the number of respondents in each gender group divided by the total number of respondents.

Table 7.2: Joint distribution data of the respondents in terms of age and gender

	Female (B1)	Male (B2)	Row total
18-35 (A1)	2	8	10 (5.2%)
36-45 (A2)	29	19	48 (25.1%)
46 or older (A3)	**12**	**121**	133 (69.6%)
Column total	**43 (22.5%)**	**148 (77.5%)**	191 (100.0%)

The data presented in Tables 7.1 and 7.2 were used to perform the raking procedure using statistical software (SAS). Table 7.3 summarises these raking weights, with each weighting factor calculated using IPF function for the corresponding sample joint distribution data that was entered in each cell of Table 7.2. For example, the raking weight 1.171 in the a1b1 cell of Table 7.3 is calculated for the data entered in the A1B1 cell of Table 7.2

Table 7.3: Raking weights calculated using the IPF function

	Female (b1)	Male (b2)
18-35 (a1)	1.171	2.405
36-45 (a2)	0.494	1.015
46 or older (a3)	0.521	1.071

Finally, the sample distribution data were adjusted by multiplying each joint distribution data with their corresponding raking factor. The adjusted sample data are presented in Table 7.4, which shows the adjusted data in each cell and gives the sum in each margin. The adjusted data in each cell of Table 7.4 (e.g., 2.342 in the second cell of the second column of Table 7.4) are calculated as the number of respondents (e.g., A1B1 in Table 7.2) multiplied by the corresponding raking weight (e.g., a1b1 in Table 7.3). Therefore, 2.342 as shown in the second cell of the second column of Table 7.4 is the product of A1B1 and a1b1. Table 7.4 also highlights that by using the raking weights, the sample marginal distributions were now consistent with the marginal population distribution.

Table 7.4: Adjusted sample distribution data

	Female	Male	Row Total
18-35	2.342	19.24	21.59 (11.3%)
36-45	14.326	19.285	33.61 (17.6%)
46 or older	6.252	129.591	135.84 (71.1%)
Column total	22.93 (12%)	168.12(88%)	191.04 (100%)

For the purpose of bias reduction and variance estimation, the raking adjusted standard errors were computed using a method referred to as Jackknife repeated replication (Lee and Forthofer, 2006, pp. 29-35). The Jackknife technique involves a systematic process of recomputing estimates where one or more observations or a group of observations are deleted at a time. While applying the Jackknife technique to the sample data, each observation in the sample was dropped in turn and the weights were re-adjusted so they added to the total weight in the sample.

The entire survey data and results were readjusted for the raking weights by applying the above statistical procedures and are referred to as the ‘weight-adjusted’ data henceforth. The whole process of computation and preparing the data for summarising the results was performed in SAS. Readjusting the entire survey sample data by applying the above

statistical techniques reduced the bias in the sample estimate and enhanced the conformity of the sample data to the population frame.

7.6 Construction of the questionnaire

The questionnaire consisted of two hypothetical case-based scenarios focusing on two resources sector company environmental impacts: 'emission' and 'effluent/waste disposal'. Even though these two impacts have known detrimental effects on air, water and land, they were identified through CONQUARF (as per the findings of the content analysis in Chapter 6, Section 6.6) to be significantly less disclosed categories. The scenarios were designed to raise a dilemma usually faced by managers in managing their organisation's environmental impacts. A number of questions were presented under each scenario. These were followed by general questions related to large versus small company disclosures and investors' willingness to forego financial returns (for example, in the form of reduced dividend receipts) for environmental concerns. A number of demographic questions were included at the end of the questionnaire. The background and the construction of the scenarios, as well as the theoretic models guiding the design of the scenarios and the analysis of the findings are explained in Sections 7.6.1 and 7.6.2 respectively.

7.6.1 Background and scenarios

Some argue that managing environmental issues and associated disclosures creates more dilemmas than handling a straightforward problem (Berry, 1993). Diminishing natural resources, climate change and increasing environmental degradation strengthen the argument for managers to pay attention to the environmental aspects of their operations. However, because of the uncertainty associated with the costs and benefits of environmental management, managers often face dilemmas in making choices between alternative courses of actions when they are confronted with environmental problems. Such dilemmas may include, but are not limited to, choices between unilateral preference versus organisational practice, economic versus environmental, and short-term versus long-term benefits. Each choice of action has its own advantages and disadvantages. In choosing the advantages of one option, managers are compelled to forego the benefits of the alternative

courses of actions which, in turn, would affect their environmental management and disclosures. A cost-benefit analysis might result in significant variation in the amount and quality of environmental disclosures of companies, especially when the companies vary in size and exposure to government and regulatory scrutiny (Brammer and Pavelin, 2008). The cost-benefit analysis would take into account both environmental and economic considerations, depending on the underlying environmental ideologies of decision makers. For example, a respondent with a strong eco-centric view would prefer undertaking environmental initiatives to prevent environmental damage even though this results in additional financial outlays. Alternatively, a respondent with a strong techno-centric view would put more weight on financial benefit while making decisions, regardless of the harmful impact of such a decision on the environment.

The findings of the content analysis of the annual reports, as discussed in Chapter 6, showed that smaller companies in the sample provided little or no environmental disclosures, especially, in terms of their emission impacts and reduction initiatives. Some of these companies stated that their level of energy consumption and carbon emission was less than the regulatory threshold specified in the *NGER Act 2007* and hence, they were not required to publicly report on their energy use and emission as per the Act. Such a finding supports the view taken by Tilley (2000) that the extent of operations is less for small companies and, hence, they often fall below the regulatory thresholds required for pollution and energy use (Tilley, 2000). However, it is claimed that the '*cumulative environmental impact'* of small firms '*as a whole could be quite considerable'* (Tilley, 2000, p. 33). Hence, the total environmental impact of small and medium sized firms can '*outweigh the combined impacts of the large firms'* (Hillary, 2000, cited in Aragón-Correa et al., 2008, p. 89). While regulation might not act as a driving force for small companies for undertaking pro-environmental initiatives, it is possible that they are likely to rely on '*industry self-regulation'* and follow the environmental practice of similar entities operating in the same industry (Boutilier and Black, 2013, p. 696).

Hence, in considering the undertaking of environmental initiatives, one of the main dilemmas these entities face is the cost-benefit analysis of 'unilateral preference versus organisational practice'. On the one hand, in line with the RBT, pre-emption of potential

risks from emerging regulations and early adoption of environmental initiatives may add to the competitive advantage of entities (Garay and Font, 2012). On the other hand, undertaking such initiatives could result in substantial costs that would reduce the company's operating profits and, thereby, returns to its shareholders. Such a dilemma would be further accentuated by the fact that the benefits relative to the costs associated with the adoption of pro-environmental initiatives are uncertain, at least for a short-term period (Horváthová, 2012; Gotschol et al., 2014). Therefore, environmental actions of the other industry participants are often considered an important factor for managers in determining environmental risks and strategy. An empirical study conducted by Tilley (2000) concluded that the managers of small firms in the study indicated that:

> The economic system and business climate act as a dominant resistant force that prevents them from taking voluntary steps to behave with greater environmental responsibility than their competitors (p. 35).

Because environmental investment may not provide immediate financial return, small firm managers fear that such financial outlays would put them into a less advantageous position economically compared to their opportunistic competitors. Such a dilemma was raised in the first scenario of the questionnaire, which was constructed as follows.

Scenario 1

*Little Ltd is a **small**[10] coal mining company operating with other small mining companies in a region in Australia. The amount of pollution discharged by these companies individually is less than the threshold that is required to be disclosed by government regulation. However, the total amount of pollution discharged by all the companies together in that region is likely to reach a level which is detrimental to the inhabitants. This may attract negative media attention and result in greater regulation in the near future. Adoption of any pollution control measures by the company will **reduce the risk of fine/penalty** due to possible breach of the potential future environmental laws, but at the same time, **increase the current operating costs**.*

*Considering this situation, the managers of Little Ltd may choose any of the following **four choices**.*

*A. **Do not** expend resources on pollution control activities **even if** the managers of the other mining companies **do**. This helps to reduce the pollution in that region but might cause Little Ltd to attract negative media attention in the future.*

*B. **Expend** resources on pollution control activities **only if** the managers of the other mining companies **do** the same as well. This helps to reduce the pollution in that region.*

[10] Small companies are defined in the questionnaire as companies that have annual revenue less than $25 million. Any companies with annual revenue of $25 million or more were regarded as large companies. This criterion is obtained from the *Corporations Act 2001*, s. 45 A.

*C. **Do not** expend resources on pollution control activities **particularly if** the managers of the other mining companies **do not** expend as well. This increases pollution in that region.*

*D. **Expend** resources on pollution control activities **even if** the managers of the other mining companies **do not**. This increases pollution in that region but Little Ltd may attract favourable media attention in the future.*

Four questions were asked based on this scenario. The first question requested the respondents to rank the above four choices as 1st, 2nd, 3rd and 4th according to their preferences. It was envisaged that the respondents would be compelled to consider the issue of potential cost versus the benefits of any pollution control activities as raised in the scenario in making their preferences, unless they believed in an extreme eco-centric philosophy. Thus, the case-based dilemma could extract more informed opinions from the shareholders than other questionnaire surveys that simply request responses to individual questions without any contextual information.

Choice A bears a techno-centric view by asserting that managers of Little Ltd prefer financial interest over environment. They do not consider that any economic benefit may arise from pollution control activities. Rather, they anticipate that as the other entities operating in that area adopt preventative actions to keep the pollution level low, the area will not attract environmental scrutiny or negative media attraction in the near future. Hence, this choice denotes 'unilateral defection' as it implies disapproval of any pollution reduction initiatives even when the other industry partners embrace such actions.

Choices B and C uphold moderate eco-centric to moderate techno-centric positions by implying that managers of Little Ltd prefer to imitate or consider the practice of other entities in determining their environmental strategy. The uncertainty related to the potential cost versus benefit that would be contributed by the adoption of environmental measures is deemed to be alleviated to some extent by observing the action of other industry partners operating in the same environment. Choice B is moderately eco-centric and asserts 'mutual cooperation', because it indicates that managers of Little Ltd would consider pollution reduction activities provided that other firms operating in that area would do the same. Alternatively, Choice C assumes less empathy with environmental well-

being and indicates ‘mutual defection’ to follow the negative environmental attitudes of their counterparts.

Choice D supports an eco-centric belief by indicating an unreserved pro-environmental attitude and hence, denotes ‘unilateral cooperation’ as it does not take into account the action of other entities in making an environmental management decision. However, it may adopt the notion of possible competitive advantage (instead of pure environmentalism) that would be likely to result from the adoption of early action for preventing pollution.

In the second scenario, considerable environmental impacts of an individual firm and the issue of the cost-benefit analysis of its environmental versus economic decisions were raised, as follows:

Scenario 2

Big Ltd is a large coal mining company that operates in a number of regions in Australia and overseas. Recently, it commenced operations in the headwaters region of a river into which it dumps toxic waste. No immediate detrimental impact is obvious in that region as the waste is carried away by the current. However, it is envisaged that over a period of time the waste will accumulate downstream. This will adversely affect the water quality and cause contamination of the fish stock and vegetation in that region. This will also result in negative media attention and may increase regulation relating to clean-up costs and prevent the company from using the river in the future. Adoption of alternate safe waste disposal methods by the company will prevent all these future negative impacts but will substantially increase the company’s current operating costs and decrease the return to shareholders.

Considering this situation, the managers of Big Ltd may choose any of the following four choices:

A. ***Do not expend*** *resources on safe waste disposal methods* ***BUT disclose*** *the impacts of waste disposal in the annual report.*

B. ***Expend*** *resources on safe waste disposal methods* ***AND disclose*** *the impacts of safe disposal in the annual report.*

C. ***Neither expend*** *resources on safe waste disposal methods* ***nor disclose*** *the impact of waste disposal in the annual report.*

D. ***Expend*** *resources on safe waste disposal methods* ***BUT do not disclose*** *the impact of safe disposal in the annual report.*

The environmental decision dilemma for the company in the second scenario is more critical than the one presented in the first scenario. Being a large coal mining company it would easily attract government and/or non-government (media and environmental lobby groups) scrutiny because of its poor waste disposal practice (Hahn and Kühnen, 2013). However, any

attempt to address such an issue would result in substantial financial outlays and thereby adversely affect the short-term operating profit and shareholder returns. The remoteness of any visible impact (both in place and time) from poor environmental practice, as presented in Scenario 2, would bring the managers an additional dilemma in making decisions about adopting necessary environmental measures. Depending upon the ideological positions with regard to the environmental and economic outcomes, the investors may choose to either: 1) consider the potential risk of environmental regulation and consequent clean-up costs in the future and thereby adopt pro-environmental measures at the expense of current economic benefit; or 2) *not* sacrifice current economic benefit for the potential environmental risks in the future. However, in Scenario 2, the use of the word "*will*" implied the risks and consequences as certain rather than a possibility. Such a certain nature of the outcomes would influence the investors' responses and hence would be argued as a limitation of the investigation.

The choice of either position may accompany additional disclosure decisions. According to signalling theory, managers need to decide whether to publicly disclose information. The theory predicts that managers communicate positive information to portray the firms' positive attributes (Connelly et al., 2011). Disclosures of any preventative measures indicate preparedness for future risks and, hence, signal competitive advantage. Therefore, disclosures are likely when managers undertake safe waste disposal initiatives. This notion is incorporated in the Choice B of Scenario 2. However, managers may also communicate negative information about the organisational activities as '*an unintended consequence of insiders' action'* (Connelly et al., 2011, p. 45). Providing negative information may also '*serve as a powerful means of guaranteeing honesty'* (Bird and Smith, 2005, p. 223). Therefore, Choice A, which is suggestive of providing disclosure of waste impacts even in the absence of undertaking preventive initiatives, is contained under Scenario 2. The decision to provide disclosures over non-disclosures by the entity, irrespective of the deployment of any safe disposal method, indicates an eco-centric belief (Bird and Smith, 2005, p. 223). Alternatively, waste disclosures are unlikely if: 1) the harmful waste impacts are deemed to be unobservable to the stakeholders; or 2) if the cost of providing waste disclosures outweighs their benefits (Connelly et al., 2011). These two viewpoints justify the inclusion of Choices C and D, respectively, under Scenario 2.

In Scenario 2, Choice B denotes a dominant pro-environmental strategy because it favours investment in safe disposal methods and subsequent disclosures of relevant impacts. Alternatively, Choice C, which suggests neither investment in, nor disclosures of, waste management activities, constitutes a dominant pro-financial strategy. This choice advances the idea of avoiding costs of undertaking safe waste management initiatives and disclosures rather than promoting environmental well-being. However, Choice A (disclosing the impact without undertaking initiatives) and D (undertaking initiatives without providing disclosures) do not constitute a dominant pro-environmental or pro-financial strategy.

Based on the second scenario, three additional questions were put forward drawing on the reasons for adopting the safe waste disposal and subsequent disclosures. Similar to the first scenario, the respondents were asked to rank the four choices (A, B, C and D) according to their preferences. The theoretical framework for analysing the preference ranking and identifying a dominant strategic choice is explained below.

7.6.2 Theoretical underpinnings for constructing the 'choices' and analysis

The outline of the choices presented in the scenarios draws on the notion of two player game theory, which has been used in research studying complex social dilemma situations (Chou and Sylla, 2011; Neshat and Amin-Naseri, 2014; Deng et al., 2014). Game theory is a study of decision-making in a competitive environment where two or more players make choices that potentially affect the interest of others (Deng et al., 2014). The theory provides:

> … a mathematical framework to explain and address the interactive decision situations where the aims, goals and preferences of the participating agents are potentially in conflict (Deng et al., 2014, p. 784) .

An interactive decision-making game contains a set of players, a number of strategic options available for each player and a payoff for each strategy combination (Deng et al., 2014). In game theory, decision makers are referred to as players and interactive decision-making situation is denoted as a game. A payoff is a number which reflects the desirability of an outcome to a player which incorporates the player's attitude towards a strategic decision

(Spyridopoulos et al., 2013). Game theory can be applied using different models, such as, decision-making tree or decision-making matrix model. In a social dilemma situation, the prisoners' dilemma (PD) model using a matrix format is often utilized to apply game theory (Pellikaan and Veen, 2002; Tanimoto, 2005). Prisoner's dilemma is a strategic game between two players where each player has an opportunity to pick one of the two given strategies. In a social dilemma situation, the prisoners' dilemma (PD) model using a matrix format is often utilized to apply game theory (Pellikaan and Veen, 2002; Tanimoto, 2005). The PD model asserts that two players (or participants) take part in a game. Each player has a choice of either favouring or opposing an action. Each player will face an outcome that is dependent on the choice of the other player. Usually, the outcomes depend on three situations: 1) if both players favour an action; 2) if both players oppose an action; and 3) if one player favours and the other opposes an action. While the players are informed about the nature of the outcomes depending on their choices, they are unaware of the choice made by the other player.

In this project, the PD model of game theory is used for: a) construction of mathematical matrices for analysing preference rankings data and b) subsequent collation of strategic outcomes. The use of PD model of game theory is assumed to be suitable in this study for a number of reasons. First, the scenarios constructed in the questionnaire present an interactive decision-making environment where a decision-maker faces a number of choices. Second, each choice consists of a strategic combination, where a strategy preferred by a decision maker is combined with that of another agent involved within the interactive decision-making environment. Finally, the payoff of each choice preferred by a decision-maker would be measured by a matrix designed by the PD model of game theory. Such a payoff is able to elicit a dominant or non-dominant strategy from each set of preference ranking indicated by a respondent. It is envisaged that, such strategies would draw upon the views of the respondents towards environmental management and the quality of disclosures of resource sector companies. Hence, in line with the decision-usefulness theory, it can be argued that such views would be able to assist in explaining the level of the quality of environmental disclosures reported by these companies.

In this project, the two scenarios that were presented in the questionnaire highlight the dilemma that firm managers usually face while making environmental decisions. The scenarios were designed to satisfy the three conditions devised in the PD model of game theory as suggested by Pellikaan and Veen (2002, p. 71): *'cognitive', 'affective' and 'evaluative'*. The cognitive element states that the respondents should be aware of the possible outcomes of the choices given to them. The affective component acknowledges that respondents should be able to clearly indicate their like or dislike of the different possible outcomes of the choices when they are confronted with the dilemma. The evaluative condition states that the respondents are able to rank the choices based on their understanding of the dilemma associated with each choice and based on their like or dislike of the possible outcomes of each choice. Such a ranking is expected to indicate their affective response.

Analysing the responses under the PD model of game theory helps to identify a dominant strategy indicated by the respondents through preference ranking. In order to identify whether a preference ordering has a dominant strategy, a choice-matrix has to be prepared according to the PD model of game theory. The player for which or with respect to which a dominant strategy is sought is positioned in the row of the matrix (row player) and the other player is placed in the column (column player) (Pellikaan and Veen (2002).

In the first scenario of this study, while indicating a preference ranking in making an environmental decision for an individual entity, the respondents were faced with 'unilateral preference versus organisational practice' dilemma. A preference made in favour of expending resources in pollution control initiatives was considered a 'cooperation' strategy and the opposing view is deemed to be a 'defection' strategy. As the scenarios present four choices (A, B, C and D), the number of possible preference orderings across these outcomes will be 24 (= 4 x 3 x 2 x 1) (Pellikaan and Veen, 2002, p. 73). In the first scenario, the two players represent – 1) 'individual entity' for which a preferred choice is sought and 2) 'other organisations' which operate in the same region. In the matrix, the 'individual entity' is positioned as the row player and the 'other organisations' as the column player. The decision-making of the 'individual entity' may or may not rely on the action of the 'other

organisations'. The choice-matrix for identifying a dominant strategy for Scenario 1 is provided in Table 7.5.

Table 7.5: Matrix for identifying a dominant strategy under PD model of game theory in Scenario 1

		Other organisation (choice made by other organisations)	
		Cooperation	Defection
Individual entity (choice preferred by individual entity)	Cooperation	**Choice B:** Both 'individual' and 'others' cooperate (i.e., expend resources on pollution control activities)	**Choice D:** The 'individual' cooperates even when the 'others' defect and **do not** spend resources on the pollution control activities
	Defection	**Choice A:** The 'individual' **does not** cooperate even when the 'others' spend on resources on pollution control activities	**Choice C:** Both 'individual' and 'others' defect (i.e., do not spend resources on pollution control activities)

However, in the second scenario, the PD model under game theory could not be applied directly as there was only one active player, 'management'. In this case, a pseudo-game theoretic notion was applied in a modified way. In a pseudo-game theoretic model, one player leads an action, followed by others (Neshat and Amin-Naseri, 2014). Instead of using two players, in this case, only one player is active in making both the decisions – that is, undertaking environmental initiatives and making public disclosures. However, the receivers of the public disclosures are deemed to be passive and can be relied upon by the managers in terms of how they (the receivers) use disclosures in their decision-making about the company.

Therefore, in the second scenario, the cost-benefit analysis of the environmental versus financial dilemma of undertaking environmental initiatives was paired with disclosure decisions. A choice-matrix was prepared to determine whether a preference ranking revealed a dominant strategy. This is presented in Table 7.6. Because the decision to 'undertake initiatives' is focused on ensuring environmental well-being at the expense of financial outlays, it served as the main determinant for a 'pro-environmental' strategy. Hence, 'undertaking initiatives' was positioned as the row player in the matrix. Alternatively, the decision to make 'public disclosure' was regarded as the column player, as such

decisions act as an additional determinant towards a 'pro-environmental' strategy. Favouring the undertaking of safe waste disposal methods and/or providing disclosures constitutes a 'pro-environmental' strategy. Alternatively, rejecting either initiatives for safe disposal methods or disclosure represents a 'pro-financial' strategy.

Table 7.6: Matrix for identifying a dominant strategy under a PD model of game theory in Scenario 2

		Public disclosures (made to investors)	
		Disclose (Pro-environmental)	Do not disclose (Pro-financial)
Environmental initiatives (undertaken by management)	Undertake initiatives (Pro-environmental)	**Choice B:** Both 'undertake initiatives' and 'disclose' (i.e., spend resources on safe waste disposal method and provide disclosures)	**Choice D** 'Undertake initiatives' only (i.e., spend resources on safe waste disposal method only but do not do not provide disclosures)
	Do not undertake initiatives (Pro-financial)	**Choice A:** Do not 'undertake initiatives' or spend on safe disposal initiatives but provide specific disclosures	**Choice C:** Neither 'undertake initiatives' for safe disposal method nor provide disclosures

Therefore, Table 7.6 indicates that management action is deemed be 'pro-environmental' if it undertakes initiatives for safe disposal irrespective of providing disclosures (which is Choice B and D). Alternatively, management action is presumed to be pro-financial if it does not undertake safe disposal methods (Choice A and C).

The analytical process for identifying the dominant strategy of a respondent follows the method suggested by Pellikaan and Veen (2002). The process involved two steps:

1. Assigning scores of 1 to 4 in a highest (4) to lowest (1) order to the choices in the choice-matrix according to the preference ranking expressed by the respondent. For example, in Scenario 1, if a respondent expressed a preference ranking BDCA (which indicates, first preference B and the last preference A), the scores to the choices in the choice-matrix would be assigned as: 4 for B, 3 for D, 2 for C and 1 for A.
2. Calculating the total score for each row in the matrix. The strategy (cooperation/defection in Scenario 1 and pro-environmental/pro-financial in Scenario 2) indicated in a row would be considered the dominant strategy if that row had a

maximum value. Alternatively, if both rows in the matrix have the same value, the outcome of the preference ranking would be regarded as a 'no maximising rule'.

The process of assigning values to ascertain the maximum value for identifying the dominant strategies are further explained in Chapter 8, under the analysis of the results for the corresponding scenarios, in Sections 8.2.1 and 8.2.2 respectively.

The first eight questions under the two case-based dilemma scenarios helped to obtain investors' preferred choices of action with regard to undertaking environmental initiatives and disclosures. In Question 9, the information needs of the investors with respect to the quality of environmental disclosures was sought. In this question, five levels of pollution disclosures were presented in a hierarchy of minimal (level 1) to detailed (level 5). Each level of disclosures was accompanied by additional information signalling the costs of manpower and technical support related to the preparation of such disclosures. The respondents were requested to indicate 'yes' or 'no' for each level of disclosure in terms of whether it should apply to small versus large companies. The criteria for small versus large companies were also included in the question. The construction of the question in this manner was deemed to enable the investor to reflect on the additional contextual information related to each level of disclosures and indicate their choice or 'yes' or 'no' with regard to the quality of the associated disclosures.

The questionnaire is presented in Appendix 9. The general layout of the survey questions under different themes is shown in Table 7.7.

Table 7.7: Design of the survey questions and themes

	Questions	**Survey themes**
Scenario 1	1 -4	unilateral preference versus organisational practice dilemma
Scenario 2	5 - 8	Financial versus environmental risk dilemma
General section	9 -10	Variation expected in the quality of disclosures of large versus small companies
Demographics	11 - 15	

The statistical methods used to measure data involved calculation of frequency and percentages with confidence intervals at 95 per cent.

7.7 Pre-testing

The construction of the survey questionnaire involved a number of stages, as follows:

1) Identifying the questions and establishing the data collection method.
2) Designing the draft questionnaire with special attention to the types, arrangements, sequences, wording and format of the questions.
3) Obtaining feedback from two independent experts in the field of study and survey research. These experts examined the questionnaire from various perspectives, including relatedness of the questions to the research objectives and theories, wording, design and data collection method.
4) Preparing further drafts of the survey instrument.
5) Pre-testing and reviewing the questionnaire.
6) Post-testing and obtaining an expert review.
7) Preparing the final version of the questionnaire.

Initially, the questionnaire was revised to ensure that the questions asked were able to contribute to the research objectives. Other issues related to the questionnaire, including the sentence structures, vocabulary, clarity, readability, ease of use, instructions and sequences were also considered. The questionnaire was then reviewed by experts in the field and revised accordingly, to accommodate that expert opinion.

The importance of pre-testing has been well established in the literature in terms of enhancing the readability and understandability of survey questionnaires, particularly in avoiding complex phrases when explaining issues that may be unfamiliar to respondents (Presser et al., 2004; Zikmund et al., 2010; Wilson, 2013). Pre-testing is considered to be one of the key stages in designing an efficient questionnaire. It enables the researcher to:

> identify inappropriate terms in question wording, an inappropriate order, errors in questionnaires related to their layout and instructions, as well as problems caused by the respondents' inability or refusal to answer certain questions (Babonea and Voicu, 2011, pp. 1323-1324).

There are several issues related to pre-testing a survey questionnaire. These include identifying the method, efficiency in selecting the sample and the sample size (Zikmund, 2010; Ackermann and Blair, 2006; Blair and Conrad, 2011). These are explored in more detail below.

7.7.1 Pre-testing method and test procedure

Personal interviews, as a recognised pre-testing method (Zikmund, 2010), were adopted in this study to conduct the pre-test. Personal interviews allow the interviewer to observe the respondents' reaction while completing the questionnaire and to understand their responses in more detail.

The interviews were conducted using the debriefing method in which the interviewees were requested to complete the questionnaire without interruption; the interviewer observed the whole questionnaire completion process. After the completion of the questionnaire, using a pre-test checklist, the interviewer asked the respondents whether they faced any problems while completing the questionnaire. The pre-test checklist is presented in Appendix 7. The feedback obtained in the interviews was addressed when refining the questionnaire.

Regarding the sample size for interview pre-testing, Blair and Conrad (2011) conducted an empirical investigation with sample sizes as small as five through to as large as 90. The study concluded that additional problems continued to be detected as sample sizes increase. However, the study also acknowledges that '*small samples are often sufficient for the purpose at hand'* especially when sample selection ensures heterogeneous interviewee characteristics (Blair and Conrad 2011, p. 637). Sheatsley (1983, p. 226) recommended that '12 - 25' interviews are enough to detect the major problems or issues in a pre-test questionnaire. In this study, 12 people were interviewed as part of the pre-test. After conducting six interviews, it was found that the nature of flaws identified in the questions became repetitive. The process of interviewing in the pre-test was concluded after the 12th interview, as no additional problems were detected in the last two interviews.

A convenience sample was taken in this study and the subjects were carefully selected for interview so that they closely resembled the target population (investors). The target population of the survey included investors who own shares in the stock market or via an investment fund. It was assumed that an investor may be a member of the public and hence of any age, gender and occupation. It is argued that a combination of demographic characteristics contributes '*better coverage of question problems'* and thus ensures efficiency and value, even from a small sample (Ackermann and Blair, 2006, p. 3998). Therefore, a mix of age, gender and occupation was considered while selecting the sample for the purpose of conducting the interviews for the pre-test. The age distribution of the sample of 12 interviewees was as follows:

- 20 – 29 years: 1
- 30 – 39 years: 3
- 40 – 50 years: 6
- More than 50 years: 2

Eight of the interviewees were male and four were female. The sample included stock brokers (2), doctors (2), engineers (2), academics (3), an administrative staff member (1), a sales representative (1) and a staff member at the managerial level (1). The interviewees owned shares in a number of ASX listed companies either personally or via investment funds.

The test procedure involved contacting the respondents by phone and informing them about the subject matter and procedures involved in the interview. Verbal consent was obtained from respondents and the interviews were conducted at the time and place suggested by the interviewees. As outlined earlier, the respondents were asked to complete the survey questionnaire in front of the interviewer. Upon the completion of the questionnaire, the interviewer asked the respondents a pre-determined checklist of questions (see Appendix 7). The interviews were tape-recorded while maintaining the anonymity of the interviewees. The time required to complete the questionnaire by each respondents was monitored and recorded by the interviewer.

7.7.2 Development of a checklist of questions for the pre-testing interviews

A checklist of questions for pre-testing was developed in the form of a questionnaire which was used while interviewing the respondents (see Appendix 7). The preparation of such a checklist considers the known and potential issues, as suggested in the literature, that a respondent would possibly encounter (Wilson, 2013; Babonea and Voicu, 2011; Rothgeb et al., 2007). Such issues include clarity, readability (difficult vocabularies), jargon, ambiguity, length, sequence and instructions related to the questions, format and the questionnaire in general. Based on the problematic items identified in the literature, a list of items was prepared, as shown in Table 7.8. The items were grouped under three main headings, as follows:

1) The use of wording in describing the scenarios/choices/questions
2) The format of the questionnaire.
3) The questionnaire instrument in general.

Open-ended questions were also asked during the interviews to encourage the respondents to provide comments and suggestions.

7.7.3 Analysis and findings of the feedback from interviews

The recordings of the interviews were transcribed manually into a Microsoft Word document. Responses where an interviewee showed clear understanding of an item in the checklist (shown in Table 7.8) were regarded as favourable responses and coded as ‘1’. Responses, where the interviewees made suggestions, or expressed concerns about any particular checklist item, were treated as unfavourable responses and coded as ‘0’. The numbers of each type of response (favourable and unfavourable) were counted and calculated in terms of percentages. Such percentages help to identify the problems in the survey questionnaire. The comments and suggestions from the narrative part of the analysis were then used, where possible, to improve the questionnaire.

The findings from the interviews are summarised in Table 7.8. The first column shows the checklist items under the three categories listed in Section 7.7.2. The remaining columns exhibit the number of favourable and unfavourable responses and their percentages.

Table 7.8: Summary of the interview responses obtained in the pre-test

Checklist items	Number of favourable responses	Number of unfavourable responses	Percentage of favourable responses (%)	Percentage of unfavourable responses (%)
1. Wording used in describing scenarios/choices/questions				
a. Clarity	12	0	100	0
b. Specificity	9	3	75	25
c. Appropriate vocabulary	11	1	92	8
d. Emphasis (Bold or italic)	7	5	58	**42**
e. Simplicity	8	4	67	**33**
f. Length	8	4	67	**33**
g. Elaboration required	9	3	75	25
h. Neutrality (or missing alternatives)	10	2	83	17
2. Format of the questionnaire				
a. Sequence	9	3	75	25
b. User-friendliness	11	1	92	8
c. Understandibility	9	3	75	25
3. Questionnaire instrument in general				
a. Understanding the concept	12	0	100	0
b. Confusion	12	0	100	0

The larger percentage of unfavourable responses recorded in the last column in Table 7.8 immediately raised issues of concern. The issues that received the highest attention were ‘emphasis’ or using bold and italic font for some words (42 per cent) followed by ‘simplicity’ and ‘length of the questions’ (33 per cent). The lowest unfavourable response under the ‘wording’ category was recorded for clarity (nil) followed by ‘appropriate vocabulary’ (8 per cent). ‘Sequence’ (25 per cent) and ‘understandability’ (25 per cent) were identified as the main issues in relation to the ‘format’ of the questionnaire. As a whole, the ‘concept’ or subject matter of the questionnaire was understood by all the interviewees without any ‘confusion’.

7.7.4 Revision of the questionnaire based on the feedback from interviews

After identifying the main issues, the comments and suggestions regarding these issues were studied carefully to obtain an understanding of how such issues affected the interviewees in completing the survey. Where deemed necessary and appropriate, the questionnaire was revised based on these suggestions, as follows:

Emphasis was added in the words in the sections related to the *choice of actions* under each *scenario* by making them bold and italic as appropriate. Such corrections were expected to make distinctions between the choices in the questions more obvious and lead to less time to comprehend the questions and to respond accordingly.

Four out of 12 interviewees indicated that they needed to read the choices under each scenario 'carefully' to make their preferences in relation to the Questions 1 and 5. However, they acknowledged that environmental problems and solutions are not straightforward, as one of the interviewees commented: *'you can't answer it from the top of mind'*. In order to enhance the readability, longer sentences were broken down into shorter ones. Technical words, such as 'greenhouse gas emission' were taken out and the simple equivalent word, for example, 'pollution', was used instead.

Additional explanations were added for Questions 9 and 10 in order to clarify the notion of small and large companies and short-term profit. Two of the respondents indicated that they felt somewhat restricted in expressing their true feelings in relation to Questions 2, 4 and 8, as the answer options were only 'agree' and 'disagree'. One interviewee commented that answering those questions was not *'that simplistic*'. Another interviewee stated that *'I don't feel comfortable'* about questions requiring an 'agree' or 'disagree' answer, as the choices seemed to be too *'extreme'*. Therefore, in these questions a third option of 'neither agree nor disagree' was added.

Suggestions were also received in relation to the format of the questionnaire and the difficulty in following the instructions (25 per cent). It was suggested that clear instructions should be set out at the beginning of the questions as to how the questions should be

answered (e.g., ranking, ticking boxes or choosing from drop-down menus). In the words of one interviewee, '*It would give an idea in advance of what sorts of questions I am going to look at*'. The interviewee also commented that reading the same instructions for similar questions *again and again* was time consuming. Accordingly, a clear set of instructions regarding the nature of questions and the methods choosing among alternatives was set out at the beginning of the questionnaire.

In relation to the sequence of the questions, Questions 6 and 7 were found to be repetitive by a number of interviewees (25 per cent). It was suggested that by emphasising (italicising and underlining) the key words, the distinction could be made clearer in these questions. Also, reshuffling the order of the answer choices was suggested. These suggestions were incorporated and the re-arrangement of choices was further enhanced using a specific function of the online survey instrument (SurveyMonkey). This enabled the automatic randomisation of choices each time the survey link was clicked.

The average time required by the interviewees to complete the survey was recorded as 16.5 minutes, with the lowest at 12 and the highest at 18 minutes. The revised version of the questionnaire was then executed in the online survey instrument and the survey link was e-mailed to three of the twelve interviewees who had the most issues regarding the questionnaire and who agreed to repeat the survey. All of the interviewees commented that the questionnaire was improved substantially and the average time to complete the questionnaire was 10 minutes. The draft was then finalised and approval sought and received for conducting the survey from the Victoria University Human Research Ethics Committee (VUHREC) before distribution to the actual target population.

7.8 Administration of the survey via SurveyMonkey

As discussed, the survey was conducted using the website of Morningstar. It was stated in the introductory section of the questionnaire that the survey aimed to obtain an understanding of investors' preferences across certain courses of actions that managers may take while facing environmental dilemmas in a given context. It was also indicated in the introductory section that the data collection and coding process was such that the

identity of the respondents would remain confidential. Thus respondents were assured that there was no risk involved in the survey participation.

The following features of the SurveyMonkey online software facilitated the data needs and objectives of this component of the research project:

- The answer choice randomisation function allowed the researcher to remove the bias that would result from ordering answer choices in a specified manner.
- Enhanced security ensured the transmission of the survey link and page from the researcher's account to the respondent's account and then back to the researcher's account.
- Enabling internet protocol (IP) blocking and restricting more than one response per IP address prevented multiple completions.
- Downloading responses directly into multiple custom reports saved time in terms of collecting, entering, processing and coding the survey data.

7.9 Chapter summary

Based on the signalling theory and the decision-usefulness theory, it is argued that the report preparers (signallers) are not likely to provide disclosures (signals) if such disclosures are not perceived to be important by investors in decision-making. Thus, this perspective suggests that the quality of disclosures is influenced by the information needs of investors. However, to what extent investors prefer a corporate environmental disclosure is steered by the environmental ideologies embraced by investors. Hence, a method for obtaining an understanding of the ideological position of investors with regard to the environmental management and disclosures was discussed in this Chapter. The method involved a questionnaire survey which included hypothetical case-based scenarios that highlighted common dilemmas, such as financial versus environmental decisions, with regard to the adoption of environmental initiatives and disclosures. It is argued that constructing questionnaires in such a way enabled the gathering of additional feedback from investors in terms of their environmental ideological standpoints and disclosure requirements. The PD model of game theory was used in constructing the questions under the case-based

scenarios and for subsequent analysis of the responses. It was envisaged that such a model would enable the identification of a dominant strategy, such as ‘pro-environmental’ or ‘pro-financial’, from the preference ranking made by investors.

The web-based unrestricted self-selected survey method used in this project was explained. A number of potential issues in relation to the use of this method were identified, such as the undefined population frame, non-response bias and multiple completion of the survey. The approaches taken to overcome these weaknesses associated with the application of the method and preparation of the questionnaire have also been described. For example, raking weights are estimated and applied to the survey data to address the statistical issues associated with population and non-response bias. The use of a security tool provided by SurveyMonkey, such as an IP address blocker, prevented the possibility of multiple completions. The clarity, readability and applicability of the questionnaire were ensured by conducting interviews in a pre-test. The method of conducting the pre-test and how the feedback was incorporated into a revised questionnaire have also been discussed. The process of analysis, results and the implications of the findings will be discussed in the next chapter (Chapter 8).

CHAPTER 8: FINDINGS FROM THE SURVEY OF INVESTORS

8.1 Introduction

In this chapter, the results of the survey of investors using a questionnaire based on hypothetical dilemma scenarios (explained in Chapter 7, Section 7.6.1) are presented and discussed with respect to the theoretical framework and research questions. The purpose of the survey was to explore the environmental ideologies of investors that might guide their preferences relating to corporate environmental initiatives and disclosures. This involved:

a) Obtaining investors' preferences across the certain courses of actions that managers might take when facing environmental dilemmas in a given context.
b) Identifying what reasons investors considered important for companies undertaking environmental initiatives and providing disclosures in public reports.

Exploring investors' expectations about the incorporation of quality attributes in environmental disclosures involved finding out whether those expectations varied across companies based on their size and level of environmental impact. The findings of this survey are important because, as per signalling theory, investor preferences for corporate environmental initiatives and disclosures are one of the contributory factors in determining the quality of environmental disclosures.

The findings and discussion are presented under the following headings. First, the demographic characteristics of the respondents who participated in the survey are summarised. Second, the findings of Questions 1 to 4, related to Scenario 1, are presented. Third, the results of the responses to Questions 5 to 6, associated with the Scenario 2, are revealed. The summary of findings is presented under each scenario with a discussion of the implications in terms of the theoretical framework used in this project. The findings from Questions 8 and 9 are then offered respectively in the next two sections. These findings relate to exploring investors' preferences in terms of the quality of environmental disclosures and their willingness to sacrifice financial interest over environmental concerns.

8.2 Demographics

One-hundred and ninety-eight (198) respondents began the online survey; however not all of them completed it in its entirety. Table 8.1 shows the count of respondents who started the survey (in the second the column) and the percentage of the respondents who completed each question (in the third column). The last row of Table 8.1 shows that 191 respondents out of the 198 that initiated the survey completed the entire survey.

Table 8.1: Response counts and percentages for each survey question

Questions	Respondents started the survey	Respondents completed the question
	N	N (%)
Question 1	198	198 (100)
Question 2	198	198 (100)
Question 3	198	198 (100)
Question 4	198	198 (100)
Question 5	198	194 (97.98)
Question 6	198	194 (97.98)
Question 7	198	193 (97.47)
Question 8	198	193 (97.47)
Question 9	198	191 (96.46)
Question 10	198	191 (96.46)

The respondents who did not complete the entire survey were not excluded from the analysis of the findings. This is because, the findings were analysed and presented under each of the 10 survey questions individually and hence, they were still usable in terms of making inferences for each separate question.

The demographic features of respondents were ascertained through Questions 11 to 15 of the questionnaire. The attributes covered in the demographics included gender, age, level of education and orientation of investment decision-making (i.e., invest individually or via investment funds). This information helped to create a profile of the respondents participating in the survey. It also assisted in identifying any differences in the responses obtained from different groups of respondents (de Villiers and van Staden, 2010). Although 198 participants commenced the survey, the total number of respondents that completed the demographic questions (Questions 11 - 15) was 191 (i.e., 96.46 per cent). All the

demographic variables, including age (which may also be regarded as ratio data), were obtained and treated as nominal data. Therefore, the calculation of the frequencies, weight-adjusted percentages and the upper and lower limit of the range at 95 per cent confidence intervals were considered suitable to allow for meaningful summary statistics. The gender and age distributions of the respondents are presented in Table 8.2.

Table 8.2: Gender and age distribution

Variables	Frequency	Weight-adjusted percentage	Lower limit	Upper limit
	(N)	(%)	(%)	(%)
Male	**148**	**84.99**	81.37	88.61
Female	43	11.47	7.85	15.09
18 - 35 years of age	10	10.81	4.46	17.16
36 - 45 years of age	48	17.65	12.58	22.73
46 years and older	**133**	**68**	60.72	75.28

From Table 8.2, it is evident that male respondents (84.99 per cent) outnumbered female (11.47 per cent) respondents in terms of participation. The table also shows that the most common age category was '46 years and older' (68 per cent) and the least common was '18 -35 years of age' (10.81 per cent).

The question regarding the respondents' 'level of education' specified four categories. These are summarised in Table 8.3.

Table 8.3: Distribution of 'Level of education'

Variables	Frequency	Weight-adjusted percentage	Lower limit	Upper limit
	(N)	(%)	(%)	(%)
Less than high school degree	1	0.54	0	1.59
High school degree or equivalent	4	2.19	0.06	4.32
Some college but no degree	38	18.92	13.17	24.67
University degree	**148**	**74.82**	68.46	81.17

The findings presented in Table 8.3 indicate that the most frequently populated category in the 'level of education' was 'university degree' (74.82 per cent), followed by 'some college but no degree' (18.92 per cent), 'high school degree or equivalent' (2.19 per cent) and 'less than high school degree' (0.54 per cent). As this was an online survey, lack of computer

literacy and internet access may explain the very low distribution in the 'high school degree or equivalent' and 'less than high school degree' categories.

Two questions (Question 14 and Question 15) were asked to ascertain whether investors manage their own fund and/or rely on investment funds to manage their investments. Table 8.4 summarises the responses for both these questions.

Table 8.4: Orientation of investment decision-making from personal to investment funds

Variables		Frequency	Weight-adjusted percentage	Lower limit	Upper limit
		(N)	(%)	(%)	(%)
Q.14. Managed investment personally	yes	**161**	79.06	72.57	85.56
	no	30	17.4	10.9	23.89
Q.15. Managed investments via funds	yes	**169**	83.3	77.51	89.08
	no	22	13.16	7.38	18.95

As the total number of responses to is the survey was 191, it is clear from Table 8.4 that the responses to Questions 14 and 15 (at 161 and 169 respectively) overlapped. This means that some of the investors who managed their shares personally also relied on investment funds to manage their investment portfolios and vice versa. Therefore, these findings were further analysed and cross-referenced to determine the frequency of the investors who managed their investments 'only personally' or 'only via the investment funds' and 'both'. The results are summarised in Table 8.5.

Table 8.5: Orientation of investment decision-making

Variables	Frequency	Weighted-adjusted percentage	Lower limit	Upper limit
Personal only(P)	20	9.74	5.47	14.02
Via fund only (F)	27	13.15	8.29	18.02
Both (B)	**142**	**69.18**	62.79	75.57
Not an investor	2	0.97	-0.44	2.39

Table 8.5 shows that most of the investors (69.18 per cent) managed their funds personally, as well as involving investment funds to manage their share portfolios. Table 8.5 also shows that all of the respondents participating in the survey were investors except for the two (0.97 per cent) that had no investments in the share market. The effects of the demographic

variables on responses were statistically examined and the results are discussed later in this chapter, in Section 8.6.

8.3 Scenario 1: Cost-benefit analysis of the 'unilateral preference versus organisational practicedilemma

As is explained in Chapter 7 (Section 7.6.1), Scenario 1 of the questionnaire was based on the cost-benefit analysis of undertaking pollution prevention initiatives by a small entity (Little Ltd). A dilemma of 'unilateral preference versus organisational practice' for environmental well-being was raised and respondents were asked to select one of four 'Choices' of action (A, B, C and D). Under Scenario 1, Choice A states that Little Ltd should not implement any pollution prevention initiatives, even if other entities operating in the same region undertake such programs. Therefore, Choice A is designated 'unilateral defection'. Choice B indicates that Little Ltd should implement pollution prevention initiatives only if other entities take such actions. Hence, Choice B is referred to as 'mutual cooperation'. Choice C denotes that Little Ltd should not adopt any pollution prevention initiatives if other entities do not follow such actions. Hence, this choice is designated 'mutual defection'. Finally, Choice D asserts that Little Ltd should undertake pollution prevention initiatives even if such initiatives are not taken by other entities. Therefore, Choice D is referred to as 'unilateral cooperation'. The respondents were required to prioritise these 4 choices according to their preferences.

8.3. Preference ranking

Question 1 under Scenario 1 was: ***For each of the choices (A, B, C and D) please indicate your preferences from 1st to 4th with 1st being the most preferred and 4th being least preferred*.**

The number of responses obtained for Question 1 of this scenario was 198. The ranking of the four choices by respondents is summarised in Table 8.6.

Table 8.6: Number of respondents indicating preference ranking of the four choices

Choices	Designation	1st preference	2nd preference	3rd preference	4th preference	Row total
A	Unilateral defection	7	5	35	**151**	198
B	Mutual cooperation	**158**	32	8	0	198
C	Mutual defection	3	**102**	72	21	198
D	Unilateral cooperation	30	59	**83**	26	198
Column total		198	198	198	198	

Table 8.7 reveals weighted results in the form of percentages and the higher and lower limit of the range at 95 per cent confidence level respectively. The weighted data in Table 8.7 refer to the survey data adjusted for using the raking weight calculated by the raking estimation method described in Chapter 7 (Section 7.5.3). The results with the non-weighted percentages are shown in Appendix 9.

Table 8.7: Weighted percentages (%) and the higher and lower limits of the range at a 95 per cent confidence level of the preference ranking

Choices	Designation	1st preference			2nd preference			3rd preference			4th preference		
		%	high	low	%	high	low	%	high	low	%	high	low
A	Unilateral defection	3.14	5.54	0.75	3.1	6.11	0.1	17.55	23.01	12.09	**76.2**	82.45	69.94
B	Mutual cooperation	**79.8**	85.82	73.78	16.53	22.18	10.57	3.68	6.27	1.08	0	0	0
C	Mutual defection	1.62	3.45	0	**48.74**	56.16	41.31	**39.99**	47.46	32.52	9.55	13.78	5.52
D	Unilateral cooperation	15.44	20.95	9.92	31.63	38.7	24.56	**38.78**	45.9	31.66	14.15	19.4	8.91

Tables 8.6 and 8.7 indicate that 'mutual cooperation' (158, 79.8 per cent) was the most preferred choice. Choice C – 'mutual defection' was indicated as both the second preferred (102, 48.74 per cent) as well as the third preferred (72, 39.99 per cent) choice. Although 'unilateral cooperation' (83, 38.78 per cent) was found to compete with 'mutual defection' for the third preferred choice at a very narrow difference, as per the weighted average results. However, the actual count for 'unilateral cooperation' (83) was documented as more than 'mutual defection' (72) under the third preference (see Table 8.6). 'Unilateral defection' (151, 76.2 per cent) was the least preferred choice. Very few respondents

indicated ‘unilateral defection’ as their first or second preferences. Alternatively, none of the respondents indicated ‘mutual cooperation’ as their least preferred or fourth preference.

While the results shown in Tables 8.6 and 8.7 illustrate most preferred (e.g., ‘mutual cooperation’) to the least preferred (e.g., ‘unilateral defection’) choices, it does not divulge any information about the respondents’ dominant strategy - either ‘cooperation’ or ‘defection’, or no dominant strategy (referred to as ‘no maximising rule’). In order to obtain such information, each possible preference ordering was analysed and interpreted individually. This process is explained in Section 8.3.2.

8.3.2 Identifying preferred strategies: dominant versus the ‘no maximising rule’

As indicated in Chapter 7 (Section 7.6.2), because there were four choices through which preference ranking could be made, a respondent could choose any of the 24 (4 x 3 x 2 x 1) outcomes. The identification of whether an outcome indicates a dominant strategy (of ‘cooperation’ or ‘defection’) or a ‘no maximising rule’ was determined by inserting scores in the outcome matrix as shown in Table 7.5 (Chapter 7). For each row player’s response (that is, their choice in Scenario 1), a pay-off matrix was prepared by allocating the highest to lowest score (from 4 to 1) for each preferred outcome according to the indicated preference ordering. This pay-off matrix would help identify whether or not a preference ordering chosen by a respondent for Little Ltd has a dominant strategy. The following guidelines suggested in Pellikaan and Veen (2002, p. 90) were used to determine the dominance rules of the preference orderings. The guidelines are further explained with an example in each case.

The necessary conditions required for an ordering to have the strategy of ‘dominant cooperation’ are specified as the pair-wise rankings: ‘B is preferred to (‘>’ is used to indicate ‘is preferred to’) A and D > C’, where Choices of A, B, C and D are designated as follows:

A: unilateral defection

B: mutual cooperation

C: mutual defection

D: unilateral cooperation

Dominant cooperation:

Based on the principle above, the six orderings – BADC, BDAC, BDCA, DBAC, DBCA and DCBA were identified as the dominant cooperative strategy. In these six orderings, the 'individual' as a row player (see Chapter 7 under Section 7.6.2) allocates a higher score in the strategy of 'cooperation' than that of 'defection'. The pay-off matrix of a preference ordering – BDAC is shown in Table 8.8 as an example where the 'individual', as a row player allocates a higher score (7) to 'cooperation' compared to 'defection' (3).

Table 8.8: BDAC - Dominant cooperation

		Other organisations (choice made by other entities)		
Individual entity (choice made by Little Ltd)		Cooperation	Defection	Row total
	Cooperation	4 (B)	3 (D)	7
	Defection	2 (A)	1(C)	3

Dominant defection:

The required conditions for an ordering to have a dominant defection strategy are defined as the pair-wise rankings: 'A > B and C > D'. Thus, the six orderings: ABCD, ACBD, ACDB, CABD, CADB and CDAB were identified as the dominant defection strategy. Similarly, these six orderings show a higher score in the strategy of defection than that of cooperation as a row player. The pay-off matrix of ACBD ('defection' is allocated a higher score (7) than 'cooperation' (3)) is shown as an example in Table 8.9.

Table 8.9: ACBD - Dominant defection

		Other organisations (choice made by other organisations)		
Individual entity (choice made by Little Ltd)		Cooperation	Defection	Row total
	Cooperation	2 (B)	1 (D)	3
	Defection	4 (A)	3 (C)	7

No maximising rules:

The other twelve orderings have no dominant strategy and hence were referred to as 'no maximising rules'. These preference orderings satisfy the following pair-wise ranking of either 'B > A and C > D' corresponding to the orderings: BACD, BCAD, BCDA, CBAD, CBDA and CDBA. Or 'A > B and D > C', corresponding to the orderings: ABDC, ADBC, ADCB, DABC, DACB and DCAB. Table 8.5 shows the pay-off matrix of ABDC (both 'cooperate' and 'defect' have the same score of 5) as an example.

Table 8.10: ABDC - No maximising rules

		Collective (choice made by other entities)		
Individual (choice made by Little Ltd)		Cooperation	Defection	Row total
	Cooperation	3 (B)	2 (D)	5
	Defection	4 (A)	1 (C)	5

Tables 8.8, 8.9 and 8.10 illustrate how different probable preference rankings satisfy the conditions of the 'dominant' and 'no dominant strategies'. The results of the dominant strategy revealed by the respondents are summarised in Table 8.11. In order to prepare Table 8.11, the survey data was processed and analysed in the Microsoft Excel spreadsheet using the 'logical' (that is, '= if (column, cell)' function) and 'statistical' function of Excel.

Table 8.11: Dominant strategy revealed by respondents

Ordering	Designation	Cooperation	Defection	No maximising	Number	Percentage
ABCD	Defection	0	3	0	3	2%
ABDC	No maximising	0	0	1	1	1%
ACBD	Defection	0	3	0	3	2%
ACDB	Defection	0	0	0	0	0%
ADBC	No maximising	0	0	0	0	0%
ADCB	No maximising	0	0	0	0	0%
BADC	Cooperation	1	0	0	1	1%
BACD	No maximising	0	0	3	3	2%
BCAD	No maximising	0	0	14	14	7%
BCDA	**No maximising**	**0**	**0**	**81**	**81**	**41%**
BDAC	**Cooperation**	**13**	**0**	**0**	**13**	**7%**
BDCA	**Cooperation**	**46**	**0**	**0**	**46**	**23%**
CABD	Defection	0	0	0	0	0%
CADB	Defection	0	0	0	0	0%
CBAD	No maximising	0	0	3	3	2%
CBDA	No maximising	0	0	0	0	0%
CDAB	Defection	0	0	0	0	0%
CDBA	No maximising	0	0	0	0	0%
DABC	No maximising	0	0	1	1	1%
DACB	No maximising	0	0	0	0	0%
DBAC	Cooperation	5	0	0	5	3%
DBCA	**Cooperation**	**20**	**0**	**0**	**20**	**10%**
DCAB	No maximising	0	0	0	0	0%
DCBA	Cooperation	4	0	0	4	2%
Column total		**89**	**6**	**103**	**198**	**100%**
Percentage		**45%**	**3%**	**52%**	**100%**	

The 24 possible preference orderings are presented in the first column. The second column reveals the dominant strategy (cooperation and defection) that corresponds with each ordering and the absence of a dominant strategy as no maximising rule (no maximising). The next three columns display the three possible strategy choices ('cooperation', 'defection' and 'no maximising', respectively) and the number of respondents with various preference orderings that fit into each of these three strategies. The sixth and the seventh columns show the total number indicated in each preference ordering and their percentages respectively. The last two rows demonstrate the total number of respondents and their percentages, respectively, for each of the dominant strategies (cooperate and defect) and

no dominant strategy as revealed in the questionnaire response. The percentage was calculated as the column total divided by the total number of respondents (198).

Table 8.11 shows that 52 per cent of respondents (103 out of 198) failed to choose a dominant strategy of either cooperate or defect when confronted with the environmental dilemma raised in Scenario 1. The highest response was for preference orderings BCDA (81, 41 per cent) where, mutual cooperation (B) > mutual defection (C) > unilateral cooperation (D) > unilateral defection (A). This indicates that: a) individuals' preference for incurring environmental outlays to reduce pollution depends on whether their industry partners or competitors undertake the same action; b) if the other firms do not adopt any environmental initiative, unilateral cooperation is unlikely; and c) unilateral cooperation is preferred to unilateral defection.

Forty-five (45) per cent of the respondents (89 out of 198) reported a dominant strategy of cooperation with the preference orderings BDCA and BDAC (23 per cent and 7 per cent respectively) and DBCA and DBAC (10 per cent and 3 per cent respectively). These respondents clearly indicated their preference for environmental well-being over financial outlays, irrespective of the environmental action of their industry counterparts. Only 3 per cent of respondents (6 out of 198), with the preference orderings ABCD (3) and ACBD (3), reported a dominant strategy to defect.

8.3.3 Preferred strategy and competitive advantage

Question 2 under Scenario 1 presented the following statement: ***If Little Ltd expends resources on pollution control measures it is likely to gain a competitive advantage in the future*.** The respondents were asked to indicate their level of agreement with this statement by selecting from the options 'agree', 'disagree' or 'neither agree nor disagree'.

The statement presented in Question 2 is consistent with the NRBT of the firm, which argues that pollution control measures will eventually reduce potential regulatory risks and save related costs (e.g., fines, sanctions and clean-up costs); they would also assist in creating a pro-environmental image of the company and, thus, derive a competitive

advantage. In line with NRBT, it was expected that those respondents who reported a dominant strategy (in Question 1) of 'cooperation', were likely to agree with the statement and those with a dominant 'defection' strategy would disagree. It was also expected that respondents who did not report any dominant strategy but 'preferred mutual cooperation (B) to mutual defection' and 'unilateral cooperation (D) to unilateral defection (A)' would also agree with the statement. All (198) respondents responded to Question 2. The response counts (N) and the weight-adjusted results in terms of the percentage and the upper and lower limit with a confidence level at 95 per cent, are summarised in Table 8.12.

Table 8.12: Pollution control measures are likely to bring competitive advantage for Little Ltd: Investors' responses

	Agree	Disagree	Neither agree nor disagree	Total
N	168	10	20	198
Actual percentage (%)	84.85	5.05	10.10	100
Weight-adjusted percentage (%)	**84.63**	**5.09**	**10.28**	100
Upper limit of confidence interval (%)	79.45	1.96	5.92	
Lower limit of confidence interval (%)	89.82	8.22	14.64	

Given the situation described in Scenario 1, the results in Table 8.12 reveal that 84.63 per cent of respondents agreed that if Little Ltd undertakes pollution control measures it would likely gain a competitive advantage in the future. Alternatively, 10.28 per cent of the respondents were unsure about such a gain and 5.09 per cent disagreed with the statement. However, the figures presented in Table 8.12 do not capture the aspects of individual strategies as reported in the preference orderings. This can be obtained by analysing and comparing the agreement response of each respondent (in Question 2) to his/her choice of strategies indicated in the preference orderings (in Question 1). Whether a reported dominant strategy (or no maximising rule) matches with the corresponding expected status of agreement can be represented with the aid of a three way cross-tabulation, as shown in Table 8.13.

Table 8.13: Matching the choice of strategies with the agreement status for competitive advantage

			Agreement with the competitive advantage statement			
			Agree	**Neither agree nor disagree**	**Disagree**	**Row total**
Choice of strategy	Dominant cooperative	N (Row %)	**79 (88.76)**	9 (10.11)	1 (1.12)	89 (100)
	Dominant defective	N (Row %)	0 (0.00)	1 (16.67)	**5 (83.33)**	6 (100)
	No dominant strategies	N (Row %)	**89 (86.41**)	10 (9.71)	4 (3.88)	103 (100)
	Column total		168	20	10	198

The results presented in Table 8.13 illustrate that 88.76 per cent of the respondents who reported a dominant cooperative strategy agreed with the competitive advantage statement provided in Question 2. In addition, 86.41 per cent of the respondents with no dominant strategy agreed with the statement. Alternatively, 83.33 per cent dominant defection strategy respondents disagreed with the statement. The agreement status of the group with no dominant strategy was identified separately and cross-tabulated for 'agree', 'disagree' and 'neither agree nor disagree' and the results are presented in Table 8.14.

Table 8.14: Agreement status of the respondents with no dominant strategy

	Agreement with the competitive advantage statement			
	Agree	**Disagree**	**Neither agree nor disagree**	**Row total**
Preference orderings with no dominant strategy	**N (%)**	**N (%)**	**N (%)**	**N (%)**
ABDC	1 (100)	0 (0)	0 (0)	1 (100)
BACD	3 (100)	0 (0)	0 (0	3 (100)
BCAD	3 (21.43)	1 (7.14)	10 (71.43)	14 (100)
BCDA	**80 (98.77)**	0 (0)	1 (1.23)	81 (100)
CBAD	1 (33.33)	2 (66.67)	0 (0)	3 (100)
DABC	0 (0)	1 (100)	0 (0)	1 (100)
Column total	88	4	11	103

The additional analysis (see Table 8.14, bold figures) indicates that out of the 103 respondents with no dominant strategy, 81 chose a preference ordering of BCDA where, 'mutual cooperation' (B) is preferred to 'mutual defection' (C) and 'unilateral cooperation' (D) to 'unilateral defection' (A). In addition, 98.77 per cent of these respondents with a

BCDA preference ordering (80 out of 81) agreed that pollution control initiatives would likely bring competitive advantage to the firm.

8.3.4 The importance of undertaking environmental initiatives: investors' views

In the context of Scenario 1, Question 3 sought an understanding of what investors considered important reasons for Little Ltd adopting pollution control measures. A list (not exhaustive) of four possible reasons that managers might think important for undertaking such measures was provided in the question (see Question 3 of the survey questionnaire in Appendix 9). Respondents were required to rank the reasons from the most important (to be ranked as first) to the least important (to be ranked as fourth) according to their own view. Initially, a list addition or fifth option, 'others' (with a text box to specify those 'others') was considered in the earlier stages of the questionnaire design. Such an inclusion would facilitate the expression of the respondents' own thoughts, if any, beyond what was on the list. However, this option was omitted in the final version as no response had been offered against it during the pre-test.

The four reasons were included in the question were underpinned by a number of theories, namely: legitimacy, NRBT and the normative branch of institutional theory. These theories were discussed in Chapter 3. The reasons for undertaking environmental initiatives and their association with the underlying theories are presented in Table 8.15.

Table 8.15: Theoretical underpinnings

Underlying theories	Reasons for spending on pollution control measures included in Q.3
NRBT	To increase profit in the long-run through cost savings made by avoiding possible penalties and fines
Legitimacy theory	To reduce the risk of non-compliance with potential regulations resulting from negative media attention
NRBT and legitimacy theory	To increase the reputation of the company as environmentally responsible
Normative branch of institutional theory	Managers value the well-being of the environment

Question 3 elicited 198 responses. The counts and non-weighted percentages are presented in Appendix 11. The weight-adjusted percentages with the upper and lower limit at a 95 per cent confidence level are presented in Table 8.16.

Table 8.16: Reasons to undertake pollution control measures: Investors' preferences, weight-adjusted data

		Preference ranking				
Reasons for spending on pollution control measures		1st	2nd	3rd	4th	Row total
To increase profit in the long-run through cost savings made by avoiding possible penalties and fines	Percentage (%)	12.89	**63.9**	17.47	5.74	100
	Upper limit	17.93	71.11	23.15	9.46	
	Lower limit	7.86	56.69	11.78	2.02	
To reduce the risk of non-compliance with potential regulations resulting from negative media attention	Percentage (%)	**74.27**	13.13	8.6	4	100
	Upper limit	81.18	18.48	13.44	6.77	
	Lower limit	67.37	7.78	3.75	1.22	
To increase the reputation of the company as environmentally responsible	Percentage (%)	6.56	20.38	**70.41**	2.65	100
	Upper limit	11.12	26.37	77.42	4.85	
	Lower limit	1.99	14.39	63.4	0.45	
Managers value the well-being of the environment	Percentage (%)	6.27	2.59	3.53	**87.61**	100
	Upper limit	10.12	4.73	6.16	92.53	
	Lower limit	2.43	0.45	0.89	82.68	

The results (Table 8.16) show that the majority of the respondents (74.27 per cent) believed that avoiding negative media attention and thereby reducing the risk of possible regulatory scrutiny due to non-compliance against any potential regulation was the most important reason for adopting pollution control measures. Increasing profit in the long-run by avoiding possible penalties/fines in future through the adoption of control measures in advance, was found to be the second (63.9 per cent) most important reason, followed by the enhancement of firm reputation (70.41 per cent). The majority (87.61 per cent) of respondents showed no faith in managers' pro-environmental attitude and hence that was found to be the least important reason.

Question 4 under the Scenario 1 asked the respondents whether they agreed with the view that ***if Little Ltd expends resources on pollution control measures, it is likely to report the change in pollution discharge in their annual report***. Again, respondents could choose from: 'agree', 'disagree' or 'neither agree nor disagree'. The results are summarised in Table 8.17 in the form of number of responses (N) in each answer choice, their percentages (%) and the upper and lower limits at a 95 per cent confidence level.

Table 8.17: Little Ltd is likely to disclose change in pollution discharge if it takes pollution control measures: Investors' responses

	Agree	Disagree	Neither agree nor disagree	Total N (%)
N (weighted percentage %)	**176 (89)**	4 (1.84)	18 (9.16)	198 (100)
Upper limit (%)	93.46	3.7	13.29	
Lower limit (%)	84.53	0	5.03	

Table 8.17 illustrates that 89 per cent of the respondents believed that Little Ltd would be likely to report on change in pollution discharge if it undertook pollution control measures. In line with the NRBT and signalling theory, it can be argued that if pollution control measures brought a competitive advantage to a firm, it is likely that they would report on the changes in pollution discharge achieved by such measures. Such reporting would signal the company's preparedness for potential environmental regulation, as well as boost its image as an environmentally pro-active company.

Therefore, the respondents who agreed that Little Ltd would provide pollution disclosure if it undertook pollution control initiatives, were also expected to agree in Question 2 that such initiatives would bring competitive advantages to the firm. In other words, the respondents who agreed with the statement given in Question 4 were also expected to indicate a consistent response (i.e., agree) in Question 2. Such a level of agreement between the responses to Question 2 and 4 is exhibited with the aid of a matrix presentation format, as shown in Table 8.18. For the purpose of convenience in presenting the results, the responses in terms of 'disagree' and 'neither agree nor disagree' are clustered into one group, as the main focus here is to analyse the consistent response with regard to *agreement* for both Questions 2 and 4.

Table 8.18: Pollution control measures, pollution disclosures and competitive advantage: Consistent response

	Q2: Pollution control measure and competitive advantage			
		Agree N (%)	Disagree + Neither agree nor disagree N (%)	Row Total N (%)
Q.4: Pollution control measure and disclosure	Agree N (%)	**162 (94.18)**	10 (5.81)	172 (100)
	Disagree + Neither agree nor disagree N (%)	10 (38.46)	16 (61.53)	26 (100)
	Column total (N)	172	26	198

The results indicate that 94.18 per cent of the respondents who agreed that Little Ltd is likely to provide pollution disclosures if it adopts pollution reduction initiatives also agreed that such initiatives would be able to bring competitive advantage to the firm.

8.3.5 Implications of the responses to Scenario 1 questions

This section summarises the implications of the findings based on the responses to Questions 1 to 4 under the Scenario 1. The aim is to obtain an understanding of what choice of actions investors prefer when confronted with an environmental dilemma in a given context. Obtaining such an understanding is important as it is considered in the management strategy literature that the '*signalling effectiveness'* of disclosures is partly determined by the '*characteristics'* of the receivers, such as existing shareholders, potential investors or both (Connelly et al. 2011, p. 54; Kang, 2008; Park and Mezias, 2005)

The dilemma presented to the respondents in Scenario 1 is illustrated in Figure 8.1. The dilemma was initiated by the fact that the pollution level of the company was well under the regulatory threshold and hence, the attempt to reduce pollution would be regarded as a voluntary exercise. However, given the fact that cumulative pollution would be increased due to the operations of other companies in the same area, this might attract negative media attention and regulatory scrutiny. Figure 8.1 also illustrates that the decision to take preventive action to reduce pollution might be constrained by current financial outlays versus future uncertain benefits. In addition, because the environment is a 'public good', the possibility of the 'free rider' problem engenders the dilemma of 'unilateral preference versus organisational practice', which further intensifies the decision-making process.

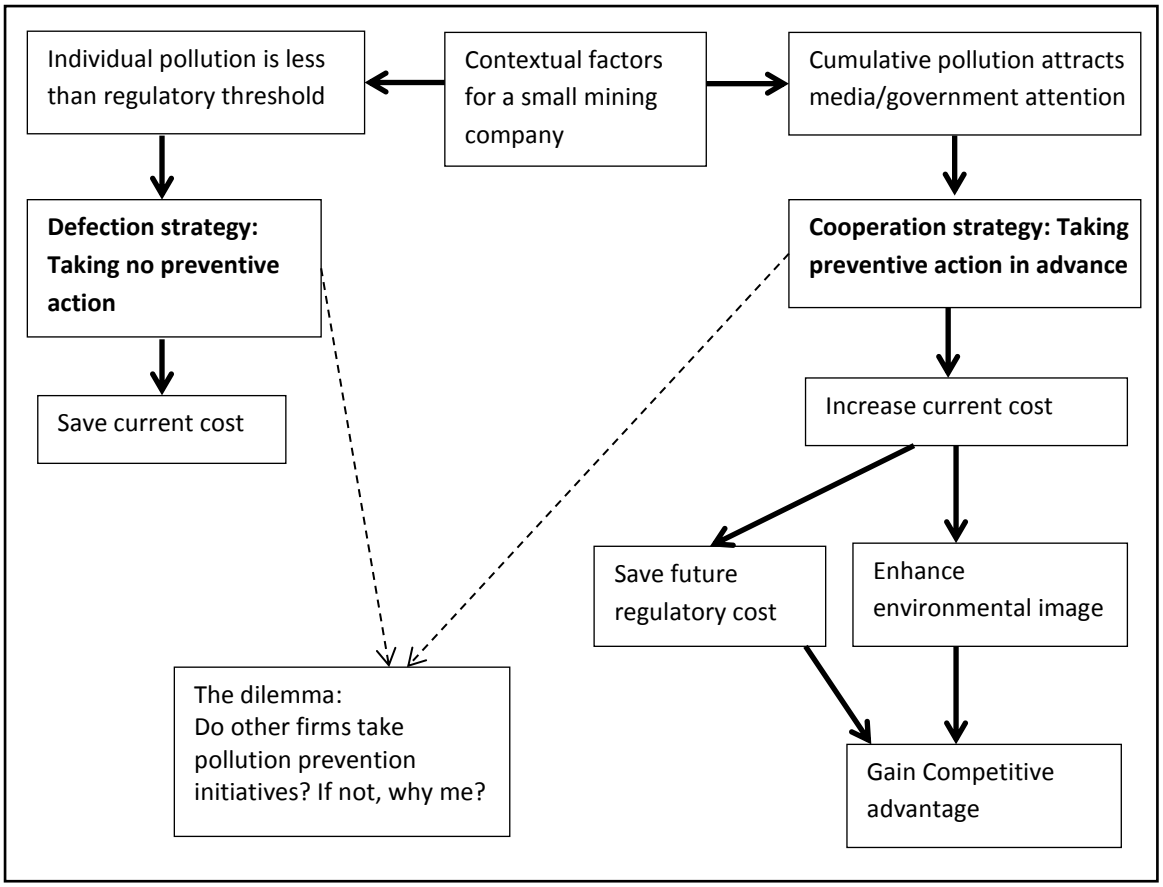


Figure 8-1: Cost-benefit analysis of the 'unilateral preference versus organisational practice' dilemma - Scenario 1

It can be argued that the finding obtained in the survey that 52 per cent of respondents failed to choose a dominant strategy (to cooperate or defect), mirrors the managers' dilemma in decision-making processes, as portrayed in Figure 8.1. It implies that making a decision about an environmental initiative is complex and requires consideration of a range of contextual factors. The most frequently reported preference ordering (BCDA at 41 per cent) suggests that the actions of industry counterparts played an important role in the decision-making process for a substantial group of respondents. This is consistent with the findings of the Tilley (2000) in that when business values financial interests over the environment, managers of small firms are unlikely to take voluntary environmental initiatives in advance of their competitors.

However, a significant proportion (45 per cent) of the respondents chose a dominant cooperative strategy where mutual and individual cooperation came ahead of mutual and

individual defection. This finding indicates that those who preferred a dominant cooperative strategy believed in the notion of competitive advantage and did not prefer the company to lag behind its competitors. In addition, 10 per cent of these respondents, with the preference ordering DBCA also possessed strong environmental values, indicating a preference for unilateral cooperation over mutual cooperation. Only a small segment (3 per cent) of the respondents preferred a dominant defection strategy.

The overall findings from the responses to Question 1 indicate that while the investors in the sample population value environmental well-being, when it comes to individual financial outlays, they tend to prefer economic interest over environmental values. The findings support the view that given the resource limitations of a small company, a pro-active environmental initiative is preferred if it is meant to comply with any existing mandatory regulation. Even the 30 per cent of respondents who indicated a dominant cooperative strategy with the preference ordering BDCA (23 per cent) and BDAC (7 per cent) preferred cumulative cooperation (B) over individual action (D). This finding also affirms the fact that an environmental initiative was favoured by respondents when other industry counterparts take similar actions (see Table 8.11).

According to the respondents' point of view (74.27 per cent, Table 8.16), regulatory risk was considered the most important factor for a small firm in deciding whether or not to allocate resources on pollution control measures. Competitive advantage due to cost savings in the long-run and environmental reputation, were denoted as the second and third important reasons respectively. Therefore, it can be argued that while these groups of investors readily recognised the risk of looming environmental regulation, they were less convinced about the association of environmental initiatives and competitive advantage. Such reasoning is consistent with the findings of the cautious preference ranking (see Table 8.7) where 79.8 per cent of the respondents indicated mutual cooperation as their first choice of action.

The survey findings revealed that the majority of investors in the population (84.63 per cent, see Table 8.12) agreed that adoption of pollution control measures would likely add to competitive advantage in the near future; and if the firm allocated resources on such measures, pollution disclosures would be likely (89 per cent, see Table 8.17). However, the

preference ranking and the subsequent reasoning of the majority of the investors behind environmental decisions did not place environmental well-being unconditionally over financial interest or indicate certainty about the competitive benefits of environmental action. Therefore, it is envisaged that managers of small firms are likely to follow similar attitudes to investors. In other words, managers would not provide specific pollution disclosures unless they are able to provide evidence of tangible benefits as expected by investors. Such an implication supports the findings of the content analysis of the sample firms, as discussed in Chapter 6, that small firms provide little or no specific pollution disclosures in their annual reports. Therefore, the findings gathered from the content analysis and the survey are consistent with the views of the receiver component of the signalling theory. The signalling theory states that if the receivers (such as shareholders or potential investors) are uncertain about the effectiveness of a signal or unable to recognise a piece of information as a quality signal, firm managers (signallers) are unlikely to provide such information.

8.4 Scenario 2: Cost-benefit analysis of the 'environmental versus financial' dilemma

The second scenario differs from the first in a number of ways. First, it relates to a large company designated as Big Ltd. Second, the company is solely responsible for polluting the environment because of its unsafe waste disposal practice. Therefore, unlike Scenario 1, the problem of cumulative pollution resulting from the collective action of other organisations is absent here. Rather, the matter of concern is whether to undertake environmental initiatives in order to reduce the environmental risk resulting directly from the company's operation *or* to overlook such a risk in order to maintain current financial turnover. Third, this scenario incorporates a decision to 'disclose' or 'not disclose' where such decisions may or may not rely on the undertaking of safe waste disposal initiatives. On one hand, specific disclosures on pollution impacts and initiatives would promote transparency and credibility (Bird and Smith, 2005) and hence, competitiveness (Connelly et al., 2011). Alternatively, signalling information about negative environmental impacts is unlikely when such impacts are assumed to be unobservable by the public or when the costs of providing information are more than their benefits (Connelly et al., 2011). It is argued that inclusion of disclosure

decisions in Scenario 2 accentuates the 'environmental versus financial' dilemma of a large company.

Hence, the four choices of actions (A, B, C and D) proposed in Question 5 under Scenario 2 were:

Choice A – disclose only but no initiative

Choice B – undertake initiative and disclose

Choice C – neither undertakes initiative nor disclose

Choice D – undertake initiative only but not disclose

Question 5 required the respondents to rank these choices (A, B, C and D) from 1st to 4th with the 1st being the most preferred and the 4th being the least preferred.

The findings are presented in Table 8.19 as the weighted percentages of the respondents, indicating the preference ranking along with the upper and lower limit at a 95 per cent confidence level. The non-weighted results are provided in the Appendix 12.

Table 8.19: Weight-adjusted percentages of the preference ranking with the upper and lower limit at a 95 per cent confidence level

			Preference ranking				
Choices			**1st**	**2nd**	**3rd**	**4th**	**Row total**
A	Disclose only	Percentage (%)	1.05	8.02	**67.28**	21.63	97.98*
		Upper limit	2.52	12.5	74.63	28.26	
		Lower limit	0	3.54	59.93	14.99	
B	Undertake initiatives and disclose	Percentage (%)	**92.99**	2.68	1.76	0.55	97.98
		Upper limit	97.01	5.01	4.34	1.63	
		Lower limit	88.97	0.35	0	0	
C	Neither undertake initiative nor disclose	Percentage (%)	3.93	3.91	19.71	**70.43**	97.98
		Upper limit	7.23	7.12	26.21	77.7	
		Lower limit	0.63	0.70	13.21	63.17	
D	Undertake initiative only	Percentage (%)	0	**83.38**	9.23	5.37	97.98
		Upper limit	0	89.25	13.62	9.38	
		Lower limit	0	77.5	4.84	1.36	

*194 out of the 198 respondents who started the survey responded to this question and hence the percentage of the row total is calculated as 97.98 % (194/198), (see Table 8.1).

Given the context described in Scenario 2, the choice of undertaking a safe waste disposal method and disclosing the impact of safe disposal in the annual report is indicated as the first preferred choice of action (B) (92.99 per cent, Table 8.19). In contrast, taking no action and providing no disclosure (C) was found to be the least favoured choice (70.43 per cent, Table 8.19). It is apparent from Table 8.19 that undertaking environmental initiatives without providing any disclosure (i.e., choice D) was not regarded as the first choice by any of the respondents. This is probably because the investors were not likely to rule out the potential of such disclosures in alleviating the risk and gaining competitive advantage.

However, Table 8.19 also highlights that Choice D (83.38 per cent) was preferred over Choice A (67.28 per cent)). This suggests that the respondents were concerned about the observability of the pollution impact of the unsafe waste disposal method. Further, the respondents may have considered the additional risk of providing disclosure of such impacts without taking any prevention scheme. Therefore, undertaking initiatives even without corresponding disclosures (Choice D) was favoured over providing impact disclosures without undertaking initiatives (Choice A).

While the results portrayed in Table 8.19 provide insight about the investors' preferences about an individual choice of action, such results do not reveal the dominant strategy followed by a respondent while ranking the choices of action. A respondent may have a dominant strategy of either 'pro-environmental' or 'pro-financial' (explained in Chapter 7, Section 7.6.2). Alternatively, they may have no dominant strategy which can be designated as 'no maximising rule'. The process of determining the preferred strategy was discussed and the findings presented in Section 8.3.1.

8.4.1 Preferred strategy: dominant versus 'no maximising rule'

In order to perform the preference ranking across the four choices of action (A, B, C and D), the respondents were expected to follow a strategy based on an environmental focus versus financial. The cost-benefit analysis of undertaking environmental initiatives was paired with the disclosure decision in Scenario 2. The choice-matrix to identify a dominant strategy from either 'pro-environmental' or 'pro-financial' and 'no dominant strategy' was explained in

Chapter 7 (Table 7.6). The pay-off matrix for a respondent was prepared by allocating scores to the outcomes from the highest (4) to the lowest (1) in order to indicate the most preferred to the least preferred choice of actions. The scores were aggregated for a row player in the pay-off matrix to determine the dominant strategy in a preference ordering as reported by a respondent. The following three guidelines were applied to determine the dominant strategy rules, similar to those used in Scenario 1.

Dominant pro-environmental:

For a dominant pro-environmental strategy, the necessary condition in a pair-wise ranking should be: 'B is preferred to (>) A and D > C'. The characteristic of this strategy is the allocation of higher scores in the row total of 'undertake initiatives' Table 7.6 (Chapter 7) than that of 'do not undertake initiatives'. Thus, the six preference rankings – BADC, BDAC, BDCA, DBAC, DBCA and DCBA were identified as dominant pro-environmental strategy. The pay-off matrix of BDAC is shown as an example in Table 8.20. This reveals that a higher score (7) is allocated to the 'undertake initiatives' row than that of the 'do not undertake initiatives' (3).

Table 8.20: An example of the dominant pro-environmental strategy: BDAC

		Public disclosure		
		Disclose (pro-environmental)	**Do not disclose (pro-financial)**	**Row total**
Undertake initiatives	Undertake initiatives (pro-environmental)	4 (B)	3 (D)	7
	Do not undertake initiatives (pro-financial)	2 (A)	1 (C)	3

Dominant pro-financial:

The necessary conditions required by a preference ordering to reveal a dominant pro-financial strategy is specified as a pair-wise ranking where 'C > D and A > B'. Such conditions ensure that the row total of 'do not undertake initiatives' is higher than that of 'undertake initiatives' row in Table 7.6 (Chapter 7). Therefore, the six preference orderings ABCD, ACBD, ACDB, CABD, CADB and CDAB were considered to have a dominant pro-financial strategy. As an example, the pay-off matrix of ACDB is shown in Table 8.21. This illustrates

that the 'do not undertake' row was allocated a higher score (7) than the 'undertake' row (3).

Table 8.21: An example of the dominant pro-financial strategy: ACDB

		Public disclosure		
		Disclose (pro-environmental)	**Do not disclose (pro-financial)**	**Row total**
Undertake initiatives	Undertake initiatives (pro-environmental)	1 (B)	2 (D)	3
	Do not undertake initiatives (pro-financial)	4 (A)	3 (C)	7

No dominant strategy:

The remaining 12 out of the 24 possible preference orderings belonged to the 'no dominant strategy' category, with pair-wise ranking conditioned as either 'B > A and C > D' (BACD, BCAD, BCDA, CBAD, CBDA and CDBA) or 'A > B and D > C' (ABDC, ADBC, ADCB, DABC, DACB and DCAB). For these preference rankings, the row totals for both rows in the choice-matrix shown in Table 7.6 (Chapter 7) are the same, hence, respondents did not indicate a dominant strategy. An example of a preference ordering, ABDC, exhibiting a 'no dominant strategy' is shown in Table 8.22 where both 'undertake initiatives' and 'do not undertake initiatives' rows share the same score of 5. This preference ranking satisfies the condition 'A > B and D > C'.

Table 8.22: An example of no dominant strategy: ABDC

		Public Disclosure		
		Disclose (pro-environmental)	**Do not disclose (pro-financial)**	**Row total**
Undertake initiatives	Undertake initiatives (pro-environmental)	3 (B)	2 (D)	5
	Do not undertake initiatives (pro-financial)	4 (A)	1 (C)	5

The dominant strategy indicated by all the respondents in the survey are summarised in Table 8.23 as follows.

Table 8.23: Dominant strategies revealed by all the respondents

Preference Ordering	Strategies as per preference ordering	Pro-environmental	Pro-financial	No dominant strategy	Number	Row Percentage
ABCD	Pro- financial	0	0	0	0	0.00%
ABDC	No dominant strategy	0	0	1	1	0.52%
ACBD	Pro-financial	0	1	0	1	0.52%
ACDB	Pro-financial	0	0	0	0	0.00%
ADBC	No dominant strategy	0	0	0	0	0.00%
ADCB	No dominant strategy	0	0	0	0	0.00%
BADC	Pro-environmental	7	0	0	7	3.61%
BACD	No dominant strategy	0	0	5	5	2.58%
BCAD	No dominant strategy	0	0	0	0	0.00%
BCDA	No dominant strategy	0	0	6	6	3.09%
BDAC	Pro-environmental	**140**	0	0	140	**72.16%**
BDCA	Pro-environmental	**28**	0	0	28	**14.43%**
CABD	Pro-financial	0	1	0	1	0.52%
CADB	Pro-financial	0	1	0	1	0.52%
CBAD	No dominant strategy	0	0	1	1	0.52%
CBDA	No dominant strategy	0	0	3	3	1.55%
CDAB	Pro-financial	0	0	0	0	0.00%
CDBA	No dominant strategy	0	0	0	0	0.00%
DABC	No dominant strategy	0	0	0	0	0.00%
DACB	No dominant strategy	0	0	0	0	0.00%
DBAC	Pro-environmental	0	0	0	0	0.00%
DBCA	Pro-environmental	0	0	0	0	0.00%
DCAB	No dominant strategy	0	0	0	0	0.00%
DCBA	Pro-environmental	0	0	0	0	0.00%
Column Total		**175**	**3**	**16**	**194**	
Column Percentage		**90.21%**	**1.55%**	**8.25%**		

The first two columns of Table 8.23 reveal the 24 possible orderings and their corresponding strategies designated as ‘pro-environmental’, ‘pro-financial’ or ‘no dominant strategy’. The next three columns reveal the number of respondents that reported against each of these three strategies through their preference ranking. The sixth and seventh columns show the row total and percentages (calculated as: Number in a row divided by the total, 194) for each possible preference ordering in a row. The last two rows provide the total number of the respondents and their percentages (calculated as column total for each strategy divided by total number, 194) for each of the dominant strategies (‘pro-environmental’ and ‘pro-financial’) and ‘no dominant strategy’.

The results presented in Table 8.23 indicate that 90.21 per cent of the respondents answering Question 5 revealed a pro-environmental strategy by ranking the choices with 'undertake initiatives' (B and D) ahead of those with 'do not undertake initiatives' (C and A). Of those respondents, 8.25 per cent failed to indicate any dominant strategy and only 1.55 per cent preferred a 'pro-financial' strategy. The findings suggest that, under the situation described in Scenario 2, the risk of potential regulatory non-compliance was perceived by the investors when a large mining company is predominantly responsible for polluting the environment. Even though it was indicated that the impact of unsafe waste disposal would take a while to be obvious, the direct link between the company's operation and the pollution might act as a risk signal to the investors. Hence, in the context of Scenario 2, the respondents favoured a 'pro-environmental' strategy over 'no dominant' and 'pro-financial' strategies.

8.4.2 The importance of undertaking safe disposal initiatives: investors' views

A number of possible reasons for expending resources on safe waste disposal and the subsequent disclosures made by Big Ltd managers were provided in Questions 6 and 7 under Scenario 2. The respondents were asked to rank these reasons from the most important to the least, according to their own point of view. The lists of reasons for Questions 6 and 7 are contained in Table 8.24 and Table 8.25 respectively.

Question 6 attracted 194 responses out of the 198 that had started the survey and hence, the total percentage response for the weighted average would be calculated as 194/198 or 97.98 per cent. The weight-adjusted results of percentages of the respondents that completed the ranking and the upper and lower limits of the range at a 95 per cent confidence level, are summarised in Table 8.24.

Table 8.24: Reasons for expending resources on safe waste disposal by Big Ltd: Investors' responses

		Preference ranking					
Reasons for expending on safe waste disposal		**1st**	**2nd**	**3rd**	**4th**	**5th**	**Row total (%)**
To avoid regulatory risks, such as penalties or loss of licence	Percentage (%)	**86.24**	3.58	3.48	3.6	1.09	97.99
	Upper limit	91.6	6.72	6.08	6.74	2.59	
	Lower limit	80.88	0.44	0.88	0.45	0	
To gain competitive advantage through the innovative safe waste disposal method	Percentage (%)	3.45	**68.79**	10.74	12.3	2.71	97.99
	Upper limit	6.02	75.76	15.6	17.29	5.06	
	Lower limit	0.87	61.81	5.87	7.3	0.36	
To enhance the reputation of the company	Percentage (%)	2.28	8.4	**67.32**	16.12	3.87	97.99
	Upper limit	5.04	12.34	74.59	22.12	7.13	
	Lower limit	0	4.46	60.05	10.11	0.61	
To avoid conflict with environmental groups	Percentage (%)	0.55	16.42	14.32	**59.12**	7.58	97.99
	Upper limit	1.63	22.12	20.22	66.62	11.63	
	Lower limit	0	10.71	8.42	51.62	3.54	
Managers value the well-being of the environment	Percentage (%)	5.47	0.8	2.13	6.86	**82.73**	97.99
	Upper limit	9.09	1.97	4.2	10.85	88.5	
	Lower limit	1.85	0	0.06	2.87	76.95	

For Question 7, out of the 198 who started the questionnaire, 193 respondents (97.47 per cent) had provided a complete response. The weighted average results based on the responses to Question 7 are presented in Table 8.25.

Table 8.25: Reasons for providing disclosures on safe waste disposal by Big Ltd: Investors' responses

		Preference ranking					
Reasons for providing disclosures on safe waste disposal		**1st**	**2nd**	**3rd**	**4th**	**5th**	**Row total (%)**
To gain competitive advantage through the innovative safe waste disposal method	Percentage (%)	5.22	**64.29**	12.01	11.22	4.73	97.47
	Upper limit	8.76	71.58	17.08	16.05	8.21	
	Lower limit	1.69	57	6.94	6.4	1.25	
To avoid regulatory risks, such as penalties or loss of licence	Percentage (%)	**84.61**	3.73	4.57	4.02	0.54	97.47
	Upper limit	90.15	6.29	7.55	7.74	1.59	
	Lower limit	79.07	1.17	1.59	0.29	0	
To enhance the reputation of the company	Percentage (%)	3.22	10.7	**63.78**	18.42	1.35	97.47
	Upper limit	5.67	15.64	71.09	24.5	2.94	
	Lower limit	0.77	5.77	56.48	12.34	0	
To avoid conflict with environmental groups	Percentage (%)	0	18.19	15.47	57.66	6.15	97.47
	Upper limit	0	24.26	21.25	**65.12**	9.52	
	Lower limit	0	12.11	9.69	50.2	2.78	
Managers value the well-being of the environment	Percentage (%)	4.42	0.55	1.64	6.15	**84.71**	97.47
	Upper limit	7.84	1.63	3.49	9.46	90.04	
	Lower limit	1	0	0	2.85	79.38	

The results (Tables 8.24 and 8.25) indicate that the ranking of the reasons for 'expending resources' on safe waste disposal resembled those for 'providing disclosures'. Avoiding regulatory risks is considered to be the most important reason for undertaking safe waste disposal initiatives (86.24 per cent, Table 8.24) and providing subsequent related disclosures (84.61 per cent, Table 8.25). Gaining competitive advantage (68.79 per cent, Table 8.24; 64.29 per cent, Table 8.25), enhancing reputation (67.32 per cent, Table 8.19; 63.78 per cent, Table 8.20) and avoiding conflicts with environmental groups (59.12 per cent, Table 8.19; 65.12 per cent, Table 8.20) were regarded to be the second, third and fourth preferred reasons respectively. Similar to the findings from Question 3 under Scenario 1, the respondents (82.73 per cent, Table 8.24; 84.71 per cent, Table 8.25) indicated that the personal views of Big Ltd managers about environmental well-being was the least important reason for undertaking environmental initiatives and providing disclosures.

8.4.3 Preferred strategy and competitive advantage

The last question (Question 8) under Scenario 2 required the respondents to indicate 'agree', 'disagree' or 'neither agree nor disagree' against the assumption that: ***If Big Ltd expends resources on safe waste disposal methods, it is likely to gain a competitive advantage in the future***. This question (Question 8) elicited 193 responses (97.47 per cent). The weight-adjusted results in percentages with the upper and lower limits at a 95 per cent confidence interval, are shown in Table 8.26.

Table 8.26: Safe waste disposal initiatives are likely to bring competitive advantage for Big Ltd: Investors' responses

	Agree N (%)	Disagree N (%)	Neither agree nor disagree N (%)	Total
Weight-adjusted percentage (%)	**149 (75.93)**	12 (5.92)	32 (15.62)	193 (97.47)*
Upper limit of confidence interval (%)	82.07	9.27	20.79	
Lower limit of confidence interval (%)	69.8	2.57	10.45	

*Missing responses amounted to 5 out of the total of 198 respondents (2.52 per cent) who started the survey (see Table 8.1).

The results show that 75.93 per cent of the respondents agreed that Big Ltd would gain a competitive advantage in the future if they spent resources on safe waste disposal initiatives. Alternatively, 5.92 per cent took the opposite view and 15.62 per cent indicated a state of uncertainty by opting for 'neither agree nor disagree'.

Consistent with the NRBT, it is assumed that those who indicated a dominant pro-environmental strategy in Question 5 would also be likely to 'agree' with the statement posed in Question 8. Therefore, the agreement status of each respondent in Question 8 was matched against the preferred strategy (i.e. dominant environmental/financial or no dominant strategy) indicated by that respondent in Question 5. The findings for Question 5 and Question 8 were then cross-tabulated to demonstrate the extent to which the individual choice of strategy corresponds with their agreement status with respect to the statement of competitive advantage. The findings are summarised in Table 8.27.

Table 8.27: Matching a dominant strategy with the expected status of agreement

		Agreement with the competitive advantage				
			Agree	**Neither agree nor disagree**	**Disagree**	**Row total**
Choice of strategies	Dominant environmental	N (%)	**143 (81.25)**	27 (15.34)	6 (3.4)	176 (100)
	Dominant financial	N (%)	2 (66.67)	0 (0.00%)	1 (33.33)	3 (100)
	No dominant strategies	N (%)	4 (28.57)	5 (35.71)	5 (35.71)	14 (100)
			149	32	12	193

Table 8.27 highlights that 81.25 per cent of those who preferred a dominant environmental strategy agree that, given the situation of Big Ltd described in scenario 2, spending on safe waste disposal methods would likely bring competitive advantage to the company in future.

8.4.4 Implications of the responses to Scenario 2 questions

The dilemma faced by a large mining company, as described under Scenario 2, in which the company is responsible for polluting the regional water source due to its unsafe waste disposal method, is mapped in Figure 8.2. Given the context explained under Scenario 2, the possible consequences of undertaking a safe disposal method and providing disclosures are highlighted. Figure 8.2 also illustrates how the benefits of environmental decisions, including ‘undertaking safe disposal methods’ and ‘providing disclosures’ (indicated by continuous arrows), are restrained by the corresponding financial outlays (indicated by dotted arrows) required for such decisions.

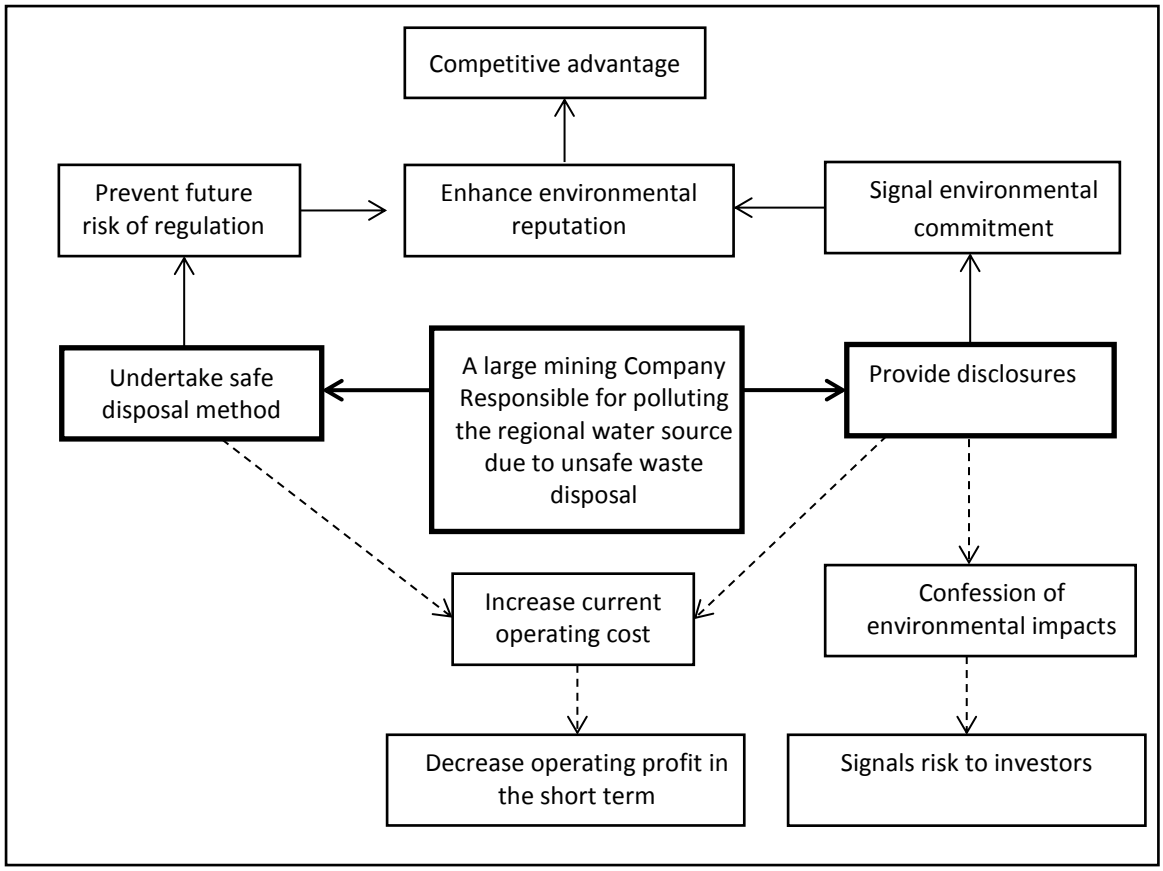


Figure 8-2: Dilemma highlighted in Scenario 2

Investors are a primary stakeholder group and hence, it is imperative to understand what strategy they would prefer after considering the environmental versus financial dilemma of environmental decisions as raised in Scenario 2. The survey findings suggest that out of the four choices of action (A – 'disclose only'; B - 'undertake initiatives and disclose', C – 'neither undertake initiatives nor disclose' and D - 'undertaking initiatives only'), Choice B was the most preferred action by investors (92.99 per cent, Table 8.19). In other words, the majority of the investors preferred the company to act pro-environmentally and provide relevant disclosures. In contrast to the responses obtained in Scenario 1, where the majority of the respondents (52 per cent, Table 6.12) failed to show a dominant strategy, for Scenario 2, most of the investors (90.21 per cent, Table 8.18) reported a dominant pro-environmental strategy. These investors indicated such a strategy by making a preference ranking (BDAC: 72. 16 per cent and BDCA: 14.43 per cent, Table 8.23) where 'undertaking initiatives' and 'disclosure' came ahead of 'not undertaking initiatives' and 'non-disclosures'. The findings imply that where the intensity of being exposed to environmental regulatory risk is readily felt by the respondents, they tend to prefer a pro-environmental strategy over no dominant

strategy. These findings again endorse the view in legitimacy theory that in presence of an obvious legitimacy threat, the company should undertake environmental initiatives and provide disclosures.

The findings (Tables 8.24 and 8.25) also indicate that avoiding regulatory breaches, such a, fines or possible litigations, was deemed to be the most important reason for undertaking environmental initiatives and providing relevant disclosures by the majority of the investors (more than 80 per cent) compared to gaining competitive advantage (less than 10 per cent). Such a finding provides substantial support for legitimacy theory in that if a firm's operations directly affect the community in a detrimental way, the firm would face a legitimacy threat in the form of negative public and societal pressure. The investors, therefore, believed that alleviating such pressure and reducing that threat, through the adoption of appropriate environmental initiatives and providing relevant disclosures, should be the first priority of the firm. Although gaining a competitive advantage is indicated as the second most important reason, 81.25 per cent (Table 8.27) of respondents who preferred a dominant environmental strategy agreed that pro-active environmental measures are likely to add competitive advantage to the company. Such a finding provides support to the NRBT in that undertaking environmental strategies, such as adopting pro-environmental initiatives and providing relevant disclosures help companies to gain a competitive advantage in the long-run.

8.5 Investors' preferences for the quality of environmental disclosures from large and small companies

Question 9 sought to find out whether and how investors' expectations of disclosures varied between large and small companies. Small and large companies are defined in a number of ways in the literature: by market capitalisation (Brammar and Pavelin, 2008), number of employees (Tilley, 2000), and annual revenues combined with number of employees (Daft et al., 1988; Covin and Slevin, 1989; Buonanno et al., 2005). In the questionnaire, the difference between small and large companies was indicated by annual revenues. A company was regarded as small if its annual revenue was less than $25 million, otherwise, it

was large. The cut-off point for the annual revenue is taken from the *Corporations Act 2001*, s. 45 A.

Five levels of pollution disclosures along an increasing hierarchy of quality (from more general towards more specific disclosures) were given in the question. Additional information, such as an example for each level of disclosure and issues, such as the occurrence of possible cost of preparation of such disclosure, was also provided. The respondents were asked to indicate their opinion by selecting either 'yes' or 'no' in the drop-down menu ascribed for each level of disclosure for both small and large companies. The aim was to obtain evidence about the extent to which investors expect quality disclosures from small and large companies. The five levels of information are presented in Table 8.28.

Table 8.28: levels of information based on quality hierarchy

Levels	Description of the levels
Level 1	Statutory declaration that the company is complying with the existing environmental laws
Level 2	Level 1 disclosure plus a general statement regarding the company's exposure to potential regulatory risks. For example, *'Our operations are subject to potential laws and regulations governing environmental protection, rehabilitation and closure'.*
Level 3	Level 1 & 2 disclosures plus a general statement on the impact of the company's operations on the environment. For example, *'Our operations, by their nature, have the potential to pollute the natural environment. We run programs to control such impacts'.*
Level 4	Level 1, 2 & 3 disclosures plus specific disclosures on pollution. For example, the amount, nature (toxic/non-toxic), measurable targets and performance against the targets. [Note: companies need to implement appropriate information systems at additional costs to produce these disclosures].
Level 5	Level 1, 2, 3 & 4 disclosures plus an independent environmental assurance report. [Note: companies need to employ environmental auditors at additional costs to produce such a report.]

Of the 198 respondents who started the survey, 191 (96.46 per cent) answered this question. The results are displayed in Table 8.29. The respondents' views of the quality of disclosures along the hierarchy (from level 1 to 5) for small and large companies is expressed in weight-adjusted percentages with the upper and lower limits at a 95 per cent confidence level.

Table 8.29: Variation of the investors' expectation of disclosures between small and large companies

Disclosure levels		Size of the companies			
		Small companies		Large companies	
		Yes	No	Yes	No
Level 1	Weight-adjusted percentage (%)	94.29	2.17	94.29	2.17
	Upper limit (%)	96.44	4.32	96.44	4.32
	Lower limit (%)	92.14	0.02	92.14	0.02
Level 2	Weight-adjusted percentage (%)	94.27	2.19	94.29	2.17
	Upper limit (%)	96.44	4.36	96.44	4.32
	Lower limit (%)	92.10	0.02	92.14	0.02
Level 3	Weight-adjusted percentage (%)	**5.42**	**91.04**	**94.83**	**1.63**
	Upper limit (%)	8.76	94.38	96.70	3.51
	Lower limit (%)	2.08	87.70	92.95	-0.24
Level 4	Weight-adjusted percentage (%)	**16.13**	**80.33**	**92.39**	**4.07**
	Upper limit (%)	21.55	85.74	95.27	6.96
	Lower limit (%)	10.72	74.91	89.50	1.19
Level 5	Weight-adjusted percentage (%)	**7.79**	**88.67**	**83.99**	**12.47**
	Upper limit (%)	11.64	92.53	88.83	17.31
	Lower limit (%)	3.93	84.82	79.15	7.63

The results shown in Table 8.29 indicate that the expectations of the investors under study did not vary from large and small companies for level 1 (statutory declaration of compliance with existing regulation) and level 2 disclosures (general environmental risk statement). However, the respondents' expectations started to differ from level 3 disclosures (general statement on environmental impact) where they anticipated more of such disclosures from large companies (94.83 per cent) than from small companies (91.04 per cent). Significant differences are observed with regard to both the level 4 (specific environmental disclosures with measurable data) and level 5 disclosures (independent assurance statement). Only 16.13 per cent of the respondents indicated 'yes' to level 4 disclosures for small companies compared to 92.39 per cent for large companies. For the level 5 disclosures the respondents' expectations from small companies dropped further to 7.79 per cent whereas for large companies it was 83.99 per cent.

These findings suggest that the investors' preferences for environmental disclosures vary from small and large companies along the hierarchy of quality disclosures. While the investors under the study preferred large companies to provide high quality disclosures,

they did not expect the same from small companies. Investors might have considered the additional cost involved in the preparation of high quality disclosures and, given the resource limitations usually experienced by small companies, they did not expect the small companies to bear an additional cost. Further, the findings reveal that small companies were expected to comply with regulations and hence, provide environmental disclosures if it is required by existing environmental laws such as a statutory compliance statement. General statements including exposure to regulatory risks and impacts of operations on the natural environment are also expected from small companies. However, specific environmental disclosures with regard to the sources, amounts and nature of pollution, measurable targets and performance against such targets were expected of large companies. Further, independent assurance reports of such disclosures were also expected from large companies.

8.6 Willingness to forego financial interest over environmental concern

The question of immediate financial outlays triggered by the adoption of environmental initiatives was highlighted in both the scenarios (1 and 2). It was also indicated that such financial outlays might reduce the return to shareholders and hence, create a dilemma for the companies' managers. The last question (Question 10) sought to examine whether investors were still willing to invest or hold shares in a company knowing that its expenditure on safe environmental initiatives would reduce its short-term profit (e.g. in two years). This question elicited 191 responses (191/198; 96.46 per cent of the total respondents who started the survey). The findings are presented in Table 8.30.

Table 8.30: Investors willingness to sacrifice short-term profit to support environmental initiatives

Percentage of respondents	Willingness to sacrifice short-term profit	
	Yes	No
N	164	27
Weight-adjusted percentage (%)	**81.68**	**14.78**
Upper limit (%)	87.11	20.21
Lower limit (%)	76.25	9.35

The findings reveal that 81.68 per cent of the respondents were willing to invest or hold shares in a company even if its short-term profit is compromised by spending on environmental initiatives. It can be argued that investors who are willing to sacrifice financial return (at least in the short-term) also prefer spending resources on undertaking environmental initiatives. Therefore, it was expected that the respondents who indicated a willingness to forego some short-term profit should also have reported a dominant environmental strategy in the context of Question 5 in Scenario 2. This was examined with the aid of a cross-tabulation and shown in Table 8.31.

Table 8.31: Willingness status with the corresponding environmental strategies

Willingness to sacrifice	**Strategies indicated in Question 5**			
	Dominant environmental	**Dominant financial**	**No dominant rule**	**Row total**
	N (%)	**N (%)**	**N (%)**	**N (%)**
Willing	**156 (95.12)**	2 (1.22)	6 (3.66)	164 (100)
Not willing N (%)	19 (70.37)	1 (3.70)	7 (25.93)	27 (100)
Column total N	175	3	13	191

The results show that 95.12 per cent of the respondents (that is, 156 out of 164) who indicated their willingness to sacrifice at least some short-term profit in favour of pro-environmental initiatives also reported a dominant environmental strategy in Question 5 with respect to the context of Scenario 2.

8.7 Differences in responses due to demographic characteristics

A chi-square statistic was performed to check for the differences in responses due to demographic variables. A chi-square test is considered appropriate as all the data collected in the survey were treated as categorical or nominal variables. In order to facilitate a comparison of age, educational qualification and investment decision characteristics, each variable was classified into two groups, as shown in Table 8.32.

Table 8.32: Groups under each demographic variable

Variables	Group 1	Group 2
Age	45 years or less	More than 45 years
Level of education	No university degree	University degree
Orientation of investment decision	Manage investment personally	Manage investment via fund and both

A 2 x 2 contingency table was prepared for each of the demographic variables to calculate the corresponding chi-square value. The differences were sought in the responses to Questions 1, 5 and 10. However, differences in responses were analysed only for those demographic variables where the observed data qualified for the 'minimum expected cell frequency' requirement for computing the chi-square, which is 5 (Pallant, 2011, p. 219).

The responses to Question 1 indicated whether a cooperative strategy was preferred in Scenario 1 in the context of a small company, where its other industry counterparts were also responsible for environmental pollution. In order to facilitate the calculation process, the 'defection' strategy and 'no dominant' strategy were reclassified into one group as 'no cooperative' strategy. The results of the chi-square test for independence with 1 DF (degree of freedom) and a *p* value at 0.05 is shown in Table 8.33.

Table 8.33: Chi-square test of independence for Question 1

Variables	DF	Chi-square	p value
Gender	1	0.225	> 0.05
Age	1	0.971	> 0.05
Level of education	1	0.326	> 0.05
Orientation of investment decision	1	**5.916**	**< 0.05**

The results indicate that there was no significance association between the respondents' gender, age and level of education individually with their preference for adopting a 'cooperative' strategy in the circumstances described in Scenario 1. However, the association between the preference for a 'cooperative strategy' with the orientation of investment decision were found to be statistically significant where $\chi^2(1, n = 189,) = 5.91$, $p < 0.05$. The preference for cooperation was found to be more frequent among the investors who manage their funds personally with no involvement of any investment funds (70 per cent, see Appendix 13).

The findings of Question 5 indicated whether a 'pro-environmental' strategy was favoured when a large company is responsible for polluting the environment through its unsafe waste disposal practice in the context of Scenario 2. For the purpose of computation, the 'pro-financial' and 'no dominant' strategy in Question 5 were also clustered into one group as 'no pro-environmental' strategy. The association of gender and age with the responses to this question cannot be established because of an insufficient data count in one of the four cells of the 2 x 2 contingency table. However, a statistically significant association with the responses was found for the level of education ($\chi^2(1,n = 191,) = 7.563$, $p < 0.05$) and orientation of investment decision ($\chi^2(1, n = 191,) = 8.913$, $p < 0.05$). The results of the test are presented in Table 8.34. The 'pro-environmental' strategy was found to be favoured more by respondents with a university degree (94.6 per cent, see Appendix 14) and also by those who managed their investments both by personally and via investment funds (94.1 per cent, see Appendix 15).

Table 8.34: Chi-square test of independence for Question 5

Variables	DF	Chi-square	p value
Gender		Not computed effectively	
Age		Not computed effectively	
Level of education	1	**7.563**	**< 0.05**
Orientation of investment decision	1	**8.913**	**< 0.05**

Question 10 required participants to indicate their opinion about whether to invest in a company whose short-term profit would be reduced because of spending on safe environmental initiatives. The chi-square test was only effectively run for two variables: age and orientation of investment decision. The results are summarised in Table 8.35, which indicates a statistically significant association between the age of respondents and their willingness to sacrifice short-term profit (χ^2 (1, n = 191,) = 9.435, $p < 0.05$).

Table 8.35: Chi-square test of independence for question 10

Variables	DF	Chi-square	p value
Gender		Not computed effectively	
Age	1	**9.435**	**< 0.05**
Level of education		Not computed effectively	
Orientation of investment decision	1	**2.383**	**< 0.05**

However, with regard to the orientation of investment decisions, this was not statistically significant. The survey results showed that participants who were more than 45 years old (90.98 per cent, see Appendix 16) and those who managed their investment via funds (87.57 per cent, see Appendix 17) were more willing to sacrifice short-term profit at the expense of increased environmental spending.

8.8 Chapter summary

This chapter has presented the findings of the survey of investors with regard to their preferences of hypothetical managerial actions under two case-based dilemma scenarios. Scenario 1 raised a cost-benefit analysis dilemma of 'unilateral preference versus organisational practice' for a small company. Scenario 2 presented the cost-benefit dilemma of 'environmental versus financial' for a large company. The PD model of game theory was applied to identify whether investors preferred a dominant strategy.

The findings reveal that in preferring one choice of action over others, environmental impact was not considered to be the main concern for investors. Rather, in Scenario 1, what other companies were doing in the same situation was considered. In the absence of regulation, in undertaking pollution preventive initiatives, the action of competitors was expressed as the next considering factor. In contrast, in Scenario 2, investors preferred the choice of undertaking environmental initiatives and making disclosures. However, this choice was preferred because doing otherwise would pose emergence of new regulations for the company. Therefore, it is concluded that investors maintain a middle ground position along the spectrum of environmental ideologies instead of expressing overtly eco-centric or techno-centric views. This is consistent with the findings discussed in Chapter 6, where managers displayed the same preference (Chapter 6, Section 6.5.3). However, the findings

also imply that investors' environmental philosophy tends to lean towards techno-centrism as they consider the undertaking of environmental initiatives on the basis of 'financial risk versus return' and/or 'unilateral preference versus organisational practice' dilemmas. Environmental concern came as a compromise to external pressure in securing ongoing survival and growth. Therefore, the findings provide support to legitimacy theory.

In identifying the reasons that investors considered important for undertaking environmental initiatives and disclosing them, the findings reveal that avoiding regulatory risks is expressed as the main reason, followed by gaining a competitive advantage. Hence it is inferred that regulation is still the main impetus in determining the extent and the quality of disclosures. However, the investors indicated that undertaking environmental initiatives and disclosures would also bring competitive advantage for companies. This finding provides support to the NRBT.

The findings with regard to the incorporation of quality attributes in environmental disclosures by large and small companies indicate that investors' expectations of the quality of disclosures vary across the companies based on their size. In expressing such a view, investors considered the level of environmental impact, regulatory requirements and costs associated with the preparation of high quality disclosures. Finally, the findings reveal that the majority of investors, who are willing to sacrifice short-term profit for undertaking environmental initiatives, also indicated a dominant pro-environmental strategy. This finding also provides support for legitimacy theory and NRBT, as it is assumed that such willingness to undertake environmental initiatives would alleviate regulatory risk and place the entity in a competitively advantageous position.

CHAPTER 9: CONCLUSION AND IMPLICATIONS

9.1 Introduction

The objective of this investigation was to examine the quality of corporate environmental disclosures of Australian resources sector companies. The resources sector makes important contributions to the Australian economy (BREE, 2014). However, being a pollution intensive sector, it faces increasing stakeholder pressure to mitigate the environmental impacts of its operations (Summerhays and de Villiers, 2012). Therefore, ensuring the quality of environmental disclosures plays an important role in signalling operational improvement and effective risk management. Further, it assists in satisfying the information needs of stakeholders for decision-making and gaining their confidence through enhanced reputation (Dong and Burritt, 2010).

Moseñe et al. (2013) suggested that in determining 'what to disclose' and 'how to disclose' in relation to corporate environmental activities, managers consider stakeholder pressure and reporting guidelines, such as the guidelines suggested in the GRI. Therefore, three factors were considered in analysing the quality of disclosures in this project: 1) quality attributes suggested by reporting frameworks and guidelines; 2) communication of environmental disclosures by managers; and 3) shareholders' preferences for environmental disclosures. The investigation was undertaken in two stages, discussed as follows.

First, the quality of environmental disclosures is analysed in the 2009 annual reports and separate environmental reports of a sample of Australian resources sector companies. The quality attributes prescribed in established reporting frameworks and guidelines were used as benchmarks for examining quality.

Second, a group of investors was surveyed to explore whether they required companies to undertake environmental initiatives and were willing to forego economic benefits for the sake of implementing pro-environmental schemes. The findings of the content analysis in the first 1 were used as a basis for preparing a questionnaire. The findings of the survey

were expected to inform investors' preferences for corporate environmental initiatives and subsequent disclosures.

9.2 Summary of research questions

Based on the gaps identified in the literature review in Chapter 2 the following four research questions were formulated for the analysis of the quality of environmental disclosures:

1) To what extent can additional quality attributes be reconciled through a single disclosure instrument for Australian resources sector companies?
2) Along the spectrum of environmental ideologies, how is a manager's positioning communicated in the management section of their sustainability report?
3) What are investors' preferences with respect to the undertaking of environmental initiatives in a given context?
4) What are the investors' preferences regarding the incorporation of quality attributes within corporate environmental disclosures?

Investigating these questions is important because it adds to the understanding of the current status of the quality of Australian resources sector environmental disclosures. Such an understanding can then be used to identify areas of shortcoming in providing environmental disclosures and investor suggestions for improvement with respect to the *quality* of environmental disclosures. Providing high quality environmental disclosures enables companies to manage stakeholder pressure for mitigating the environmental impacts of organisational operations. Further, it allows stakeholders to assess the organisational impacts on the environment regarding pollution, reduction targets and environmental initiatives, and achievements against such targets.

The research method applied to answer Research Questions 1 and 2 was content analysis, which was described in Chapter 5, with the findings detailed in Chapter 6. In order to answer Research Questions 3 and 4, a survey of investors was conducted using a questionnaire containing case-based hypothetical scenarios. The method and the findings were discussed in Chapter 7 and Chapter 8 respectively.

9.2.1 The findings from the content analysis

The findings presented in Chapter 6 revealed that, with the exception of the 'production' category, a large percentage of the sample companies (85 per cent) did not provide information across the environmental disclosure categories identified in the reporting frameworks and guidelines. Almost all the sample companies with a market capitalisation below $500 million provided no specific numerical disclosures in any of the quantifiable disclosure categories. Instead, these companies provided a compliance statement in accordance with the mandatory requirements of the *Corporations Act 2001* section 299(1) (f) Annual Director's report – declaring that management was not aware of any breaches of existing environmental regulations. Further, some of these non-disclosing companies indicated that their level of energy consumption and carbon emission was less than the regulatory threshold and hence, they were not required to publicly report on the energy use and emission as per the *NGER Act 2007*. In contrast, the specific quantified disclosures of emission categories were reported by companies with a market capitalisation of more than $1 billion.

Compared with the energy and utility sectors, the metals/mining sub-sector companies provided more information across all the disclosure categories examined under the content analysis. Some disclosure categories, such as 'water recycling', 'water sources affected' and 'effluent discharge' were merely mentioned as general disclosures without any numerical data or, in some cases, not disclosed at all by the energy and utility sub-sector companies. Alternatively, the sector-supplement disclosures specifically related to the energy and utility sub-sectors as suggested in GRI, such as 'water use in processing' and 'emission from generation capacities' were addressed by the entities involved in energy generation. Such a finding implies that companies tend to release information on those disclosure categories that they deem to be relevant to their operating activities.

Most of the disclosures provided across the environmental disclosure categories tended to take the form of general comments, claims and commitments. This observation holds for all three sub-sectors. Failure to provide quantifiable data by the majority of the companies

reduced the materiality of reported disclosures. Quantifiable information was primarily associated with the 'production', 'energy use' and 'overall GHG emission' categories. For example, the percentages of metals/mining sub-sector companies that provided quantified information in for 'production', 'energy use' and 'overall GHG emission' are 41 per cent, 14 per cent and 12 per cent. However, in all cases, reference to a calculation method or bases of measurement was not reported on these quantified disclosures. For example, the percentages of metals/mining sub-sector companies that reported on calculation references for 'production', 'energy use' and 'overall GHG emission' were 2 per cent, 12 per cent and 9 per cent respectively (see Table 6.2). Hence, the representational faithfulness of the reported data, which was identified as a quality attribute in the reporting frameworks, in terms of their verifiability, remains deficient. Further, in many cases, the disclosures were not classified, such as 'direct versus indirect energy use/emission', 'toxic versus non-toxic effluents' and 'hazardous versus non-hazardous wastes', as was suggested in the environmental reporting guidelines (GRI, 2006). This fact affects both the faithful representation and the understandability of the reported information. The percentage of compared information was also documented as low. This raises concerns about the comparability attributes of the disclosure quality. It hinders the possibility of ascertaining company performance with respect to previous years.

High quality disclosures were reported with respect to the four disclosure categories of 'production', 'overall GHG', 'NOx' and 'SOx' by a number of entities in each sub-sector. Disclosures in these four categories were deemed to have high quality because such disclosures contained all the quality attributes identified in the CONQUARF, specifically denoting information related to the quantification, classification, comparison and calculation basis related to these categories. Such high quality disclosures associated with these environmental categories would be explained by the mandatory disclosure requirements imposed by the relevant regulatory authorities on companies with certain characteristics. For example, companies with extraction activities are required to provide production disclosures, including exploration results and ore reserves, by the JORC Code and ASX listing rules. Likewise, companies with emission and energy use over and above the prescribed regulatory thresholds are obligated to provide relevant disclosures as per the requirements of the *NGER Act 2007*.

The connotative analysis of the environmental reports concluded that managers adopt a middle ground position along the continuum of environmental ideologies. The meaning of sustainability as conveyed in the CEO messages indicate that acknowledging environmental risks and adopting innovative preventive actions were regarded as necessary steps for the maintenance of the ongoing survival and growth of the company. Such a mindset was surfaced by the repeated use of certain texts that implied similar meaning. For example, the frequent use of words such as 'challenge', 'understand', and 'viable' tends to highlight the justification or reasonableness of organisational actions towards the environment. Simultaneously, the use of words such as 'successful', 'value', 'return' and 'competitiveness' tend to direct readers attention towards hope for economic development and growth. Hence, the meaning construed in the managements' perception of sustainability places the role of environmental commitments as one of the ways of maintaining survival while ensuring a positive financial return. Therefore, it is argued that by providing environmental disclosures, managers intend to generate legitimation appeals to justify or explain the environmental performance of their organisation. Simultaneously, managers make competitive appeals via environmental disclosures to portray the entity as a front-runner in managing environmental impacts in an innovative way. Both legitimacy and competitive appeals are seen as adding value to the ongoing survival and economic growth of the entity.

The findings of the connotative analysis of the environmental disclosures provided in the sample reports identified a varying degree of legitimation and competitive appeals. The common approach for making legitimation appeals was found to be the provision of the actual measurement data regarding the major environmental impacts of organisational operations. All five sample companies provided numerical data in relation to emission, using either graphs (bar or pie charts) or tables with comparative and calculation references. However, it is argued that without the background knowledge of the technical terms, measurement units and the implications of the reported measures, such data carries little significance for the general public. Further, the sample companies also reported that they are required to provide the same data to the NGER system. Hence, it can be argued that the intended purpose of providing such detailed accounts is not necessarily to discharge accountability, rather to demonstrate the fact that the entities have in place a sound

scientific system for impact measurement and reporting. This, in turn, helps to demonstrate an environmentally responsible image of the entities and adds to the defence against any potential criticisms.

Competitive appeals are created by signalling company ownership of an EMS, including innovative infrastructure that can reduce environmental impacts. Disclosures of initiatives to reduce environmental impacts were found to be associated with detailed descriptions of how they work and to what extent they are able to reduce environmental impacts. Such disclosures were often found to be accompanied with pictures of machines or industrial processes to create a visual appeal for credibility that would remain much longer in the mind of readers. By providing disclosures in this way, entities seek to establish that they have first-hand knowledge or technologies that add to their competitive advantage in confronting current and potential environmental challenges and concerns.

9.2.2 The findings from the survey of investors

The findings of the investors' survey, as explained in Chapter 8, identified investor preferences over a range of managerial actions when they are presented with an environmental dilemma in a given context. Investor preferences regarding the incorporation of quality attributes in corporate environmental disclosures were also identified. The data was sought at three levels:

a) Obtaining an understanding of what choice of actions investors prefer when confronted with an environmental dilemma in a given context.
b) Identifying what reasons investors considered important for undertaking environmental initiatives and disclosures.
c) Examining whether investor expectations of environmental disclosures varies between large and small companies.

In Scenario 1, an 'unilateral preference versus organisational practice' dilemma for a small mining company was presented to the investors. Within this scenario, environmental pollution was acknowledged as the result of the cumulative actions of other companies

operating in the same region. Given this context, the majority (52 per cent) of the respondents failed to choose a predominant strategy of whether or not to take pollution reduction initiatives, irrespective of what other companies chose to do. The findings revealed that the preferred investor choice of action for a company with an emission level below the regulatory threshold was to undertake reduction initiatives *only if* its competitors did the same. Cooperation by other organisations and individual 'cooperation' for undertaking initiatives to reduce emission was preferred to defection by other organisations and individual 'defection', it was therefore assumed that the majority of the respondents took environmental well-being into account in their decision-making. However, given the probability of additional costs relating to pollution reduction initiatives, along with the resource limitations faced by a small company, the majority of investors prioritised economic interest over environmental concern. In addition, while investors did agree that undertaking reduction initiatives was likely to add a competitive advantage to a small company, they indicated that existing regulation should be the main factor for a small firm in deciding whether to allocate resources to pollution control.

Scenario 2 presented the dilemma of 'disclosure versus non-disclosure' faced by a large mining company responsible for polluting the regional water source due to its unsafe waste disposal methods. Such a dilemma raises the issue of risks versus the benefits resulting from undertaking safe disposal initiatives and providing related environmental disclosures. The findings revealed that investors preferred safe disposal methods and related disclosures over no action and non-disclosure. The preferred action indicated by the investors would likely be driven by the fact that, in this scenario, the large company was individually responsible for polluting the water source, despite the fact that the visible impact was not yet apparent. It can be argued that stating the risks and consequences definitively in scenario 2 is a limitation of the study. The responses for scenario 2 could have been different if the word "may" was used instead of "will" in the questionnaire. The certain nature of risk and consequences is assumed to make the company more prone to possible community protests and regulatory action that would, in turn, culminate in putting restrictions on using the river, as well as possible financial penalties. These actions would be likely to disrupt the company's operation and eventually affect investors' returns. Avoiding regulatory actions, such as fines or possible litigation, was indicated as the first preferred

reason for undertaking environmental initiatives and providing relevant disclosures by the majority of the investors.

In order to obtain an insight into the extent to which investors expect quality disclosures from small and large companies, five levels of pollution disclosures were presented in the questionnaire, arranged in a hierarchy of low to high. The findings revealed that investors expect large companies to provide high quality disclosures with reference to the sources, amounts and nature of pollution, measurable targets and performance against such targets. Further, independent assurance reports of such disclosures were also expected from large companies. By contrast, considering the additional cost involved in the preparation of high quality disclosures and given the resource limitations usually experienced by small companies, investors did not expect small companies to provide such quality disclosures. The findings also suggest that the majority of investors were willing to sacrifice short-term profit to support pro-active environmental initiatives.

9.3 The theoretical implications of the findings

In this investigation, it is posited that corporate environmental disclosures cannot be fully analysed by a single theory. It is acknowledged that both legitimacy theory and NRBT, conjoined with the signalling theory, have a role in analysing the quality of corporate environmental disclosures. The project also drew on the notion of decision-usefulness theory, which asserts that managers are reluctant to provide information if it is not in demand by the users.

The findings of content analysis provide support for legitimacy theory and NRBT in revealing that in the absence of a legitimacy threat, firms are not likely to provide environmental disclosures at additional costs in annual and/or sustainability reports. Legitimacy threats can be attributed to the political visibility of firms and their exposure to regulation (Brammer and Pavelin, 2008, Stubbs et al., 2013). Relatively small sample companies (e.g., with a market capitalisation of less than $500 million) are likely to have fewer operations and impacts on the environment compared to their larger counterparts (e.g., more than $1 billion), and so, are less prone to political scrutiny. Therefore, taking the broad perspective

of legitimacy theory, it could be argued that decreased political visibility essentially reduces the legitimacy threat for these companies, which, in turn, discourages them from providing specific environmental disclosures.

Further, it can also be assumed that non-disclosing entities do not face competition from their larger market participants. Rather, they compete against the entities that share the same size characteristics. Because non-disclosure is a common feature observed in these entities, it may be concluded that there is little incentive to spend additional funds on environmental disclosures as these may not bring any competitive advantage. Therefore, the findings provide support for NRBT in that, in the absence of a necessary observable competitive force, excelling in environmental management is not likely to bring any competitive advantage. Rather, it might be deemed to be counterproductive on the basis of a cost-benefit analysis. The findings are consistent with the finding of Stubbs et al. (2013, p. 464), where managers of the non-disclosing firms expressed the belief that in the absence of any regulatory '*pressure*' and/or '*perceived benefit*', they '*feel little need*' to provide disclosures. Such an outcome also resonates in the findings of the investors' survey developed in this project. First, according to investors, compliance with existing regulations should be the main determining factor for small companies undertaking environmental initiatives. Second, investors preferred small companies spending resources on environmental initiatives *only if* their competitors did the same. Third, given the resource limitations of small companies, investors preferred them not to provide specific environmental disclosures at additional costs. These findings also indicated a preference for managers adopting a decision-usefulness notion of communication when deciding whether or not to provide environmental disclosures.

The findings of the content analysis were consistent with the view that larger firms (with a market capitalisation of more than $1 billion) that operate in the extending phase of organisational legitimacy use environmental disclosures as a resource or competitive tool. The findings provide support for NRBT in that larger firms provide high quality disclosures that are quantified, classified (e.g., as to the source/toxicity), comparable and which include reference to calculation methods and explanatory narratives. The findings reveal that, in addition to offering legitimacy appeal, such disclosures also have the ability to provide

competitive signals with respect to the advanced position of the disclosing company's risk management ability. Further, in support of signalling theory, the findings of the investor survey reveal that for large companies, and where the environmental impacts of company operations are observable, investors prefer the companies to spend resources on impact reduction initiatives. They also prefer companies to provide specific environmental disclosures at additional costs.

The legitimacy and competitive appeals identified in the disclosures of the sample companies support the view presented in Prasad and Elmes (2005) that companies tend to highlight environmental pragmatism rather than environmental idealism when providing such disclosures. Environmental pragmatism asserts that adopting innovative initiatives enables the prevention of environmental pollution while still maintaining financial growth.

9.4 Contribution to literature

This study contributes to the environmental reporting literature in two areas: methodological and contextual.

Methodological

In this study, an enhanced disclosure instrument (CONQUARF) was developed to extract several environmental disclosure quality attributes over and above those identified in previous studies. The instrument consists of a quality coding tool, which was developed by integrating the established quality attributes set in a number of accounting and environmental reporting frameworks and guidelines for identifying the quality of disclosures. Thus, the coding tool serves as an authoritative source against which disclosures should be benchmarked. This new development overcomes the limitation identified in the literature by Guenther et al., (2007), as the lack of attention to quality attributes has now been addressed. Because the quality coding tool is based on the established reporting frameworks, it added objectivity to the content analysis task and removed the arbitrariness that was found in the content analysis tools adopted in various environmental literatures (e.g., Toms, 2002; Beck et al., 2010).

The instrument is relatively uncomplicated to use because it identifies quality as a dichotomous measure, that is, existence or non-existence. Therefore, it does not rank the quality against a continuum of high to low and removes the arbitrariness or subjectivity in terms of ranking a disclosure against a continuous numeric scale. Further, the content analysis instrument was designed to enable the readers to view both the *content* and *quality* of disclosures in a single graphical presentation instead of examining each attribute separately. This feature assists in identifying, from a single depiction, if information is provided in a particular environmental disclosure category and to what extent such disclosures meet the established quality criteria.

Hence, the survey makes a novel contribution to the literature in a number of ways. Most environmental dilemma studies have been undertaken as part of strategic decision-making, with special reference to ethics and moral judgement by managers (e.g., Woiceshyn, 2011; Litschka et al., 2011) or in the form of simulation studies (Tanimoto, 2005). Few studies address the investors' dilemma in relation to the mitigation of environmental problems (Aitken, Chapman and McClure, 2011). This study therefore makes a unique contribution to methodology by conducting a survey of investors with a questionnaire that includes hypothetical case-based scenarios. The choices of managerial actions stated under each scenario correspond to the environmental ideologies of moderate to extreme eco-centrism and techno-centrism, as discussed in Chapter 2. Inclusion of small case-based scenarios stating the costs and benefits associated with managing environmental problems in a particular context, allowed the investors to provide thoughtful responses that would otherwise be received in a questionnaire with standalone questions. In addition, the preferred choice of action of respondents reflects their ideological views with respect to environmental issues.

Another unique contribution to the methodology is the application of the PD model of game theory in designing the questionnaire and analysing the responses obtained from the scenario-based questions. Outlining the managerial choices of actions within the frame of the PD model of game theory rendered the survey and analysis empirically feasible and allowed inferences to be drawn. Thus, the survey conducted in this study elevates the

investigation of the environmental dilemma of investors from a hypothetical or simulation stage to an empirical enquiry.

Contextual

Analysing the quality of disclosures has been identified as an under-represented area in the environmental literature (Hahn and Kühnen, 2013). This study extends the existing literature in this area by investigating the quality of environmental disclosures in the context of the Australian resources sector using the quality criteria suggested in the established reporting frameworks and guidelines.

Unlike previous studies (Deegan and Rankin 1997; de Villiers and van Staden, 2010), the questionnaire used in this investigation did not simply query what information investors need and why they think that information is important. Instead, it placed investors within specific contexts and dilemmas in relation to an environmental problem. From this informed position, the respondents selected preferred choices of action. Therefore, the survey in this study addressed the concern raised in Aitken, Chapman and McClure (2011) by compelling the respondents to question 'what I would have done in a situation like this', instead of simply making demands for additional disclosures. Including such decision-making predicaments allow us to draw upon the ideological standpoint of respondents in relation to environmental concerns.

9.5 Implications for companies and policy-makers

The findings of this investigation provide several insights through the benchmarking of environmental disclosure quality, using a sample of Australian resources sector companies, against the quality attributes suggested in existing reporting guidelines and frameworks. The findings suggest that companies are likely to provide high quality environmental disclosures if it is deemed to be relevant to management. The notion of relevance can be derived from a number of factors. A disclosure category is more likely to be relevant if it is one or more of the followings:

- significantly affected by the nature and extent of the organisational activities

- deemed to be useful by the report users
- subject to public debates or potential environmental regulations
- subject to compliance with the current environmental regulations

In other words, any disclosure category that has observable detrimental environmental impacts or is subject to potential or existing regulatory constraints, which in turn may have consequential impacts on the economic outcome of the entity, would be deemed to be relevant to management.

Certain disclosure categories, such as effluents discharge, which would inform about the significant hazardous environmental impacts of organisational operations, remained largely undisclosed by 95 per cent of the sample companies. The findings revealed that 85 per cent of the sample companies did not provide any quantified information in relation to disclosure categories such as resource consumption (energy and water) and pollution (emission, effluents and waste disposal). These findings indicate that the lack of relevance and materiality in the reported disclosures. Such disclosures would render the reader unable to assess the environmental footprint of resources sector companies in Australia. Failure to provide information in relation to the measurable pollution reduction targets and achievements against such targets makes it difficult to follow the companies' progress with regard to their environmental impacts. Further, a lack of reference to calculation methods reduces the verifiability and hence, credibility of the reported information.

The findings of the survey reveal that investors preferred small companies (with annual revenue less than $25 million) to undertake environmental initiatives if required by regulation or if similar action was undertaken by their competitors. By contrast, investors preferred large entities to undertake environmental initiatives, to mitigate the visible environmental impact, and provide high quality disclosures at additional costs. These findings imply that investors take into account a cost-benefit analysis before making preferences with regard to the undertaking of environmental initiatives and disclosures. In general, the findings of the content analysis and investors' survey indicate that environmental disclosures are regarded as a risk management tool by both managers and investors, rather than as a simple means of providing accounts of the environmental

impacts of organisational operations. Based on the findings of this investigation, the following recommendations are made for the purpose of enhancing the quality of environmental disclosures in Australian resources sector companies:

1. **Companies should adopt a strategy of providing specific information in relation to their environmental footprint, measurable targets and achievements against such targets.**

   The investigation concluded that investors prefer large companies to undertake pollution reduction initiatives and provide relevant disclosures. The relevant disclosures preferred by investors specifically include information about the amount of pollution (in quantifiable units, e.g., tonnes, watts and litres), nature (e.g., toxic/non-toxic), measurable targets and performance against targets. Investors also preferred large companies to provide independent assurance reports for their environmental disclosures. Such a preference was made even after considering of the additional costs of preparing such disclosures. Hence, preparation of this information warrants specific strategies, plans and implementation of environmental management systems (EMS) by the reporting company. Such information would add to the credibility of company disclosures about their environmental impacts, as perceived by investors and thus, help gain a competitive advantage.

2. **Industry associations, such as MCA, should take a more active role in providing guidelines for preparing sector-specific environmental disclosures, which can vary based on the nature of mineral extractions.**

   Instead of providing general guidelines as currently exist in the MCA 2000 Code, MCA should stipulate specific disclosure requirements for their signatories in relation to their operational impacts on the natural environment. They should also advise on procedures, especially for small companies, regarding how to gather required data relating to resource consumption and pollution from available sources (e.g., utility bills), without incurring excessive costs. Industry associations should prepare industry average data (for specific disclosure categories, such as energy use and GHG emission), make them available to their signatories and encourage them to report quantified data with respect

to such averages. This would streamline the reporting of compared data and help in assessing a company's environmental performance against industry benchmarks.

3. **The road to improving the quality of environmental disclosures largely comes down to a preference for regulation.**

   Preferred choice of actions indicated in the survey findings for Scenario 1 and Scenario 2 implies that investors appreciate managers who carry out a cost-benefit analysis prior to taking any pro-active environmental measures. Therefore, it is concluded that investors also prefer a middle ground notion of environmental ideology instead of extreme eco-centric or techno-centric views. The findings of the connotative analysis and survey also indicate that environmental disclosures are regarded as risk management tools instead of a means of discharging accountability. The environmental disclosure categories that are overwhelmingly subject to existing environmental regulations, such as emission and energy use, are more prevalent in the annual reports of large companies and rich in quality attributes. This coincides with the investors' choice that regulation should be the main deciding factor in determining the adoption of pro-active environmental measures including disclosures.

4. **Regulators should involve relevant stakeholder groups, including environmental scientists and engineers, to assess the regional *cumulative* impacts of existing and potential mining activities and set thresholds for disclosures based on such impact assessments.**

   The findings suggest that non-disclosing firms follow a decision-usefulness perspective when either their emission levels are below regulatory thresholds or they do not consider there to be any perceived benefit from providing environmental disclosures. However, while the pollution discharged by an individual entity might be less than the regulatory threshold, the cumulative effect of pollution in a particular region as contributed by the companies operating in that region can be detrimental.

5. **Quantified data, measurable targets and achievement against such targets with respect to resource consumption and discharge of pollution disclosure categories**

should be made compulsory. Such regulatory requirements would compel companies to measure, monitor and account for their environmental impacts.

Currently, the environmental reporting guidelines (e.g., GRI) propose only voluntary environmental disclosures in annual or sustainability reports. The findings of the content analysis suggest that the content and quality of environmental disclosures can vary from no disclosure (e.g., from Cooper Energy Limited) to very detailed disclosure (e.g., from ORG). Given that firms are compliant to the regulatory requirements, it is recommended that specific information regarding certain environmental disclosure categories should be made compulsory to bring the resources sector companies under the regulatory regime. Disclosure categories with regard to resource consumption (such as, energy and water) and discharge of pollution (such as, emission, effluents and waste) are important in ascertaining the environmental footprint of companies operations.

9.6 Limitations

The content analysis instrument (CONQUARF) developed in this study was designed to capture the quality criteria of quantifiable disclosure categories only (e.g., 'energy use' and 'emission'). Disclosure categories that require narrative descriptions, such as explaining environmental strategies, methods of effluent and waste treatment and recycling technologies, cannot be examined using the instrument. However, instead of moulding the instrument to fit the predominantly descriptive disclosure categories, separate quality criteria were identified based on the guidelines suggested in GRI (2006) with respect to such categories. In this way, the process of content analysis was retained without diminishing the rigour of the instrument in analysing the quantitative disclosures.

Although a mixed quantitative-interpretative approach was adopted to conduct the content analysis in this study, the interpretative component was limited to the denotative interpretation or obvious meaning of information. In order to overcome this limitation, the analysis was further substantiated by undertaking a connotative-interpretative analysis of a sub-sample of annual reports. The sub-sample consisted of the environmental reports of those companies that provided a substantial amount of disclosures about a range of

environmental aspects, including environmental strategies, energy use, pollution and biodiversity.

Further, there was a degree of subjectivity and a lack of precision when identifying some of the quality attributes. For example, to identify a disclosure category as 'classified', no distinction was made in terms of being identified in either of three ways: by 'source', 'nature' or 'scope'. Instead, the presence of any such disclosures was documented as 'classified', even when more than one of these three choices was required to understand the appropriate performance related to a specific category. The same lack of precision held true in examining the 'compared information' attribute. Whether a comparison was based on years or industry average was not distinguished. In addition, being a pure, index-based 'denotative meaning oriented' study, the content coding tool drew on counting the frequency of content diversity and content quality, but failed to take into account the connotative or intended meaning of disclosures. This limitation was, however, overcome by undertaking a subsequent connotative content analysis of a number of reports that had a large volume of environmental disclosures.

The major drawbacks of the survey of investors included non-response bias and the possibility of exposure to the unintended responses associated with a non-probability based unrestricted self-selected survey. This was overcome by using an appropriate statistical method (estimation and use of raking weight), inserting appropriate demographic questions and designing the survey instrument to block multiple completions. Finally, the sample of survey respondents only represented the existing or prospective members of a specific investment fund. Exclusion of other investors who had personal investment in the stock markets, as well as institutional investors, made the sample less representative. Further, it can be argued that failure to identify whether the investors have shares in the Australian resources sector companies would result in a lack of connectedness of the survey to the content analysis of resources sector annual reports. however, it is assumed that as the title of the online article in which the survey link is provided, mentioned specifically resources sector, the investors having concerns in the resources sector companies would be interested in undertaking the survey. Therefore, the results obtained in the investors' survey should be used with caveats for generalising the conclusions.

9.7 Concluding remarks and further research

The content analysis instrument CONQUARF developed in this study has extended the analysis of the quality of environmental disclosures by integrating the qualitative characteristics prescribed in a number of established reporting frameworks and guidelines. The instrument enabled the identification of what was disclosed and to what extent such disclosures conformed to quality. The additional connotative analysis of disclosures explained how language and other visual tools such as graphs, tables and pictures can be deliberately used to convey messages intended by managers.

The responses obtained from the investors' survey correspond to the findings of the content analysis in relation to the low or non-disclosures by small companies and the association of high quality disclosures with regulation. The findings of this research as a whole indicated that managers and investors share a similar ideological ground with regard to the environmental obligations of entities. It is recommended that appropriate regulatory intervention be applied to make companies more accountable and thus, to enhance the quality of environmental disclosures. Hence, the role of regulation of the environment in enhancing the environmental management policies of organisations and disclosures would offer a potential theme for future research.

It would be useful if further research was conducted to test CONQUARF across different sectors and in different geographical settings to identify further enhancements or limitations to the model. Future research should involve obtaining management opinions via semi-structured interviews in relation to their understanding of the need for providing environmental disclosures and identifying the difficulties in applying existing reporting guidelines to provide such disclosures. The content analysis of the annual and sustainability reports shows that the quality of disclosures varies across the disclosure categories (e.g., emission disclosures cover more quality attributes than effluent disclosures). It is imperative to know whether such a variation results from the lack of knowledge in obtaining data from reliable sources and/or from a lack of understanding as to how to report such data.

The current study could be extended by undertaking interviews of the interviewees of the pilot study about the issue of corporate environmental management and disclosures. The findings of this investigation show that the extent of disclosures can vary from no disclosures to a large volume of disclosures across companies. Future research should involve surveys or interviews in order to obtain the views of regulators, auditors, accountants, and environmentalists with regard to the quality of environmental disclosures. Such views would provide insights in developing methods of identifying, reporting and evaluating the significant organisational impacts on the environment and how these impacts are managed. It is stressed in prior literature that '*accounting researchers must be involved in developing techniques'* and demonstrating their application for the purpose of evaluating corporate environmental impacts (Epstein, 2003, p. 21).

It is concluded that in the absence of regulation, providing environmental disclosures will continue to be regarded as best practice and portrayed as a virtue instead of a necessity. Without specific obligatory guidelines, relevance, materiality and the faithful representation of available disclosures would be a major concern.

APPENDICES

Appendix 1: Extended list of categories and sub-categories

Categories	Sub-categories	Explanation/Examples
1. Environmental strategy	1. Identifying challenges	'Our operations are subject to various national and regional laws and regulations governing environmental protection, rehabilitation and closure' (BHP Annual Report 2009c)
	2. Identifying business impact, risks and opportunities	'These businesses, by their nature, have the potential to affect the environment … Climate change and greenhouse effects may adversely impact our operations and markets' (BHP Annual Report 2009)
	3. Setting performance targets	'We run programs to improve our environmental performance, set specific targets, such as for energy use and greenhouse gas emissions, and track our progress against our targets'(BHP Annual Report 2009)
	4. Corporate governance	ORG has a separate 'Health, Safety and Environment Committee' which met four times in 2009 (ORG, 2009a)
Specific Disclosure		
2. Materials	5. Use/production	Production of mineral products is analysed
3. Energy	6. Use	Amount (e.g., joules) of energy consumption by the source
	7. Initiative to reduce the use and reduction achieved	'Origin has also developed a substantial portfolio of renewable energy opportunities. This includes wind, geothermal and solar photovoltaic energy' (ORG, 2009a).
4. Water	8. Use	Consumption of water disclosed in mega litre or other units
	9. Water sources significantly affected	Types of the water sources that are significantly affected by withdrawal of water – such as ground water, river water and purchased water
	10. Water volume recycled or re-used	Volume of water in mega litre that undergoes treatment process and re-used
	11. Use in processing/cooling/ consumption*	'In 2008/09 water used as part of our cooling system at HC Extractions totalled 27.45 ML…' (AGL, 2009a).
	12. In thermal or nuclear power plant*	Use of water in mega litre in nuclear power station
5. Emissions	13. Overall greenhouse gas (GHG) emission	Total volume of GHG in tonnes of CO2 equivalent
	14. Direct GHG emission	Emissions from the sources that are owned or controlled by the reporting organisation
	15. Indirect GHG emission	Emissions results from the generation at sources purchased from other organisations (e.g., electricity)
	16. Other emissions	Emissions results from business travel and transport

	17. Initiatives to reduce and reduction achieved	Undertaking
	18. ODS emission	Volume of ozone depleting substances in tonnes
	19. NOx	Weight of NOx in kilograms
	20. SOx	Weight of SOx in kilograms
	Emission per Megawatt hour (MWh) in terms of	
	21. *from all generating capacity	Emission from all generation capacity
	22. *from consumption by all power plants	A breakdown of emissions by geographic locations of power plants
6. Effluents	23. Amount	Total amount of discharge in terms of volume (e.g., cubic metres per year)
	24. Quality of discharge	Classification of discharge in terms of hazardous and non-hazardous
	25. Destination	Final destination of discharge in river water, isolated containment or underground
	26. Treatment method	Treatment method such as land-fill, chemical or biological treatment before being discharged into the natural environment
	27. Recycling	Total amount of waste water processed and re-used in the same facility or different organisations
7. Waste	28. Amount	Amount of waste produced in tonnes
	29. Nature	Classified as hazardous and non-hazardous
	30. Disposal method	Land-fill, composting or incineration
	31. Recycling	Recycled and re-used in the same process or other purposes
8. Biodiversity	32. Area disclosure related to the size and biodiversity value	Habitat description and whether the fields of operation are in, or adjacent to, the area with high biodiversity value or require specific conservation care
	33. Detailed impact on habitat	Impact of operations on the ecology of the area including plants, species, habitat and changes in ground water level
	34. Initiatives to reduce impact	Implementation of specific strategies to prevent the negative impacts of business activities
9. Impact of transportation		Impact of transport resulting from spill, emission, noise and energy use
10. Products/ services		Impact of product and services and initiatives to mitigate them
11. Compliance/ breach		Fines or sanctions for breach of specific environmental laws

*Electric utility sector supplement disclosure categories

Appendix 2: List of the sample companies

Metals/Mining (59)
Name (ASX code)
BHP Billiton Limited (BHP)
Rio Tinto Limited (RIO)
OZ Minerals Limited (OZL)
Macarthur Coal Limited (MCC)
OneSteel Limited (OST)
Aquarius Platinum Limited (AQP)
Lynas Corporation Ltd (LYC)
Brickworks Ltd (BKW)
Minara Resources Ltd (MRE)
Beadell Resources Ltd (BDR)
Focus Minerals Ltd (FML)
Silver lake Resources Ltd (SLR)
IMX Resources Ltd (IXR)
Ramelius Resources Limited (RMS)
Orocobre Limited (ORE)
Eldorado Gold Corporation (EAU)
Adamus Resources Ltd (ADU)
Golden West Resources (GWR)
Norton Gold Fields Ltd (NGF)
Azumah Resources Ltd (AZM)
Iron Ore Holdings Ltd (IOH)
Mindax Ltd (MDX)
Centaurus Metals Limited (CTM)
Bannerman Resources Limited (BMN)
Nyota Minerals Limited (NYO)
Jupiter Energy Limited (JPR)
AusQuest Limited (AQD)
Austpac Resources N.L. (APG)
Papillon Resources Ltd (PIR)
Crusader Resources Limited (CAS)
Sierra Mining Limited (SRM)
Gold Anomaly Limited (GOA)
Great Western Exploration Limited (GTE)
Carpentaria Exploration Limited (CAP)
Admiralty Resources NL (ADY)
Cobar Consolidated Resources Limited (CCU)
Magnetic Resources NL (MAU)
NSL Consolidated (NSL)

Golden Cross Resources (GCR)
Mundo Minerals Limited (MUN)
GME Resources Ltd (GME)
Altura Mining Ltd (AJM)
Augur Resources Ltd (AUK)
Royalco Resources Ltd (RCO)
MHM Metals Limited (MHM)
Copper Strike (CSE)
Torian Resources NL (TNR)
Metals Australia Ltd (MLS)
Sinovus Mining Ltd (SNV)
Quay Magnesium Limited (QMG)
Nimrodel Resources Limited (NMR)
Brazilian Metals Group Ltd (BMG)
Australia oriental minerals (AOM)
Killara Resources Ltd (KRA)
White Cliff Minerals Limited (WCN)
Rimfire Pacific Mining NL (RIM)
Pacific Mining Limited (PFM)
Eagle Nickel Limited (ENL)
Outback Metals Limited (OUM)
Energy (36)
Name
Origin Energy Limited (ORG)
Coal & Allied Industries Limited (CNA)
Paladin Energy Limited (PDN)
Karoon Gas Australia Limited (KAR)
Drillsearch Energy Limited (DLS)
Cue Energy Resources Ltd (CUE)
Nido Petroleum Ltd (NDO)
Linc Energy (LNC)
New Zealand Oil & Gas Limited (NZO)
Bow Energy (BOW)
Otto Energy (OEL)
Cockatoo Coal Limited (COK)
Cooper Energy Limited (COE)
Mission New energy Ltd (MBT)
Wildhorse Energy Ltd (WHE)
African Energy Ltd (AFR)
Marmota Energy (MEU)
Galilee Energy Limited (GLL)
Equatorial Coal Limited (EQX)

Planet Gas (PGS)
Acer Energy Ltd (ACN)
Sino Gas & Energy Holdings Limited (SEH)
Crossland Uranium Mines Limited (CUX)
Pryme Energy Limited (PYM)
Azimuth Resources Limited (AZH)
Bounty Mining Ltd (BNT)
Northern Minerals Limited (NTU)
Advance Energy (AVD)
Strategic Energy Resources (SER)
Whinnen Resources Limited (WWW)
Coal Fe Resources Limited (CES)
Kilgore Oil and Gas Ltd (KOG)
Agri Energy Ltd (AAE)
Somerton Energy Limited (SNE)
Longreach Oil Limited (LGO)
Excelsior Gold Limited (EXG)
Utilities (8)
Name
AGL Energy Limited (AGL)
Envestra Ltd (ENV)
Infigen Energy (IFN)
Ethane Pipeline Income Fund (EPX)
Geodynamics Limited (GDY)
Pacific Energy Limited (PEA)
Enerji Ltd (ERJ)
Geothermal Resources Limited (GHT)

Appendix 3: Separate quality criteria used for non-quantifiable disclosure categories

Effluents discharge and waste disposal:

Attributes	Examples
Quality	'Non-mineral waste is categorised as either hazardous or non-hazardous. Hazardous non-mineral waste includes oil, materials contaminated with hydrocarbons …' (BHP, 2009b, p. 14)
Destination	'Excess water from the tailings dam passes through a series of polishing ponds before being discharged to a tributary of the Kobok River' (NCM, 2009, p. 41)
Treatment method	'At Gosowong, tailings pass through a cyanide detoxification unit before being discharged to the tailings dam' (NCM, 2009, p. 41)
Re-use	'Water conservation and recycling at the EKATI Diamond Mine … have reduced surface freshwater … and have reduced the volume of effluent discharged into the environment' (BHP, 2009b, p. 14)

Biodiversity:

Attributes	Examples
Area disclosure	'As a result of our mining, processing, smelting and petroleum activities, we have disturbed 166,000 hectares of land … of which 38,500 hectares have been rehabilitated' (BHP, 2009b, p. 14)
Impacts on habitat	'The intrinsic nature of the operation of Cadia Hill Open Cut and Ridgeway underground mine will result in disturbance of large areas of land' (NCM, 2009, p. 34)
Initiatives to reduce impacts	'CVO has entered into an agreement with Orange City Council to receive and store biosolids for rehabilitation and soil enhancement purposes' (NCM, 2009, p. 35)

Environmental strategy:

Attributes	Examples
Corporate governance	'Newcrest's Risk Management Framework is used to identify and evaluate risk events … major hazard risks (including operational, safety and environmental)' (NCM, 2009, Corporate Governance Statement, p. 16)
Identifying challenges	'AGL recognises that climate change and air quality are critical issues facing the global community and accepts the scientific consensus that greenhouse gases … need to be stabilised to minimise dangerous climate change …' (AGL, 2009b, p. 8)
Identifying risks	'As Australia moves towards renewable and other more expensive energy resources, energy companies will need to increasingly focus on the consequences …' (AGL, 2009b, p. 6)
Setting targets	'The expansion of the Renewable Energy Target … with the ability to develop up to 2,000 MW of identified renewable projects …' (AGL, 2009b, p. 8)

Appendix 4: Reliability of content analysis

The coincidence matrices prepared for computing the Krippendorff's alpha reliability accounts for all values entered by the coders presented in the reliability data matrices.

Calculating Krippendorff's α:

Template of reliability matrices table

		Coder 1	
		1	**0**
Coder 2	1	O_{11}	O_{10}
	0	O_{01}	O_{00}

Reliability matrix table with data for all values entered by the coders

		Coder 1		**Row totals**
		1	**0**	
Coder 2	**1**	560	45	605
	0	45	2830	2875
	Column totals	605	2875	**3480**

The formula for calculating Krippendorff's α = $1 - \frac{Do}{De}$

Where, *Do* is the observed disagreement among values assigned to the unit of analysis

And *De* is the expected disagreement that one would expect when the coding of units is attributable to chance rather than to the properties of these units

The formula for computing Binary α reliability:

$_{\text{Binary}}\ \alpha = 1 - [(n-1)\frac{O_{01}}{n_0 . n_1}]$

Where, n = the total number of values paired = 3480

O_{01} = Number of pairs of observed disagreement = 45

(For this binary data, mismatching coincidences occur in two cells O_{01} and O_{10} of equal frequency, 10)

n_0 = Number of 0s in the reliability data matrix = 2875

n_1 = Number of 1s in the reliability data matrix = 605

Therefore, Krippendorff's α for disagreement = 1 – [3479 x (45/(2875x605)] = 0.09

[Expected disagreement = ((row totals x columns totals)/n-1] = (605*2875)/(3480-1) = 499.96

Which means, **the Krippendorff's α reliability = 1 – 0.09 = 0.91**

Coefficient of reliability:

Coefficient of reliability is calculated as *'the ratio of coding agreements to the total number of coding decisions'* (Holsti, 1969, p. 140). The formula to calculate the Coefficient of reliability (CR):

$$\frac{2M}{N1 + N2}$$

Where, M = the number of coding decisions that the coders agree upon

N1 and N2 = the total number of coding decisions made my each of the coders

With 3390 (calculated as 560 + 2830, see the 'Reliability matrix table with data for all values entered by the coders') coding decision agreed upon out of 3480, calculation of the coefficient of reliability for twenty text coded reports resulted in a 97.4 per cent agreement.

Calculation of Scott's pi:

Coefficient of reliability does not take into account the number of coding agreements occurring as a result of chance (Holsti, 1969). Calculation of Scott's pi takes into account the possibility of agreement by chance. The formula for calculating Scott's pi is :

$$\frac{\%\ of\ observed\ agreement - \%\ of\ expected\ agreement}{1 - expected\ agreement}$$

The coincidence matrices prepared for computing Scott's pi accounts for units in two dimensions or a pair of values entered by two coders on a coding decision. The following matrices are prepared based on the number of coding decisions made by the two independent coders:

Template of contingency matrices table

		Coder 1	
		1	**0**
Coder 2	1	O_{11}	O_{10}
	0	O_{01}	O_{00}

Contingency matrices table with data for paired values entered by the coders

		Coder 1		Row totals
		1	**0**	
Coder 2	**1**	280	26	306
	0	19	1415	1434
	Column totals	299	1441	**1740**

O_{11} = the number of times the coders agree on decision '1'
O_{00} = the number of times the coders agree on decision '0'
O_{10} and O_{01}= the number of times the coders disagree

The number of *Expected frequency* (E) per cell is calculated by the following formula:

$$\frac{(Row\ totals)(column\ totals)}{Number\ of\ assertions\ being\ coded}$$

The Coincidence matrices with the value of the expected frequency (shown in bold and italic) in those cells represent agreement along the diagonal cells are shown below:

Contingency matrices table with expected frequency data

		Coder 1		Row totals
		1	**0**	
Coder 2	**1**	280	26	306
		52.58	253.41	
	0	19	1415	1434
		246.41	***1187.58***	
	Column totals	299	1441	1740

The sum of expected frequency in cells that represent agreement: (52.58+1187.58) = 1240.16
The per cent of expected agreement is calculated as: $\frac{2E}{N1+N2}$ = $\frac{2*1240.16}{1740+1740}$ = 0.7127

Therefore, the Scott's pi is calculated as:
(0.97 – 0.71)/ (1 – 0.72) = 0.8965

Scott's Pi is equal to or more than 0.8 is recommended as strong inter-coder reliability.

Appendix 5: Analysis of the quality of disclosures

Metals/Mining sub-sector quality analysis

Disclosure categories	**Elements of quality coding tool**					**Total disclosure**
	a: general disclosure	b: quantified unit	c: classified	d: compared	e: calculation method	**Total disclosure**
Production	27	24	11	5	1	**68**
Energy use	8	8	6	3	7	**32**
Energy initiative	7	4	2	2	3	**18**
Water Use	8	5	3	4	1	**21**
Water source affected	5	3	3	2	0	**13**
Water recycled	6	3	0	1	0	**10**
Overall GHG	8	7	6	4	5	**30**
Direct GHG	3	3	2	0	1	**9**
Indirect GHG	3	3	2	0	1	**9**
Initiative reduce	3	1	0	1	1	**6**
ODS	2	1	0	1	1	**5**
NOx	3	3	1	2	2	**11**
SOx	3	3	1	2	2	**11**
Other emissions	3	2	1	0	0	**6**
Effluents discharge	3	2	1	2	0	**8**
Waste and/or spill	7	3	3	2	1	**16**
Product impact	2	0	0	0	1	**3**
Total disclosure	**101**	**75**	**42**	**31**	**27**	**276**
Percentage	0.37	0.27	0.15	0.11	0.10	

Energy sub-sector quality analysis

Disclosure categories	**Elements of quality coding tool**					**Total disclosure**
	a: general disclosure	b: quantified unit	c: classified	d: compared	e: calculation method	**Total disclosure**
Production	15	12	4	9	6	**46**
Energy use	1	0	0	0	0	**1**
Energy initiative	1	1	0	1	0	**3**
Water use	3	2	1	2	0	**8**
Water use in processing*	1	1	1	1	0	**4**
Water source affected	2	0	0	0	0	**2**
Water recycled	1	0	0	0	0	**1**
Overall GHG	3	2	1	2	2	**10**
Direct GHG	1	1	1	1	1	**5**
Indirect GHG	1	1	1	1	1	**5**
Initiative reduce	2	2	1	1	1	**7**
ODS	0	0	0	0	0	**0**
NOx	1	1	1	1	1	**5**
SOx	1	1	1	1	1	**5**
Other emissions	0	0	0	0	0	**0**
Emission from generation & capacity*	1	1	1	1	1	**5**
Emission from combustion*	1	1	1	1	1	**5**
Effluents discharge	2	0	0	1	0	**3**
Waste and/or spill	4	2	2	1	0	**9**
Product impact	0	0	0	0	0	**0**
Total disclosure	**41**	**28**	**16**	**24**	**15**	**124**
Percentage	0.33	0.23	0.13	0.19	0.12	

*Electric utility sector supplement disclosure categories

Utility sub-sector quality analysis

Disclosure categories	Elements of quality coding tool					Total disclosure
	a: general disclosure	b: quantified unit	c: classified	d: compared	e: calculation method	**Total disclosure**
Production	5	5	1	1	1	**10**
Energy use	1	1	1	0	1	**4**
Energy initiative	1	1	0	0	1	**3**
Water use	1	1	0	1	0	**3**
Water use in processing*	0	0	0	0	0	**0**
Water source affected	1	0	1	0	0	**4**
Water recycled	0	0	0	0	0	**0**
Overall GHG	1	1	1	1	1	**5**
Direct GHG	0	0	0	0	0	**0**
Indirect GHG	0	0	0	0	0	**0**
Initiative reduce	1	1	1	1	1	**5**
ODS	1	1	1	1	1	**5**
NOx	1	1	1	1	1	**5**
SOx	1	1	1	1	1	**5**
Other emissions	0	0	0	0	0	**0**
Emission from generation & capacity*	1	1	1	1	1	**5**
Emission from combustion*	0	0	0	0	0	**0**
Effluents discharge	0	0	0	0	0	**0**
Waste and/or spill	1	0	0	0	0	**1**
Product impact	1	1	1	1	1	**5**
Total disclosure	**17**	**15**	**10**	**9**	**10**	**60**
Percentage	0.28	0.25	0.17	0.15	0.17	

*Electric utility sector supplement disclosure categories

Appendix 6: Correspondence details of the external statistics expert

Neil Diamond Ph.D.
Associate Professor
Statistical Support, Victoria University
Director, ESQUANT Statistical Consulting
Telephone +61 3 8371 0027
Email: neil.diamond@esquant.com.au

Appendix 7: Pre-test interview checklist for evaluating the questionnaire for investors' survey

Interviewee demographic characteristics:

Age group		Gender		Occupation
20 – 29 years		Male		
30 – 39 years		Female		
40 – 49 years				
More than 50 years				

Completion time: ……..

1. Content of the scenarios/choices/questions

a) **Clarity**: Are there words or phrases you do not understand?

Scenario	Pollution	Waste disposal
Response		

Questions	1	2	3	4	5	6	7	8	9	10
Response										

Comments: ……

b) **Specificity:** Are specific events, instances or options clear to you?

Scenario	Pollution	Waste disposal
Response		

Questions	1	2	3	4	5	6	7	8	9	10
Response										

Comments: ……

c) **Appropriate vocabularies:** Is there any jargon or terms you do not understand?

Scenario	Pollution	Waste disposal
Response		

Questions	1	2	3	4	5	6	7	8	9	10
Response										

Comments: ……

d) **Emphasis:** Are the italicised words noticeable? Should any sections be emphasised?

Scenario	Pollution	Waste disposal
Response		

Questions	1	2	3	4	5	6	7	8	9	10
Response										

Comments: ……

e) **Simplicity:** Is the structure of the sentences and questions easy to follow? Did you have to read any questions twice?

Scenario	Pollution	Waste disposal
Response		

Questions	1	2	3	4	5	6	7	8	9	10
Response										

Comments: ……

f) **Length:** Is any question too long?

Scenario	Pollution	Waste disposal
Response		

Questions	1	2	3	4	5	6	7	8	9	10
Response										

Comments: ……

g) Does any question need to be elaborated?

Scenario	Pollution	Waste disposal
Response		

Questions	1	2	3	4	5	6	7	8	9	10
Response										

Comments: ……

h) **Neutrality:** Do you feel that any of the questions lead you to a particular answer?

Questions	1	2	3	4	5	6	7	8	9	10
Response										

2. Format of the questionnaire:

a) Do the scenarios/choices and questions follow logically?

Scenario	Pollution
Response	

Questions	1	2	3	4	5	6	7	8	9	10
Response										

Comments: ……

b) Does the format of any section restrict your readability of that section?

Scenario	Pollution	Waste disposal
Response		

Questions	1	2	3	4	5	6	7	8	9	10
Response										

Comments: ……

c) Does the format of any section restrict your understanding of that section?

Scenario	**Pollution**	**Waste disposal**
Response		

Questions	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Response										

Comments: ……

3. Instrument:

a) Is the questionnaire easy to read?

Comments: ……

b) Is the questionnaire too cluttered?

Comments: ……

Appendix 8: Survey article posted on the website of Morningstar

MORNINGSTAR®

Survey: Are resource companies environmentally responsible?

Staff | 27 Nov 2012

Page 1 of 1

The resources sector is a major part of the Australian economy, with mining companies dominating the Australian Securities Exchange.

Waste disposal and pollution are becoming major environmental concerns for these mining companies. These companies, however, are confronted with a number of options that will impact their investment-making decisions.

In choosing the advantages of one option, managers are compelled to forego the benefits of the alternative courses of action and this in turn affects investment decision-making by shareholders.

As shareholders in resource companies, Morningstar readers are invited to participate in a research project conducted by Victoria University.

The project, titled "Analysis of the quality of environmental disclosures of the Australian resources sector companies," aims to get an understanding of investors' preferences across certain courses of action that managers may take when facing environmental dilemmas.

The survey will take around 10 to 15 minutes to complete and your details, including your responses to the questions, will remain anonymous.

Morningstar is committed to informing the investor about investment issues. Your involvement in this survey will help improve the current environmental disclosure policies and practices of the resource companies you invest in.

You can complete the online survey here. The survey needs to be completed by **19 December 2012**.

Appendix 9: Survey questionnaire

Invitation to participate in a survey on environmental disclosure issues

You are invited to participate in a research project entitled *Analysis of the Quality of Environmental Disclosures of the Australian Resources Sector Companies*.

Project details

Waste disposal and pollution are becoming major environmental concerns for mining companies in Australia. However, managers often face dilemmas in making decisions from alternative options while dealing with these concerns. Some of these dilemmas include choices between self-interest versus collective interest, economic versus environmental and short term versus long term benefit. Each option has its own advantages and disadvantages. In choosing the advantages of one option, managers are compelled to forego the benefits of the alternative course of actions and this in turn affects investment decision-making by shareholders. This project aims to obtain an understanding of investors' preferences across certain courses of actions that managers may take while facing environmental dilemmas in a given context.

What will I gain from participating?

You may benefit from participating in this research by contributing to a broad discussion that has the potential to improve current environmental disclosure policies and practices.

How will the information I give be used?

The survey response will be collected in an integrated data file and analysed in an aggregated manner. The final result will be in a collective form and will have contribution to the policy making in corporate environmental reporting. The result will be published in the proposed PhD thesis and in various professional and academic journals.

What are the potential risks of participating in this project?

Your participation is entirely voluntary and remains anonymous. Data will be coded and remain non-identifiable. Any personally identifying information collected from participants will not be retained. Data will be stored in the computer of the investigating member which is password protected. The computer is kept in a secured shelf in the personal office of the chief investigator which is always kept locked. The confidentiality of the responses will be completely assured. Strong measures will be put in place to protect the privacy of participants by ensuring confidentiality of their responses and anonymity in all reports arising from the study.

How will this project be conducted?

The method obtained in this project is conducting an online questionnaire survey. The relevant authoritative personnel of a number of investment funds and associations will be contacted and requested to circular the survey link via email. The participation of the respondents will be entirely voluntary. Participation in the survey will constitute the consent of a potential respondent. The respondents will be sent a follow up email two weeks after the first email.

What will I be asked to do?

- The questionnaire presents two small scenarios and a general questions section.
- The scenarios are related to pollution and waste disposal with four questions under each scenario.
- Each scenario presents an environmental problem and four possible choices of actions or ways of responding. In the first question under each scenario, you are asked to rank your preferences among the choices as 1st, 2nd, 3rd and 4th.
- Three additional questions are presented under each scenario. And there are two further questions under the general questions section. The responses to these questions are in the form of multiple choice or ranking.

Contact details of the investigating team:

Organisation/s involved in the project:

Chief Investigator:

Student Researcher:

Any queries about your participation in this project may be directed to the Chief Investigator listed above.

If you have any queries or complaints about the way you have been treated, you may contact:

Research Ethics and Biosafety Manager
Victoria University Human Research Ethics Committee
Victoria University, PO Box 14428, Melbourne, VIC, 8001 or phone (03) 9919 4148.

NOTE: THIS QUESTIONNAIRE WILL TAKE 10-15 MINUTES TO COMPLETE.

Scenario 1: Air Pollution

Questions 1 to 4 are related to the following scenario.

Little Ltd is a **small** coal mining company operating with other small mining companies in a region in Australia. The amount of pollution discharged by these companies individually is

less than the threshold that is required to be disclosed by government regulation. However, the total amount of pollution discharged by all the companies together in that region is likely to reach a level which is detrimental to the inhabitants. This may attract negative media attention and result in greater regulation in the near future. Adoption of any pollution control measures by the company will reduce the risk of fine/penalty due to possible breach of the potential future environmental laws, but at the same time, increase the current operating costs.

Considering this situation, the managers of Little Ltd may choose any of the following **four choices**. They:

A. ***Do not*** expend resources on pollution control activities ***even if*** the managers of the other mining companies ***do***. This helps to reduce the pollution in that region but might cause Little Ltd to attract negative media attention in the future.

B. ***Expend*** resources on pollution control activities ***only if*** the managers of the other mining companies ***do*** the same as well. This helps to reduce the pollution in that region.

C. ***Do not*** expend resources on pollution control activities ***particularly if*** the managers of the other mining companies ***do not*** expend as well. This increases pollution in that region.

D. ***Expend*** resources on pollution control activities ***even if*** the managers of the other mining companies ***do not***. This increases pollution in that region but Little Ltd may attract favourable media attention in the future.

1. **For each of the above choices (A, B, C and D) please indicate your preferences from 1st to 4th with 1st being the most preferred and 4th being least preferred.**

	1st preference	2nd preference	3rd preference	4th preference
Choice A	○	○	○	○
Choice B	○	○	○	○
Choice C	○	○	○	○
Choice D	○	○	○	○

2. **If Little Ltd expends resources on pollution control measures it is likely to gain a competitive advantage in the future. Do you agree?**

○ Agree

○ Disagree

○ Neither agree nor disagree

3. Listed below are possible reasons that the managers of the Little Ltd might have had *for expending resources* on pollution control measures.

From your point of view, please rank the reasons from the most important (1st) to the least important (4th).

	1st	2nd	3rd	4th
To increase profit in the long run through cost savings made by avoiding possible penalty and fines	○	○	○	○
Managers value the well-being of environment	○	○	○	○
To increase the reputation of the company as being environmentally responsible.	○	○	○	○
To reduce the risk of non-compliance with potential regulations resulting from negative media attention	○	○	○	○

4. If Little Ltd expends resources on pollution control measures, it is likely to report the change in pollution discharge in the Annual Report. Do you agree?

- ○ Agree
- ○ Disagree
- ○ Neither agree nor disagree

Scenario 2: Waste Disposal

Questions 5 to 8 are related to this scenario.

Big Ltd is a **large** coal mining company that operates in a number of regions in Australia and overseas. Recently, it commenced operations in the head-waters region of a river into which it dumps toxic waste. No immediate detrimental impact is obvious in that region as the waste is carried away by the current. However, it is envisaged that over a period of time the waste will accumulate downstream. This will adversely affect the water quality and cause contamination of the fish stock and vegetation in that region. This will also result in negative media attention and may increase regulation relating to clean-up costs and prevent the company from using the river in the future. Adoption of alternate safe waste disposal methods by the company will prevent all these future negative impacts but will substantially increase the company's current operating costs and decrease the return to shareholders.

Considering this situation, the managers of Big Ltd may choose any of the following **four choices**. They:

A. ***Do not expend*** resources on safe waste disposal methods ***BUT disclose*** the impacts of waste disposal in the Annual Report.

B. ***Expend*** resources on safe waste disposal methods ***AND disclose*** the impacts safe disposal in the Annual Report.

C. ***Neither expends*** resources on safe waste disposal methods ***nor discloses*** the impact of waste disposal in the Annual Report.

D. ***Expend*** resources on safe waste disposal methods ***BUT do not disclose*** the impact of safe disposal in the Annual Report.

5. For each of the above choices (A, B, C and D) please indicate your preferences from 1st to 4th with 1st being the most preferred and 4th being least preferred.

	1st preference	2nd preference	3rd preference	4th preference
Choice A	○	○	○	○
Choice B	○	○	○	○
Choice C	○	○	○	○
Choice D	○	○	○	○

6. Listed below are possible reasons that the managers of the Big Ltd might have had for *EXPENDING RESOURCES* on safe waste disposal methods.

From your point of view, please rank the reasons from the most important (1st) to the least important (5th).

	1st	2nd	3rd	4th	5th
To avoid regulatory risks, such as penalties or loss of license.	○	○	○	○	○
To avoid conflict with environmental groups	○	○	○	○	○
To enhance reputation of the company	○	○	○	○	○
To gain competitive advantage through the innovative safe waste disposal method	○	○	○	○	○
Managers value the well-being of environment	○	○	○	○	○

7. Listed below are possible reasons that the managers of the Big Ltd might have had for *DISCLOSING* their waste management performance.

From your point of view, please rank the reasons from the most important (1st) to the least important (5th).

	1st	2nd	3rd	4th	5th
To gain competitive advantage through the innovative safe waste disposal method	○	○	○	○	○
To avoid regulatory risks, such as penalties or loss of license	○	○	○	○	○
To enhance reputation of the company	○	○	○	○	○
Managers value the well-being of the environment	○	○	○	○	○
To avoid conflict with environmental groups	○	○	○	○	○

8. If Big Ltd expends resources on safe waste disposal methods, it is likely to gain a competitive advantage in the future. Do you agree?

- ○ Agree
- ○ Disagree
- ○ Neither agree nor disagree

GENERAL QUESTIONS

9. What levels of disclosures relating to pollution should apply to small versus large companies?

Please indicate your opinion by selecting either 'yes' or 'no' in the drop down menu for each level of disclosure for both: small companies (revenue: less than $25 million) and large companies (revenue: $25 million or more).

	Small companies	Large companies
Level 1: Statutory declaration that the company is complying with the existing environmental laws.		
Level 2: Level 1 disclosure **plus** a general statement regarding the company's exposure to potential regulatory risks. For example, "Our operations are subject to potential laws and regulations governing environmental protection, rehabilitation and closure."		
Level 3: Level 1 & 2 disclosures **plus** a general statement on the impact of the company's operations on the environment. For example, "our operations, by their nature, have the potential to pollute the natural environment. We run programs to control such impacts"		
Level 4: Level 1, 2 & 3 disclosures **plus** the specific disclosures on pollution. For example, the amount, nature (toxic/non-toxic), measurable targets and performance against the targets. [*Note: Companies need to implement appropriate information systems at additional costs to produce these disclosures*].		
Level 5: Level 1, 2, 3 & 4 disclosures **plus** an independent environmental assurance report. [*Note: Companies need to employ environmental auditors at additional costs to produce such a report.*]		

10. Are you willing to invest or hold shares in a company if its expenditure on safe environmental initiatives reduces its short-term (i.e., two years) profit?

- Yes
- No

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11. What is your gender?

- Female
- Male

12. Which category below includes your age?

- 18-35
- 36-45
- 46 or older

13. What is the highest level of education you have completed?

- Less than high school degree
- High school degree or equivalent
- Some college but no degree
- University degree

14. Do you personally manage your own investments in the share market?

- Yes
- No

15. Does any investment fund(s) manage your investments in the share market on your behalf?

- Yes
- No

End of the questionnaire

Appendix 10: The preference ranking of the four choices in Scenario 1 (Question 1)

Non-weighted percentages (%) and the higher and lower limit of the range at 95 per cent confidence interval

Choices	Designation	1st preference			2nd preference			3rd preference			4th preference		
		%	high	low	%	high	low	%	high	low	%	high	low
A	Unilateral defection	3.54	6.11	0.96	2.53	4.71	0.34	17.68	22.99	12.36	**76.26**	82.19	70.34
B	Mutual cooperation	**79.80**	85.39	74.21	16.16	21.29	11.03	4.04	6.78	1.3	0	0	0
C	Mutual defection	1.52	3.22	-0.19	**51.52**	58.48	44.55	36.36	43.06	19.66	10.61	14.90	6.32
D	Unilateral cooperation	15.15	20.15	10.16	29.80	36.17	23.43	**41.92**	48.79	35.05	13.13	17.84	8.43

Appendix 11: Reasons to undertake pollution control: investors' preference Little Ltd

Non-weighted count (N) and percentages (%)

	Preference ranking				
Reasons for spending on pollution control measures	**1st N (%)**	**2nd N (%)**	**3rd N (%)**	**4th N (%)**	**Row total**
To increase profit in the long-run through cost savings made by avoiding possible penalty and fines	24 (12.12)	**132 (66.67)**	32 (16.16)	10 (5.05)	198 (100)
To reduce the risk of non-compliance with potential regulations resulting from negative media attention	**154 (77.78)**	22 (11.11)	14 (7.07)	8 (4.04)	198 (100)
To increase the reputation of the company as being environmentally responsible	9 (4.55)	38 (19.19)	**145 (73.23)**	6 (3.03)	198 (100)
Managers value the well-being of the environment	11(5.56)	6(3.03)	7 (3.54)	**174 (87.88)**	198 (100)
Column total	198	198	198	198	

Appendix 12: The preference ranking of the four choices in Scenario 2 (Question 5)

Non-weighted percentages (%) and the higher and lower limit at 95 per cent confidence level

Choices	Designation	1st preference N (%)	2nd preference N (%)	3rd preference N (%)	4th preference N (%)	Row total N (%)
A	*disclose only*	2 (1.03)	14 (7.22)	**141 (72.68)**	37 (19.07)	193 (100)
B	*perform and disclose*	**186 (95.88**)	5 (2.58)	2 (1.03)	1 (.052)	193 (100)
C	neither *perform nor disclose*	6 (3.09)	7 (3.61)	33 (17.01)	**148 (76.29)**	193 (100)
D	*perform only*	0 (0.00)	**168 (86.60)**	18 (9.28)	8 (4.12)	193 (100)
Column total		193	193	193	193	

Appendix 13: Orientation of investment decision and cooperative strategy in Question 1

Variables	Cooperative strategy			
	Yes	No	Row total	Row % for cooperative strategy
Only personally managed	14	6	20	**70**
Via investment fund with or without personally managed fund	70	99	169	41.42

Appendix 14: Level of education and pro-environmental strategy in Question 5

Variable	Pro-environmental strategy		Row total	Row %
	Yes	No		
No university degree	35	8	43	81.4
University degree	140	8	148	**94.6**
Column total	175	16	191	

Appendix 15: Orientation of investment and pro-environmental strategy in Question 5

Variable	Pro-environmental strategy			
	Yes	No	Row total	Row %
Only personally managed	15	5	20	75
Via investment fund with or without personally managed fund	159	10	169	**94.1**
Column total	174	15	189	

Appendix 16: Age and willingness to sacrifice financial interest over environmental well-being

Variables	Willingness to sacrifice			
	Yes	No	Row total	Row %
45 years or less	43	15	58	74.14
45 years plus	121	12	133	**90.98**
Column total	164	27	191	

Appendix 17: Orientation of investment and pro-environmental strategy in Question 5

Variables	Willingness to sacrifice			
	Yes	No	Row total	Row %
Only personally managed	15	5	20	75
Via investment fund with or without personally managed fund	148	21	169	**87.57**
Column total	163	26	189	

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