Corporate environmentalism in JSE listed Gold, Platinum and Diamond Mining Companies - Environmental leadership importance, business orientation and corporate strategy focus.

Final Research Report

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by
S J van Wyk
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ABSTRACT

This study examines the importance of corporate environmentalism – the process by which company management integrates environmental concerns into their business decisions – in the South African JSE listed gold, platinum and diamond mining companies. It was clear that the era of corporate environmentalism has dawned in the South African mining environment as the elements testing this construct were found to be widely acknowledged and related to by the managerial levels sampled. It was evident from the extant literature that the degree of corporate environmentalism in a company is primarily a function of the values of company management. Therefore the effort and focus on environmental matters will be determined by the drive from company executives and senior leaders. The industry and company culture is also a main contributor to how the environment is perceived and how the priorities of corporate environmentalism will be lived up to.

The main constructs comprising the foundation for this study has been identified as environmental leadership importance, environmental business orientation and environmental strategy focus. These constructs proved to be intertwined and therefore present rather complex management challenges. A corporate environmentalism implementation pathway is presented in this study whereby companies can apply a theory based framework which is based on auctioning of appropriate environmental leadership gateways.

The importance of the constructs of corporate environmentalism for company management of the sample mining companies was further tested by posing a structured questionnaire to corporate environmental managers and functional environmental managers of JSE listed mining companies. Analysis of the results was conducted on the industry, sector, company and managerial level. As this study is representative of 34% of the market capitalisation of the South African JSE listed mining companies, the findings could be extrapolated to the broader mining industry that ascribes to the principles of the JSE Sustainability Reporting Index.

From the empirical study the hypothesis that environmental leadership is important for company management on the mining industry level was accepted. However, the

managerial buy-in into environmental business orientation still proved to be challenging for most of the companies as the hypothesis that company management is environmentally orientated in their business decisions has been rejected. Although the importance of inclusion of environmental issues into business strategy seems to gain some momentum, the hypothesis relating to its valuation by company management was also rejected. The buy-in and deployment of the sub-constructs of corporate environmentalism was however found to vary on a company specific basis although there were definite trends in company and industry responses.

It was also found that the majority of the sample companies only 'Mildly agreed' that corporate environmentalism was viewed as a strategic pillar by company management. Furthermore, companies 'Agreed' that focussed leadership is required for improved environmental performance but only 'Mildly agreed' to the importance of environmental management for corporate strategy decisions and excellence in business orientation. One would however expect in this time of increasing environmental pressure that company management would assign higher priority to the elements of corporate environmentalism.

Comparatively, the Platinum mining sector outshined both the Gold and Diamond mining companies regarding the importance of corporate environmentalism. It would however be too much of a generalisation as the construct importance should be reviewed on a company specific basis. It can be suggested that the platinum sector might have been much more attentive towards environmental matters as a result of the late environmental legislation that was introduced in the last decade to which the platinum sector had to adhere to during its expansion phase.

From a sub-construct specific perspective, environmental performance, ascribing to environmental values and a compliance drive towards environmental policy commitments were found to be the highest priority aspects for company management. It would appear that company management is not ignorant when it comes to environmental matters although there is reluctance when environmental expenditure is required that can have an influence on profits. Company management in the sampled mining companies are however not yet fully convinced about the business case for corporate

environmentalism which could be the reason for the finding that business recommendations by environmental personnel are not readily implemented by company management. The uptake of ownership regarding the responsibility towards environmental matters for company management proves to be rather slow and it is evident that management rely on specialist support and leadership to handle environmental matters. Environmental competence for company management is also not yet seen as strategically important.

It would further appear that the areas of managerial focus within mining companies hinges around the corporate governance requirements of the Triple-bottom-line and regulatory environment and not as much around the strategic and business value presented by corporate environmentalism. Therefore the regulatory command and control mindset is still largely embedded in the managerial paradigm of the companies sampled. An environmental business maturity matrix is therefore presented to categorise companies according to their maturity level of corporate environmentalism.

Some limitations regarding this research have been identified and included the lack of response from the functional environmental and industry level. The level of interpretation of constructs also presents some research limitations. The technical inclination of some of the constructs could also have left respondents uncertain and accessibility to relevant information could also have jeopardised the responses. The available literature on mining and corporate environmentalism was also a limiting factor for the research.

It is was therefore evident from this study that various knowledge gaps still exist pertaining to corporate environmentalism, specifically pertaining to the mining industry. The reason why the corporate and functional environmental managers in the companies in this study only 'Mildly agreed' on average should be determined. Only then can a better understanding be gained of the real drivers of corporate environmentalism in the mining environment. Secondly, the importance of corporate environmentalism should be established on the operational management levels of the mine including the views of the mine, engineering and technical managers and even board members. On a more holistic level, the real contribution of corporate environmentalism to shareholder value should also be pursued to gain insights into incentives for environmental management.

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I would also like to thank my wife, children, family and friends for their understanding and support.

I certify that the report is my own work and all references used are accurately reported.

Signed: ……..

Date: ……..

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List of Definitions

Corporate environmental management	Corporate guidance through specialised centres assisting functional levels of companies to reduce, evaluate, monitor and control their environmental impact (Schaltegger and Wagner, 2006).
Corporate Environmentalism	Corporate environmentalism is the organization-wide recognition of the legitimacy and importance of the biophysical environment in the formulation of organization strategy, and the integration of environmental issues into the strategic planning process (Banerjee, 2002).
Environmental Business Leadership	The ability of an individual or group to guide positive change toward a vision of an environmentally better future through the activities of the organisation. (Berry and Gordon, 1993).
Environmental business orientation	The notion of pro-actively managing the responsibility towards the environment by recognising the impact a company has on the environment and the need to minimize such impact through business decisions.
Environmental Impact	The influence of a company's activities on the physical natural environment (e.g. the impact on land, water and air quality and biodiversity). The emphasis is on processes and activities (Schaltegger *et al,* 2003).
Sustainability	Seeking to meet the needs and aspirations of the present without compromising the ability to meet those of the future. (WCED, 1987).

List of Abbreviations

CEM	Corporate Environmental Manager
Corp Env.	Corporate Environmental Manager (Graphs)
DMR	Department of Minerals
DWE	Department of Water and Environment
ELM	Environmental Leadership Model
Env. Man	Functional Environmental Manager (Graphs)
FEM	Functional Environmental Manager
ICMM	International Council for Mining and Metals
JSE SRI	Johannesburg Securities Exchange Social Responsibility Initiative
NGO's	Non Governmental Organisations
SA-GPDCs	South African Gold Platinum Diamond Companies
SHEQ	Safety Health Environmental Quality
UN	United Nations
NEMA	National Environmental Management Act of 1996
NWA	National Water Act of 1998
AQA	Air Quality Act of 2001
CARA	Conservation of Agricultural Resources Act of 1989
MRA	Minerals Act of 1991
MPRDA	Minerals and Petroleum Resources Development Act of 2002

1 ORIENTATION

1.1 AUDIENCE

The audience for this topic will be all parties interested and involved in corporate environmental strategy and broad environmental management the South African mining industry. These include:

- Corporate environmental portfolio groups responsible for sustainable development as part of executive boards of mining companies.
- Corporate and regional environmental managers of mining companies.
- Regulators and policymakers dealing with environmental policy, leadership and enforcement (DMR, DWE).
- Interest groups e.g. Chamber of Mines, Johannesburg Stock Exchange Sustainability Reporting Initiative, Centre for Sustainability in Mining and Industry (CSMI), International Council on Mining and Metals (ICMM). Various NGO's and environmental pressure groups could also be interested in the research.
- Academia involved in research on various levels of mining and the environment, and corporate environmental governance.
- Environmental service suppliers to the mining industry including design consultancies, financial services and influential contractor companies.

1.2 CONTEXTUAL SETTING OF THE TOPIC TO BE RESEARCHED

There is an increasing awareness that the attitudes and actions of business leaders and managers play a crucial role in determining social responsibility outlook of mining companies (Hermanus, 2007), and specifically towards environmental performance. Corporate environmental leadership is recognized by multinational mining companies as an important strategy to reach the ultimate environmental target of "Zero Harm" and other agreed indicators in their regulatory environmental commitments. Although there is reported progress in meeting environmental milestones, mining companies acknowledge that progress in environmental improvement is rather slow. Environmental incidents still frequent environmental audit reports of mining companies and there is a need for significant rather than incremental change to raise the bar in environmental

performance. This acknowledged trend in the mining industry have led to significant changes in the external environment of market systems in South Africa over the past decade which mainly included increased regulatory force and public pressure for environmental concern. The environmental playing field has therefore undoubtedly changed for mining companies as global and national legislation and policy have altered the environment for business. The implication is that a lack of focus on environmental performance is a significant business risk as the violation of mining permits can lead to the shutdown of operations and associated environmental fines, which could tarnish the public image of the company and result in decreased investor confidence. The question needs to be asked though to what extent has corporate mining management valued environmental leadership and to what extent they have adapted their business approach to influence mining operations to act in an environmentally responsible way. Furthermore, environmental concerns need to be translated into strategy if corporate greening is to occur (Coddington, 1993) and therefore these changes in market forces should be incorporated into corporate business strategies.

Currently the leadership direction for environmental performance of multinational mining companies hinges around environmental commitments required by the regulatory and stakeholder environment. These commitments are based on corporate governance views, local environmental legislation, internal operating standards and participation in Global Sustainability Initiatives e.g. the JSE Sustainability Reporting Initiative (prerequisite to be noted on stock exchange) and the ICMM sustainability code. Secondly operational environmental management systems (e.g. ISO14001) are widely acclaimed systems embedded within the requirements of the above mentioned codes and provide the basis for the implementation of the codes. Mainly three pathways are followed to optimise environmental performance which is Environmental policies with a moral and ethical appeal for sustainable development that drives corporate governance and guides the environmental objectives and continual improvement requirements. These are measured and maintained through an environmental management/reporting system and regulatory defined indicators and channeled through public reporting to highlight comparative environmental achievements (FTSE_4_Good, 2008).

As corporate environmental leadership requirements are qualified in relation to the results interface of this systemized approach (Hermanus, 2007), the question should be asked what the business value of these environmental protection initiatives are as corporate influence and decision-making is often driven by bottom-line value. The various components of environmental systems which are deduced in the sustainability codes are however extremely complex and corporate leadership do not take account of the dynamic relationship between the components inherent to the systems. This complexity can only be promoted by environmental management portfolio groups and it can therefore be hypothesized that the value of the system can be optimised through the managers operating within the corporate structure which can inform the nature of the dynamic environmental relationships.

The question should therefore be asked how corporate environmental managers influence corporate decision-making and how the complexity of mining environmental management is conveyed to get the desired environmental focus of company's executive boards. The sustainability of a forced environmental ideology can also be questioned and therefore the value drive behind environmental protection initiatives - whether it is simply carried out as a result of regulatory force and stakeholder expectation, or if it is included as part of the business strategy of the company to reduce cost and gain competitive advantage – should be understood in more detail to outline the bottom-line value of corporate environmentalism. However, environmental differentiation is here to stay according to Sugar and Descano (1999), and therefore clarity is required as to what the state of corporate environmentalism is in mining companies and also what corporate and organizational leadership criteria would be required to drive environmental decision-making and performance with regard to business strategy in mining companies.

Flannery and May (1993) asserted that firms that are environmental leaders go beyond environmental regulations; they assume a stewardship orientation toward the natural environment. Types of pro-environmental leadership activities demonstrated by these firms include: Protection of the biosphere; Sustainable natural resource use; Reduction

of waste; Marketing of safe products, processes and services; and assessment and annual environmental audits of their operations.

Environmental leadership is also required to provide strategic direction to unlock the efficiency of the required systems and to manage beyond the set systems to the ultimate advantage of the natural environment.

It is essential for mining companies to apply their business acumen and resources to achieve alignment of environmental management goals and production targets in a cost effective and sustainable way (Warhurst, 1999). To be realistic however, it should be acknowledged that leadership for Zero Harm to the natural environment should be exercised both within the environmental systems and the business sphere and for effective corporate environmental management, these two constructs should be aligned. Both of these constructs are characterized by their inherent components and the complexity of decision-making sets in when the dynamics of the components of the constructs are interfaced (Hermanus, 2007). This alignment starts with corporate leadership and goals and then permeates down to other levels of system operation. The question however is what constitutes the middle ground of alignment between the environmental systems requirements and the business sphere, which can be pursued within corporate environmentalism (Banerjee, 2002).

Corporate environmentalism provides the academic interface for environmental leadership and environmental strategy which can be defined on a high level as the leadership provided for the recognition and integration of environmental concerns into a firm's strategic decision-making processes to achieve Zero harm to the natural environment. Banerjee (2002) points out that the construct of corporate environmentalism is founded in environmental business orientation and environmental strategy focus. The contribution of environmental leadership importance to drive the goals of corporate environmentalism is however acknowledged and added as a foundation for this study,

The question should therefore be asked how these dynamic constructs crystallize in the South African mining industry on a corporate and functional level and how these aspects are incorporated into corporate business strategies of mining companies. A further question is how these dynamic constructs can be incorporated into a corporate environmental leadership framework to compliment the achievement of the objectives of the Sustainability codes in a consistent and bottom-up manner.

This can only be achieved by understanding the management approach whereby mining businesses address environmental issues and can provide a contribution towards influencing corporate strategy and changing environmental behavior of these companies.

Given the complexity of environmental issues facing the mining industry, it is important to understand how decision-makers responsible in a mining organization interpret the relationship between the biophysical environment and their organization and what factors influence their environmental strategies and actions. Corporate environmentalism provides a potential platform to change existing ways of environmental thinking in organizations and organizational members are important agents of change in this process and therefore a contribution in the field of mining with regards to this construct will add considerably to access the value of environmental business leadership in this industry. Starik and Rands (1995) have asserted that senior managers have helped to develop and implement environmental leadership strategies in several types of companies (except for mining) and the question now is what universal leadership pathway is required to achieve the set objectives of corporate commitments (for mining). Thus, understanding how managers interpret environmental issues facing their mining company is an important step in attempting to understand the development of pro-environmental organization behavior as it is the attitudes and behaviours of managers that will shape corporate behavior and buy-in into environmental protection paradigms (Smith, 1991). Furthermore, businesses that integrate their environmental planning with their strategic business planning can improve their corporate performance and gain a competitive edge (Sugar and Descano,

1999). Corporate environmental influence processes is however required to take environmental performance to a new level of focus and real achievement in meeting the systems within the business sphere.

In summary the following questions need to be answered to present an environmental leadership and management pathway for mining companies in South Africa: What constitute corporate environmentalism for the mining industry? Secondly, world-class environmental leadership requirements for mining and its business value should be understood. Furthermore, the degree to which corporate environmentalism transpires in corporate strategic decision-making in the South African mining industry should inform the commitment of mining companies to environmental management. Lastly, a managerial framework for corporate environmentalism should be developed to assist with the implementation of environmental business leadership and how this can be linked with perceptions of environmental managers and their superiors towards environmental business orientation and environmental strategy focus?

This study will provide an investigation into the stated questions and provide and analysis of corporate environmentalism for amply representative sample mining companies. Managerial perspectives on company management commitment to environmental leadership importance, strategy focus and business orientation in the sample companies will reveal the corporate buy-in into the value provided by environmental protection. An environmental leadership pathway to implement and fast track corporate environmentalism in mining based on this research will further be provided to streamline environmental business influence and adequate strategic decision-making on an environmental level.

The South African JSE SRI listed gold, platinum and diamond mining companies (SA-GPDCs) will be focused on for this study.

1.3 RESEARCH PROBLEM AND SUB-PROBLEMS

From the contextual setting the research problem can be outlined as follows:

- Have the South African JSE SRI Gold, Platinum and Diamond Mining Companies yet acknowledged corporate environmentalism as a strategic pillar which requires focussed leadership for corporate strategy decisions and excellence in business orientation?

The sub problems that need to be addressed to further understand the main research problem are as follows:

- What constitutes corporate environmentalism and what are its main components?
- What are the organizational environmental leadership criteria for responsible companies?
- How important is environmental leadership and environmental leadership activities for the South African mining industry?
- What is the state of environmental business orientation and strategy focus in the South African mining companies' corporate environment?
- How are the environmental leadership requirements and the business sphere aligned on a functional and corporate level and how does it affect environmental business decision-making in mining companies?
- What pathway can be applied to fast track corporate environmentalism as a means to position the company more favourably for shareholders and stakeholders?

1.4 RESEARCH QUESTION

The following research question can be formulated based on the research problem and sub problem:

Has company management of the sample mining companies acknowledged the business importance of corporate environmentalism for strategic decision-making?

1.5 RESEARCH OBJECTIVES

This study has the following research objectives:

- To investigate what constitutes corporate environmentalism and how its constructs can be applied as a means to achieve world class environmental leadership.
- To determine the degree of business importance attached to corporate

environmentalism by company management as perceived by corporate environmental managers (CEMs) and functional environmental managers (FEMs) with regards to:

- The importance of environmental business leadership and environmental leadership activities of the sample companies.
- The environmental strategy focus of the sample companies.
- The environmental business orientation of the sample companies.

- To draw up an environmental leadership pathway for corporate environmentalism on an implementation level as informed by this study and by the extant literature on environmental business leadership.

These research objectives should clarify the status on the following perceptions of the mining industry:

- The extent to which environmental business leadership is acknowledged as an integral part of business processes in the South African mining industry.
- The perception about the business value of world class environmental achievement as a means to gain superior competitive advantage in the South African mining industry.
- The degree to which environmental management is involved in corporate business strategy in the South African mining industry.

1.6 BOUNDARIES OF THE RESEARCH

The research will only focus on JSE listed and SRI committed multinational but South Africa mining companies for the Gold, Platinum and Diamond mining sectors as the researcher has ample access to individuals with environmental designations in these companies. The companies evaluated also make up a representative sample for the analysis on a sector and industry level as indicated in Table 1.1.

Environmental management for the purpose of this study can be used interchangeably with environmental protection. Environmental business leadership can also be

regarded as a synonym for sustainability leadership. **The social and economic spheres**, which also form part of the Triple Bottom-line of environmental management, **are not to be included** for the purposes of this study and the intent is to focus on environmental leadership and strategy to protect the biophysical environment.

The companies that have been have selected to make out the research sample is presented in Table 1.1.

Table 1.1: Companies selected for the study and each respective company's market capitalisation for the 2008 – 2009 financial years.

Sample companies	**Sample code**	**Market Capitalisation 2008 – 2009 Financial Year**	**Commodity representation**
Gold Mining Companies			
AngloGold Ashanti Ltd.	Gld1	R 111 451 207 483.00	47.74%
Gold Fields Ltd.	Gld2	R 74 361 529 621.00	31.85%
DRD Gold Ltd.	Gld3	R 8 930 179 342.00	3.83%
Total % of SA Gold Industry		**R 194 742 916 446.00**	**83.42%**
Platinum Mining Companies			
Anglo Platinum Ltd.	Plt1	R 157 058 777 737.00	47.35%
Lonmin PLC	Plt2	R 36 660 019 736.00	11.05%
Impala Platinum Holdings Ltd.	Plt3	R 107 368 391 240.00	32.37%
Total % of SA Platinum Industry		**R 301 087 188 713.00**	**90.78%**
Diamond Mining Companies			
De Beers SA (DBCM)	Dmd1	R 56 895 000 000.00	94.55%
Petra Mining Ltd.	Dmd2	R 1 816 366 223.00	3.02%
Total % of SA Diamond Industry		**R 58 711 366 223.00**	**97.56%**
% of Mining Industry represented		**R1,618,975,908,867.00**	**34.25%**

Source: *Sharenet*, 2009.

Note that the Sample companies and Sample Codes presented in this Table must be regarded as sensitive as confidentiality to the participants of these companies has been guaranteed in exchange for information.

1.7 POSSIBLE CONSTRAINTS TO THE RESEARCH AND ACTIONS TO DEAL WITH THE CONSTRAINTS

Possible constraints expected for the research was the late return of questionnaires or a lack of ample response to the questionnaire to conduct a representative study.

- This constraint was overcome by weekly telephonic and electronic mail reminders during the data gathering period. Time was allowed for personal interviews for critical respondents that have not responded by the first deadline. As the researcher knows most of the individuals on a personal level, the required feedback was obtained by the second deadline imposed.

A second constraint was the availability of academic textbooks on the subject of environmental business leadership and corporate environmentalism as these textbooks are extremely scarce and expensive to purchase.

- The literature from accredited journals however provided enough insight into the topic. Sis text books on these subjects were purchased from Greenleaf publishing in the UK as listed in the bibliography.

The timeous availability of Statistical software limitations were also expected to be a possible constraint.

- Assistance for the statistical analysis required was arranged by the researcher with statistical department of the NWU business school (as the school is close to the researcher's residence). The researcher however firstly applied the statistical tests provided by *Microsoft Office Excel* to which he has access to on his personal computer.

1.8 KEY ASSUMPTIONS

Some of the key assumptions of this study are the following:

- The individuals to be interviewed had to have at least 2 years experience in the mining environmental field.
- The mining companies had to be listed on the Johannesburg Stock Exchange.
- The individuals interviewed still had to be in the service of the sampled company and had to be employed by the time the questionnaire was sent out and received back.
- Statistical assistance had to be available from the NWU Business school in August 2009 and had to be completed within three weeks after submission.

1.9 IMPORTANCE OF THE STUDY

The social cost of mining is rapidly increasing as environmental regulations tighten and shareholders are demanding ethical and environmentally responsible corporate governance from the companies they invest in. It is therefore eminent that mining companies include corporate environmental management focussing on the natural environment as a strategic pillar of their future business case as pressure will increase for reduced environmental impact from mining activities.

Corporate environmental vision and leadership is however required to direct company commitment and to accept custodianship of the initiatives which will influence future environmental practice. The application of a consistent environmental leadership pathway, based on the principles of corporate environmentalism, to leverage environmental business orientation and environmental strategy focus could aid in an industry wide norm which will provide for a renewed benchmark for environmental corporate governance.

Limited literature is available on corporate environmentalism and the mining industry. Furthermore, very little information is available in the literature for corporate environmental leadership and incorporation of environmental management in corporate strategy in emerging markets. There are also knowledge gaps regarding the drivers of environmental business value and buy-in from senior management into environmental business leadership. The degree of involvement of environmental managers in

business strategies of South African mining companies also presents research opportunity.

This study can therefore contribute to shape an approach whereby corporate environmentalism is firmly introduced as a strategic pillar thereby applying environmental management as a means to differentiate a mining company in the strategic, regulatory and investor environment. Measuring the buy-in from company management, however, has to substantiate a shortcoming with regards to this business imperative. It is also the intention of this research to delineate focus areas for future leadership initiatives in corporate environmental management and to provide an industry wide comparison of environmental managerial involvement in business strategy.

1.10 CHAPTER LAYOUT OF THE RESEARCH REPORT

This Report is structured into two sections; the first section sets out the theoretical basis for the study (Chapters 1-4), while the second section reports on the empirical investigation on environmental business leadership in the selected mining companies. (Chapters 5-7). The contents of each chapter are as follows:

Chapter 1: Orientation

This chapter provides a clear understanding of the objectives and purpose of the study. The contextual setting, industry dilemma, research question and objectives, importance and scope of the study, key assumptions, and expected constraints for the research, delimitations, definitions, and a framework for each chapter in the report are presented.

Chapter 2: Foundation of the Study

This chapter gives the theoretical foundation of the study. It provides a brief overview of academic scope of the research problem, and provides the context for the research to follow.

Chapter 3: Literature Review

This chapter consists of a comprehensive review of the relevant research literature pertaining to the body of knowledge on corporate environmentalism and environmental business leadership. Environmental leadership models are discussed and the business case for environmental management in mining is reported on. Corporate environmental management frameworks in terms of sustainability reporting for mining companies are discussed and the strategic imperative for environmental business leadership is outlined. The constructs of corporate environmentalism is further discussed and finally, an environmental leadership pathway along the hierarchic levels of a mining company is presented. This pathway is primarily based on the literature. The literature review presents the foundation for the empirical study to follow.

Chapter 4: Research Methodology

This chapter explains the research methodology employed. The questionnaire design, sampling design, data collection, measuring instruments and the method of data analysis are described and explained in detail in this chapter.

Chapter 5: Research Results

This chapter presents the results revealed by the questionnaires. It discusses the data collection process and comments on the responses received to questionnaire. The data obtained from the questionnaire is then considered and interpreted on a construct-by-construct basis as compiled by the responses that were composed by the intricate questions on each construct.

Chapter 6: Discussion, Conclusion and Recommendations.

This chapter synthesizes the outcomes of the findings to determine patterns and relationships between them. The findings are measured against the patterns presented in the literature study. Limitations in the research process are examined and the learnings identified in the analysis are summarised in the conclusion. Recommendations for further research are also proposed in this section.

Chapter 7: References and Annexure.

This chapter includes the full reference list used in the Research Report.

Appendices

The Appendices include in order: The consistency matrix used to compile the questionnaire, the cover letter and questionnaire, detail results obtained by the questionnaire and a publishable article.

2 FOUNDATION OF THE STUDY

2.1 ACADEMIC FOCUS AREAS

The academic focus areas were based on the following disciplines of which the intricacies and relationships are outlined within the context of the study:

- Corporate environmental citizenship
- Corporate environmentalism
- Environmental business leadership
- Business strategy and the environment

2.2 BODY OF KNOWLEDGE ON THE FOUNDATION FOR THIS STUDY

The holistic context for this study can be provided by corporate environmental citizenship, of which corporate environmentalism is a sub-category. According to Epstein (2008) corporations must become more sensitive to environmental social, environmental and stakeholder issues in striving to become more responsible corporate citizens. Achieving this goal is the primary objective of corporate environmental citizenship - earning the right to a social and environmental licence to operate and building a track record of environmental milestones to prove environmental commitment.

Thus, whether the concern is for society and the environment, government regulation, stakeholder pressure or economic profit, managers must make significant changes to more effectively manage their environmental impacts. Schaltegger *et al.* (2003) states that environmental citizenship is about business management accepting the task of systematically reducing environmental damage and environmental risk through technological innovation while creating business value by reducing material flows and improving economic flows. Business value can then be increased in turn by reducing the use of inputs for any given level of output by improving transformation processes and by reducing outcomes relating to environmental damages, effects, impacts and waste associated with the companies' business activities.

The preferred channel how these aspects can be incorporated into business plans and company strategies are through institutionalised environmental management channels.

These dedicated environmental organisational entities must provide leadership and technical input into the functional and corporate structures of the company. This alignment has largely occurred in the South African mining industry but is largely systems orientated, leaving the contribution to business strategy and ultimately business value rather inert. It is therefore only through a concerted leadership drive and strategic focus that the concept of responsible environmental citizenship can be included in the operating domain of companies (Holliday *et al.,* 2002).

Corporate environmental citizenship is however to vast to be referred to as the foundation for this study as the field of environmental citizenship has extended considerably over the last two decades that it constitutes the academic disciplines of sustainable economic citizenship and social responsibility citizenship in its own right.

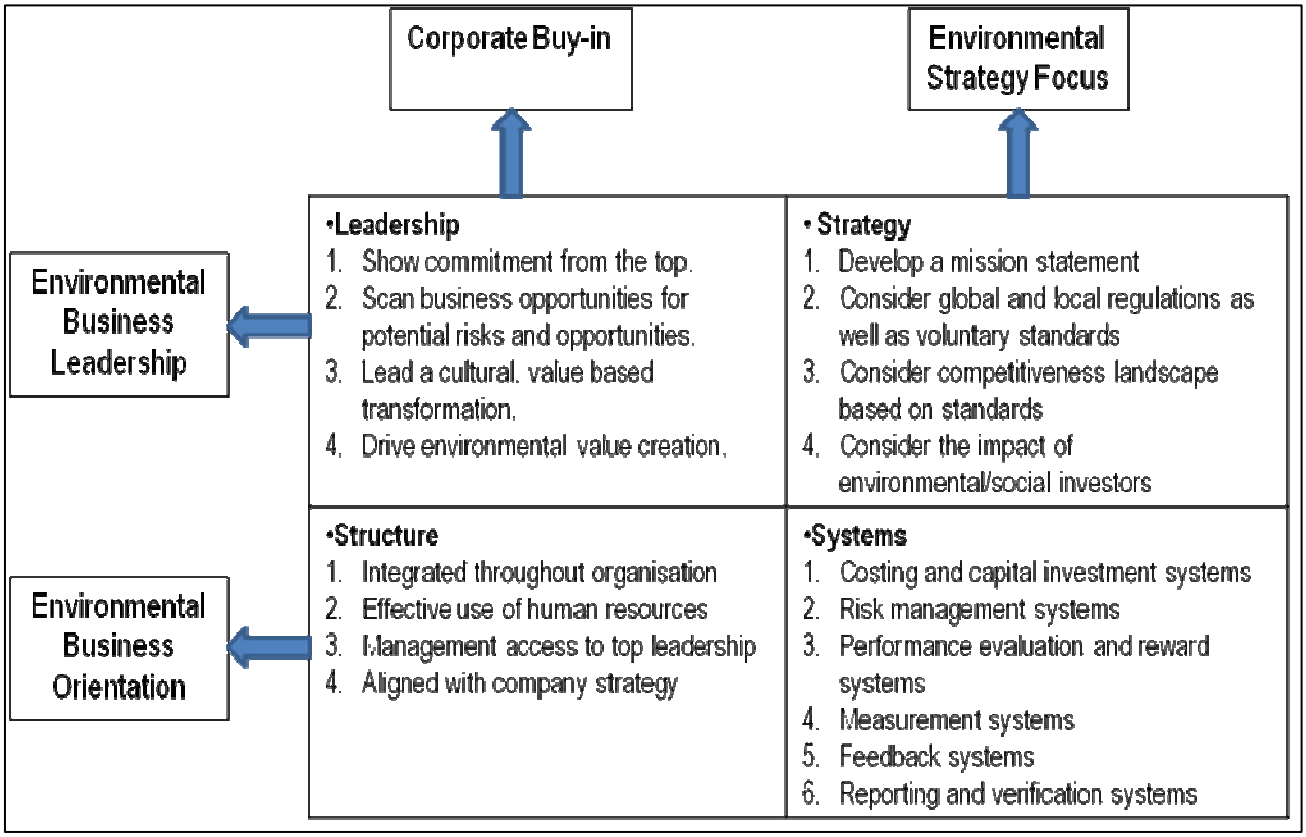
The search for a new paradigm that specifically addresses the environmental impact of business and the leadership required to deal with organisational change pertaining to decision-making about the biophysical natural environment has lead to the development of the concept of **corporate environmentalism**. This concept will form the foundation for this study.

The basic premise of this argument is that attention to the concepts of environmental business leadership and the value of protecting the natural environment is lacking in the literature, and in cases where environmental issues have been addressed, the underlying paradigm is anthropocentric where ecological principles are either subsumed or disassociated with the economic paradigm.

Banerjee (2002) asserts that the construct of corporate environmentalism encompasses the realm of organisational leadership behaviour and applied business strategy in the field of environmental protection. Corporate environmentalism provides the academic interface for corporate environmental leadership and environmental strategic objectives which can be described on a high level as the leadership provided for the recognition and integration of environmental concerns into a firm's strategic decision-making processes. Based on an examination of the literature, a working definition of corporate

environmentalism is proposed by Banerjee (2002): "Corporate environmentalism is the organization-wide recognition of the legitimacy and importance of the biophysical environment in the formulation of organization strategy, and the integration of environmental issues into the strategic planning process". Figure 2.1 models the components and actions of **corporate environmentalism** as outlined by Epstein (2008).

Figure 2.1: Corporate Environmentalism Model



Source: Epstein (2008)

This definition of corporate environmentalism, as expanded on in Figure 2.1 provides the primary foundation of this study as this construct will be tested for sample companies of the South African mining industry. Although a segmented approach can be applied to assess the alignment of the mining industry with the proposed environmental business success factors it should, however, be mentioned that these elements of corporate environmentalism cannot be viewed in isolation but are closely intertwined.

Given the complexity of environmental issues facing the mining industry, it is important to understand how decision makers in an organization interpret the relationship between the biophysical environment and their organization and what factors influence their environmental strategies and actions. Thus, understanding how managers interpret environmental issues facing their company is an important step in attempting to understand the development of pro-environmental organization behaviour, as it is the attitudes and behaviours of managers that shape corporate behaviour (Smith, 1991).

Corporate environmental citizenship commitments have also been formalised for responsible mining companies. These global environmental objectives govern to a large extent the leadership paradigms and focus for multinational mining companies. Commitments to the principles of sustainable development are primary drivers for environmental targets that responsible companies pursue. Therefore the inclusion of these frameworks as part of the holistic foundation will also present strategic direction and focus areas for corporate environmental leadership and will guide the optimality of this study.

The successful enactment of these principles on an organisational level relies on a recognised and efficient environmental leadership and management structure (Schaltegger *et al.,* 2003). Corporate leadership however remain the primary driver for corporate environmentalism on a functional level. Therefore a short overview of environmental leadership and extant leadership models must be presented as part of the foundation of the study to outline the scope of corporate environmentalism even further. The crux of corporate environmentalism also doesn't lie in the policies and commitments made to environmental protection and improvement but rather with crystallisation world class environmental leadership criteria in the organisational domain. The challenge to influence organisational members to think and act more environmentally friendly with regards to corporate and operational decision-making need more attention and therefore environmental leadership literature forms part of the foundation for this study.

By expanding the field of corporate environmentalism through an analysis of the mining sector, this study can make a contribution towards the inclusion of environmental thinking into business strategy and to reinforce the imperative of sustainability thinking in the business models of mine management.

3 LITERATURE REVIEW

3.1 CORPORATE ENVIRONMENTALISM

Corporate environmentalism, i.e. the recognition and integration of environmental concerns into a firm's decision-making process, is a proven way that business can address environmental issues (Banerjee, 2002). It involves the recognition by firms that environmental problems arise from the development, manufacture, distribution, and consumption of their products and services. Integrating environmental issues in the strategic planning process is another theme of corporate environmentalism.

The question should be asked however to what extent corporate environmentalism forms part of modern day business leadership. Furthermore, the components of corporate environmentalism should be aligned with the management philosophy of the business. Therefore the embeddedness of environmental business leadership in corporate environmentalism needs to be understood. Banerjee (2002) has identified environmental business orientation and environmental strategy focus as the main constructs comprising corporate environmentalism. However, from the extant literature it is clear that the relevance and buy-in into the values of these constructs can only be optimised through focussed environmental leadership. These three constructs will be discussed in the sections to follow to set the context for the empirical study.

3.1.1 Environmental Business Leadership

3.1.1.1 Context for corporate environmental leadership

In the last few decades, there has been a heightened awareness of environmental issues by governments, policy makers, environmental pressure groups, business firms, and the public all over the world (Banerjee, 2002). More than a century of industrial development has resulted in well known environmental impacts including global warming, ozone depletion, air and water pollution, soil erosion, and deforestation and urgent intervention is required to change the course of action.

Aside from the creation of enormous wealth, mining has been a significant contributor to

environmental degradation in many countries (Brooks, 1999). For many years, mining was carried out with little regard for environmental protection and the legacy of mining is well documented to include large scale land destruction and air and water pollution. The corporate social responsibility landscape has however changed and the picture of mining firms operating without regard for nature is no longer the standard *modus operandi*. Corporate attitudes are changing, government policies are sharpening, civil society is getting more informed and the business environment that brings them all together is changing rapidly (Warhurst, 1999). International environmental agreements, government environmental policies and regulation, industry environmental management practices, and pro-environmental consumer behaviour have brought about a new and dynamic business environment where the focus lies on of initiatives to address environmental problems brought about by mining. This growing trend appears to reflect changes in the external environment of market systems which have strategic implications for mining firms as increased regulatory forces and public environmental concern have the potential to influence business actions. Therefore, effective leadership is essential to cope with the business challenges brought about by the intensifying environmental regulatory framework.

Environmental leadership lies at the heart of corporate environmental responsibility which should drive corporate environmental policy, influence environmental value systems, promote the business case of compliance with regulatory environmental objectives, ownership of the implementation of environmental protection procedures and monitor environmental performance trends. A new breed of environmental leaders is emerging to address the complexities of mining and the environment (Knights & Morgan, 1992). These environmental leaders, corporate or individual, infuse their desire to protect the natural environment into their strategic decision-making and action processes. The strategy formulation process often becomes the opportunity for individual organizational members (e.g., top management) to state their convictions and influence the future direction of the organization or exert their “corporate strategic leadership” (Knights & Morgan, 1992). Therefore, because top managers set company strategies and allocate resources, they often are the crusaders of an organization’s environmental leadership initiative. The question is how environmental business

leadership should influence organizational strategy and operational activities. Some explanation is provided by corporate environmentalism and subsequently environmental leadership paradigms can provide further insights into the leadership approach required to influence environmental responsible business practices in mining.

3.1.1.2 Environmental business leadership defined

There is a vast body of literature about leadership. This literature is diverse and ranges from individual leadership styles and qualities, to understanding the interface between leaders and the context within which they operate and strategies and behaviours that leaders can employ (Yukl, 2006). The most obvious role of a leader is the ability to enable, influence and motivate others towards achieving a purpose or goal and to contribute to the effectiveness and success of the organisation / group of which they are members. Therefore this definition could be expanded to include the influence of employees to think and act differently with regards to the protection of the natural environment.

Reviewing leadership present the difficulty that the same term is used to describe leadership as both a “set of individual characteristics” and as a “process to bring about change”. As a set of individual characteristics this will include behaviours and personality attributes that will make an individual able to be more effective at reaching certain goals. As a process, leadership is an effort by a leader to influence members of a group to direct their activities towards a common goal.

This study is primarily investigating the “process” of environmental leadership necessary to achieve environmental strategy focus in business plans of mining companies.

In order to understand the broad objectives of an environmental leadership process in the mining industry, a summary of the key paradigms in corporate environmental leadership is provided.

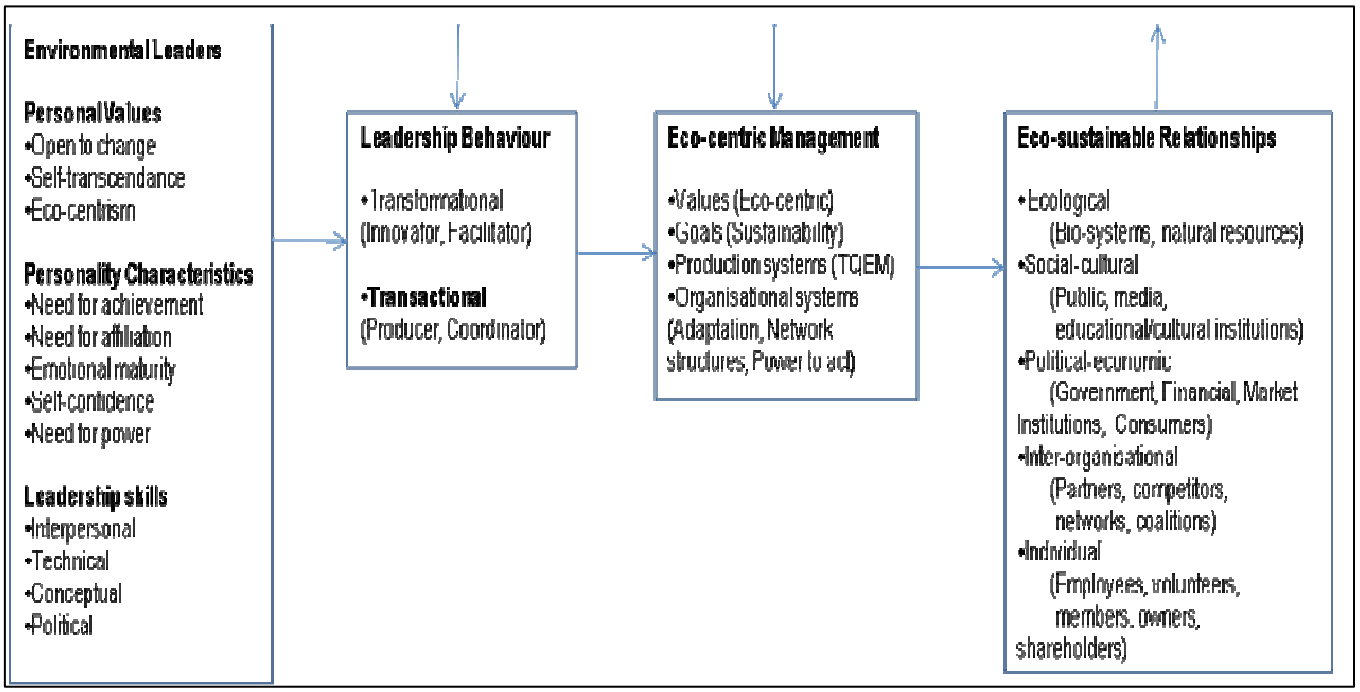
3.1.1.3 Summary of environmental leadership paradigms

Berry and Gordon (1993) defined environmental leadership as the ability of an individual or group to guide positive change toward a vision of an environmentally better future. They also contended that the unique problems of environmental problems (long term, complex, multi-disciplinary and emotionally charged) require a different approach than that of traditional leadership views. Shrivastava (1994) also support the notion that corporate transformation to ecological sustainability requires a new form of eco-centric management and leadership. This eco-centric approach for environmental leadership is firstly guided by a personal belief system that deeply values and identifies with nature. This is contrary to the traditional belief that the biophysical environment is principally in service of all human kind's survival needs, not taking a holistic view with regards to sustainable development. Secondly, environmental leadership is an enactment of eco-centric values in organisational processes, activities and relationships. Whereas economical and technological concerns dominate traditional goal-setting and decision-making processes, the eco-centric view incorporate ecological sustainability as a primary element in developing organisational missions and goals (Hart, 1995).

Thus, environmental leadership is defined by Egri and Herman (2000) as the ability to influence individuals and mobilise organisations to realize a vision of long term ecological sustainability. Eco-centric values and assumptions should be used by environmental leaders as guide to change economic and social systems that they perceive as currently and potentially threatening the health of the biophysical environment around their organisation's activities. This model describes the values, personality characteristics and leadership skills that were found to typify environmental leaders in the study by Egri and Herman (2000). These characteristics inform leadership style which encompassed both transformational and transactional leadership behaviours. The leader's behaviour is influential in the operation of eco-centric management at the organisational level. It is proposed that eco-centric management encompass organisational values, goals, production systems and organisational systems. For this management styles to be effective, the managers require adaptation orientation, boundary spanning task systems, simple adhocracy, network structures and clan modes of governance. The final component of the model represents both the

objectives and process of environmental and eco-centric management which is establishing and nurturing ecological, socio-cultural, political economic, inter-organisational and individual levels. These relationships feeds back into leadership behaviour and management style. The model is presented in Figure 3.1.

Figure 3.1: Model of Environmental Leadership



Source: The Author combined the work of Egri and Herman (2000); Shrivastava (1995); Starik and Rands (1995).

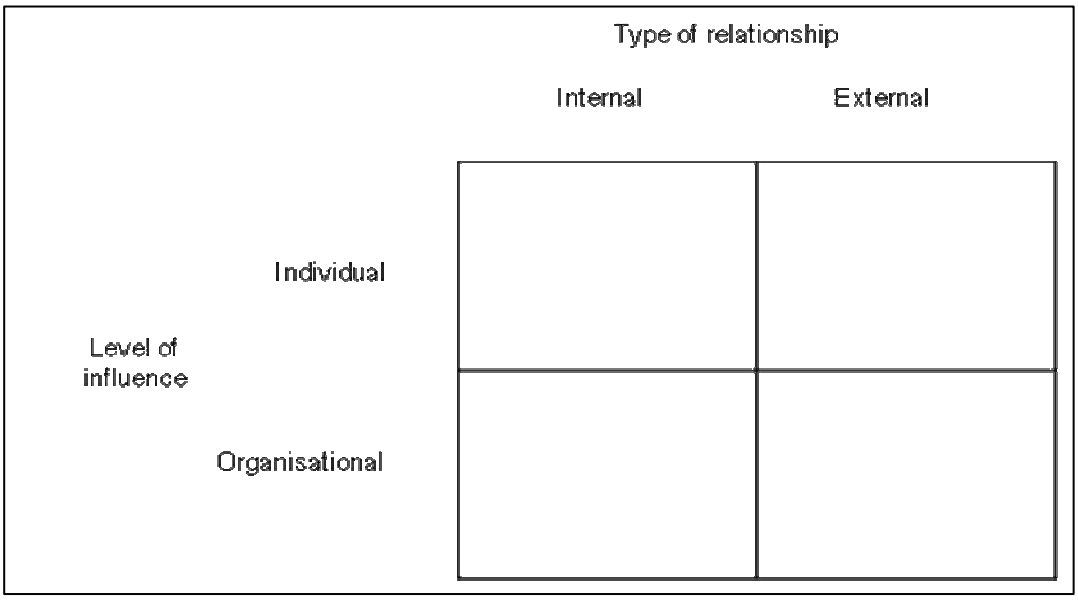
Portugal and Yukl (1994) provides a more practical two-dimensional perspective required for effective environmental leadership to achieve company environmental objectives as illustrated in Figure 3.2. They state that environmental leadership can be viewed both as an influence process between individuals and as an organisational process of mobilising forces to change and reform social systems. These perspectives by Portugal and Yukl (1994) can be summarised as follows:

Individual leadership

- Interaction with individuals or small groups, departments, project teams.
- Appeals to logic and values of individuals.

- Higher order needs used to influence individuals to transcend their own self-interests for the sake of the cause/organizational goals.
- Mentoring or applied environmental training.

Figure 3.2: A two-dimensional framework for environmental leadership



Source: Portugal and Yukl (1994)

Individual leadership

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- Appeals to logic and values of individuals.
- Higher order needs used to influence individuals to transcend their own self-interests for the sake of the cause/organizational goals.
- Mentoring or applied environmental training.

Organisational leadership

- Leader to directly influence attitudes of many people.
- Indirect influence through policies, procedures, structure and culture of the organization.
- Use of political power to establish policies, programs, budgets and control systems to direct and control operations of an organisation and guide activities of members.

- Use of mass media and symbolic actions to emphasize key values and to build support for new strategies and policies and influence how events are interpreted by members of the organisation and external stakeholders.

Internal leadership

- Setting objectives, motivating commitment to the objectives and strategies, organising work activities to accomplish the objectives, motivating commitment to the objectives and strategies and maintaining cooperative relationships and teamwork.

External leadership

- Creating and maintaining a network of relationships with people outside the organisation and influencing outsiders.
- Gathers information about the external environment, analyzing the information to identify strategic threats and opportunities.
- Serving as outside spokesperson on environmental matters for the organisation.
- Negotiating agreements that are acceptable for the organisation.
- Gaining cooperation and support from outsiders whom the organisation depends on to accomplish its mission.

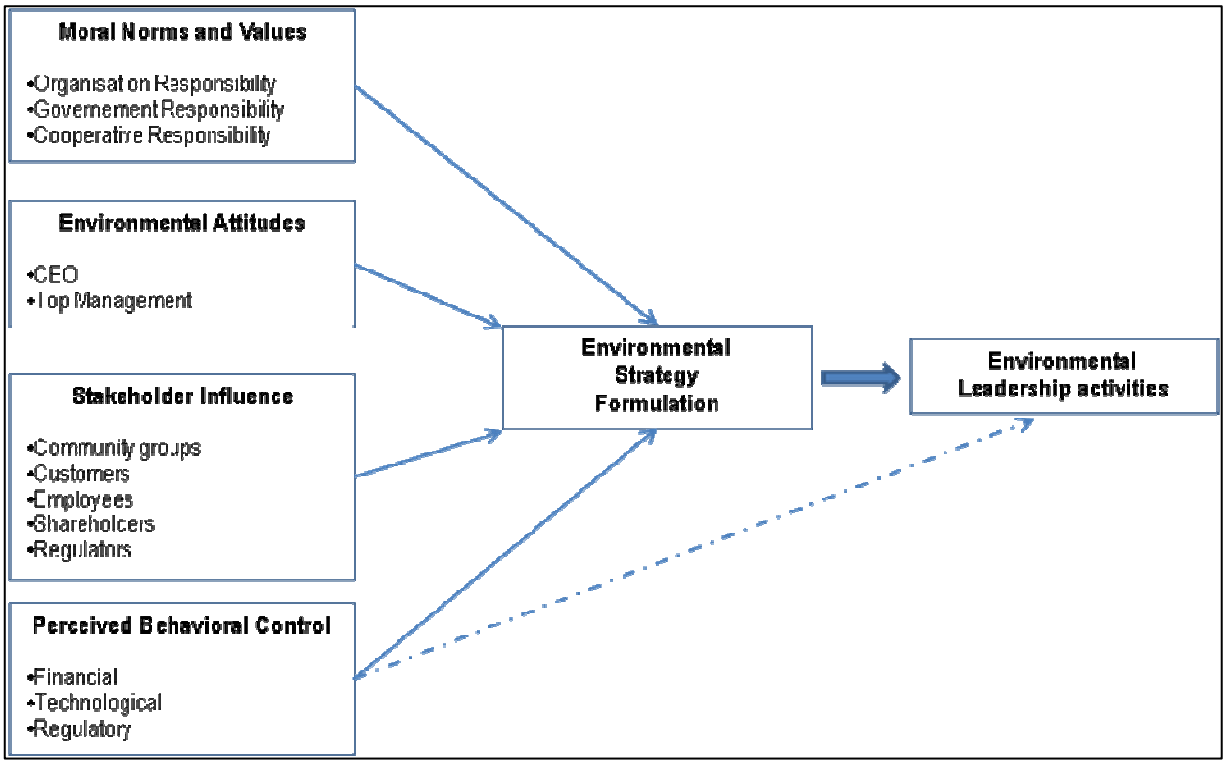
Environmental leadership in organizations can therefore be better understood as a **process** that involves two levels of influence (individual and organizational) and two types of influence relationships (internal and external).

Gladwin (1993) stated that transformational leadership is needed to inspire and guide the fundamental transformations of mission, structure, and political, cultural and technical systems required for achieving environmental sustainability. Although transformational leadership can bring about change, environmental leadership is more likely to be successful if leaders understand how influence processes at the individual and organizational level are interrelated. The slow process of gaining converts one individual at a time is unlikely to accomplish major change in a timely way unless there are some highly visible indicators of progress in the form of policies, programs, and budgets. However, environmental policies and programs are unlikely to be approved

and implemented unless environmental leaders build a coalition of supporters through a process of interpersonal influence with individuals and small groups of people in key positions inside and outside the organization. Thus, the two levels of influence must occur together in a mutually supportive way with careful timing and coordination.

Flannery and May (1993) proposed an environmental leadership model (ELM) to be the mechanism whereby both individual and organizational values and behaviour can be examined. The model considers four main antecedents to an organization's environmental strategy. These include the 1) moral norms and values of a company, 2) the environmental attitudes of senior management, 3) the stakeholder influence and 4) the perceived behavioral control. The level of the firm's environmental strategy that hinges on the named antecedents in turn drives the organization's environmental leadership activities. The ELM presented in Figure 3.3 accounts for the prominent factors impacting decision makers in formulating organizational strategies.

Figure 3.3: Environmental Leadership Model (ELM) influencing environmental activities



Source: Flannery and May, (1994)

Norms and Values

The environmental psychology literature affirms the relevance of moral norms to environmental behaviours. Freeman (1984) proposed that a values analysis of executives is crucial to the development of an enterprise strategy or mission and the inclusion of an environmental strategy is a direct reflection of the intrinsic environmental values of top management. It is proposed that if top management intrinsically values the environment, then they will feel that the organization should pursue environmental protection activities. The ELM therefore includes *moral norms as* a prominent factor to assess whether the top decision makers believe the organization is primarily responsible for environmental protection. Schwartz's (1977) hypothesized that a moral norm is activated if the individual is aware of the adverse consequences to others from some action and then ascribes responsibility for corrective action to an individual (often to himself or herself).

While the executives' attitudes toward environmental issues may vary depending upon the specific subject (e.g., investment in pollution control technology) their sense of responsibility, which is primarily based on their basic intrinsic values, will determine the outcome. Furthermore, if top management perceives this same level of responsibility for the organization, it is highly plausible that environmental leadership as an enterprise strategy will emerge.

Environmental Leadership Attitudes of Key Decision Makers

The level of environmental activities displayed by an organization is largely determined by the decision maker's *environmental leadership attitudes.* The model distinguishes the CEO from top management during attitude assessment because the CEO often becomes the prominent voice during the strategy formulation process. While decision makers hold only a few "intrinsic" or basic values toward the state of the natural environment, they will each have a different set of attitudes depending on the specific environmental issue.

Ajzen (1991) postulates that human behaviour is a function of salient information or beliefs that is relevant to the behaviour. Specifically attitudes are the product of the

strength of a person's beliefs that performing the behaviour will lead to certain consequences (i.e., behavioural beliefs) and the individual's evaluation of those consequences (i.e., outcome evaluations). A behavioural belief of a top management executive, for example, might be examined by asking him/her how likely or unlikely a particular outcome might occur (e.g., exceeding pollution emission standards) if the organization followed an environmental leadership strategy. For the outcome (i.e., beyond compliance), the decision maker would then be asked to assess whether the outcome was highly desirable or highly undesirable. Combined, the environmental behavioural belief and outcome evaluation components make up the executive's attitude toward a given environmental activity. For example, while all the key decision makers may agree that pursuing pollution reduction is necessary, their attitudes about the best methods of pollution control may vary. Consequently, depending on the particular environmental issue, attitudes of the decision makers will be very influential, but perhaps divergent, in shaping an environmental leadership strategy.

Stakeholder Influence

Stakeholder influence on organizations may be one of the most prominent, and complex, factors impacting the development of environmental strategies of organizations. When top management analyses the organization's environmental activities, one of its first tasks is to determine the organization's set of relevant stakeholders and the perceptions of those stakeholders. Stakeholders are all those interest groups, parties, actors, claimants, and institutions both internal and external to the corporation who either affect or who are affected by a company's actions, behaviour, and policies. The traditional stakeholder classification includes investors, board of directors, managers, employees, customers, suppliers, competitors, the community, society-at large, unions, governments/regulators, and politicians, media, neighbours, transporters, distributors, retailers, and activists. Harrison (1993) asserted that an organization's sustained communication patterns with stakeholders are a requisite to its success as a leader in the environmental domain.

An organization's set of stakeholders often hold dissimilar and conflicting interests in the organization. According to Mitroff (1983), there is a network of interdependent

relationships among an organization's stakeholder group. Some of the stakeholders endorse and support an organization's activities while others may disapprove and resist and organization's activities. Stakeholder groups may also influence other stakeholders in the focal organization's network. Hence, if an organization changes its strategic focus, it is plausible that each stakeholder relationship will need to be reassessed.

According to Digman (1990) it is the responsibility of top management to monitor and satisfy as many stakeholder expectations as possible. If top management cannot satisfy the "most important" stakeholder groups' demands, it is plausible the organization's performance will be negatively impacted.

If strategists perceive the organization as an institution in society, influenced by and influencing a multitude of living and non living entities, then this social influence will be reflected in their patterns of strategic decision making.

Perceived Behavioural Control

The placement of this concept in the model is significant as it considers the reality of the contexts surrounding environmental leadership strategizing. Ajzen (1991) found the *perceived behavioural control* factor to be so strong that, along with behavioural intention, it could significantly predict environmental behaviours. Transferring this logic to organizational activities, it is plausible that a strong perception of behavioural control (e.g., financial constraints) could stifle any environmental leadership strategies from being realized. Perceived behavioural control is a function of the resources and opportunities an individual possesses (i.e., control beliefs) and the facilitating or inhibiting effect of the particular control factor (i.e., perceived facilitation) (Ajzen, 1991).

In essence, the fewer obstacles individuals have historically experienced and currently anticipate to perform the behaviour, the greater should be their perceived control over executing the behaviour. For individual levels of behaviour, Ajzen (1991) asserted that "intentions are assumed to capture the motivational factors that influence a behaviour". According to Digman (1990), strategies are the "organization's preselected means or approach to achieving its goal and objectives taking into account and coping with future

external conditions”

Ajzen (1991) incorporated the perceived behavioural control factor into his theory of planned behaviour because he realized that while an individual may intend to behave in a particular way, various constraints may prevent the behaviour from occurring. “Intended strategies” therefore often fall short of becoming “realized strategies” because of situational constraints.

In extending the perceived behavioural control concept to the ELM shown in Figure 3.3, situational constraints surrounding top management’s intent to engage in environmental leadership activities are included. If the top management member perceives many restrictions to the organization acting pro-environmentally, the variable may have a major influence on strategy formulation. To understand the environmental leadership policies and activities of organizations, managers must be pragmatic and include the various regulatory, technological, and financial constraints in their strategies.

Strategy formulation

The Environmental Leadership Model (ELM) attempts to delineate the most prominent factors influencing top managers in their development of the firm’s response and strategies to the issue of environmental protection. The ELM recognizes that the strategy formulation process yields a set of strategies which direct the “response patterns” of the organization. It is posited that the perceptions of the firm’s strategists about the concerns of significant stakeholder groups, constraints impacting decision making, and felt moral responsibility for protecting and sustaining the natural environment ultimately surface in the organization’s activities. Therefore Flannery and May (1993) argue that environmental leaders should pursue proactive strategies, as opposed to reactive strategies (Wartick & Cochran, 1985), to manage their relationships with the natural environment.

3.1.1.4 Environmental values and leadership criteria

Ramus (2002) states that the main difficulty with developing support for environmental leadership is that environmental management is not the focus of many line managers' attention. Even in firms with a stated commitment to environmental sustainability and with sustainability policies in place, managers still do not give the same level of support for environmental initiatives and expenditure. Three types of environmental leadership activities have been identified – 1) Those activities that focus on a decrease in the environmental impact of the company, 2) those that solve an environmental problem (and cost problem) for the company and 3) those activities that develop a more environmentally friendly process or product.

According to Hostager *et al.* (1998), both organizational and individual factors will affect employee willingness to buy in to environmental leadership initiatives. The firm should try to signal for and provide organizational incentives for employees to take environmental actions. In addition the individual's skills and competences should enhance their ability to participate in environmental leadership initiatives. As importantly, employees might search for companies with intrinsic motivation and values that motivate them to take actions to protect the natural environment. Managers can however only influence the organizational factors and therefore, perceptions and actions of supervisory behaviour of managers in the mining business should be understood.

Three leadership behaviours that appear relevant according to Portugal and Yukl (1994) are: 1) articulating an appealing vision with environmental elements, 2) changing perceptions about environmental issues, and 3) taking symbolic actions to demonstrate personal commitment to environmental issues. These behaviours may involve either the individual or organizational level of influence and either internal or external relationships.

According to Portugal and Yukl (1994) it has been proven that a clear and appealing vision of environmental leaders is a key part of most successful efforts to transform people and influence their commitment to major change in organizations. An inspiring vision seems especially relevant for empowering people to be environmental change agents. A clear vision guides decision making and facilitates initiative by employees at

all levels of the organization. The leader should communicate the environmental vision during the day-to-day interaction with internal and external company stakeholders in language that people can easily understand, and with appropriate use of language an demotion. Effective environmental leaders are also persistent about advocating the themes in their vision at every opportunity with peers, subordinates and outside stakeholders. Eventually, the environmental values in the vision may become embedded in the culture of the organization, especially if the leader makes changes in the appraisal, reward, and budgeting systems to emphasize and support these values.

Symbolic actions are another type of leadership behavior that appears relevant for environmental leadership. Effective leaders make dramatic changes that symbolize the leader's commitment to a vision or objective. The most effective changes are highly visible and affect the everyday lives of organization members. Some examples of symbolic actions on environmental issues include the decision to stop a certain mining practice that is harmful to the environment, another form of symbolic action is role modeling or leading by example. The leader seeks to build support for a policy or program by making personal sacrifices and demonstrating appropriate behaviours for others to follow after.

Effective environmental leaders also raise awareness about the importance of environmental issues and influence people to transcend their narrow self-interest to protect the natural environment for future generations (Egri and Herman, 2000). These leaders encourage people to consider the long-term environmental implications of business decisions as well as the short-term economic aspects. One way to focus attention on environmental issues is to make the analysis of environmental costs and benefits a normal part of the decision process. Another approach is to hold regular conversations with important stakeholders inside and outside the organization to involve them in making sense of complex environmental issues. Special meetings may be conducted to focus attention on environmental issues, discuss shared concerns, evaluate current programs, and identify areas of agreement about necessary changes.
Portugal and Yukl (1994) states that creative solutions to environmental problems can be encouraged by influencing people to view the problems in a novel way and to

motivate employees to think and act differently when it comes to environmental decision-making.

Ramus (2002) has found that environmental policies are a powerful signal of environmental orientation and organizational and supervisory support for environmentally responsible decision-making. These policies show line management and employees that the company expect and desires environmental protection in leadership and operational strategies. Thirteen environmental policies have been identified in world class environmentally pro-active firms and seven leadership behavioural traits that drive the implementation of these policies have been outlined by Ramus (2002). These policies and behavioural traits are listed in Table 3.1.

Table 3.1: Environmental policies and leadership behavioral traits for world class environmentally orientated businesses.

Environmental policies	**Environmental leadership traits**
Written and signed environmental policy	Communication: Leaders communicating the environmental vision, targets and performance results openly.
Specific targets for improving environmental performance	
Publication of an environmental annual (sustainability) report	Competence building: Supportive of environmental education and training.
Efficient environmental management system	Information dissemination: Sharing strategic information with decision-makers in the company.
Environmental purchasing policy	
Environmental training and education	Innovation: Encouraging new ideas about the ways to minimise the impact on the natural environment and reducing cost in the process.
Employee responsibility for environmental performance	Rewards and recognition: Using formal rewards and informal praise to recognize and reinforce desired employee behaviour.
Life cycle analysis (assessment) policy	
Management understanding sustainable development	Management of goals and responsibilities: Using quantitative and qualitative measures to

Fossil fuel consumption reduction policy	share goals and responsibility for performance with employees.
Toxic chemical use reduction policy	
Reducing the use of unsustainable products policy	Environmental value recognition: Develop managers who believe in environmental value creation.
Same environmental standards at home and abroad	

Ramus (2002) further state that their research indicates that environmental business focus and orientation only transpires when both corporate commitment to a written environmental policy statement and line management support for environmental leadership transpires in an organisation. These policies make employees more sensitive to managerial support for environmental business orientation. Therefore it is argued that companies need more than a clearly communicated set of environmental policies aimed at preserving the natural environment, but rather line managers who use a set of behaviours that show they care about environmental value creation. Therefore the crux of environmental business leadership is for companies to start hiring managers who already use learning organization behaviours and who value environmental protection.

Brown and Karagozoglu (1999) states that environmental business leadership cannot be separated from business orientation and environmental strategic objectives as both of these constructs are critical foundations for active environmental stewardship. They have subsequently identified eight elements of dynamic environmental leadership which are proposed as basic environmental leadership criteria. These criteria are also integrated with environmental business strategy focus areas. These are:

- Management vision and values (Management responsiveness)
- Regulatory compliance (Relationship with regulators and regulatory flexibility)
- Strategic will and resources (Budgeting paradigms)
- Accuracy and efficiency of environmental management systems and reporting (Focus on prevention)
- Investment in green technology and processes (Environmental innovation)

- Drivers for environmental performance (Comparative environmental performance and associated incentives)
- Corporate capitalization (Environmental competitive advantage) and
- Financial cost-benefit of environmental management (Cost saving, penalty evasion and increased profits);

Following the organisational environmental leadership criteria as outlined in the section above, the quest for more responsible environmental management has been formalised in global corporate governance frameworks. These frameworks have been developed to propose global best environmental practice benchmarks and will be shortly discussed in the next section.

3.1.1.5 Global environmental leadership frameworks

The last 20 years have seen the development of several environmental leadership frameworks in the international arena on the back of the Rio-Convention on Sustainable Development of 1988. These frameworks or codes provide criteria for environmentally responsible business practices. The International codes provide guidelines for corporate governance and companies commit themselves to pursue the standards set out in these codes as responsible citizens (voluntary) or as prerequisite to be noted on stock exchanges. Some of the multinational mining companies have committed themselves to the objectives of these codes and principles and therefore an overview is presented to outline the environmental leadership criteria. There are mainly three global environmental leadership frameworks namely the CERES framework, the UN Global compact, and the mining specific ICMM framework. The principles of each of the frameworks are presented in Table 3.3.

- **United Nations Global Compact** (Compiled from www.unglobalcompact.org)

The Global Compact is the world's largest corporate citizenship initiative and exists to assist the private sector in the management of increasingly complex risks and opportunities in the environmental, social and governance realms. The Global Compact seeks to combine the best properties of the UN, such as moral authority and convening power, with the private sector's solution-finding strengths, and the expertise and

capacities of a range of key stakeholders. By partnering with companies and leveraging the expertise and capacities of a range of other stakeholders, the Global Compact seeks to embed markets and societies with universal principles and values for the benefit of all. It can therefore be regarded as strategic policy initiative for businesses that are committed to align their operations and strategies with ten universally accepted principles in the areas of human rights, labour, environmental and anti-corruption. By doing so, business, as a primary agent driving globalization, can help ensure that markets, commerce, technology and finance advance in ways that benefit economies and societies everywhere. The UN Global Compact is also seen as a business leadership platform, endorsed by Chief Executive Officers, and offering a unique strategic platform for participants to advance their commitments to sustainability and corporate citizenship. Structured as a public-private initiative, the Compact presents a framework for the development, implementation, and disclosure of sustainability principles and practices and offer participants a wide spectrum of specialized work streams, management tools and resources, and topical programs and projects with the aim to help advance sustainable business models and markets in line with a more sustainable and inclusive global economy.

The Global Compact also incorporates a transparency and accountability policy known as the Communication on Progress (COP). The annual posting of a COP is an important demonstration of a participant's commitment to the UN Global Compact and its principles. Participating companies are required to follow this policy, as a commitment to transparency and disclosure is critical to the success of the initiative.
There are primarily three of the UN Global Compact principles applicable to environmental business leadership in mining. These include Principle 7, 8 and 9 as depicted in Table 3.3.

- **CERES Framework** (Compiled from www.ceres.org and Carrol and Bucholtz, 2006)

The Ceres Principles is widely acknowledged in the USA and the code presents a corporate benchmark for environmental conduct which is publicly endorsed by companies as an environmental mission statement or ethic. Imbedded in that code of conduct is the mandate to report periodically on environmental management structures

and results in order to reward activities that assures an environmentally improved future, and discourage practices that degradation of the environment and society. These Principles establish an environmental ethic with criteria by which investors and others can assess the environmental performance of companies. Companies that endorse these Principles pledge to go voluntarily beyond the requirements of the law. These Principles obligate endorsers to behave as prudent persons who are not governed by conflicting interests and who possess a strong commitment to environmental excellence and to human health and safety.

By endorsing the Ceres Principles or adopting their own comparable code, companies not only formalize their dedication to environmental awareness and accountability, but also actively commit to an ongoing process of continuous improvement, dialogue and comprehensive, systematic public reporting. Furthermore, companies that commit towards these principles affirm the belief that they have the responsibility for the environment by operating in a manner that protects the earth.

CERES also proposed a business plan with four pillars to be accepted by industry to achieve a sustainable global economy, each with specific ambitious goals which includes:

Pillar 1: Ascribe to honest an accounting practice that abolishes the folly of free pollution.

Pillar 2: Set new standards and environmental expectations through higher standards of business leadership.

Pillar 3: Aspire to bold environmental solutions that will accelerate green innovation.

Pillar 4: Change the rules of the game: Implement smart new policies that reward sustainability performance.

- **International Council for Mining and Metals Sustainability Principles** (Compiled from www.icmm.com)

In 1999, the global mining sector was facing significant problems in environmental performance reputation, sustaining profits, access to new assets and maintaining investor and employee confidence and it was accepted at the highest level of mining

companies that environmental performance need to be regarded as an urgent priority. Subsequently, the International Council on Mining and Metals - ICMM - was formed in 2001 to represent the world's leading companies in the mining and metals industry and to advance their commitment to sustainable development. ICMM represents many of the world's leading mining and metals companies as well as regional, national and commodity associations. Their members are committed to the responsible production of the minerals and metal's society needs and it seeks to play a leading role by promoting good practice and improved environmental performance internationally and across different commodities. ICMM also provides a platform for industry and other key stakeholders to share challenges and develop solutions based on sound science and the principles of sustainable development.
Its vision is for a respected mining and metals industry that is widely recognized as essential for society and as a key contributor to sustainable development and its mission is two-fold – to distinguish its members as industry leaders, and to make a contribution to raising standards across the industry as a whole.

To be an ICMM member, a company must build trust and respect with key stakeholders as a result of good performance in sustainable development, including clear and comprehensive approaches to reporting and assurance. By doing this they will be seen by governments and communities as preferred partners in the development of resources; by customers as providers of safe and responsibly produced products; by investors as being companies of choice; by talented people as employers of choice; and by financiers as being secure, well-managed and able to achieve superior returns.

Since 2003, ICMM's Council has adopted a number of position statements that give greater clarity to some of the commitments of the 10 Principles. Seven of these statements are directly aimed at decision-making about the natural environment as outlined in Table 3.2.

The benchmark for corporate environmental leadership has been set through these global environmental leadership frameworks and the environmental licence to operate is being clearly defined by social and shareholder expectations.

Table 3.2: Summary of relevant principles of Global environmental leadership frameworks.

UN Global Compact Principles	CERES Principles	ICMM Principles
7. Businesses should support a precautionary approach to environmental challenges	1. Protection of the Biosphere	1. Ethical business practices and sound systems of corporate governance.
	2. Sustainable Use of Natural Resources	2. Integrate sustainable development considerations within the corporate decision-making process.
	3. Reduction and Disposal of Wastes	3. Uphold fundamental human rights, respect cultures, customs and values in dealings with stakeholders affected by business activities.
8. Businesses should undertake initiatives to promote greater environmental responsibility.	4. Energy Conservation	4. Risk management strategies based on valid data and sound science.
	5. Environmental Risk Reduction	5. Seek continual improvement of health and safety performance.
	6. Environmentally safe products/services.	6. Seek continual improvement in environmental performance.
9. Businesses should encourage the development and diffusion of environmentally friendly technologies.	7. Environmental Restoration	7. Contribute to conservation of biodiversity and integrated approaches to land use planning.
	8. Informing the Public on environmental matters	8. Facilitate and encourage responsible product design, use, re-use, recycling and disposal of our products.
	9. Management Commitment to Environmental management	9. Contribute to the social, economic and institutional development of the communities in which we operate.

	10. Environmental Audits and Reports	10. Implement effective and transparent engagement, communication and independently verified reporting arrangements with our stakeholders.

Therefore it is imperative for companies to integrate environmental business leadership in their corporate decision-making and strategic thinking.

3.1.2 Environmental Business Orientation

3.1.2.1 Context of environmentally considerate business orientation

Banerjee (2002) asserts that environmental business leadership in an organisation cannot exist without corporate environmental business orientation. Environmental business orientation refers to the notion of responsibility toward the environment, the importance of recognizing the impact a company has on the environment, and the need to minimize such impact through focussed business decisions. Environmental orientation is a corporate value, akin to corporate environmental/ social responsibility. It involves respecting and caring for the environment and being responsive to external stakeholders as well as being good corporate citizens. Shrivastava (1995) have identified two sub-themes of environmental business orientation of which the first focuses on the company's outflow of internal values, standards of ethical behaviour, and commitment to environmental protection. This theme highlights an environmental orientation that is internally focused often reflected by environmental mission statements that appear in firms' annual reports. The second theme reflects managers' perceptions of external stakeholders and the need to respond to stakeholder interests. Sustainable development, protecting the environment for future generations, responsibility to the community and to society, and the need for a positive company image are elements that constitute this theme (Gladwin et al., 1995; Hart, 1995).

Schaltegger and Wagner (2006) views environmental business orientation as the channel through which business value and competitive advantage can be generated. They believe that shareholder value is created through environmental protection by the

following business decisions:

- Capital extensive equipment – Using smarter, smaller, cheaper and less polluting equipment.
- Dematerialised operations by reducing throughput and material consumption in order to reduce throughput and material consumption, storage and costs.
- Margin widening by a reduction in costs of production and by increased benefits to customers.
- By boosting sales through increasing customer benefit with more desirable products and services.
- Safeguarding the flow of finance and gaining confidence of capital providers by reducing risks and creating a green profile.
- Prolonging the duration and value growth through differentiation, increasing earnings potentials and anticipation of future costs.

Environmental business orientation can therefore increase shareholder value and will result in future orientated long term financial gains as well as market incentive.

3.1.2.2 The business case for corporate environmentalism

Traditionally, environmental costs have been treated as ‘‘externalities’’ arising from economic activity, and these costs were typically not borne by the producer and are thus not included in the market transaction. The change in market forces (regulation) and corporate governance business practices (ethics standards) has changed this status. Environmental management codes like “the polluter pays principle” and the “cradle to grave environmental responsibility” (NEMA, 1996) has been implemented to internalize these externalities by estimating the external cost of pollution and by applying pollution taxes (Petulla, 1980).

The link between corporate environmentalism and financial performance is yet to be fully explored. A few studies show there is a positive relationship. Using stock prices as a company’s performance measure and environmental awards and crises as proxy variables for corporate environmentalism, Klassen and McLaughlin (1996) found that market valuation of company rose significantly in the period following announcement of

an environmental award. The converse was also true: Significant negative returns were demonstrated for firms that faced environmental crises. Russo and Fouts (1997) used return on assets as a measure of company performance and environmental ratings of firms by an external agency as a measure of environmentalism performance and found that environmental performance and economic performance were positively related. They also found that industry growth moderated this relationship. Another fairly popular concept for linking environmental with economic performance is the concept of eco-efficiency measuring value in relation to environmental impact added or the environmental impact caused per monetary unit earned (Schaltegger and Wagner (2006).

Cliff and Wright (2000) state that companies in industries with higher environmental impacts face or will start to face a competitive disadvantage if stringent environmental regulation burdens them with higher compliance costs –relative to total production costs- than other industries. This is a challenge that specifically the mining industry faces. Another study by Dean and Brown (1995) indicated that high levels of environmental regulation actually conferred an advantage on companies in a variety of manufacturing industries as these regulations served as barriers to new entrants into the market.

According to Schaltegger and Wagner (2006), environmental issues can influence five basic business perspectives that relate to market competitiveness and economic performance:

- Direct financial effects (e.g. fines, penalties etc.)
- Market effects (effects on competitiveness of the company in the market such as higher willingness to pay, increased market share, stronger customer binding etc.)
- Effects on business and production processes (e.g. lower production costs, decreased purchasing costs because of lower material and resource costs).
- Effects on learning and organisational development (organisational culture of environmental processes leading to more innovative and motivated personnel).
- Non-market effects on business performance (e.g. less resistance from the communities in the proximity of the operations of the company, less political resistance, less standing time as a result of environmental non-conformance).

While significant cost advantages can accrue due to corporate environmentalism, the relationship between corporate environmentalism and economic performance is more complex and not always a win–win strategy (Walley and Whitehead, 1994; Hart and Ahuja, 1996). Caution must be used to advocate the ‘‘it pays to be green’’ maxim to all companies and industries.

3.1.2.3 Business strategies and the environment

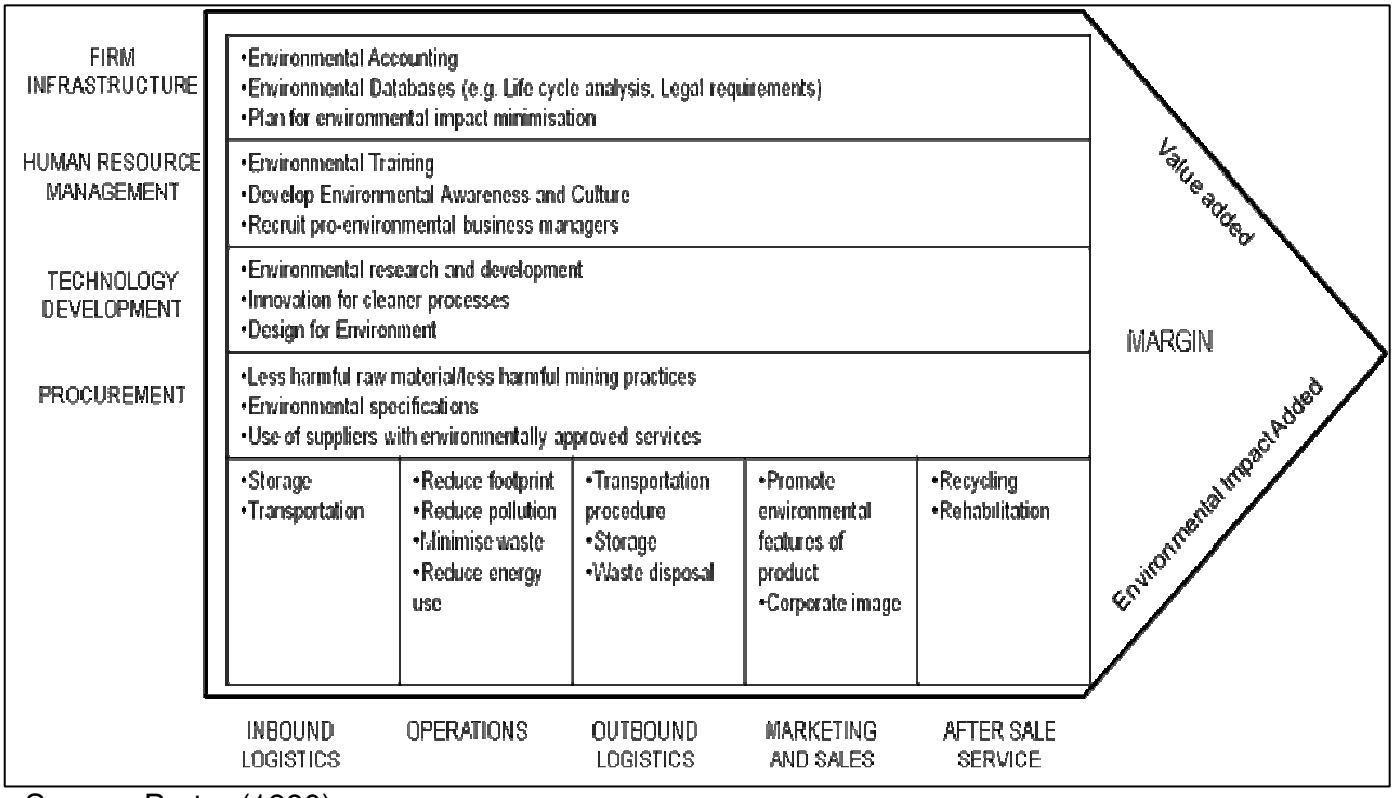
Schaltegger and Wagner (2006) proposed the four goals for environmental business orientation and provided strategies to achieve these goals. These are summarised in Table 3.3.

Table 3.3: Company related strategies to achieve the central goals of environmental business orientation.

Goals	Strategies
Cost-effectiveness	Reduction of resource and energy consumption Promotion of process and product innovation Fostering regular information exchange with stakeholders Building up environmental commitment of all employees
Reduction of resource and energy consumption	Commitment and management of environmental protection Fostering environmental competence in the company Commitment of management to environmental protection Additional systems accreditation
Implementation of environmental process and product innovations	Fostering regular information exchange with stakeholders Building up environmental commitment of all employees
Improvement of environmental communication	Implementing publicly visible environmental protection measures (renewable energies and environmentally friendly products. Implementing environment related advertising strategies.

All areas of management contribute to business influences on the environment and should have a hand in their reduction. Therefore the development of an appropriate orientation towards the environment is a generic functional task of business (Schaltegger *et al.,* 2003). The environmental impacts of business touch on and draw in all aspects of the value creation chain, from the procurement of goods and services, through the sales and manufacturing channel to the waste disposal phase. At the same time, all the value creation is connected to the creation of harmful substances – no value added without environmental impact added (Porter, 1990). The environmental value chain is presented in Figure 3.4 and present some of the activities that could be affected by an increase in environmental sensitivity and which activities should be focussed on in the operational strategy pertaining to the environment.

Figure 3.4: Environmental Value Chain Activities (Porter, 1999)



Source: Porter (1990)

Thus, to improve on environmental performance, it is imperative that environmental impact added should be reduced. The contribution of every chain in the value chain

should be evaluated from in order to understand the true environmental footprint of the company. This assessment should stretch right across the business activities, from production processes, support function activities, operational planning and control, human resources, financing, procurement and supply chain, but most importantly the drive should be from corporate leadership through policies and procedures (Epstein and Roy, 1998). Environmentally orientated business management is thus multifunctional activity and the management aspects there-off should be recognised.

To improve on environmental performance across the business, co-operation is crucial between different functions. Numerous decisions must be made regarding the appropriate flow of tasks, technology, information, values and human resources and the environmental input into these activities entails many activities and resources often spread in many locations (Epstein and Roy, 1998). Therefore the inclusion of the environmental management function in the organizational structure is critical to environmental protection objectives. This essential organisational need brings about the institutionalisation of environmental management (Schaltegger *et al.,* 2003), so biophysical objectives can become an integral part of management in the individual functional areas. Focussed business management around environmental matters therefore need to be structured appropriately according the degree of environmental impacts perceived around the value chain activities.

3.1.3 Environmental Strategy Focus

3.1.3.1 Context for business strategy and the environment

Research that explicitly recognizes the importance of the biophysical environment and examines its role in strategic management has started to appear in the literature since the mid 1990's (Gladwin *et al*., 1995; Shrivastava, 1995a). The importance of examining ecological impacts through business activities on strategy formulation has been argued and it has been concluded that that these considerations should be applied at the broadest corporate strategic level. However, theory development is still in the infancy stage and there are few empirical studies examining environmental influences on corporate strategy. There have been several attempts to establish theoretical linkages

between the biophysical environment and business organizations. While there is plenty of research on the societal role of business very little is said about how corporate environmentalism affects firm competitiveness and profitability. In a mail survey of environmental executives in a variety of US firms, Judge and Douglas (1998) found that integration of environmental issues into the strategic planning process was a key variable that was positively related to financial and environmental performance (based on respondents' self-reported perceptions). It was found that the ability to successfully integrate environmental concerns into business planning and operation becomes a strategic capability that can confer competitive advantage.

The third research stream that is emerging focuses on the strategic implications of environmental issues for the company. What is however required more urgently is an assessment of how environmental issues can influence the behaviour of decision-makers within companies and how managerial behaviour can be modified to address environmental issues.

Thus, a study into the field of corporate environmentalism as a strategic issue should be based on managerial perceptions of the strategic importance of environmental issues as well as the level of integration into strategy (Banerjee 2002).

Environmental strategy focus reflects the degree of integration of environmental issues into the strategic planning process of a company. The level of strategy focus in companies can differ and some companies integrate environmental issues at higher levels of strategy than other. One of the main driving forces behind strategic environmental thinking is the change in the external environment that and companies were forced to some degree to integrate environmental issues into their strategic planning process. Among the strategic actions influenced by environmental concerns are new product development, location of new exploration or manufacturing areas, increased R&D investments, technology development (especially in pollution prevention and waste management), and changes in product and process design.

Product-market decisions are also driven by environmental concerns in companies with a higher level of environmental strategy focus. By developing new processes that are

less environmentally damaging, companies can take advantage of the growing market for environmentally responsible products and services (Dechant and Altman, 1994). Significant cost advantages can result from environmental improvements such as superior waste management, use of cheaper recycled raw materials, and pollution prevention which limits the costs of compliance with environmental regulations (Smith, 1991). Thus, higher levels of strategic focus can result in what Shrivastava (1995) calls ‘‘ecologically sustainable least-cost strategy’’ and ‘‘ecologically sustainable niche strategy’’ to achieve competitive advantage.

As company management decide upon an environmental strategy, managers need to evaluate how it will affect their long-term competitive positioning. Competitive priorities such as cost and quality can be endangered as a result of environmental pressures (Epstein, 2008). Further, the pursuit of a particular priority may affect the type of environmental standard it will adopt. For example, in the case of cost leadership, cost-driven firms may be less likely to invest in new, cleaner technologies. Some will have already invested in highly specialized and expensive production equipment and may be unwilling to re-invest in newer technologies to raise local environmental standards to an unnecessary and constraining global corporate level. Companies pursuing a differentiation strategy may on the other hand wish to raise environmental standards to a global corporate level as environmental products can be perceived as products of higher quality (Epstein and Roy, 1997a). Raising local standards to a global environmental standard often results in both improved corporate environmental performance and improved worldwide image whereas meeting the lowest legal limit in a country may result in negative market reactions.

Companies with a higher environmental strategy focus tend to have well developed frameworks for addressing these environmentally strategic related issues (Judge and Douglas, 1998) which will be discussed in the following sections.

3.1.3.2 Strategic environmental management

Starik and Carroll (1991) proposed a tool for managers that can be applied to business

and the natural environmental issues. This Strategic Environmental Management Tool (SEMT) includes a wide range of responses for environmental effectiveness. The method uses the McKinsey 7S framework in which seven typical organisational components necessary for success are integrated and seven green suggestions are given for each "S". Carroll and Bucholtz (2006) motivate the addition of an 8th S which is also included in the discussion. The model is presented in Figure 3.5.

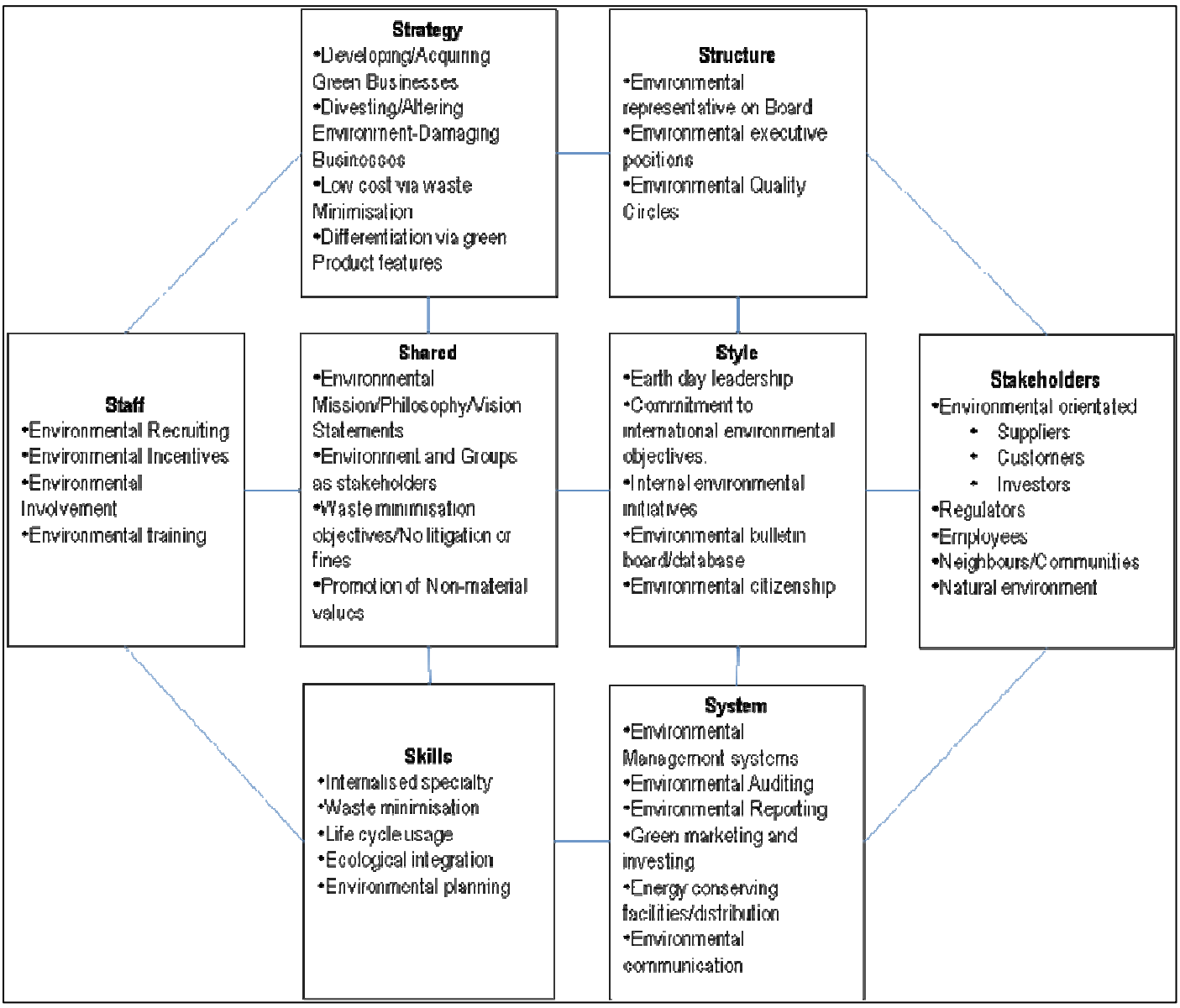
Business should build environmental components into their super-ordinate goals, strategies, structures, and so on, in order to develop an overall organisational environmental response. These goals can include an emphasis on environmental protection in a company's mission statement and should filter down to the operational activities of the company. The key to this model is for managers to identify opportunities for developing environmental responses in each of the "S" categories and to ensure that each of these responses is compatible with the others.

The business/environmental manager can also incorporate concern for the environment and take environmentally sensitive actions in all organisational departments and at all organisational levels.

From an efficiency point of view, the requirements of strategic management can be separated into three functional levels of responsibility extracted from the model presented in Figure 3.5 being 1) Corporate management driving the strategy, shared functionality and leadership style, 2) Stakeholders and 3) Institutionalised environmental management requiring structure, staff, skills and systems.

During the inception phase of environmental management in the late 1980's, uncertainty existed as to how environmental management should be introduced into organisational structures. Environmental managers were often part of a central corporate staff and reported to the general counsel. As professional environmental managers became part of the system, it was deemed necessary and desirable to push primary environmental responsibility to the functional units and many companies reduced their central staff.

Figure 3.5: Strategic Environmental Management Model



Starik and Caroll (1991) and Caroll and Bucholtz (2006).

Many companies today have recognized that both central corporate environmental management staff, along with environmental management personnel at the functional level, is necessary (Epstein and Roy, 2000). Environmental management is therefore structured as a separate internal group as part of the overall business management and functions most effectively in a matrix structure (Schaltegger *et al.,* 2003). The environmental manager has authority to seek to implement environmental solutions through the co-operation with other managers. Environmental management is normally

introduced through project groups or permanent multifunctional teams. Other substantial advantages can be achieved at the business unit and facility level in product and process design, operational controls, and self-audits to control and reduction of waste production and other environmental impacts (Epstein, 2008).

Without an environmental manager to lobby other managers there is a danger that environmental interests will not be integrated into business thinking.

In the case of integrative environmental standard, strong central corporate environmental staff is necessary to provide overall strategic planning, guidance, and coordination to the corporate environmental function and to the functional units and facilities (Epstein and Roy, 2000). In order to implement environmental strategies, a central corporate environmental team is critical to the internal audit function and to furnish overall direction for identifying, measuring, and reporting environmental impacts. This team can also be essential in the development and application of consistent tools for costing, capital investments, and performance evaluation and for directing the environmental strategy integration throughout the organization (Epstein and Roy, 2000).

A multitude of ways of institutionalising environmental expertise into a business demonstrates that there is no single answer to the question about how to structure environmental functionality (Schaltegger *et al.,* 2003). At worst, an environmental management portfolio can become isolated and a poorly funded function. At best, organisational structures exist that, with a high level of support, commitment from top management, provide resources to ensure that environmental management practices are integrated throughout the business. Such integration of environmental thinking and activities can be promoted and facilitated by an environmental portfolio manager and should be integrated into all support and primary activities of the value chain. Attention is needed that environmental management is not delegated to a separate group that is isolated from all other primary and support activities (Schaltegger *et al.,* 2003).

3.1.3.3 Environmental strategy implementation levels: The resource-based view

The underlying assumption in the environment-as-strategy field of research is that

corporate environmentalism can provide sustained competitive advantage. In an attempt to incorporate environmental considerations into management theory, Hart (1995) proposed a ‘‘natural-resource-based view of the firm’’. The traditional resource-based theory of the firm links available resources to firm capabilities and competitive advantage. A business firm’s capabilities are based on the nature of its internal and external resources: the less imitable the resources are the more unique the capabilities they can provide. These unique capabilities create competitive advantage (Rumelt, 1984; Barney,1991). Thus, managing ‘‘core competencies’’ is a key strategic task for achieving competitive advantage (Prahalad and Hamel, 1990). From a resource-based perspective it is argued that sustained competitive advantage can be gained by leveraging competencies that arise from resource characteristics. Hart (1995) takes this argument a step further by stating that the constraints imposed by the biophysical environment will provide new capabilities for firms and that recognizing, managing, and leveraging these (natural) resource constraints will ultimately lead to sustained competitive advantage. Thus, pollution prevention (rather than ‘‘end-of-the-pipe’’ pollution controls involving clean-up technologies and processes) becomes a strategic capability that can lead to competitive advantage by lowering costs (of compliance). Hart (1995) also identified stakeholder integration as a key resource that can provide strategic capabilities.

Attempts to operationalize the conceptual framework of the natural-resource-based view of the firm are beginning to appear in the literature. Sharma and Vredenburg (1998) found that companies that were environmentally proactive developed unique organizational capabilities. In particular, the proactive firms in their sample demonstrated capabilities for stakeholder integration, higher-order learning, and continuous innovation. These capabilities were also associated with self-reported managerial perceptions of competitive advantage (Sharma and Vredenburg, 1998).

While there has been some progress in situating environmental issues within the theoretical framework of resource capabilities and strategic management, construct definition and measurement is still in its incipient stage.

3.1.3.4 Environmental reporting and performance as a strategic issue

Judge and Douglas (1998) defined environmental performance ‘‘as a company’s effectiveness in meeting and exceeding society’s expectations with respect to concern for the natural environment’’. Numerous organizations have developed environmental performance indexes to help them gauge the performance of strategic business units and company facilities to monitor their environmental exposure (Epstein and Roy, 1998). Environmental performance has been measured in a number of ways: self reports, proxy measures (e.g. environmental awards), or environmental ratings provided by external agencies (Judge and Douglas, 1998). The development is sometimes prompted by external evaluators and sometimes part of a comprehensive performance evaluation system used to motivate improved environmental performance.

The recent global corporate view on environmental performance has changed drastically from only compliance to beyond compliance. Some companies have implemented global integrative environmental standards, explicitly identifying corporate goals and setting specific targets that will likely improve corporate environmental performance and focus attention on areas of concern and priority.

Environmental strategy is linked more powerfully to environmental performance through the development of performance measures. The environmental performance of corporations, business units, facilities, teams, managers, and all other employees must be measured and must be part of the way they are evaluated for success. In addition, incentives should be established to encourage excellence (Epstein and Roy, 1998). If environmental performance is truly important, evaluations and rewards should highlight that component for both global integrative and local adaptive environmental strategies (Epstein, 2008).

A company that sincerely wants to change its corporate culture through either types of strategy as well as establish and maintain a position of environmental leadership must make the environmental performance of individuals, facilities, and divisions an integral part of the performance evaluation.

Furthermore, it is difficult to achieve maximum environmental performance and goals of sustainability or environmental excellence unless management sends a clear message that environmental performance is critical to the company. If employee performance is evaluated based on short-term profit or revenue contributions, employees quickly recognize that trade-offs on the environment are acceptable and desired changes in corporate culture will be more difficult.

Environmental monitoring has become increasingly important for annual reporting to the public and to shareholders. This initiative has been led by the leading stock exchange listing criteria in the world. The implications are that only proven environmentally responsible companies that ascribe to the principles of sustainability reporting are allowed to be listed.

The South African business sphere has adopted the value of responsible environmental management and it is highlighted in the requirements of successful corporate governance. This is advocated by the King Report on Corporate Governance for South Africa (2002) ("King II") and requires companies to adopt a more inclusive approach to business, with greater emphasis on the non-financial aspects of performance, of which environmental performance is but one component. To achieve an integrated / inclusive approach, companies should display good corporate governance standards in all their activities both in principle and in practice. This has led to the JSE's Social Responsible Index (SRI) that was launched in May 2004 in response to the debate but taking cognisance of the South African context. The approach followed to compile the Index was based on the FTSE_4_Good Index.

The Index is structured along the three Pillars of the triple bottom line, namely environment, society and economy. A company must address each of these Pillars if it is truly to be said to have integrated sustainability into its business practices. The **environmental pillar** is based on the premise that all companies have an impact on environmental resources, only the extent varies. Companies therefore need to develop strategies to measure and monitor their impacts and implement systems that ensure that these resources are used in a sustainable manner. The **economic pillar** states that

financial performance is not a reflection of long-term growth but often reflects short-term company performance. Companies need to be able to adapt to macro-economic driving forces through balancing the use of resources against short term profits and should further be focussed on working towards long term growth. The **social pillar** supports the notion that companies need to demonstrate core business strategies that are linked to internal management systems and key performance indicators aimed at promoting the social upliftment, development and poverty reduction of its staff and the communities in which it operates. They are also required to develop and maintain positive relationships with a far wider structure of stakeholders, including staff and the community generally.
The challenge facing companies is to integrate the principles emerging from each of the three Pillars and from corporate governance into their existing frameworks of governance and business practice. Companies wishing to be included in the SRIndex should therefore develop a vision for the company and ensure that they understand each of the aspects of the three Pillars.

To be qualified as an environmental responsible company the SRI Environmental Criteria measure companies along the following business practices:

Tool 1 - Policy and strategy

Companies must establish environmental policies that identify the challenges that the company faces, and that commit to the use of reasonable targets for improved performance and for successfully integrating long-term considerations into their business strategies.

Tool 2 - Management systems and performance

Companies must establish environmental management systems at central and operational levels to ensure that policies are implemented and that the achievement of targets, set in such policies, are monitored and measured. The JSE will be looking to use increasing amounts of performance information to validate the assessment undertaken in accordance with the three Pillars.

Tool 3 - Reporting

Companies should identify and engage relevant key stakeholders and disclose as much data as possible in relation to the targets set in policies and the company's performance in relation to such targets by regularly, accurately and on-time reporting.

With regards to mining and the environment, according to the JSE SRI criteria, company should continually seek to improve its environmental performance by:

- Working to reduce and control its negative environmental impacts;
- Promoting higher awareness of the environmental impacts of its products / services;
- Working to use natural resources in a sustainable manner and to develop products and services that have reduced negative impacts; and
- Committing to risk reduction, reporting and auditing.

The JSE has sought to identify those activities that have potentially high impacts on the environment, or whose environmental impact receives much public scrutiny; and distinguish those from medium and low impact activities. The SRI Index uses the FTSE Global Classification System (as applied in the FTSE/JSE Africa Index Series) as a starting point for identifying business activities with a potentially high impact on the environment. A company is classified in a high, medium or low impact category according to its JSE industry sector classification. The higher the environmental impact, the more stringent the criteria it needs to meet for inclusion. The SRI Index, however, does apply a degree of flexibility to sector definitions. As a general rule a company is rated as high impact if a high impact activity accounts for at least 15% of its turnover. It must be noted that this classification only relates to environmental impact and not to overall impacts of companies. Mining resorts to **the high impact category** and requires the following listing criteria:

Table 3.4: JSE SRI measurement tool requirements and indicators for high impact companies that must be included in environmental leadership management strategies for listed companies.

	Indicators
Policy: **Minimum requirements:** Must cover the group's entire activities in South Africa.	Policy identifies: • Direct and indirect current and future impacts the company has on the environment Policy commits: • To use of reasonable targets or initiatives or environmental programmes, appropriate to the company's size and business • To monitoring and performance review • To continuous improvement in environmental impact • To stakeholder relevant involvement on environmental issues • To relevant public reporting of key environmental issues • Policy explores product / operation lifecycle impacts on the environment
Performance and management: **Minimum requirements:** Environmental management system or programme must at least cover those parts of the group / company with the most significant environmental impacts in South Africa	• Development of awareness of significant environmental impacts • Documented targets, initiatives, programmes or management systems to address and monitor most significant impacts across all operations • Processes and structures in place for internal auditing of environmental practices where relevant • Internal reporting processes and structures and management review in place to monitor performance • Evidence of continual improvement (relevant to targets) and correction of non-compliance incidents • Achievement of targets, or measures to move towards this
Reporting and consultation:	• Quantitative, comparable and non-selective data on environmental issues given publicly where relevant

Minimum requirements: Reports should cover the group's entire activities in South Africa.	• Regular, clear and comprehensive disclosure made whenever disclosure made • Performance against targets fairly reported on Independent verification • Stakeholder dialogue undertaken whenever relevant • Disclosure of major non-compliance, prosecution, fines, accidents

(The information related to the JSE SRI has been compiled from www.jse.co.za/sri/docs/criteria)

3.1.4 Measuring Corporate Environmentalism

Measuring the degree of corporate environmentalism is a complex task taking into accounts the intricacies and intertwinement of the theory of the components of the construct. Adding the variation in understanding and interpretations of definitions in environmental management by environmental practitioners and the maturity level, qualifications of individuals and corporate priority of environmental management in companies, the assessment of corporate environmentalism presents some challenges.
Some studies have been conducted on determining the construct of corporate environmentalism for small sample companies in the manufacturing, chemicals, electronics, consumer products, foods, services, pharmaceuticals and utilities industries (Banerjee, 2002; Klassen and Angell, 1998; Starik and Marcus, 2000; Porter and van der Linde, 1995).

No studies have been found that has focus on corporate environmentalism and the mining industry despite its environmental legacy and its listing under high environmental impact category with the sustainability indices at the world's leading stock exchanges.

To pursue an industry specific study on corporate environmentalism, the nature of the industry, its focus areas, culture and structures need to be understood and taken into consideration in formulating questions to gain relevant information. The questions

should also be informed by the most recent literature on the subject as presented in the section above. Taking all these elements into account, as well as the ground breaking work done by Banerjee (2002), the basis for the questions to access corporate environmentalism in sample mining companies will be shortly outlined. Ideally, the views of corporate and business unit management, technical and operational management, marketing and human resource management, supply chain and procurement and corporate and functional environmental management should be incorporated in a study of the buy-in into the constructs comprising corporate environmentalism.

In order to evaluate **corporate environmentalism**, the three main constructs discussed in the literature study and its sub-themes should be evaluated. These constructs include Environmental Leadership Importance, Environmental Business Orientation and Environmental Strategy Focus. From the literature study, five sub-constructs have been assigned to each of the three main constructs. The aspects surrounding the evaluation criteria for company management pertaining to each of the sub-themes of corporate environmentalism are shortly outlined as it should form part of any empirical investigation into this field of study.

Construct 1: Environmental leadership importance mainly revolves around the business value that company management can extract from influence as to how the company should go about the costs and implications of a lack of environmental protection and also strategic environmental planning.

In order for company management to prove that environmental leadership is important to the company, they must openly value and act on **commitment to and compliance** with environmental regulations and standards. A world class environmental policy should also be in place, irrespective of the requirements of stock exchange listings. Company management should also have a solid and open relationship with environmental regulators and must value the input and value added by this relationship. Furthermore, acting on environmental leadership importance, company management must endorse not only participation, but also leadership on an internal and external level towards the international sustainability codes e.g. the ICMM principles. The company management

should therefore live the values of environmental leadership irrespective of the bottom-line value of environmental management and uphold environmental ethics of the highest standard.

The second construct under environmental leadership importance is the degree to which company management provide **adequate human and financial resources** to reach the environmental objectives as outlined in the policy stated above. These resources should be provided at the highest level of company management and be driven from an active executive environmental portfolio with its own mission and objectives which is aligned with the company values and strategy. Company management must ensure that adequate resources are provided to the functional or business unit level of operations as environmental leadership input should be integrated on ground level to have a real influence on company operations. These resources will also ensure that environmental reporting is done accurately and efficiently and leadership for environmental improvements can be provided on the operational level. As the annual report is the public face of the company, the contribution to the improvement of the environmental image portrayed by functional environmental management as a function of their direct role should be valued by company management who is committed to environmental leadership.

If company management has not bought into the **business case for environmental management** and protection, it can be argued that very little value can be extracted from this initiative and therefore, it can become an isolated function that will not receive the required attention. Company management must therefore be tuned into the business value of environmental leadership in order to regard it as a priority component of its strategy. Company management must also be convinced that environmental leadership can provide a competitive advantage in the market place and add value to their future positioning in the micro and macro business environments. This can only be achieved through active pursuit of the cost/value benefit that is derived from environmental leadership. A lack of buy-in into the business case of environmental leadership can therefore be regarded as either ignorance of company management as to what the real cost of improper environmental management is or the cost/risk can be tolerated within

the context of the business environment.

Fourthly, company management that ascribe to the value of environmental leadership importance must insist on the involvement of **environmental leaders in the development of business strategies** in order to achieve environmental objectives and to delineate current and future environmental risks that may have an impact on the company's business. As the operational domain is often the heart of most businesses, the environmental leadership portfolio is often regarded as an ad hoc optional. Therefore, the strategic will of company management to act on environmental compliance commitments and the relevant business case thereof should position environmental leadership to contribute to both operational and business strategies of the functional and corporate levels. Furthermore, company management that values environmental leadership should realise the brand value of enhanced environmental performance as reflected in annual triple-bottom-line-reporting. Some of the strategic contributions of environmental leadership can include best in class resource consumption per unit product, innovative technologies and reduced environmental expenditure as well as an overall reduced environmental footprint.

To achieve these improvements, the business **recommendations with regards to the environment should be valued** by company management and suggestions that can add value to business processes should be implemented as a matter of urgency. To instil this culture will however require a drive right from the top of company management and a continual drive for environmental excellence should form part of the company strategy. Company management should therefore be pro-active by recognising and supporting the value of environmental protection initiatives. This should be formally done by rewarding the achievement of environmental targets and by putting an individual incentive scheme in place. The urgency of environmental management should also be regarded as an indispensible component of business management for companies that value environmental leadership to such a degree that company management should understand and acknowledge the implications of the absence of environmental leadership. This will require a value shift towards a culture of renewed leadership thinking.

Construct 2: Environmental business orientation refers to how company management approach environmental matters in their business decisions. Strategic, financial and operational decisions can create or destroy value and therefore the need to recognise the short and long term impacts a company might have on the on the environment.

The first step towards responsible environmental business orientation is for company management to **accept ownership and responsibility in their business** role with regards to the natural environment. In order to achieve this, each manager must view environmental protection as a high priority activity for the company and also realise the implications for not regarding the environment. Environmental management must therefore be lobbied through a concerted effort by company management and the environmental leadership portfolios to understand the importance of environmental protection from a business point of view. Maturity in environmental business orientation is reached once company management acknowledge that it is not difficult to be financially successful and to protect the environment at the same time. The inclusion of environmental thinking into business plans is often regarded as a necessary evil and operational paradigms tend to be rather short-term focussed. By accepting environmental responsibility, company management can be more environmentally orientated in their business role.

This orientation will lead to an overall **environmental approach towards business decisions**. Usually a clear company policy statement that reinforces the notion of environmental awareness and protection in all facets of the business is the starting point of this approach. It should however be the company's mission to be a leader in environmental protection in their industry that drives the environmental approach, which is hinging on the corporate value system and culture of company management. Therefore, **environmental values should be entrenched** in the business approach of the company. As pressure is mounting to improve on environmental performance and to reduce environmental impacts, environmental protection is not an option any longer and whether acknowledged by company management or not, it is vital for the long term survival of the company. This cannot be achieved without a change in the operating

culture and therefore a value based approach should be driven by company management to change the attitude of business units towards environmental matters. Company management should through public announcement and symbolic leadership actions provide support towards the responsibility and intent of the business to operate environmentally friendly. Furthermore, the corporate value system on environmental protection should be driven by the executive environmental portfolio committee and feedback of results achieved based on value-based decision-making should be published and set the example for future operational activities.

However, if **company leaders are primarily profit orientated** in their decision-making despite the environmental implications, environmental expenditures will be minimised and environmental business orientation can be expected to be low. In this case, expenditure on aspects such as environmentally friendly technology, rehabilitation and environmental resources will be kept to a minimum despite the fact that the expenses will have to be made at some point in time, only at escalated rates and usually enforced by regulators. This postponement mindset delivers short term financial gains but is detrimental to the longer term cash flow of the company. Therefore environmental expenditure and efforts should rather be evaluated by the long term economic benefits to the company. This long term saving brought about by environmental business orientation will serve both shareholders and employees, whilst the responsibility towards environmental protection is adhered to. Company profits can never be regarded as more important than environmental activities as stipulated in the International sustainability codes and company management's commitment to responsible corporate governance.

In order to further establish buy-in into corporate environmentalism and more specifically environmental business orientation, the degree to which **company leaders are ignorant towards environmental matters** should be established. Corporate green-washing or environmentally responsible smoke screens are rife in order to convince stakeholders that companies are committed to environmental objectives of reduced environmental impacts. As the long term financial well being of the company can depend on the state of the natural environment during and after operations, company

management should acknowledge that the natural environment does affect a company's business activities and therefore, environmental protection efforts should be much more than an issue of maintaining a good public image. Ignorance towards environmental matters should therefore be pro-actively managed out of companies that ascribes to the values of world class environmental leadership.

Construct 3: Environmental Strategy Focus deals with the degree to which environmental matters are incorporated into the company's corporate goals and strategic processes, planning and structures. Without strategic buy-in into environmental management, the value generated from this support function cannot be leveraged to the detriment of especially the long term objectives of the company. Therefore, it is imperative that company management drives environmental leadership, value systems, business orientation and continual improvement in environmental performance as a strategic issue.

In order to derive value from environmental management, company management must ensure that **environmental issues are integrated into strategic management** objectives at all levels of the company. Environmental protection objectives should be part and parcel of a company's strategic planning process and alternatives should be constantly pursued in order to reduce long term environmental impacts. This can only be achieved through co-operation between all functional levels of the business and be demanded by company management as a standard practice.

By **linking environmental objectives with corporate goals and strategies**, environmental issues will always be considered when dealing with current and future projects. The introduction of this process into business plans will streamline the expectations and requirements for environmental impacts, expenditure and resource requirements. In this way, company management will have insights into the degree of environmental exposure and the costs and benefits based on the environmental risks outlined. These risks can also be managed more pro-actively taking the corporate goals and strategies into account.

In order to meet the strategic environmental goals and objectives, **environmental competence of managers** should be regarded as a strategic asset for the company. Implementing environmental strategy should start with an effective structure and should be endorsed further by company management in employment decisions. As environmental competence can be viewed as a differentiating core competence, employment decisions should be influenced by environmental concerns. Furthermore, the environmental value system can be reinforced to employees at all levels through frequent environmental initiatives e.g. compulsory practical training and awareness campaigns. This can lead to operational managers that are committed and competent to implement the company's environmental goals and could provide the company with the advantages brought about by the environmental resource-based view.

Environmental competence of managers can also over time lead to improved **environmental performance which is one of the main strategic priorities** of corporate environmental management. To achieve world class environmental performance, a company should have established internal environmental standards as performance criterion for all the facets across the value chain. These standards should pursue a "beyond compliance" value whereby company management acknowledge that staying ahead of regulation is staying ahead of future costs and competition. Environmental efforts therefore can no longer be motivated only by regulatory compliance as future business opportunities and expansion strategies will be influenced by an environmental track record.

The company should therefore culture a management principle of **accountability for environmental performance** and drive it as a central element of the company's strategy. This accountability can be measured through the commitment of company management to take environmentally friendly technology into consideration in business decisions with the sole purpose of improved environmental performance over time. This improvement in environmental quality will emphasize the company's commitment to their social and environmental licence to operate and in turn will provide favourable response from shareholders, community members and regulators. By applying environmental accountability as a strategic element, companies can brand and differentiate their

environmental profile. The annual report to shareholders can then be used as a channel to prove the company's commitment to environmental protection.

3.1.5 The Corporate Environmentalism Pathway.

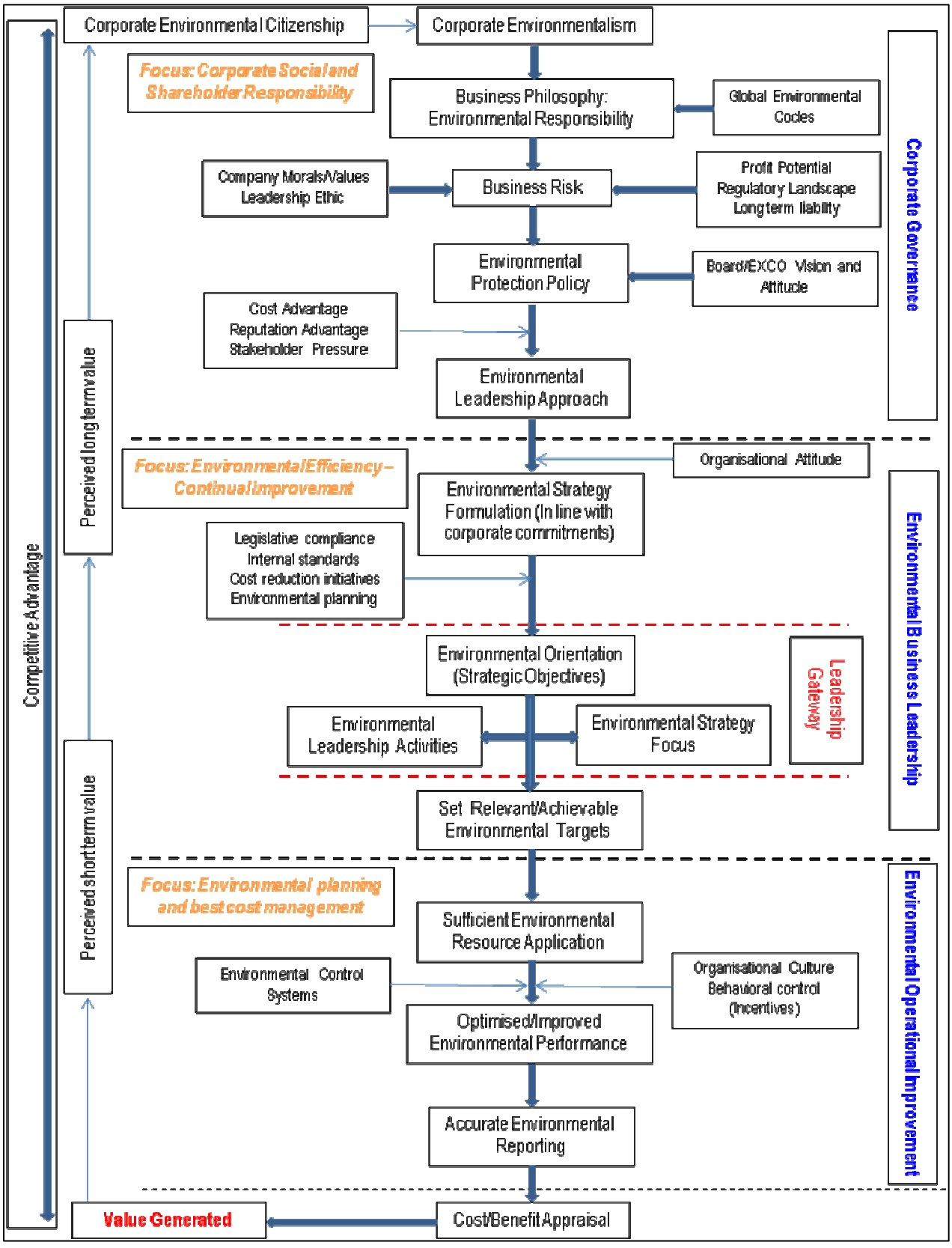
From the literature review presented, a model has been developed to contextualize a pathway for corporate environmentalism. The model, which is presented in Figure 3.6, unpacks the complexity of corporate management requirements for high environmental impact businesses.

The pathway has been developed to structure and delineate the various environmental responsibility levels within the chain of environmental leadership. Furthermore, it outlines the factors that influence decision-making and function along the hierarchic levels within the company. In the end, corporate environmentalism should generate value for a company, whether it is profitability or sustainability and therefore it should be practical and implementable.

The model is organised along the corporate functional level where the corporate governance level should take account for the shareholder value that is being created and the contribution towards corporate social investment is determined. This is typically the role of the corporate executive environmental portfolio which consists of board members responsible for sustainability issues and corporate managers.

Environmental business leadership should drive environmental efficiency and continual improvement objectives. As outlined in the figure, the leadership gateway should be passed through up and down the company hierarchy to optimise the efficiency of environmental decision-making. In this way, environmental matters also remain a corporate priority as feedback and responses are managed through this gateway. This is typically the role of the corporate environmental manager.

Figure 3.6: Corporate Environmentalism implementation pathway.



This model can aid in the thought process of corporate management as to how the responsibilities of corporate environmentalism should be structured and also provide a basis for environmental value creation. In the short term (less than 5 years of implementation of this structure), the value of environmental management are usually questioned and its strategic contribution often underrated. However, as time passes and the structure is adopted as standard practice, the comparative value can be proven and competitive advantage can be gained.

The contribution of this model to corporate citizenship should however stand the test of cost efficiency and time, but is presents a simple point of departure for institutionalising corporate environmentalism.

4 RESEARCH METHODOLOGY

4.1 SELECTION OF A RESEARCH STRATEGY

The research for this study has been conducted in two phases: Phase one will consist of a literature study of the extant literature on environmental leadership and business processes embedded in environmental management in high environmental impact businesses such as mining (presented in section 3 of this document). This phase has been supplemented by phase two, a quantitative survey to investigate environmental leadership importance, environmental business orientation and environmental strategy focus in the sample mining companies. Information was gathered by means of a survey methodology from individuals working in the relevant field.

This study has been limited to the mining industry and more specifically the JSE listed multinational gold, platinum and diamond mining companies operating in South Africa.

4.2 DESCRIPTION OF THE RESEARCH METHODOLOGY

This section deals with the methods and instruments that have been used in this research to derive information and also present the statistical methods that were applied to make sense of the data.

The focus of this section will be on the literature study that will be conducted as well as questionnaire design, layout and administration, target population, sampling method, instrumentation, scoring techniques, data collection, response rate and statistical methods to be used.

4.2.1 Literature review

A thorough literature study has been conducted on the extant environmental leadership literature with the specific emphasis on leadership process and the crystallization of environmental leadership through environmental management in South African mining companies. The aim of the literature study have been to obtain basic definitions of the concept of corporate environmentalism and to study the relevance of environmental leadership in mining companies as it is implemented through environmental business

orientation and environmental strategy focus. The literature basis has provided insights into the priority dimension of environmental management in mining companies.

The literature study included:

- Relevant publications in accredited academic journals.
- Authoritative books on corporate environmental leadership and the business case of environmental management.
- Relevant industry publications and case studies pertaining to environmental business leadership.

The research has aimed to provide an orientation to research already conducted within the field of study as well as a perspective on the most current research, paradigms and models applicable to corporate environmentalism in mining. The global environmental sustainability codes have also been incorporated to provide insights with regards to the study objectives.

4.2.2 Quantitative survey

In quantitative research, the research design is considered crucial in determining the most appropriate technique for the measurement of perceptions of respondents. While a number of techniques are available for the collection of primary data such as surveys, experiments, or observations, the survey method was selected as the appropriate one for this research. The survey method was selected because it allows descriptive reporting and makes use of questionnaires where respondents provide information on their attitudes and perceptions.

4.2.2.1 Measuring instrument(s)

A structured questionnaire has been applied to gather information from the participants. A questionnaire is a printed list of questions or statements which respondents are asked to answer Melville (1996). The objective is to obtain a view on their opinions on the topic of the research. Questionnaires are commonly used and abused and it is relatively easy to compile one but not easy to compile an effective one. For this research, an amended questionnaire from the research of Banerjee (2002) was used as the validity

questionnaire has already been established and the research has been aimed at most industries except for mining. The questionnaire is designed to help determine how well the organization being researched is functioning in a related area. To cater for different educational levels, only closed (structured) questions where used as opposed to open questions in which respondents would have been required to answer in their own words.

The other advantages of closed questions are:

- They simplify questionnaire completion and hence encourage respondents to take part
- Coding for data analysis is simplified
- The questionnaire can be completed in a relatively short time
- The amount of probing needed is reduced

A Seven point Likert type scale - which allowed for ”unsure” answers as well – have been adopted for this research. The Likert scale is the most common variation of the summated rating scale (Cooper and Schindler, 2003).

The respondents were asked to agree or disagree with each statement and each response is assigned a numerical score that may be totalled to measure attitudes. This type of scale helps in the comparison of one person’s score with a distribution of scores from well-defined samples. By this means, the combined opinions of the levels of management for a managerial level, company, sector and industry can be generated.

The possible answers will be coded with numerical values, such as the extent to which the employees agreed with the statements.

The first part of the questionnaire will capture environmental leadership data, the second part environmental business orientation and the last part will gather information on environmental strategy focus. This breakdown is presented in Table 4.1.

Table 4.1: Indexing of question focus areas.

TOPIC OF SECTION	STATEMENT NUMBERS	SUB-CONSTRUCTS	PERCEPTION NUMBERS
Environmental Leadership Importance	1 – 15	Environmental policy commitment and compliance importance.	1
		Environmental resources are adequate.	2
		Business case for environmental leadership.	3
		Environmental portfolio involvement in business strategies.	4
		Business recommendations regarding environment valued and implemented.	5
Environmental Business Orientation	16 – 29	Environmental ownership and responsibility in business role of management.	6
		Acknowledgement of environmental leadership input for sound business decisions.	7
		Environmental values entrenched in the business approach.	8
		Profit orientation despite environmental implications.	9
		Degree of environmental ignorance towards environmental matters.	10
Environmental Strategy Focus	30 - 45	Environmental issues are integrated into strategic objectives.	11
		Environmental objectives are linked with corporate goals and strategies.	12
		Accountability for environmental performance a central element of company strategy.	13
		World class environmental performance is a strategic objective for the company.	14
		Environmental competence of managers is of strategic importance for the company.	15

4.2.2.1 Validity of the questionnaire

Validity and reliability or research is a pre-requisite and fundamental characteristic of scientific work. Reliability implies that the same matter that is researched continuously

by the same or different individuals must render the same results (Cooper *et al.,* 2003). The questionnaire method complies with this criterion to a satisfactory extent, but is not infallible as it is impossible to control the environment in which the questionnaire is answered. The mood and time available of and for the respondent may for example influence his/her responses. These environmental factors are however also valid for other research methods.

Validity implies that the research should be able to measure what it is suppose to measure. All measures will be taken into account to ensure the internal validity of this research. Leading questions will be avoided and the wording of each question will be simple and unambiguous. The questionnaire will also be designed to be completed simply and accurately. Control questions will be added to determine whether respondents are contradicting themselves.

The content validity of the survey has been evaluated by means of a pre-test survey with a number of knowledgeable individuals on the subject.

4.2.2.2 Distribution of the questionnaire

The questionnaires have been distributed to corporate (CEMs) and functional level (FEMs) environmental managers for the sample mining companies. Respondents have been asked to assess each statement and then tick to show their level of agreement or disagreement with each statement. The questionnaire consisted of 3 pages with clear instructions on how the questionnaire should be completed. A total of 45 statements were included in the questionnaire. Approximately 7-10 minutes were required to complete the questionnaire.

The data was collected by sending out the questionnaire in the form of an e-mail to each individual with a preceding phone call notifying them of the e-mail and confirming the brief of the study. A short cover letter which is part of the questionnaire explained the purpose of the study in more detail. The participants were asked to fill out the questionnaire on the basis of their experience with their current employer. Anonymity was also guaranteed for all participants.

4.2.2.3 Population and Sampling

The target population were corporate environmental managers and environmental managers on functional level at different JSE listed multinational gold, platinum and diamond mining companies in South Africa.

Due to the relatively small number of the intended population, the whole population was be surveyed rather than employing sampling. The planned sample size was approximately 50 individuals (14 CEMs 38 FEMs approached) who are knowledgeable in the field of corporate environmental management (and environmental leadership) in mining.

4.2.2.4 Unit of analysis

The unit of analysis was employees at different environmental management levels at the different mining companies.

4.2.2.5 Levels of Measurement

Variables can be measured at different levels of precision and these levels are called levels of measurement. There are four levels of measurement namely: nominal, ordinal, interval and ratio. The precision or level of measurement determines the appropriate statistical technique to be used in the analysis of the data. This research will apply only ordinal measurements. Ordinal data are rank-ordered data based on relative ordered relationships. It can be used to establish the positioning of a variable on a continuum and therefore ordinal data has a specific order or rank associated with the categories though there is no true numeric value associated with the data. Categories can be ‘excellent’, ‘good’, ‘fair’ and ‘poor’ or ‘Agree’ and ‘Disagree’.

4.2.2.6 Data coding

The data was captured and coded in the *Microsoft Excel XP Professional* computer software in the required format for the purpose of statistical testing.

4.3 STATISTICAL ANALYSIS

Descriptive statistics and comparative statistics were applied in this research. The choice of statistical tests and techniques were based on the level of measurement of the data collected.

4.3.1 Descriptive Statistics

Descriptive statistics are quite straight forward to use and deals with methods of organising, summarising and presenting data in such a way that the meaningful essentials of the data can be extracted and interpreted easily. The objective of using these types of statistics is to determine as much as possible about the data by using visual displays such as charts and tables to provide a perspective and a set of tools to search for clues and patterns within datasets (Cooper and Schindler, 2004). The characteristics of location and spread of the data can also be determined and are useful when cleaning data, discovering problems and summarizing distributions.

4.3.1.1 Measures of location

The common measures under this category are:

- Mean which is the average
- Median which is the midpoint of the distribution
- Mode is the most frequently occurring value

The mean response was applied to typify the data for the two levels of management per company and commodity. The mean was also derived for the industry and for the distinctive managerial levels included in the study.

4.3.1.2 Measures of spread

These describe how values scatter or cluster in a distribution and the common ones are:

- Variance is the average of the squared deviation scores from the distribution's mean.
- Standard deviation summarizes how far away from the average the data values typically are.
- Range is the difference between the smallest and largest scores in a distribution.

The standard deviation is calculated for each of the data points derived from the questionnaire.

In this study, the organisational level and mining type make up the variables to calculate the frequency tables that will enable the description of the sample population. At the same time, the mean response of employees per category and the standard deviation was calculated on the various constructs within the questionnaire as a first step in exploring the respondent's perceptions regarding the constructs of corporate environmentalism.

4.3.2 Comparative Statistics

To meet the objectives of this study, it is imperative to understand the variation in perspectives between the various organisational levels, the different mining groups, the different mining sectors and the mining industry, and the constructs under investigation. Appropriate comparative statistics have been applied to test the linearity and variation in responses with regards to the sub problems and the constructs assigned to each sub problem.

4.3.2.1 Data correlation analysis

The responses of the Corporate Environmental Managers and the functional environmental managers were correlated on an industry, sector and company specific basis to test the degree of consensus with regards to their opinions on the questions posed. These correlations then present the alignment of opinions with regards to the various constructs and derivations can be made about the state of environmental leadership importance, environmental business orientation and environmental strategy focus per company, per sector and for the industry.

4.3.2.2 One way analysis of variance (ANOVA)

Further statistical testing has been applied to evaluate the differences or similarity in means between the responses of the subgroups and statements to be tested. To determine whether there has been change or no change in the population of interest or whether a real difference exists in the data set, selected statistical analysis is applied. To

test multiple groups (more than 2) at once against one independent variable an analysis of variance (ANOVA) needs to be performed. Analysis of Variance (ANOVA) (One-way) testing has been applied on an inter-company management level, inter-sector level and for the total industry responses per construct and per sub-problem tested. In this way, results can be assessed for significant differences in responses between the organisational levels within the mining companies and between the mining commodity representatives. Once p-values with a confidence level of more than 95% (<0.05) has been established (by comparing the results on each of the constructs between the average responses of corporate and functional environmental managers) the response (and correlation) has been deemed as statistically significant. This means that there is a less than 5% chance that the variation in result can be ascribed to chance alone and therefore should be investigated further.

4.3.2.3 Post-hoc Non-parametric testing (One sample t-test)

Once the Analysis of variance presents significant differences between the populations measured, post hoc tests can be applied to establish which construct and which sample is explaining this variation. This procedure tests whether the mean of a single variable differs from a specified constant. The goal of the t- test is to test whether a sample comes from a population with a specified mean when you do not know the true population standard deviation (which you typically do not have). The t-test is appropriate when one has an independent variable with two categories and a continuous dependent, and wishes to test the difference between the means of the various categories of the independent variable. Significant differences in responses of employees from different organisational levels and mining companies can be tested with this tool.

For the purposes of this study, company specific post-hoc testing was conducted by means of *Microsoft Excel Statistics package* which point out patterns in the data shows significant differences in the sampled. As this study is extremely broad with the aim to delineate current status of corporate environmentalism and its sub-constructs, formal post-hoc or t-tests is not conducted as it will result in cumbersome data. This can be conducted at a follow-up and sub-construct specific study.

5 RESEARCH RESULTS

5.1 INTRODUCTION

This chapter presents the results revealed by the distributed questionnaires. The first part of the chapter discusses the data collection process and comments on the responses the researcher received to the questionnaire. The data obtained from the questionnaire is then considered and interpreted on an individual question-by-question basis.

5.2 QUESTIONNAIRE RESPONSE

The questionnaire was drafted and modified from the work done by Banerjee (2002) although the questions were changed to be more mining oriented and to serve the research objectives of this study. A section with regards to environmental business leadership was added.

The draft questionnaire was pre-tested with a colleague who has been involved in all levels of environmental management on gold mines. Once his feedback was received, the questionnaire was edited and submitted for review as part of the interim research report. A list of potential participants was drafted and their contact details were gathered.

After the final questionnaire was approved by the study leader, it was sent together with the cover letter via e-mail on July 10th 2009 to 3 levels of management for 6 different commodities. The self-imposed deadline for responses was set to be August 17th 2009. The first questionnaire was received back on the same day it was sent out whilst the remainder of the responses trickled in over the remainder of the allowed response time. Reminders were sent out 4 times on a weekly frequency to those individuals who have not responded.

A response summary is presented in Table 5.1.

Table 5.1: Response summary for the full population size tested.

	Managerial Levels (n=138)								
Commodity/ Mine type	**Corporate environmental manager**			**Functional environmental manager**			**Operations managers: Mine/General works/ Metallurgical/ Engineering/Surface**		
	Sent	Received	% Received	Sent	Received	% Received	Sent	Received	% Received
Platinum	7	6	85.7	15	6	40.0	*16*	*0*	*0*
Gold	7	4	57.1	13	10	76.9	*19*	*0*	*0*
Diamond	3	3	100.0	8	4	50.0	*12*	*0*	*0*
Coal	*6*	*3*	*50.0*	*9*	*3*	*33.3*	*7*	*0*	*0*
Chromium	*3*	*1*	*33.3*	*3*	*1*	*33.3*	*10*	*2*	*20*
Total			**65.4%**			**50.0%**			**3.1%**

A total of 136 questionnaires were sent out of which 43 were returned, a response rate of 31.2%. The operations manager's response rate was the poorest with only the operations managerial level of chromium returning two questionnaires.

As the response rate of the operations managers were almost nonexistent, it was decided by the researcher and the study leader to omit this level for the purpose of this study but to note the absence of participation as a future research topic.

The response rate for the corporate and functional environmental management levels of chromium and coal was also found to be inadequate and not suitably representative to present true results taking into account the size of these industries in South Africa. It was therefore also decided to omit these industries from the study and to focus on these industries as a follow-up study.

The remainder of the response populations presented adequate response rates to derive representative data from. Corporate environmental managers (CEMs) and functional environmental managers (FEMs) from a total of 8 companies, which include 3 Gold mining companies, 3 Platinum mining companies and 2 Diamond mining companies, were delineated for inclusion in this study. The CEMs all had a minimum of 10 years experience in the mining industry and had been employed for at least three years with the company that they have evaluated for this study. The FEMs all had a minimum of 3 years experience in the mining industry and had been in employment with their current company for at least two years. All the respondents had some tertiary qualification relating to environmental management.

A summary for the revised population is presented in Table 5.2.

The sample size should be a function of the variation in the population and the estimated precision needed by the researcher, whilst meeting the required confidence levels for the precision of the study. Cooper and Schindler (2003) argue that a sample should bear some proportional relationship to the size of the population from which it is drawn if the calculated sample size exceeds 5% of the population, the sample size may

be reduced without sacrificing precision. The response ratio for this study can therefore be deemed as adequate as more than 52% of the individuals who received questionnaires responded. The data gathering effort for the revised purpose can therefore be considered as satisfactory, and so the conclusions drawn from the sample can be said to be a fair reflection of the population. The researcher strongly believes that all reasonable measures were taken to elicit responses from the sample, and that this is an excellent response rate given the traditionally low response rates reported in business research (often less than 10%).

Table 5.2: Response summary for the revised population size tested.

	Managerial Levels studied							
Mine type	**Corporate environmental manager**				**Functional environmental manager**			
	Total Sent	Received	% Received	Company Response Breakdown	Total Sent	Received	% Received	Company Response Breakdown
Gold	7	4	57.1	Gld1 - 2	13	10	76.9	Gld1 – 5
				Gld2 – 1				Gld2 – 3
				Gld3 - 1				Gld3 - 1
Platinum	4	4	100.0	Plt1 = 2	17	9	52.9	Plt1 – 4
				Plt2 = 1				Plt2 – 2
				Plt3 = 1				Plt3 - 3
Diamond	3	3	100.0	Dmd1 - 2	8	4	50.0	Dmd1 - 3
				Dmd2 - 1				Dmd2 =2
Total	14	11	**78.6%**	**11**	38	23	**60.5%**	**23**

The researcher can therefore conclude that the data obtained from the sample is a fair reflection of the intended populations.

It also has to be mentioned that 5 of the FEMs (22%) and 2 of the CEMs (18%) specifically asked for their identity not to be revealed.

5.3 INTERPRETATION OF DATA

The questionnaire used to gather information comprised of 45 questions that tested 15 constructs relating to the research objectives. Three questions relating to each of the constructs were posed to the respondent in order to test the variance and to act as controls for the responses. The 15 constructs can then be used to make derivations about the 3 main sub-problems as 5 constructs relate to each of the sub-problems.

A blank questionnaire can be found in Appendice 7.2.3 and should be used for reference. In the following pages, each construct is individually analysed in depth to determine patterns, relationships, comparisons and learnings for environmental business leadership in the sample companies. The constructs for the managerial levels and for the three commodities is analysed.

As anonymity was guaranteed to the respondents, no names will be mentioned and only the mining/commodity type and managerial levels will be mentioned.

A summary of the results from the questionnaires is presented in Appendice 7.2.4.

Two types of analysis have been used for the interpretation of the data. Firstly, the industry response at the two managerial levels towards each of the 15 constructs have been analysed whereby the degree to which respondents agreed to the questions composing the construct have been assessed. The variation in responses between the two managerial levels has been tested as to understand the differences in perception and opinion on the constructs. This analysis provides insights into the industry interpretation of corporate environmentalism.

Secondly, the company specific responses on the two managerial levels are outlined to obtain a clear understanding as to how corporate environmentalism is interpreted within

companies. For the purpose of this analysis and interpretation, all questions marked as UNSURE (4) in the first analysis were assigned a 0 as uncertainty about the questions on this managerial level is unexpected for companies that are committed to world class environmental performance.

Therefore the revised range of agreements for the second analysis is as follows:

0 – Unsure 1 – Strongly Disagree 2 – Disagree 3 – Mildly Disagree
4 – Mildly Agree 5 – Agree 6 – Strongly Agree

For the purposes of the interpretation of the data for both types of analysis, the average responses, standard deviations, correlation between the opinions and the levels of management for the second analysis, and the p-values indicating the variance in response between managerial levels and companies are presented in the Tables. The graphs present the rounded-off data for the second analysis for ease of resorting the average responses to the above mentioned classes and for comparison purposes.

5.4 INDUSTRY AND COMBINED RESULTS FOR THE SAMPLED COMPANIES

5.4.1 Combined Industry Results

To understand the importance of corporate environmentalism for company management of mines the responses from all 34 participants to the 45 questions were aggregated and are presented in Table 5.3. The data is graphically presented in Figure 5.1.

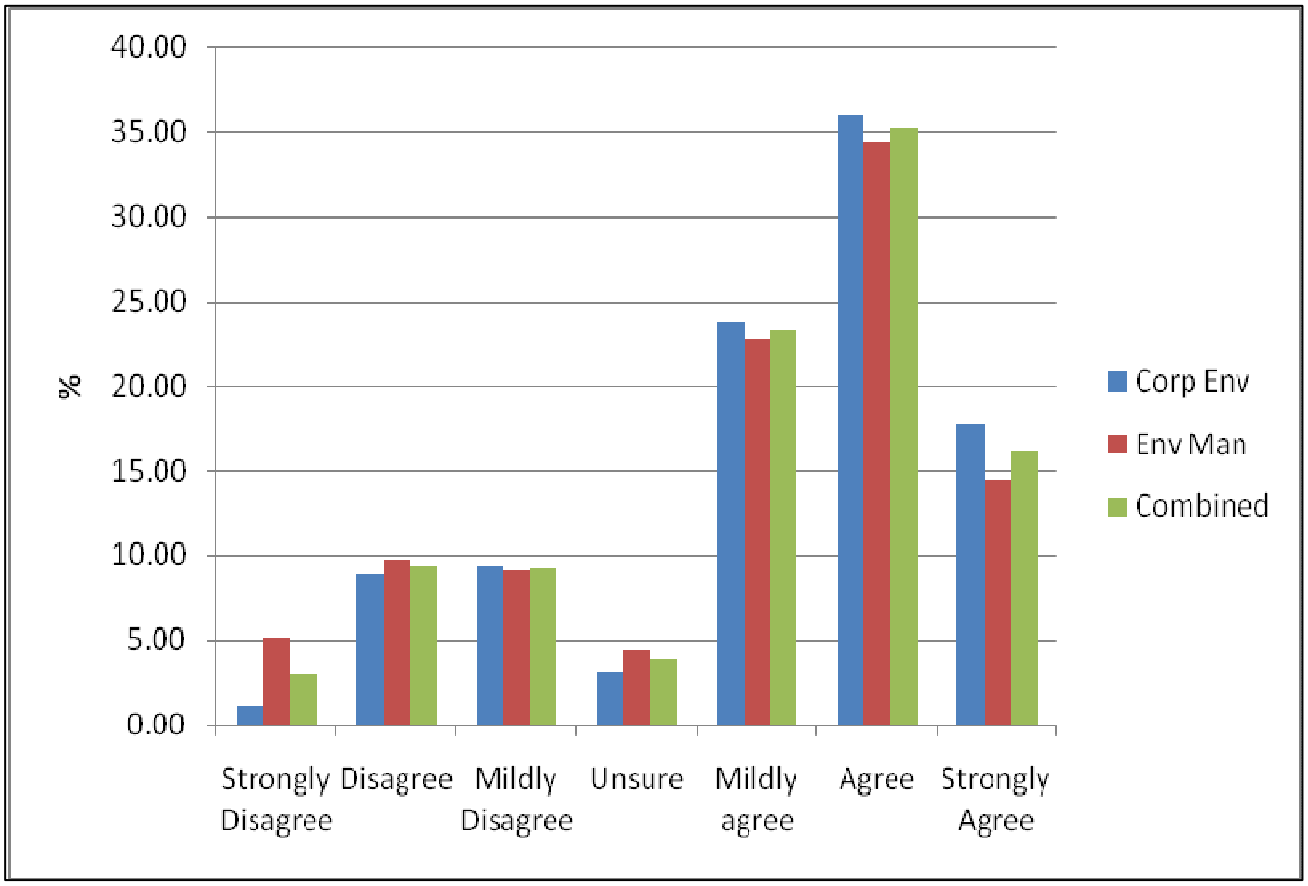
From the combined results it is clear that on a high level, both Corporate Environmental Managers (CEMs) and Functional Environmental Managers (FEMs) agreed to the importance that company management attach to corporate environmentalism with 78% of the answers being in agreement with the posed statements. The two levels of management strongly agreed to 35% of the questions whilst 23% of the questions were mildly agreed to. Of concern was the disagreement and mild disagreement of 9.2% respectively as the questions were structured to reveal positive affirmation for good environmental acceptable practice.

Table 5.3: The combined result for the importance of corporate environmentalism on an industry front as revealed by the sampled companies.

		Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Managers	Average	1.11	8.82	9.33	3.18	23.82	35.98	17.76
	Stdev.	0.87	3.26	1.27	0.40	2.32	4.09	0.24
Environmental Managers	Average	5.07	9.76	9.15	4.40	22.73	34.44	14.44
	Stdev.	1.40	2.18	1.31	0.65	5.92	1.91	2.22
Combined	Average	3.09	9.29	9.24	3.79	23.28	35.21	16.10
	Stdev.	2.41	2.53	1.16	0.82	4.07	2.98	2.30
Summary			Disagreement 21.6				Agreement 78.4	
Descriptive statistics	P-value			<0.001*				

* Significant difference between the companies on this construct.

Figure: 5.1: A graphic presentation depicting the importance of corporate environmentalism for managers on an industry front.



As an introduction it should be stated that the combined data reveals 'Agreement' as the main response category whilst construct specific analysis reveals 'Mild agreement' as the main response category. Therefore it is imperative to report on the data on a commodity and company specific level to ensure that the results of this study are not skewed.

The results regarding the degree to which company management has bought into environmental leadership importance, environmental business orientation and environmental strategy focus is further outlined. The data in Table 5.4 and Figure 5.2 depict the combined data relating to each of the related sub-problems for this study.

Table 5.4: Combined data summary for the sample companies tested for each sub-problem.

		Environmental Leadership Importance	Environmental Business Orientation	Environmental Strategy Focus
Corporate Env. Manager	Average	4.61	3.70	4.25
	Stdev.	0.77	1.15	0.86
Environmental Manager	Average	3.61	3.83	4.04
	Stdev.	0.77	1.01	0.98
Combined result	Average	4.11	3.76	4.15
	Stdev.	1.07	1.08	0.92
Descriptive Statistics	Correlation	-0.43	0.71	0.65
	p-value	0.868	0.000*	0.002*

* Significant difference in the response of the CEM and the FEM on this construct.

From the data presented in Table 5.4 it is clear that the Corporate Environmental Managers for all the companies testifies stronger towards the importance of environmental leadership for company management than does the Functional Environmental Managers. This could perhaps be ascribed to bias from the CEMs responses as a weak negative correlation was established between the opinions of the two managerial levels which indicate opposing views towards the importance of environmental leadership. The CEMs mostly 'agreed' with the questions testing this hypothesis whilst the FEMs were only in 'mild agreement'. On average the data present only 'mild agreement' with the importance of environmental leadership for company management of mines.

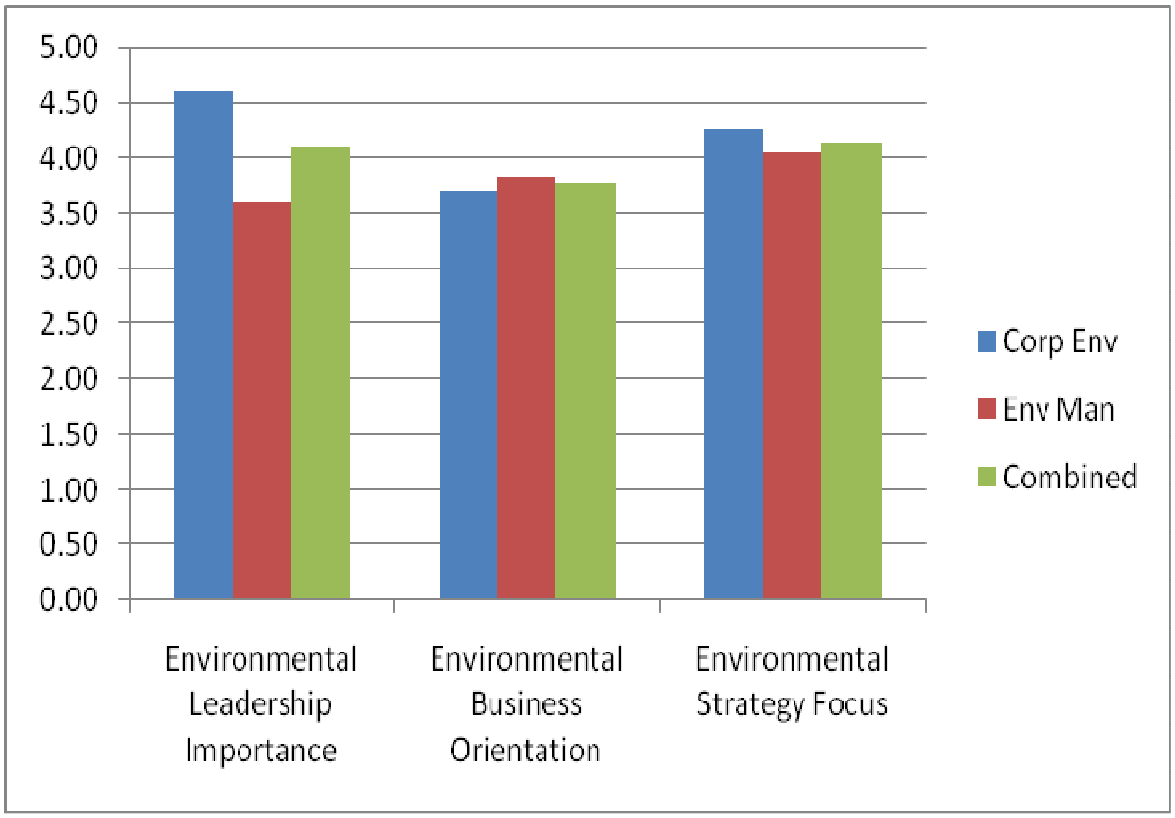
No significant variation in responses of the populations could be established when all the data was analysed by means of One-way ANOVA testing for environmental leadership importance. As the p-value generated was higher than 0.05 (<95% confidence), the hypothesis can be accepted that environmental leadership is important for management of mining companies.

Assessing the data presented on Environmental business orientation on an industry basis it appears that this construct has received the least buy in from the sample companies compared to the other two constructs. This should also be qualified as sector and company specific but from the correlation of 0.71, there is consensus from all the CEM's and FEMs that they are only in 'mild agreement' that their company management is orientated to environmental matters in their business roles. Large variation in responses was however encountered as resembled by the p-value (of less than 0.001) indicating that the hypothesis that company management is orientated towards the environment in their business decisions should be rejected. FEMs were however more in 'mild agreement' than were CEMs for this construct indicating that there is slightly more buy-in into environmental business orientation on operational level than on corporate level on an industry basis. This might be ascribed to the focus on ground level to save costs and evade financial penalties in order to increase profits whilst the focus on corporate level might be more on parenting and governance issues.

The data presented in Table 5.4 once again only indicate 'mild agreement' towards the focus on environmental matters in strategic business decisions by company management. CEMs however felt more involved in strategic planning than did FEMs and an acceptable positive correlation were established between the opinions of the CEMs and the FEMs (0.65). There was once again large variation encountered in the responses to this construct and between sectors and companies that the hypothesis that mining company management is strategically focussed on the environmental implications of their decisions can be rejected. A p-value of less than 0.0025 was generated through One-way ANOVA testing indicating that there are significant differences in the responses towards this construct by the respondents.

Figure 5.2 graphically presents the average responses by the two levels of management and their combined responses. From this depiction it is clear that on an industry level, company management of mining operations have acknowledged the environmental implications for their business but only 'mild agreement' towards the valuation of corporate environmentalism could be established from the respondents.

Figure 5.2: Combined data summary for the sample companies tested for each sub-problem.



It appears that despite the pressure for improved environmental performance on mines, the application of corporate environmentalism hasn't yet matured in the culture of company management and therefore buy-in into the business value that this construct can add appears to be rather low. Corporate environmentalism is therefore included in business leadership, orientation and strategy, but not to the level where it is a central part of corporate decisions or competitive strategy. It should be qualified though that sector and company specific analysis should reveal the importance for the respective categories and will be discussed later in this section.

5.4.2 Commodity Specific Results

5.4.2.1 Environmental Leadership Importance

On average, CEMs agreed to the importance of environmental leadership by company management to a larger extent than FEMs. FEMs were on more occasions inclined to 'Mild agreement', 'Disagreement' and even 'Strong disagreement'. This is evident from the data presented in Table 5.5 and Figure 5.3. Large variation in responses were however encountered on a the tested managerial levels for this sub-problem as a p-value of less than 0.05 was encountered when One-way ANOVA analysis was conducted on the response levels. It can also be derived that environmental leadership importance should be derived on a company specific basis and cannot be accounted for on a generalised basis. Therefore the responses per mining sector for this sub-problem are outlined.

Table 5.5: The combined result for environmental leadership importance on an industry front as revealed by the sampled companies.

		Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env.	Average	0.61	5.45	7.88	3.03	25.45	40.00	17.58
Managers	Stdev.	1.36	4.98	4.60	3.71	5.91	3.95	5.83
Environmental	Average	6.09	7.25	7.83	3.77	29.57	32.75	12.75
Managers	Stdev.	3.30	3.69	3.78	3.49	4.98	6.77	2.79
Combined	Average	4.31	6.67	7.84	3.53	28.24	35.10	14.31
	Stdev.	2.03	4.01	2.50	2.46	4.67	5.34	3.30
Descriptive Statistics	P-value				<0.001*			

* Significant difference between the companies on this construct.

Table 5.6 and Figure 5.4 present the data and graphic presentation for the combined data for environmental leadership importance for the distinctive mining sectors tested.
From the data depicted in Table 5.6 it is evident that there was neither good correlations between the responses of the tested managerial levels, nor was there any statistical significant data derived for environmental leadership importance for the distinctive sectors.

Figure 5.3: The combined result for environmental leadership importance on an industry front as revealed by the sampled companies.

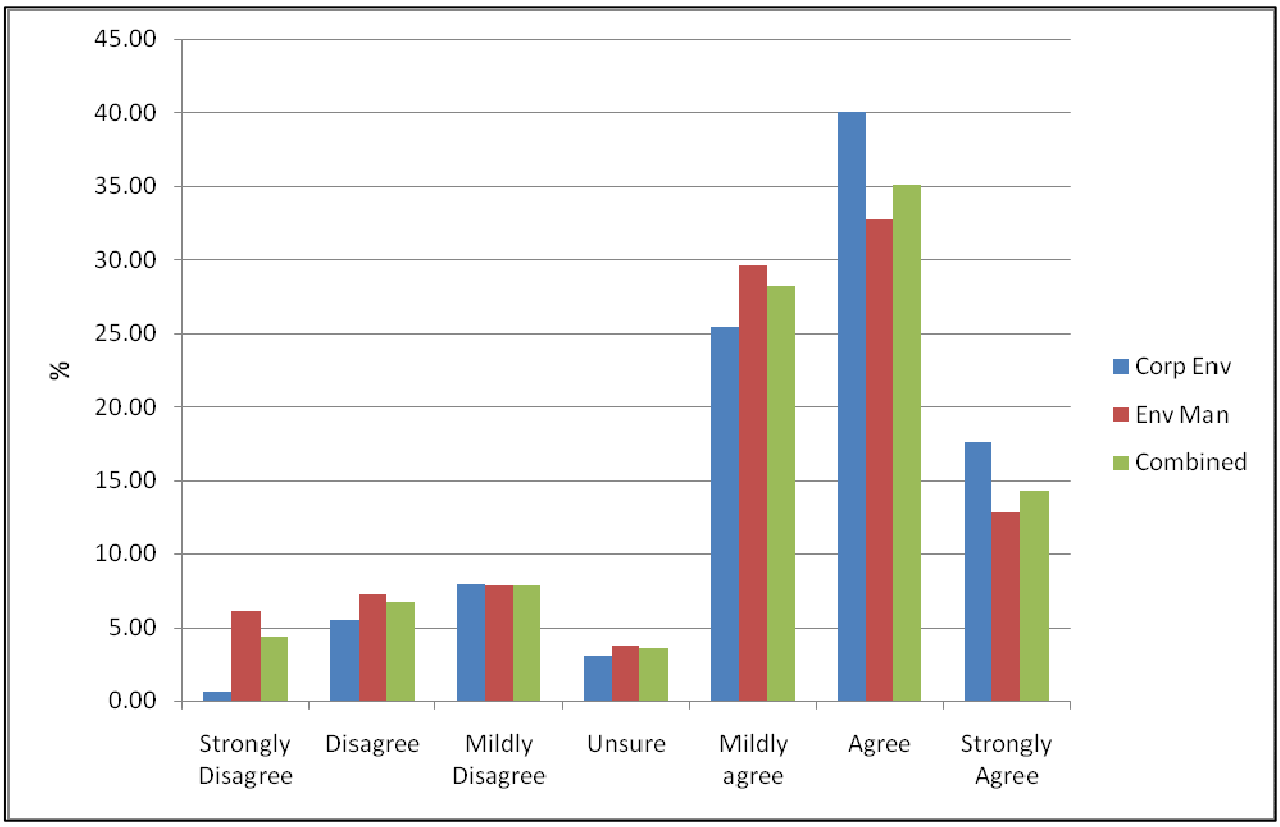


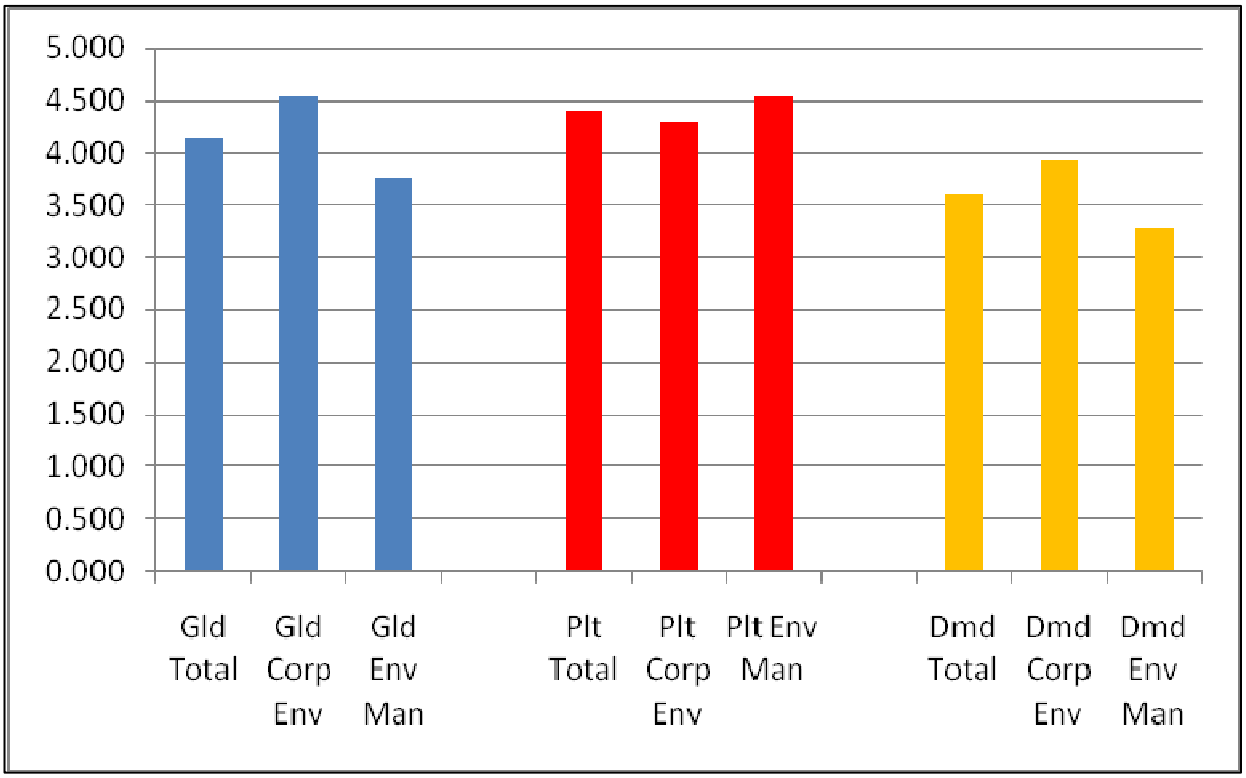
Table 5.6: The combined response data ordained per mining sector tested for environmental leadership importance.

		Gold Sector	Platinum Sector	Diamond Sector
Combined results	Average	4.14	4.41	3.61
	Stdev.	0.75	0.58	1.73
Corporate Env. Manager	Average	4.53	4.29	3.93
	Stdev.	0.79	0.71	1.75
Environmental Manager	Average	3.75	4.53	3.29
	Stdev.	0.44	0.41	1.74
Descriptive statistics	Correlation	-0.195	0.013	0.150
	p-value	0.298	0.653	0.996

This data reveal that environmental leadership importance cannot be explained on either industry or sector level, but will have to be investigated on a company specific basis.

Figure 5.4 graphically depicts the comparison on averages between the tested managerial levels and the various sectors for environmental leadership importance.

Figure 5.4: The combined response data ordained per mining sector tested for environmental leadership importance.



From Figure 5.4 it is clear that the platinum sector is more in agreement with the importance of environmental leadership pertaining to their company management than the gold and to a lesser extent the diamond mining sectors. The CEMs of the gold and diamond mining industries do believe that environmental leadership is important but the FEMs of these sectors are less convinced. Of concern however is that the average response was 'Mildly agree' where one would expect more positive response from JSE listed companies on this matter. Of even more concern is the average response from the FEMs of the diamond mining sector who 'mildly disagreed' with this statement indicating that environmental leadership is not as important for their company management on ground level as it should be.

The constructs comprising this sub-problem will be discussed further in the sections to follow.

5.4.2.2 Environmental Business Orientation per sector

Environmental business importance appears to be well supported by company management on an industry level as revealed by the response of more than 36% on both managerial accounts. This data is depicted by Table 5.7 and graphically outlined by Figure 5.5.

Table 5.7: The combined result for environmental business orientation importance on an industry front as revealed by the sampled companies.

		Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Managers	Average	3.03	6.06	9.09	0.00	30.30	36.36	15.15
	Stdev.	5.25	5.25	9.09	0.00	18.92	31.49	5.25
Environmental Managers	Average	1.45	15.94	14.49	2.90	17.39	36.23	11.59
	Stdev.	2.51	9.05	2.51	2.51	7.53	2.51	12.55
Combined	Average	1.96	12.75	12.75	1.96	21.57	36.27	12.75
	Stdev.	1.70	7.40	3.40	1.70	10.33	9.45	6.79
Descriptive Statistics	P-value				<0.001*			

*Significant difference between the companies on this construct.

From the information in the Table it is also evident that a large portion of the 'Mild agreement' category by the CEMs is however split over 'Mildly disagree' and 'Disagree' by the FEMs, which is concerning as more than 30% of the FEM responses indicate that company management is not orientated towards the environment in their business decisions with regard to the specific statements. The large variation in response with regards to this construct ($p < 0.05$), however, indicates that the intricacies of this construct should be investigated in more detail as to explain the drivers for the variation. As is outlined in the section to follow, it can most probably be explained by commodity and company specific responses.

Figure 5.5: The combined result for environmental business orientation importance on an industry front as revealed by the sampled companies.

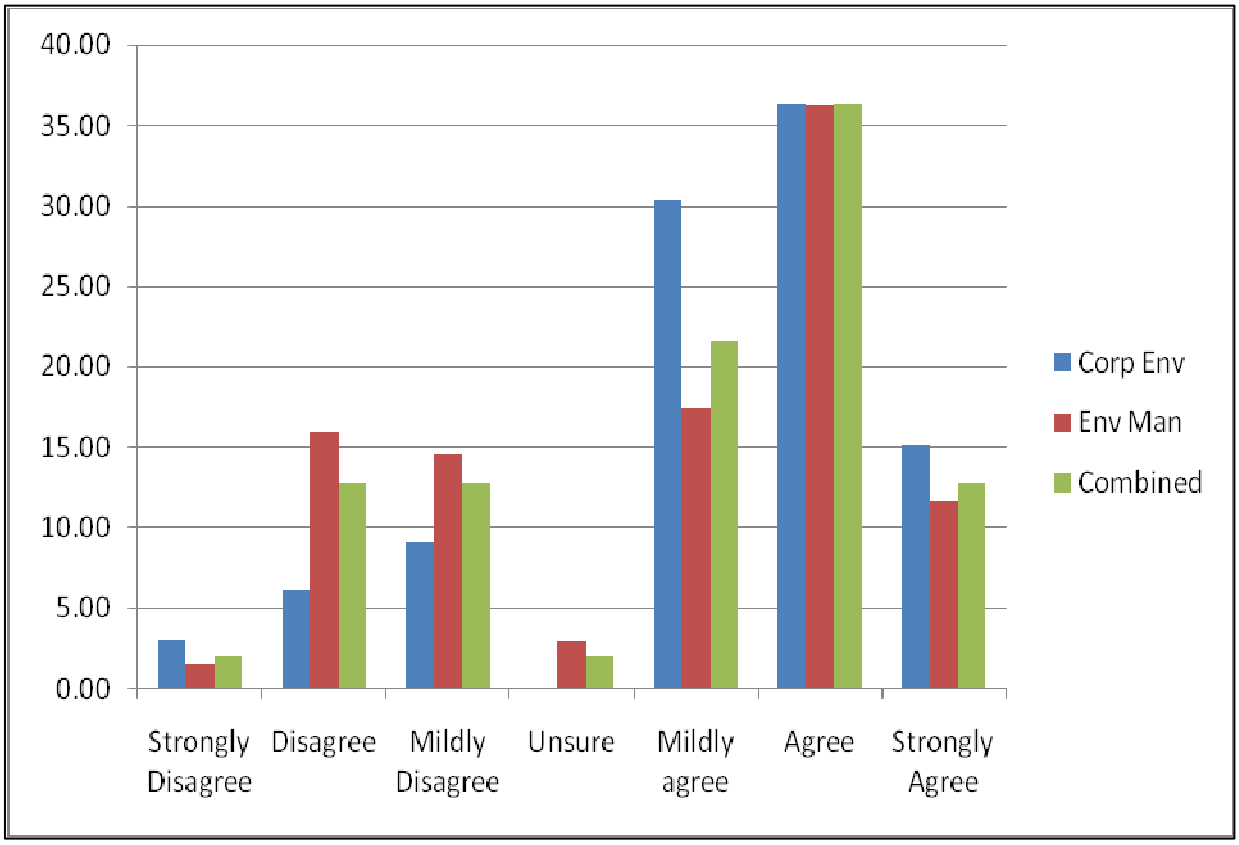


Table 5.8 and Figure 5.6 present the data and graphic presentation for the combined data for environmental business orientation for the distinctive mining sectors tested.

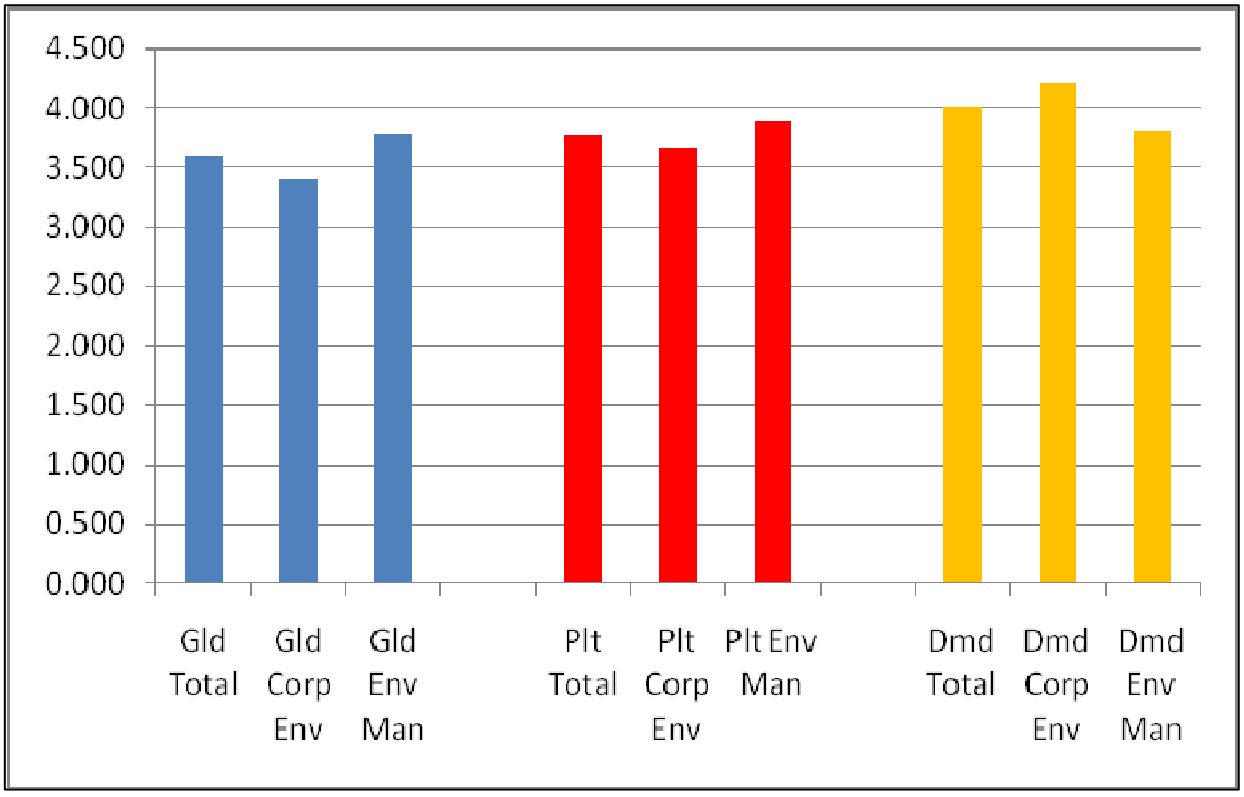
Table 5.8: The combined response data ordained per mining sector tested for environmental business orientation.

		Gold Sector	Platinum Sector	Diamond Sector
Combined results	Average	3.60	3.78	4.00
	Stdev.	1.05	1.10	1.10
Corporate Env. Manager	Average	3.41	3.66	4.21
	Stdev.	1.08	1.22	1.09
Environmental Manager	Average	3.79	3.89	3.80
	Stdev.	1.02	0.99	1.12
Descriptive statistics	Correlation	0.685	0.825	0.691
	p-value	0.001*	0.000*	0.471

* Significant difference in the response of the CEM and the FEM on this construct.

From the data presented in Table 5.8 it is evident that the average response to environmental business orientation of management of mining companies was 'Mildly agree'. There were good positive correlations established for all three the sectors involved implying that the CEMs and the FEMs that took part in this study had similar opinions on this matter for the specific mining sector. Significant variance in responses was established for the gold and platinum sector between the combined responses of the two managerial levels sampled with p-values of less than 0.05. From the data graphically depicted in Figure 5.6 it is clear that the CEMs of the gold sector 'Mildly disagreed' with the notion that their company management includes environmental thinking in their business orientation. The CEMs of the diamond industry were mostly in 'Agreement' with this construct.

Figure 5.6: The combined response data ordained per mining sector tested for environmental business orientation.



The findings for environmental business importance indicates that the state of environmental business orientation in mining might be more a function of the culture and

nature of the business rather than the company specific traits, although the variation in response in the gold and platinum sector warrants further investigation towards company specific orientation.

5.4.2.3 Environmental Strategy Focus per sector

The inclusion of environmental issues in company strategy in the mining industry appears to be more important for company management from the CEMs response compared to that of the FEMs. The data on this construct is presented in Table 5.9 and is graphically represented in Figure 5.7. The data further reveals that the FEMs 'Strongly disagreed' as with environmental leadership importance on some of the statements that tested company management buy-in on this construct. The CEMs also 'Mildly disagreed' and 'Disagreed' to the same extent, but no 'Strong disagreement' was encountered. As with the other two preceding sub-problems tested, significant variation was found in the responses as indicated by the p-value which is lower than 0.05. To understand the reason for the variation, the constituents of the sub-problem will be analysed in more detail.

Table 5.9: The combined result for importance of environmental strategy focus on an industry front as revealed by the sampled companies.

		Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Managers	Average	0.61	11.97	9.85	2.88	24.85	31.82	18.03
	Stdev	1.36	6.44	4.22	2.17	10.37	6.94	5.58
Environmental Managers	Average	5.65	11.16	9.20	4.35	19.49	36.52	13.62
	Stdev	3.26	4.63	2.94	3.55	4.89	5.06	9.20
Combined	Average	4.02	11.42	9.41	3.87	21.23	35.00	15.05
	Stdev	2.56	4.57	2.15	2.80	6.40	4.77	7.64
Descriptive Statistics	P-value	<0.001*						

* Significant difference between the companies on this construct.

Table 5.10 and Figure 5.8 present the data and graphic presentation depicting the combined data for environmental strategy focus for the distinctive mining sectors tested.

Figure 5.7: The combined result for importance of environmental strategy focus on an industry front as revealed by the sampled companies.

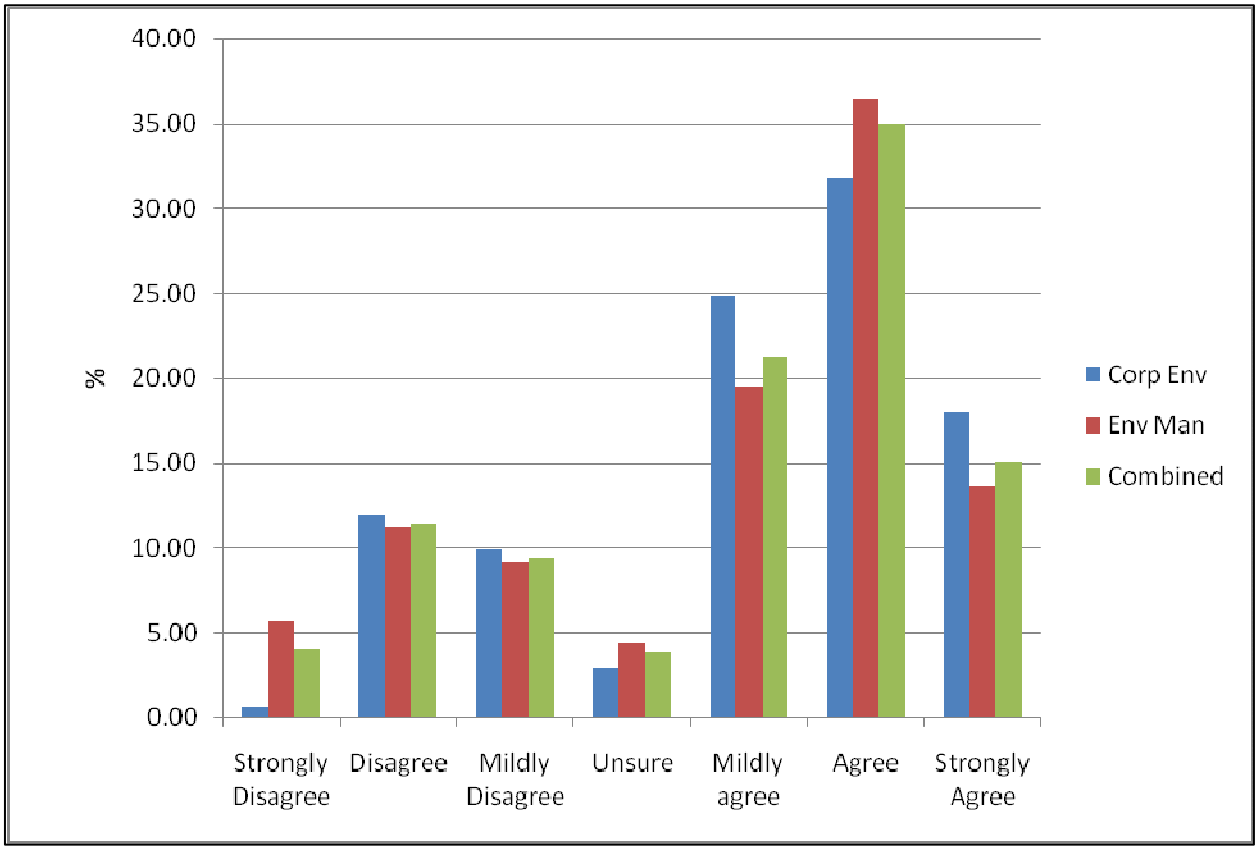


Table 5.10: The combined response data ordained per mining sector tested for environmental strategy focus.

		Gold Sector	Platinum Sector	Diamond Sector
Combined results	Average	3.92	4.46	4.02
	Stdev.	0.86	0.58	1.27
Corporate Env. Manager	Average	4.11	4.39	4.26
	Stdev.	0.89	0.59	1.15
Environmental Manager	Average	3.73	4.52	3.78
	Stdev.	0.81	0.59	1.39
Descriptive Statistics	Correlation	0.387	0.407	0.934
	p-value	0.001*	0.002*	0.781

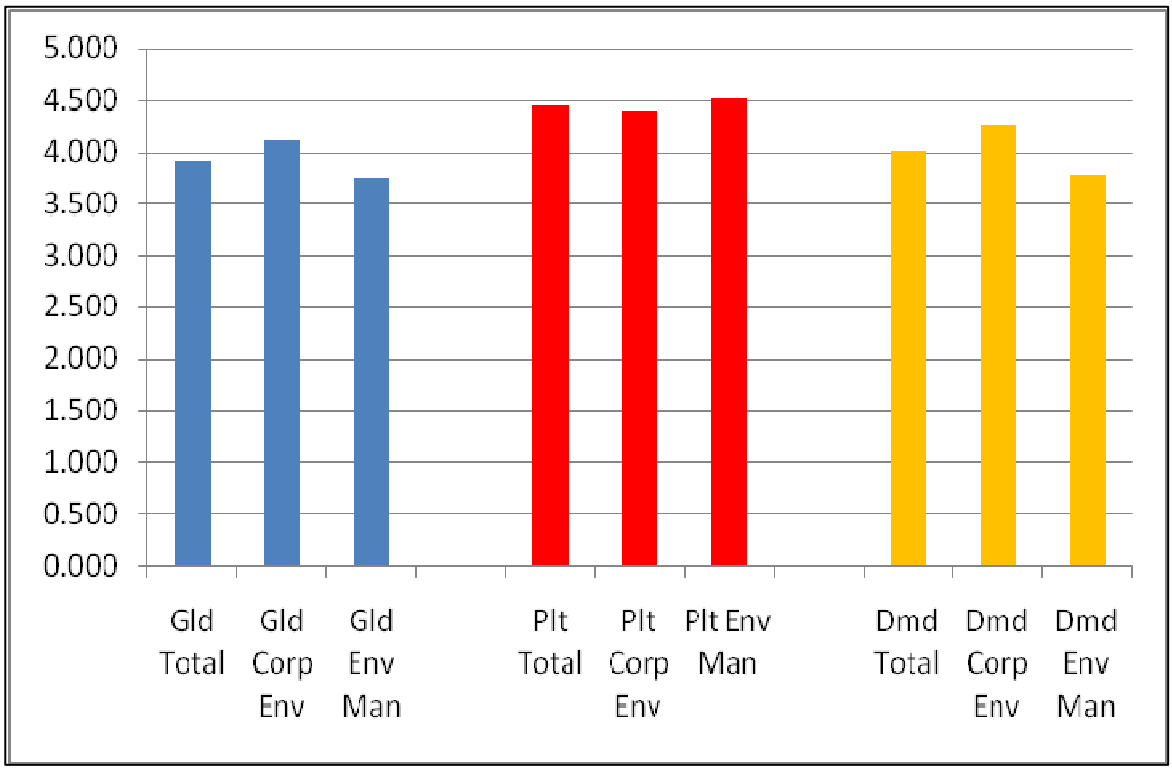
* Significant difference in the response of the CEM and the FEM on this construct.

The platinum sector has comparatively bought in more into the inclusion of environmental issues as part of business strategy than the other two sectors included in

this study as they are more in 'Agreement' with this construct. This is evident from the data depicted in Table 5.10 indicating that on average, the platinum sector is more in 'Agreement' on both levels of management compared to the other two sectors. There was however a good correlation between the opinions of the respondents from the diamond sector. Significant variances were encountered in the responses from the gold and platinum sectors (p-values of less than 0.05) and the reasons for these findings should be further investigated.

From the information depicted in Figure 5.8 it is also evident that the CEMs of the gold and diamond sectors were more in 'Agreement' with their company management's environmental strategy focus compared to the FEMs of these sectors.

Figure 5.8: The combined response data ordained per mining sector tested for environmental strategy focus.



Company specific orientation towards the inclusion of environmental matters in strategy decisions therefore have to be investigated in the section to follow.

5.5 CONSTRUCT SPECIFIC RESULTS

The following section presents detail results for the 15 sub-constructs that were selected to test the 3 main sub-problems (constructs) for corporate environmentalism (5 sub-constructs per main construct). These were tested for each of the sample companies under the relevant heading of the main construct relating to the relevant sub-problem.

5.5.1 Examining the importance of environmental leadership for the various mining companies.

5.5.1.1 Construct 1: Importance of commitment and compliance to environmental value statement/policy.

Table 5.11a, Table 5.11b and Figure 5.9 present the data and graphic presentation for the commitment and importance of environmental compliance for company management on an industry and company specific basis.

Table 5.11a: Data summary for importance of environmental commitment and compliance for industry wide company management.

	Construct1 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly Agree	Agree	Strongly Agree
Corporate Env. Manager	Average	0.0	0.0	3.0	9.1	21.2	42.4	24.2
	Stdev.	0.0	0.0	5.2	9.1	5.2	10.5	5.2
Environmental Managers	Average	8.7	2.9	4.3	2.9	24.6	43.5	13.0
	Stdev.	0.0	2.5	4.3	5.0	12.6	4.3	8.7
Combined	Average	5.9	2.0	3.9	4.9	23.5	43.1	16.7
	Stdev.	0.0	1.7	3.4	6.1	10.2	6.1	4.5
Descriptive Statistics	p-value				<0.001*			

* Significant difference between the companies on this construct.

From the data in Table 5.11a, both levels of management were in 'Agreement' and to a lesser extent in 'Mild agreement' and 'Strong Agreement' on the importance of company compliance to environmental policies and commitments. Some 'Disagreement' was encountered at the FEM management level though. Of concern is the high proportion of 'Unsure' responses (9.1%) by CEMs towards this construct as this level of management

should be on the forefront to lobby and report on environmental compliance and commitment with company management. A p-value of less than 0.05 is indicative of large variation in response and therefore the sub-construct is further evaluated on a company specific level.

From the data presented in Table 5.11b, it is clear that the CEMs on average 'agreed' more to the importance of environmental commitment and compliance than the FEMs. All the responses 'Mildly agreed' to the construct, except for the CEM of Plt3 who 'Mildly disagreed'. The company management of Dmd2 however hasn't taken the importance of environmental compliance and commitment seriously at all with 'Strong disagreement' and 'Disagreement' to the construct from both the CEMs and FEMs respectively.

Table 5.11b: Data summary for importance of environmental commitment and compliance for the specific sample company's management.

	Construct 1	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env.	Average	4.83	5.67	4.33	4.83	5.00	3.33	5.50	1.00
Manager	Stdev.	0.29	0.58	0.58	0.58	0.00	3.06	0.50	1.73
Environmental	Average	4.20	4.11	4.00	4.83	4.67	4.22	5.11	1.50
Manager	Stdev.	0.20	0.38	1.00	0.88	0.76	1.07	0.38	0.50
Combined	Average	4.52	4.89	4.17	4.83	4.83	3.78	5.31	1.25
	Stdev.	0.45	1.10	0.24	0.00	0.24	0.63	0.27	0.35
Descriptive	Correlation	0.866	-0.500	0.866	0.904	1.000	0.882	0.000	0.866
Statistics	p-value	0.035*	0.018*	0.643	1.000	0.488	0.659	0.346	0.656

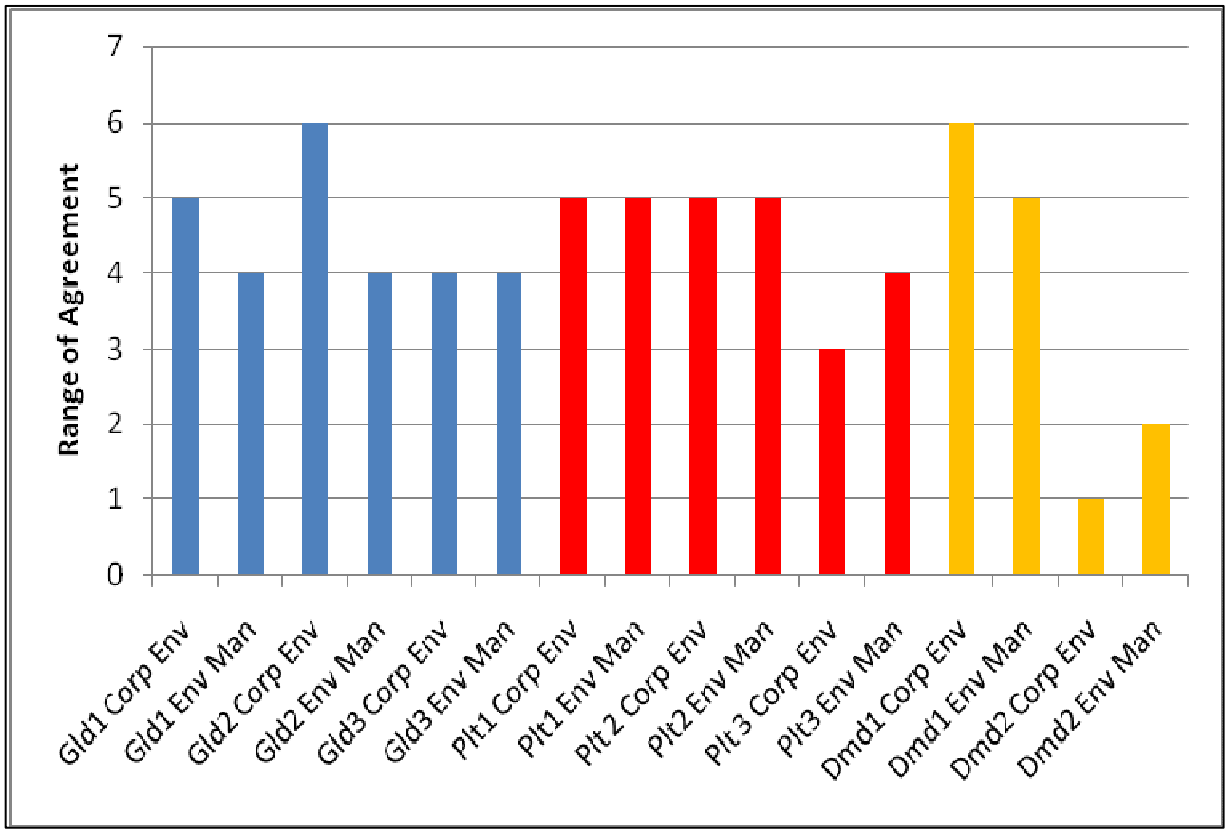
* Significant difference between the managerial responses and companies on this construct.

There was also good correlations between the responses from CEMs and FEMs for this construct (>0.866) except for the response from Gld2 and Dmd1, where either negative correlations (-0.500) or no correlation (0.000) were found respectively. From the data presented in Figure 5.9 it is evident that Plt1, Plt2 and Dmd1 have responded the best for this construct as they are mostly in 'agreement' with this construct in comparison to the other sample companies.

The only significantly different responses between CEMs and FEMs, and between the sample companies for the questions relating to this construct were found for Gld1 and

Gld2. This was based on the variations found in the means of the sample populations as revealed by their One-way ANOVA p-values lower than 0.05.

Figure 5.9: Data summary for importance of environmental commitment and compliance for the sample company management.



It is clear from this data that company management's view on environmental commitment and compliance differ for the sample companies despite the same legal requirements and sustainability reporting commitments.

5.5.1.2 Construct 2: Adequacy of environmental resources.

Table 5.12a, Table 5.12b and Figure 5.10 present the data and graphic presentation for the provision of adequate environmental resources to reach the organisational environmental objectives on an industry and company specific level. From the data in Table 5.12a, both levels of management were in 'Agreement' and to a lesser extent in

'Mild agreement' and 'Strong Agreement' on the adequacy of environmental resources to reach organisational goals. Some 'Disagreement' was encountered at the FEM management level though. The variation in responses was outlined by a p-value of less than 0.05 (0.002) and therefore the sub-construct should is further investigated on a company specific basis.

Table 5.12a: Data summary for importance of the provision of adequate environmental resources on the industry level.

	Construct2 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly Agree	Agree	Strongly Agree
Corporate Env. Manager	Average	3.0	9.1	9.1	0.0	21.2	39.4	18.2
	Stdev.	5.2	9.1	0.0	0.0	13.9	13.9	9.1
Environmental Managers	Average	2.9	11.6	10.1	0.0	26.1	34.8	14.5
	Stdev.	2.5	6.6	9.1	0.0	15.1	11.5	9.1
Combined	Average	2.9	10.8	9.8	0.0	24.5	36.3	15.7
	Stdev.	2.9	6.8	6.1	0.0	13.9	11.1	9.0
Descriptive Statistics	p-value				0.002*			

* Significant difference between the companies on this construct.

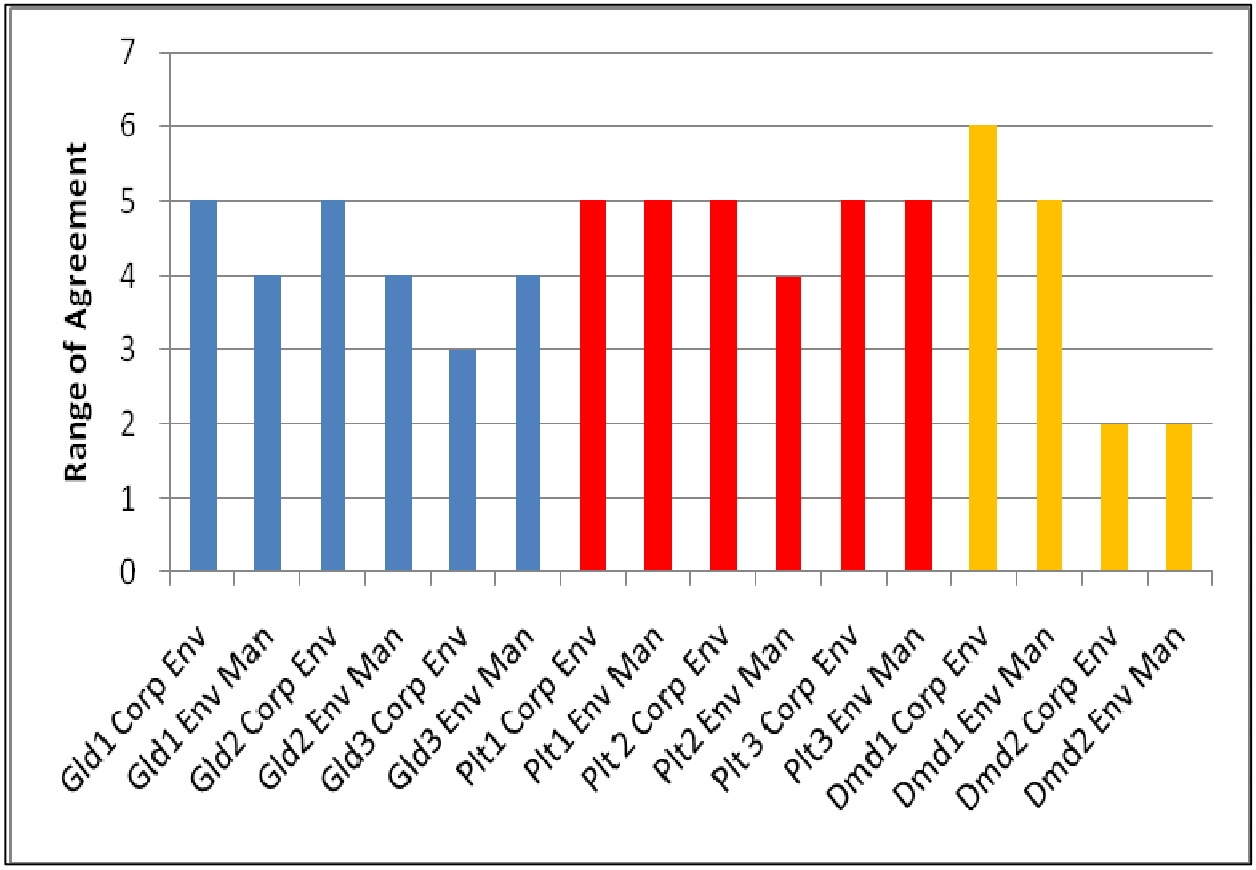
From a company specific point of view, there was a marked difference in the responses of the companies to this construct. From the data presented in Table 5.12b, two of the companies 'Mildly disagreed' and 'Disagreed' (Gld3 and Dmt2), whilst one of the companies 'Strongly agreed' (Dmt1).

Table 5.12b: Data summary for the provision of adequate environmental resources to reach the organisational environmental objectives.

	Construct 2	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env. Manager	Average	4.50	5.00	2.67	4.50	4.67	4.67	5.67	2.00
	Stdev.	0.87	1.00	1.15	1.00	0.58	0.58	0.29	1.00
Environmental Manager	Average	4.07	3.67	4.00	5.08	3.83	4.89	5.11	1.83
	Stdev.	0.76	0.58	1.73	0.14	0.58	0.69	0.69	0.58
Combined	Average	4.28	4.33	3.33	4.79	4.25	4.78	5.39	1.92
	Stdev.	0.31	0.94	0.94	0.41	0.59	0.16	0.39	0.12
Descriptive Statistics	Correlation	0.991	0.000	0.500	-0.866	0.500	0.277	0.277	0.000
	p-value	0.550	0.116	0.329	0.374	0.152	0.692	0.270	0.815

Most of the responses however resorted to the 'Mildly agree' and 'Agree' bracket. Only Gld1 presented a good correlation (>0.650) between the responses of the CEMs and the FEMs indicating that there is limited consensus between the levels of management on this construct for the other sampled companies.

Figure 5.10: Data summary for the provision of adequate environmental resources to reach the organisational environmental objectives.



In general, the CEMs of the gold mining companies believed that resources were adequate more than the FEM's, except for Gld3 (Figure 5.10). The levels of management for the platinum mining companies mostly 'Agreed' to sufficient resources. The highest agreement was found with Dmd1 on the CEM managerial level whilst the worst feedback was collected from Dmd2 who 'Disagreed' with the notion of the adequacy of resources. However, none of the sample companies presented p-values of less than 0.05, and therefore there were no significant differences between any of the responses of the two managerial levels for any of the companies.

A possible reason for the findings surrounding this construct is that platinum mining companies have recently expanded in a time where the environmental regulatory environment has become much more stricter and therefore the adequacy of resources are more prevalent whilst the gold mining companies may be stuck in a culture of a minimum resource approach towards non-core functions.

5.5.1.3 Construct 3: Belief in the business case for environmental leadership.

Table 5.13a, Table 5.13b and Figure 5.11 present the data and graphic presentation for the provision of the belief of company management that a business case exists for environmental leadership. This was conducted on the industry and company specific level.

From the data presented in Table 5.13a, the CEMs was more in agreement with the notion that company management has a belief in the business case for environmental management compared to FEMs who are mostly in 'Mild agreement'. Of interest was that 8.7% of FEMs responded as being 'Unsure' towards this construct which is indicative of the disbelief of this managerial level in company management showing interest in the business case for environmental leadership. The variation in response as indicated by the p-value (<0.05) warrants further company specific evaluation.

Table 5.13a: Data summary for company management's belief that a business case exists for environmental leadership on the industry level.

	Construct3 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate	Average	0.0	9.1	12.1	0.0	21.2	42.4	15.2
Env. Manager	Stdev.	0.0	9.1	5.2	0.0	13.9	5.2	10.5
Environmental	Average	5.8	7.2	7.2	8.7	33.3	29.0	8.7
Managers	Stdev.	2.5	2.5	5.0	0.0	14.0	9.1	8.7
Combined	Average	3.9	7.8	8.8	5.9	29.4	33.3	10.8
	Stdev.	1.7	3.4	2.9	0.0	5.1	6.8	3.4
Descriptive Statistics	p-value				<0.001*			

* Significant difference between the companies on this construct.

From the data presented in Table 5.13b it is evident that in 4 of the 8 companies sampled, CEM's 'Agreed' more that company management has faith in the business case of environmental leadership compared to FEM's.

Table 5.13b: Data summary for company management's belief that a business case exists for environmental leadership.

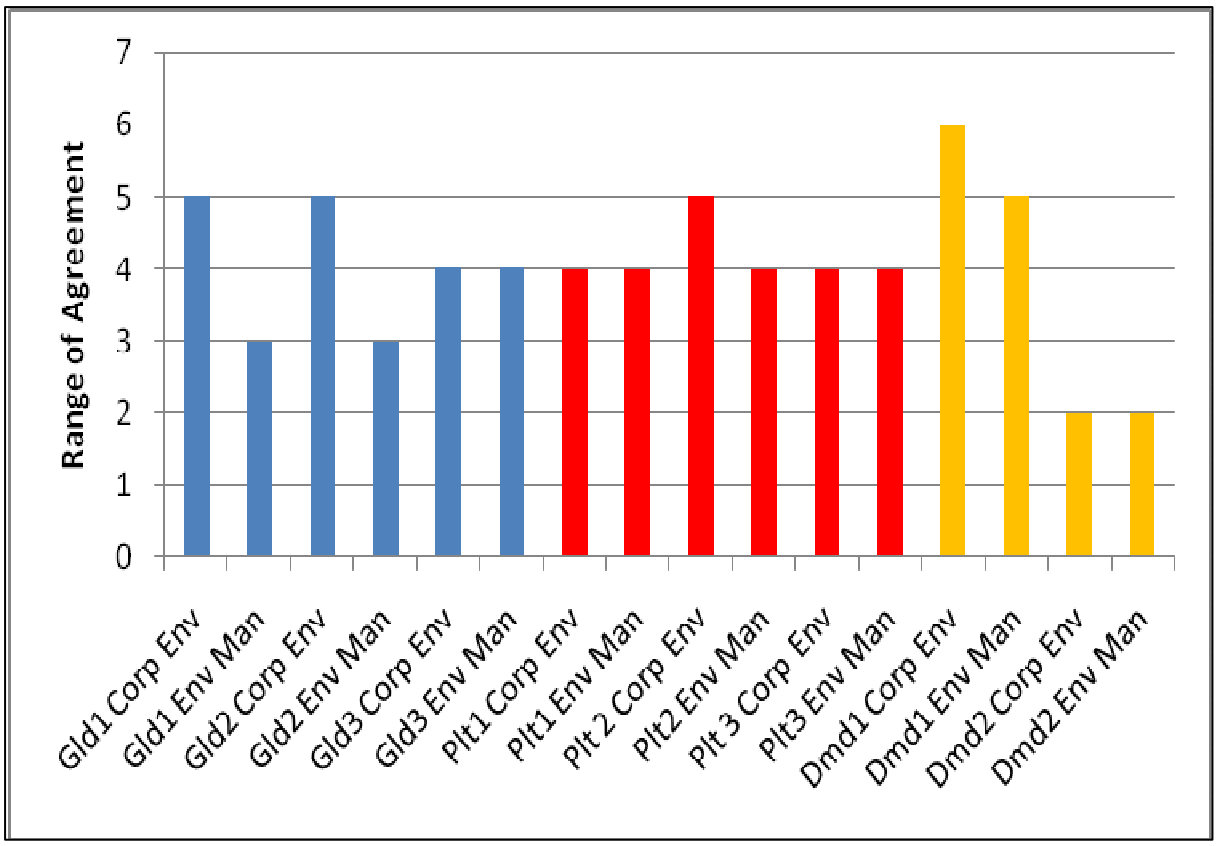
	Construct 3	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env.	Average	4.83	5.33	3.67	3.67	5.00	4.33	5.50	2.33
Manager	Stdev.	0.29	0.58	0.58	0.58	0.00	1.15	0.00	0.58
Environmental	Average	3.47	3.00	4.00	4.42	4.00	4.00	5.00	1.67
Manager	Stdev.	0.76	0.67	0.00	0.14	0.50	1.20	0.33	0.58
Combined	Average	4.15	4.17	3.83	4.04	4.50	4.17	5.25	2.00
	Stdev.	0.97	1.65	0.24	0.53	0.71	0.24	0.35	0.47
Descriptive	Correlation	-0.381	-0.866	0.000	-0.500	0.000	-0.240	0.866	0.500
Statistics	p-value	0.043*	0.010*	0.374	0.094	0.025*	0.746	0.061	0.230

* Significant difference between the managerial responses and companies on this construct.

There was however not very good correlations between the opinions of the two managerial levels except for Gld2 and Dmd1 who presented correlations of -0.866 and 0.866 respectively.

From the data presented in Figure 5.11 it is evident that most of the companies 'Mildly agreed' that company management has bought into the business case of environmental leadership, except for the FEM management of Gld1, Gld2 and Dmd2. Dmd1 presented the highest 'Agreement' response for both managerial levels whilst Dmd2 presented the lowest buy in into the business case of environmental leadership compared to the sample companies. Of interest though is that p-values of less than 0.05 were derived for 3 of the sample companies being Gld1, Gld2, and Plt2 meaning that these managerial levels responded in a statistically significant different way compared to the other managers and companies.

Figure 5.11: Data summary for company management's belief that a business case exists for environmental leadership.



5.5.1.4 Construct 4: Involvement of environmental leaders in business strategies.

Table 5.14a, Table 5.14b and Figure 5.12 present the data and graphic presentation for the degree to which company management involve environmental leaders in the development of business strategies on the industry and company specific level.

From the data presented in Table 5.14a it is evident that CEMs were more in agreement to the statements comprising this construct compared to FEMs. The large variation in response as indicated by the p-value of less than 0.05 warrants that this sub-construct be evaluated on a company specific basis.

The FEMs indicated that they were in 'Mild disagreement' to some of the statements. The large variation in response as indicated by the p-value, of less than 0.05, warrants that this sub-construct be evaluated further on a company specific basis though.

Table 5.14a: Data summary for the degree to which company management involve environmental leaders in the development of business strategies on the industry level.

	Construct4 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Manager	Average	0.0	0.0	3.0	3.0	30.3	42.4	21.2
	Stdev.	0.0	0.0	5.2	5.2	18.9	13.9	13.9
Environmental Managers	Average	2.9	4.3	13.0	5.8	27.5	30.4	15.9
	Stdev.	5.0	4.3	7.5	2.5	10.0	11.5	2.5
Combined	Average	2.0	2.9	9.8	4.9	28.4	34.3	17.6
	Stdev.	3.4	2.9	6.8	1.7	10.3	11.1	2.9
Descriptive Statistics	p-value				<0.001*			

* Significant difference between the companies on this construct.

As mining's core business is to extract ore out of the ground as efficient and cheaply as possible, it can be expected that company management might exclude environmental input from the development of business strategies. From the data presented in Table 5.14, it is evident that CEM's mostly 'Agreed' that they are involved, whilst FEM's only 'Mildly agreed' for most of the responses.

Table 5.14b: Data summary for the degree to which company management involve environmental leaders in the development of business strategies at the mine.

	Construct 4	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env. Manager	Average	5.00	5.33	4.67	4.17	4.67	4.33	5.50	3.33
	Stdev.	0.87	0.58	0.58	0.76	0.58	0.58	0.00	3.06
Environmental Manager	Average	4.00	3.67	4.00	4.83	4.17	5.11	4.11	1.83
	Stdev.	0.20	0.88	0.00	0.29	0.76	0.51	1.39	0.76
Combined	Average	4.50	4.50	4.33	4.50	4.42	4.72	4.81	2.58
	Stdev.	0.71	1.18	0.47	0.47	0.35	0.55	0.98	1.06
Descriptive Statistics	Correlation	0.866	0.982	0.866	0.189	0.756	0.945	0.277	-0.500
	p-value	0.123	0.052	0.116	0.230	0.417	0.155	0.159	0.456

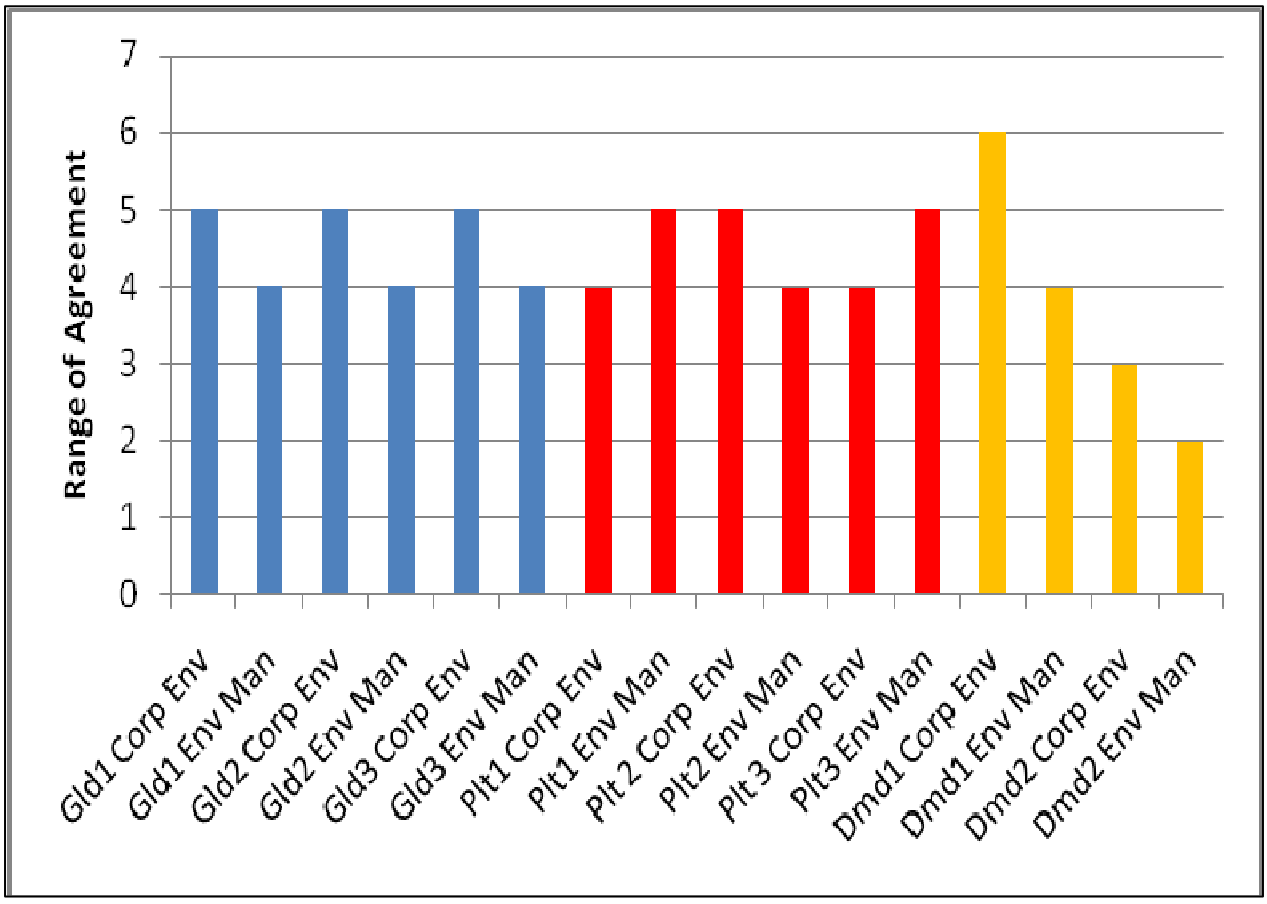
* Significant difference between the managerial responses and companies on this construct.

Good correlations were found between the opinions of CEMs and FEM's except for Plt1, Dmd1 and Dmd2. The CEMs of Gld1, Gld2, Gld3, Plt2 and Dmd1 all 'Agreed' on

average that their input forms a central part of the mine's business strategies. The respondents from Dmd2 either 'Mildly disagreed' or 'Disagreed' to being involved with business strategy.

Only the p-value of Gld2 was found to be less than 0.05 and therefore the response of this company was significantly different compared to other managerial levels and company responses.

Figure 5.12: Data summary for degree to which environmental leaders are involved in the development of business strategies at the mine.



It therefore seems that most of the mining companies do acknowledge the value of environmental leadership in business strategy development to some degree as environmental personnel are more readily involved.

5.5.1.5 Construct 5: Business recommendations regarding the environment are valued.

Table 5.15a, Table 5.15b and Figure 5.12 present the data and graphic presentation for the degree to which business recommendations with regards to the environment are valued on the industry and company specific level.

From the data presented in Table 5.15a it is evident that both CEMs and FEMs were more in 'Mild agreement' with the statements relating to this construct and the spread in response ranged from 'Strongly disagree' to 'Strongly agree'. CEMs however were more prone to 'Agreement'. It would therefore appear that business recommendations regarding the environment are only valued to a limited degree. The large variation in response, as indicated by the p-value of less than 0.05, warrants that this sub-construct be evaluated further on a company specific basis.

Table 5.15a: Data summary for the degree to which business recommendations with regards to the environment are valued by company management on an industry level.

	Construct5 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate	Average	0.0	9.1	12.1	3.0	33.3	33.3	9.1
Env. Manager	Stdev.	0.0	15.7	5.2	5.2	10.5	13.9	0.0
Environmental	Average	10.1	10.1	4.3	1.4	36.2	26.1	11.6
Managers	Stdev.	2.5	10.0	4.3	2.5	2.5	7.5	2.5
Combined	Average	6.9	9.8	6.9	2.0	35.3	28.4	10.8
	Stdev.	1.7	11.9	1.7	3.4	5.1	9.5	1.7
Descriptive Statistics	p-value				<0.001*			

* Significant difference between the companies on this construct.

From the data presented in Table 5.15b it is notable that only 4 of the 8 CEMs agreed that their business recommendations regarding the environment are valued by company management whilst 3 of 8 FEMs concurred with this finding. The responses by Plt2 and Dmd1 indicated that this was true for both levels of management involved in this study.

Table 5.15b: Data summary for the degree to which business recommendations with regards to the environment are valued by company management.

	Construct 5	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env	Average	3.83	4.67	3.67	4.17	4.67	2.33	5.17	3.33
Manager	Stdev.	1.15	0.58	1.53	0.58	0.58	2.52	0.29	0.58
Environmental	Average	3.40	2.67	4.00	4.67	4.67	4.56	5.22	1.50
Manager	Stdev.	0.87	1.00	0.00	0.14	0.29	0.38	0.19	0.87
Combined	Average	3.62	3.67	3.83	4.42	4.67	3.44	5.19	2.42
	Stdev.	0.31	1.41	0.24	0.35	0.00	1.57	0.04	1.30
Descriptive	Correlation	0.993	0.866	0.655	1.000	0.500	-0.803	0.500	-0.500
Statistics	p-value	0.631	0.040*	0.725	0.219	1.000	0.205	0.795	0.038

* Significant difference between the managerial responses and companies on this construct.

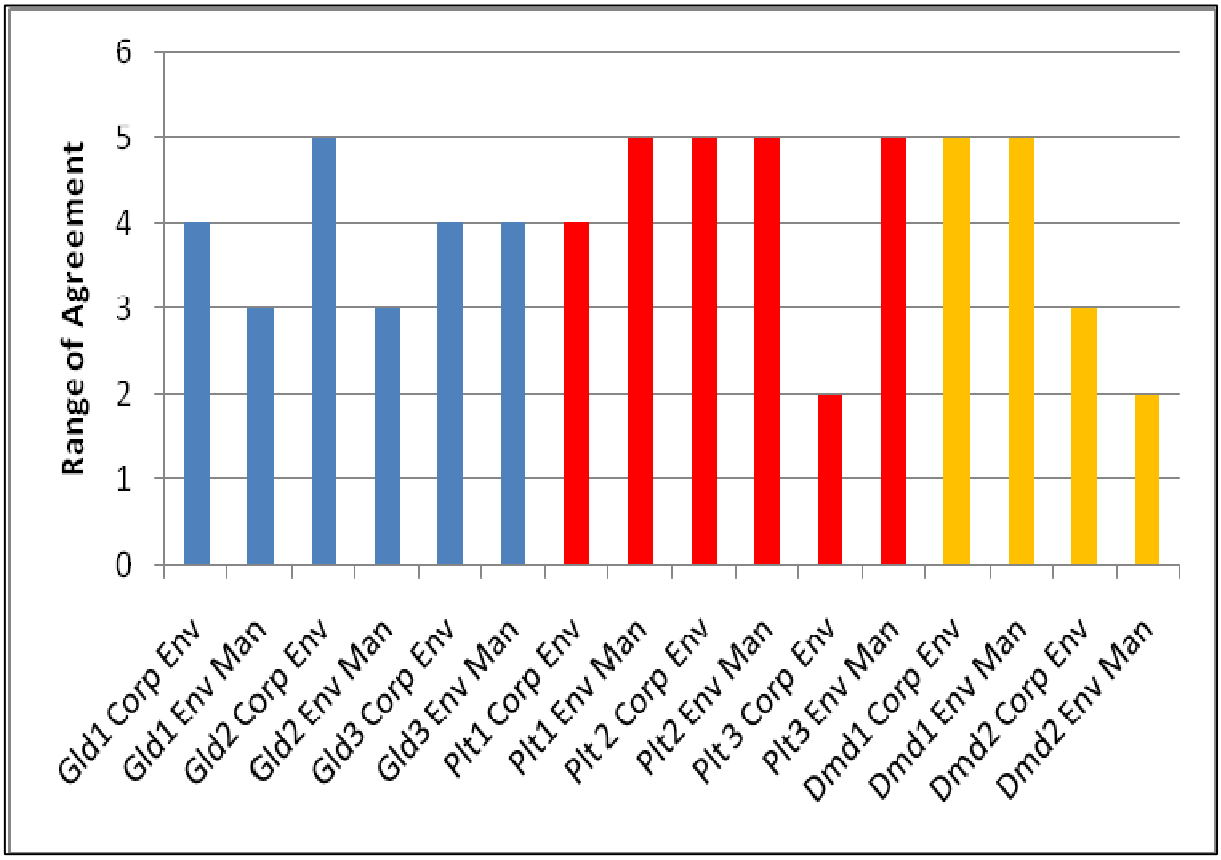
The CEMs of Gld2 and Plt3 and the FEMs of Dmd2 were the most in 'Disagreement' with this construct. Good correlations were found for most of the comparative opinions confirming that both levels of management have the same opinion on this matter (despite some strong negative correlations for Plt3).

From the data presented for this construct in Table 5.15b it is once again evident that the adoption of business recommendations by company management from an environmental point of view is strongly company specific.

The only significantly different responses between CEMs and FEMs, and between the sample companies for the questions relating to this construct were found for Gld2 and Dmd2. This was based on the variations found in the means of the sample populations as revealed by their One-way ANOVA p-values lower than 0.05.

On average the responses towards this construct by both levels of management was rather low compared to the other four constructs tested for environmental leadership importance.

Figure 5.13: Data summary for the degree to which business recommendations regarding the environment are valued by company management.



5.5.2 Determining the environmental business orientation for sample companies.

5.5.2.1 Construct 6: Ownership of environmental responsibility in business role of managers.

Table 5.16a, Table 5.16b and Figure 5.14 present the data and graphic presentation for the degree to which company management have accepted ownership in their business responsibility towards the natural environment on the industry and company specific level.

From the data presented in Table 5.16a it is evident that both CEMs and FEMs were in 'Agreement' with the statements relating to this construct. FEMs however were however not as convinced with larger spread of response towards 'Mild agreement' and

'Disagreement'. It would therefore appear that company management has to a larger degree taken up the responsibility according to CEMs compared to the views of FEMs. The large variation in response as indicated by the p-value, of less than 0.05, warrants that this sub-construct be evaluated further on a company specific basis.

Table 5.16a: Data summary for the degree to which company leaders accept ownership and responsibility w.r.t. the natural environment on industry level.

	Construct6 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Manager	Average	3.03	6.06	9.09	0.00	30.30	36.36	15.15
	Stdev.	5.25	5.25	9.09	0.00	18.92	31.49	5.25
Environmental Managers	Average	1.45	15.94	14.49	2.90	17.39	36.23	11.59
	Stdev.	2.51	9.05	2.51	2.51	7.53	2.51	12.55
Combined	Average	1.96	12.75	12.75	1.96	21.57	36.27	12.75
	Stdev.	1.70	7.40	3.40	1.70	10.33	9.45	6.79
Descriptive Statistics	p-value			<0.001*				

* Significant difference between the companies on this construct.

The integration of environmental responsibility into company management's portfolio seems to be challenging from the data presented in Table 5.16b and Figure 5.14. Most of the responses were in 'Mild disagreement' with regards to company management accepting ownership and responsibility for the environment in their business role.

Table 5.16b: Data summary for the degree to which company leaders accept ownership and responsibility w.r.t. the natural environment.

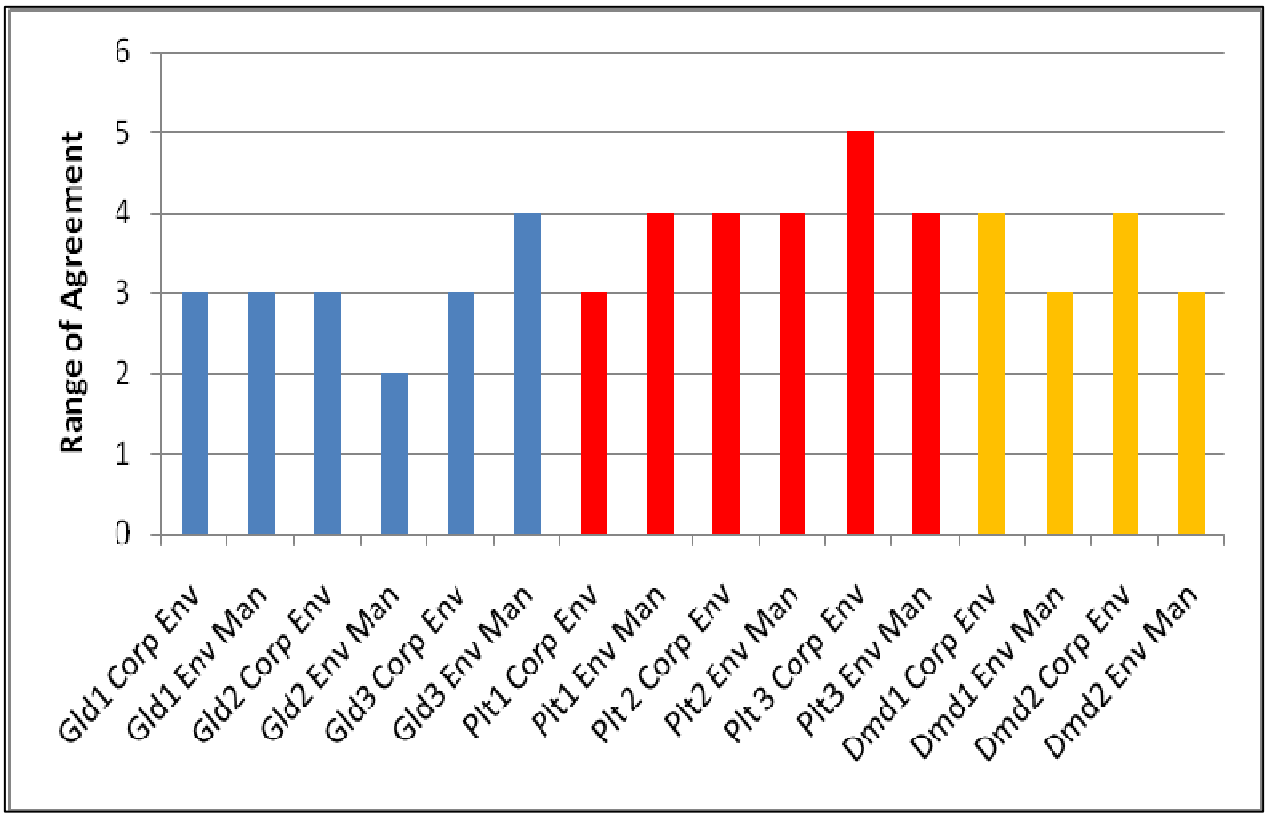
	Construct 6	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Manager	Average	3.33	3.33	2.67	3.17	3.67	4.67	4.17	4.00
	Stdev.	1.26	1.15	0.58	1.04	1.53	2.31	2.31	2.00
Environmental Manager	Average	3.07	2.22	4.33	3.50	3.50	4.33	3.44	2.67
	Stdev.	0.95	0.51	0.58	0.87	1.00	1.45	1.58	0.76
Combined	Average	3.20	2.78	3.50	3.33	3.58	4.50	3.81	3.33
	Stdev.	0.19	0.79	1.18	0.24	0.12	0.24	0.51	0.94
Descriptive Statistics	Correlation	0.981	0.945	0.500	0.971	0.655	0.993	0.977	0.982
	p-value	0.784	0.202	0.024*	0.692	0.882	0.843	0.678	0.341

* Significant difference between the managerial responses and companies on this construct.

Only the response from both levels of Plt2 and Plt3 was in 'Mild agreement' with this construct. The correlations between the opinions of the two levels of management were once again good (except for Gld3) and therefore the two levels of management mostly concurred in their opinion. Gld2 presented the worst feedback with regards to this construct and it seems that managers in this company don't take ownership with regards to the natural environment seriously.

Only the p-value for one of the companies (Gld3) was found to be less than 0.05 indicating the variance in responses encountered in this sample.

Figure 5.14: Data summary for the degree to which company leaders accept ownership and responsibility w.r.t. the natural environment.



The change in the requirements of the modern mining manager to incorporate sustainability thinking seems to present difficulty in practice and although environmental aspects are becoming more and more of a line responsibility, company management does not seem to respond too well to this modern day business requirement. This was especially true for the gold mining companies sampled.

5.5.2.2 Construct 7: Acknowledgement of environmental leadership approach towards business decisions.

Table 5.17a, Table 5.17b and Figure 5.15 present the data and graphic presentation for degree to which company leaders acknowledge an environmental leadership approach towards business decisions on the industry and company specific level.

Table 5.17a: Data summary for the degree to which company leaders acknowledge an environmental leadership approach towards business decisions on industry level.

	Construct7 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Manager	Average	4.5	9.1	9.1	0.0	18.2	36.4	22.7
	Stdev.	6.4	12.9	0.0	0.0	0.0	12.9	6.4
Environmental Managers	Average	4.3	6.5	4.3	2.2	13.0	45.7	23.9
	Stdev.	6.1	3.1	6.1	3.1	12.3	9.2	21.5
Combined	Average	4.4	7.4	5.9	1.5	14.7	42.6	23.5
	Stdev.	6.2	6.2	4.2	2.1	8.3	10.4	16.6
Descriptive Statistics	p-value				0.022*			

* Significant difference between the companies on this construct.

From the data presented in Table 5.17a it is evident that FEMs experienced the environmental leadership approach towards business decisions more intensely than the CEMs. Of interest is the high level of 'Agreement' of the FEMs (45.7%) and also the higher than expected 'Mild disagreement' and 'Disagreement' (9%) of the CEMs to this construct. It would therefore appear that the environmental leadership approach is driven on business level but not as much on corporate level. The large variation in response as indicated by the p-value, of less than 0.05, warrants that this sub-construct be evaluated further on a company specific basis.

From the data presented in Table 5.17b it is evident that Gld1, Plt1, Plt3, as well as Dmd1 were mostly in 'agreement' with this construct, whilst the remainder were mostly in 'mild agreement' (or 'mild disagreement' as is the case with Dmd2). This is once again of concern taking into consideration the effort and resources spent on environmental management in mining operations.

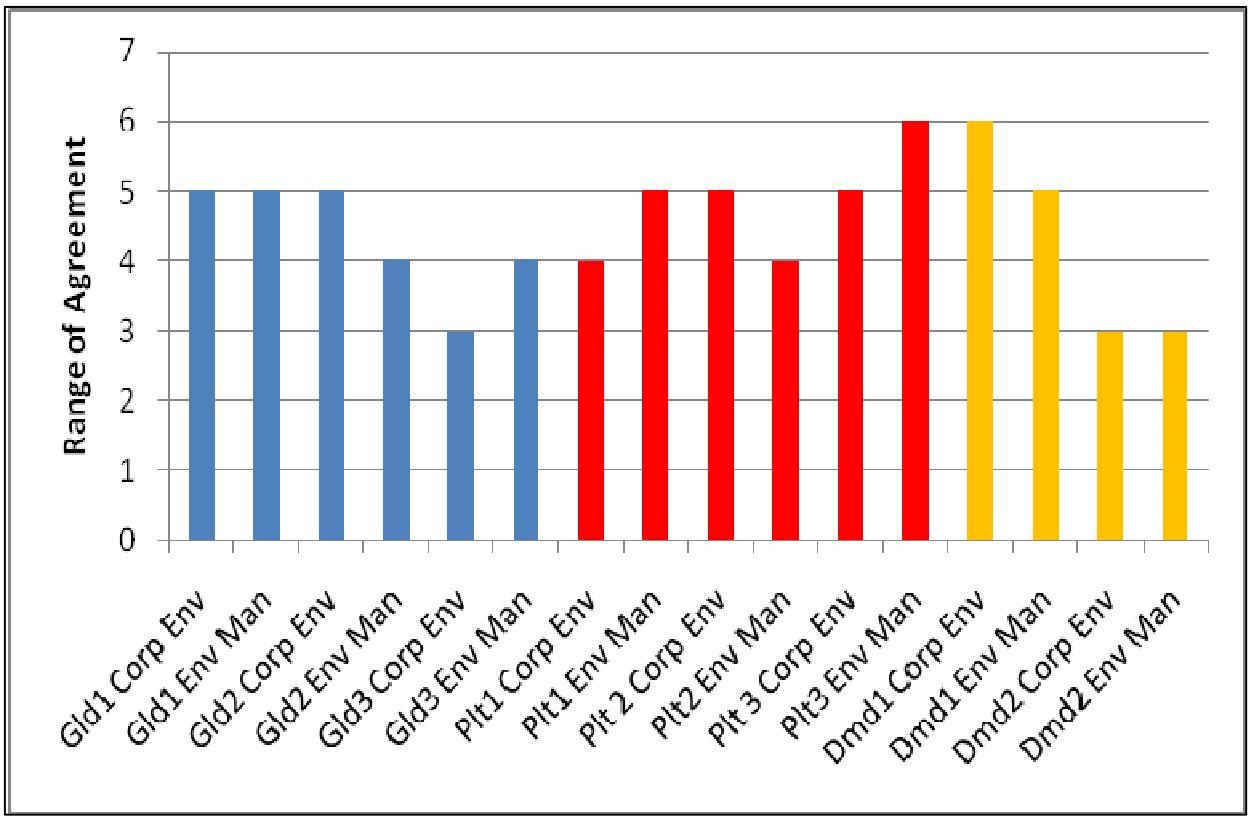
Table 5.17b: Data summary for the degree to which company leaders acknowledge environmental leadership input towards business decisions.

	Construct 7	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env. Manager	Average	4.75	4.50	3.00	4.00	5.00	4.50	5.75	2.50
	Stdev.	0.35	2.12	1.41	0.00	0.00	0.71	0.35	2.12
Environmental Manager	Average	4.80	3.67	4.00	5.00	3.75	5.50	5.00	3.25
	Stdev.	0.85	0.47	1.41	1.06	1.77	0.71	0.47	3.18
Combined	Average	4.78	4.08	3.50	4.50	4.38	5.00	5.38	2.88
	Stdev.	0.04	0.59	0.71	0.71	0.88	0.71	0.53	0.53
Descriptive Statistics	Correlation	1.000	1.000	1.000	1.000	1.000	1.000	-1.000	1.000
	p-value	0.946	0.642	0.553	0.317	0.421	0.293	0.214	0.808

* Significant difference between the managerial responses and companies on this construct.

It is also clear that the opinions of both levels of management tested in this study strongly concurred on this construct with correlations of 1.000 for all the sample companies except for Dmd2.

Figure 5.15: Data summary for the degree to which company leaders acknowledge environmental leadership input towards business decisions.



There were no significant differences found between the responses of the managerial levels and between companies as no p-values of less than 0.05 could be established.

The trend established in the data however suggests that company management on a company specific basis do follow an environmental leadership approach towards business decisions and this construct is therefore well embedded in the business make-up of the sampled companies.

5.5.2.3 Construct 8: Environmental values are entrenched in business decisions.

The JSE listed mining companies all have to implement a mandatory environmental value statement and environmental policy which should become entrenched in the way the companies operate. Table 5.18a, Table 5.18b and Figure 5.16 present the data and graphic presentation for degree to which these environmental values are entrenched in business decisions on the industry and company specific level.

From the data in Table 5.18 it is clear that both CEMs and FEMs responded in varying degrees of 'Agreement' to this construct to which the FEMs attested more to.

Table 5.18a: Data summary for the degree to which environmental values are entrenched in business decisions of company leaders on an industry level.

	Construct8 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate	Average	0.0	6.1	6.1	0.0	18.2	45.5	24.2
Env. Manager	Stdev.	0.0	5.2	10.5	0.0	9.1	9.1	18.9
Environmental	Average	0.0	2.9	2.9	2.9	24.6	36.2	30.4
Managers	Stdev.	0.0	2.5	5.0	2.5	9.1	18.1	15.1
Combined	Average	0.0	3.9	3.9	2.0	22.5	39.2	28.4
	Stdev.	0.0	1.7	3.4	1.7	6.1	15.1	15.1
Descriptive Statistics	p-value				<0.001*			

* Significant difference between the companies on this construct.

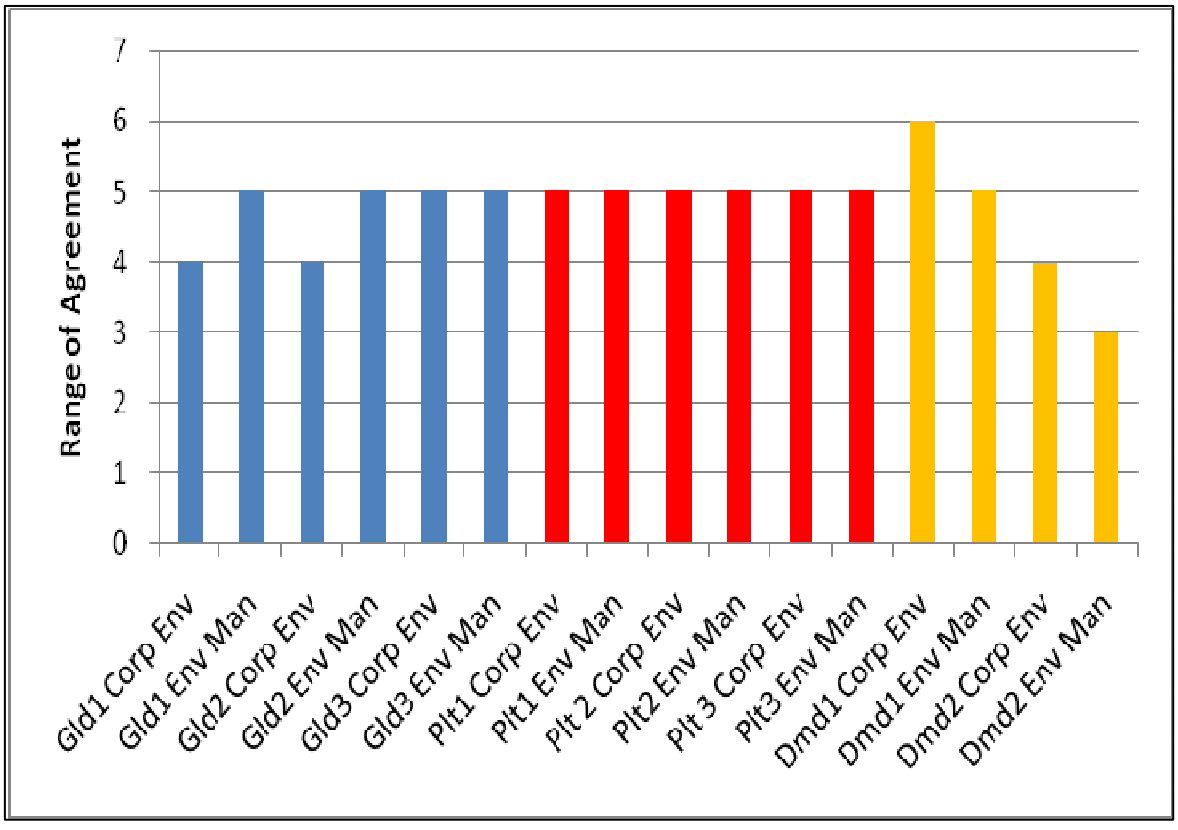
From the data presented in Table 5.18 and Figure 5.16 it is also evident that most of the sample companies 'Agreed' that environmental values are entrenched in business

decisions. This is especially true for the platinum mining companies sampled. On average, Plt1, Plt3 and Dmd1 presented were in 'Strongest agreement' to this construct. The CEMs of Gld1, Gld2 and Dmd2 only 'Mildly agreed' whilst the FEMs of Dmd2 'Mildly disagreed'.

Table 5.18b: Data summary for the degree to which environmental values are entrenched in business decisions of company leaders.

	Construct 8	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env	Average	4.33	3.67	4.67	5.17	5.00	5.00	5.50	4.00
Manager	Stdev.	0.76	0.58	0.58	0.76	0.00	1.00	0.00	2.00
Environmental	Average	4.60	4.89	5.33	5.17	4.67	5.22	5.22	2.67
Manager	Stdev.	0.53	0.96	1.15	0.63	0.29	0.51	0.38	0.76
Combined	Average	4.47	4.28	5.00	5.17	4.83	5.11	5.36	3.33
	Stdev.	0.19	0.86	0.47	0.00	0.24	0.16	0.20	0.94
Descriptive	Correlation	-0.990	-1.000	1.000	-0.217	1.000	0.982	1.000	0.982
Statistics	p-value	0.645	0.664	0.422	1.000	0.114	0.749	0.279	0.341

Figure 5.16: Data summary for the degree to which environmental values are entrenched in business decisions of company leaders.



There was however not very good consensus on the findings of this construct as there was either very good positive or negative correlations with no correlation for Plt1 at all. Furthermore, no p-values of less than 0.05 could be established and therefore none of the companies presented statistical significant differences in opinion and company stance.

5.5.2.4 Construct 9: Financial/Profit decisions despite environmental implications.

The contentious issue of making money despite potential environmental impacts and externalising internalities were tested by this construct as part of the intent of the business orientation of company management. Table 5.19a, Table 5.19b and Figure 5.17 present the data and graphic presentation for the degree to which company leaders are profit orientated despite potential environmental impacts on the industry and company specific level.

From the data presented in Table 5.19a it is evident that there is uncertainty regarding the profit motives of company management when it comes to required financial expenditure and potential environmental impacts. It would also appear that on the industry level, company management are still more profit orientated despite their potential environmental impact as more than 50% of both CEMs and FEMs responded in 'Agreement' to the statements that tested this construct.

Table 5.19a: Data summary for the degree to which company leaders are profit orientated despite potential environmental impacts on an industry level.

	Construct9 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate	Average	3.0	15.2	12.1	12.1	30.3	18.2	9.1
Env. Manager	Stdev.	5.2	5.2	21.0	5.2	13.9	0.0	9.1
Environmental	Average	4.3	14.5	15.9	13.0	21.7	23.2	7.2
Managers	Stdev.	4.3	2.5	6.6	0.0	4.3	10.0	2.5
Combined	Average	3.9	14.7	14.7	12.7	24.5	21.6	7.8
	Stdev.	4.5	2.9	2.9	1.7	6.1	6.8	4.5
Descriptive Statistics	p-value				0.001*			

* Significant difference between the companies on this construct.

The large variation in response as indicated by the p-value of less than 0.05, warrants that this sub-construct be evaluated and qualified on a company specific basis.

Table 5.19b: Data summary for the degree to which company leaders are profit orientated despite potential environmental impacts.

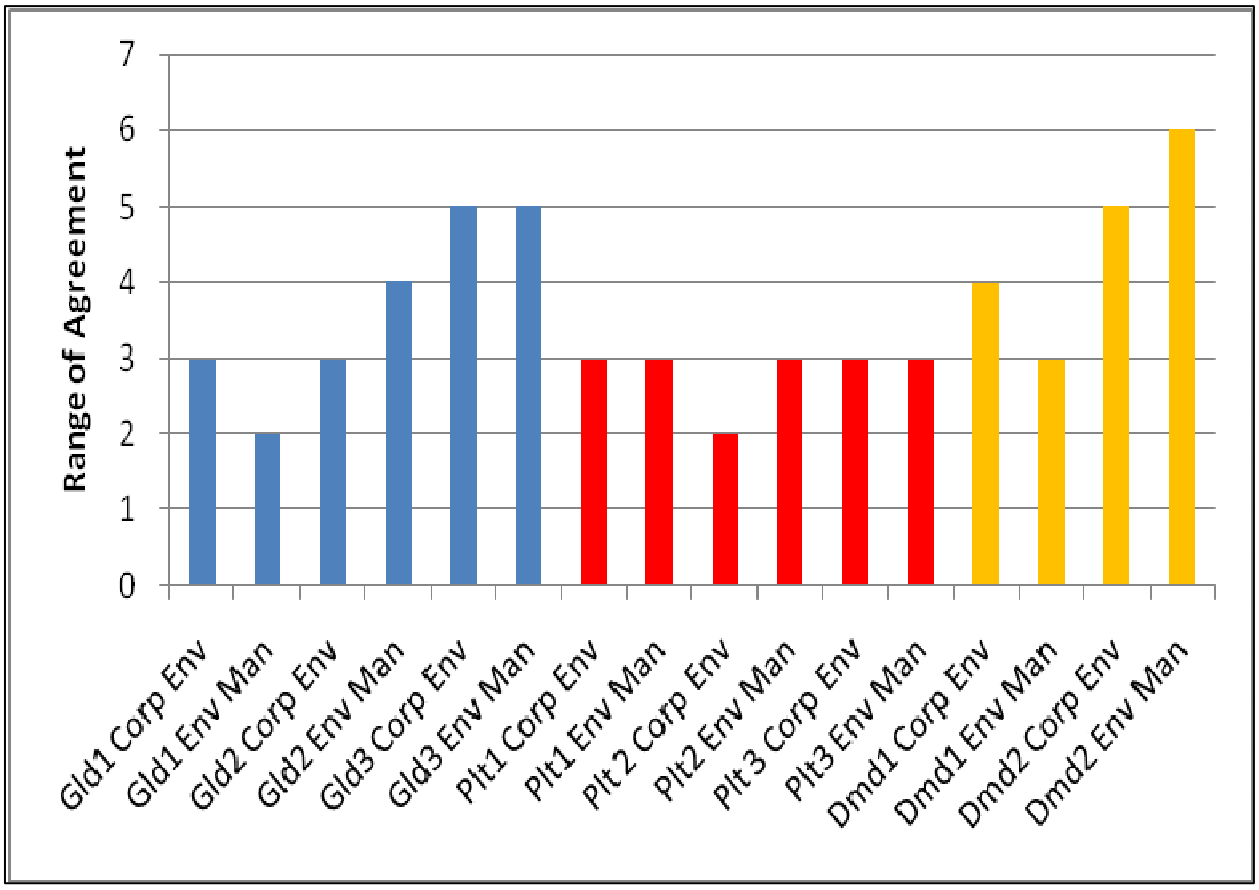
	Construct 9	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env.	Average	2.67	3.33	5.00	2.50	2.00	2.67	4.33	5.00
Manager	Stdev.	0.58	0.58	0.00	0.50	1.73	0.58	2.02	1.73
Environmental	Average	2.40	3.78	5.00	3.00	3.17	2.78	3.33	5.83
Manager	Stdev.	0.20	1.54	0.00	0.43	0.76	1.07	1.53	0.29
Combined	Average	2.53	3.56	5.00	2.75	2.58	2.72	3.83	5.42
	Stdev.	0.19	0.31	0.00	0.35	0.82	0.08	0.71	0.59
Descriptive	Correlation	0.000	-1.000	-1.000	0.000	0.756	-0.988	0.945	-0.500
Statistics	p-value	0.492	0.104	0.519	0.261	0.346	0.882	0.532	0.457

From the data presented in Table 5.19b, it appears on average that 4 of the sampled companies ‘Mildly agreed’ or ‘Agreed’ to company management being profit orientated despite potential environmental impacts. These were samples Gld2, Gld3, Dmd1 and Dmd2. The platinum samples and Gld1 were in ‘Mild disagreement’ regarding this construct.

Of interest however were the positive correlations for Plt2 and Dmd1 whilst the remainder of the samples revealed either no correlation or strong negative correlations indicating that there is no consensus regarding this matter between the managerial levels tested for most of the sample companies.

Furthermore, no p-values of less than 0.05 could be established and therefore none of the companies presented statistical significant differences in opinion and company stance on this matter.

Figure 5.17: Data summary for the degree to which company leaders are profit orientated despite potential environmental impacts on a company specific level.



5.5.2.5 Construct 10: Company management is not ignorant in their business orientation towards environmental matters.

Table 5.20a, Table 5.20b and Figure 5.18 present the data and graphic presentation for the degree to which company leaders are ignorant in their business orientation to environmental matters on an industry and company specific level.

It would appear from the data presented in Table 5.20a that CEMs are more convinced that company management is pro-active towards environmental matters than FEMs. CEMs 'Disagreed' to 44% and 'Strongly disagreed' to 17% of the statements that tested ignorance in environmental business orientation at corporate management level. FEMs however testified more towards a degree of ignorance by company management as more than 38% of the responses belonged to the total 'Agreement' bracket.

Table 5.20a: Data summary for the degree to which company leaders are ignorant in their business orientation to environmental matters on an industry level.

	Construct10	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Manager	Average	17.2	44.2	8.8	6.1	14.9	8.8	0.0
	Stdev.	16.7	9.4	0.4	10.5	10.7	0.4	0.0
Environmental Managers	Average	11.6	29.0	18.8	4.3	14.5	14.5	7.2
	Stdev.	9.1	16.5	6.6	0.0	5.0	13.3	9.1
Combined	Average	13.7	33.3	15.7	4.9	14.7	12.7	4.9
	Stdev.	11.9	10.3	4.5	3.4	5.9	9.0	6.1
Descriptive Statistics	p-value				0.011*			

* Significant difference between the companies on this construct.

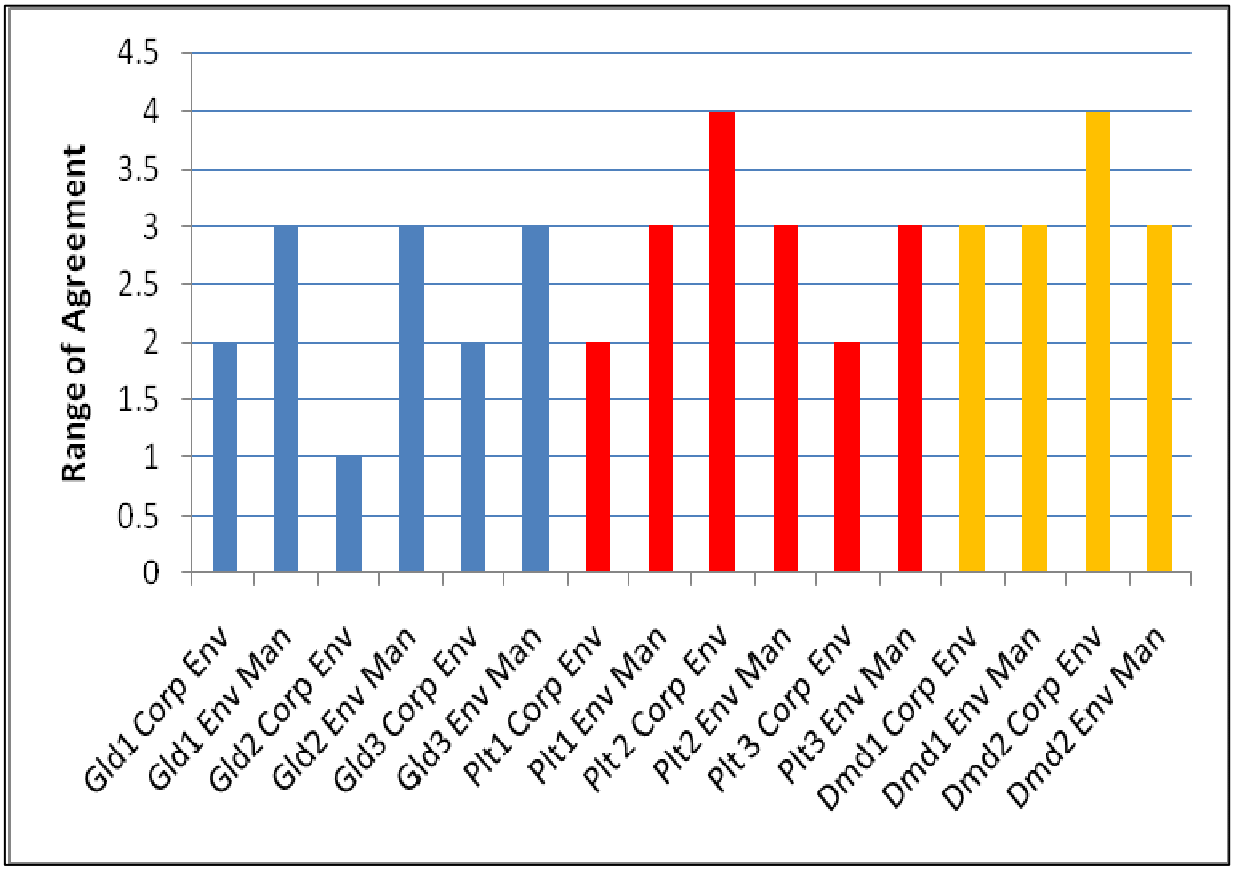
The large variation in response as indicated by the p-value of less than 0.05, once again warrants that this sub-construct be evaluated on a company specific basis.

On a company specific level it would appear that the sample companies are not ignorant in their business orientation towards environmental matters. The data presented in Table 5.20b reveals that most of the company managers are not ignorant as the CEMs of 5 of the sample companies 'Disagreed' with the statements that tested this construct whilst most of the FEMs 'Mildly disagreed'. The CEMs of Plt2 and Dmd2 however presented anomalies regarding this construct as they 'Mildly agreed' to their company managers being ignorant in their environmental business orientation.

Table 5.20b: Data summary for the degree to which company leaders are ignorant in their business orientation to environmental matters.

	Construct 10	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env. Manager	Average	2.17	1.33	2.33	1.83	3.67	2.00	2.50	4.33
	Stdev.	0.58	0.58	1.53	0.58	1.53	0.00	0.50	0.58
Environmental Manager	Average	2.93	3.11	2.67	2.67	3.17	3.00	3.22	3.33
	Stdev.	0.50	1.35	2.08	0.80	0.29	1.86	1.02	2.02
Combined	Average	2.55	2.22	2.50	2.25	3.42	2.50	2.86	3.83
	Stdev.	0.54	1.26	0.24	0.59	0.35	0.71	0.51	0.71
Descriptive Statistics	Correlation	0.918	0.786	0.996	0.359	0.189	-1.000	0.982	-0.786
	p-value	0.158	0.104	0.834	0.218	0.607	0.404	0.332	0.456

Figure 5.18: Data summary for the degree to which company leaders are ignorant in their business orientation to environmental matters.



There was however no statistically significant findings for this construct, with no p-values lower than 0.05. The correlations between the opinions of the CEM's and the FEMs were also positive for four of the companies, whilst two companies rendered strong negative correlations (Plt3 and Dmd2). From these findings it would appear that there is a difference in perception on a corporate and functional level, the latter being closer to the mining operation on the ground.

It would however appear that there has been a change in the environmental business orientation from an industry that was largely associated with ignorance regarding the natural environment.

5.5.3 Examining the environmental strategy focus for mining companies.

5.5.3.1 Construct 11: Integration of environmental issues into strategic management.

The integration of environmental issues into strategic management objectives presents the foundation for environmentally responsible mining companies. Table 5.21a, Table 5.21b and Figure 5.19 present the data and graphic presentation for degree to which environmental issues are integrated into strategic management objectives on an industry and company specific level.

Table 5.21a: Data summary for the degree to which company leaders integrate environmental issues into strategic management objectives on an industry level.

	Construct11 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Manager	Average	0.0	6.1	9.1	6.1	27.3	39.4	12.1
	Stdev.	0.0	10.5	9.1	5.2	15.7	10.5	5.2
Environmental Managers	Average	2.9	11.6	10.1	5.8	18.8	39.1	11.6
	Stdev.	2.5	12.6	10.9	2.5	6.6	7.5	2.5
Combined	Average	2.0	9.8	9.8	5.9	21.6	39.2	11.8
	Stdev.	1.7	11.9	10.3	2.9	9.5	4.5	2.9
Descriptive Statistics	p-value			<0.001*				

* Significant difference between the companies on this construct.

From the data presented in Figure 5.21a it is evident that company management in the mining industry do integrate environmental issues into strategic management objectives. This is evident from the fact that both CEMs and FEMs were in 'Agreement' to the statements that tested this construct. There were however some disagreement encountered from the FEMs and also some 'Unsure' responses which are indicative of reluctance by company management to take environmental matters into account their strategic management approach.

The large variation in response as indicated by the p-value of less than 0.05, once again warrants that this sub-construct be evaluated on a more company specific basis.

Table 5.21b: Data summary for the degree to which company leaders integrate environmental issues into strategic management objectives.

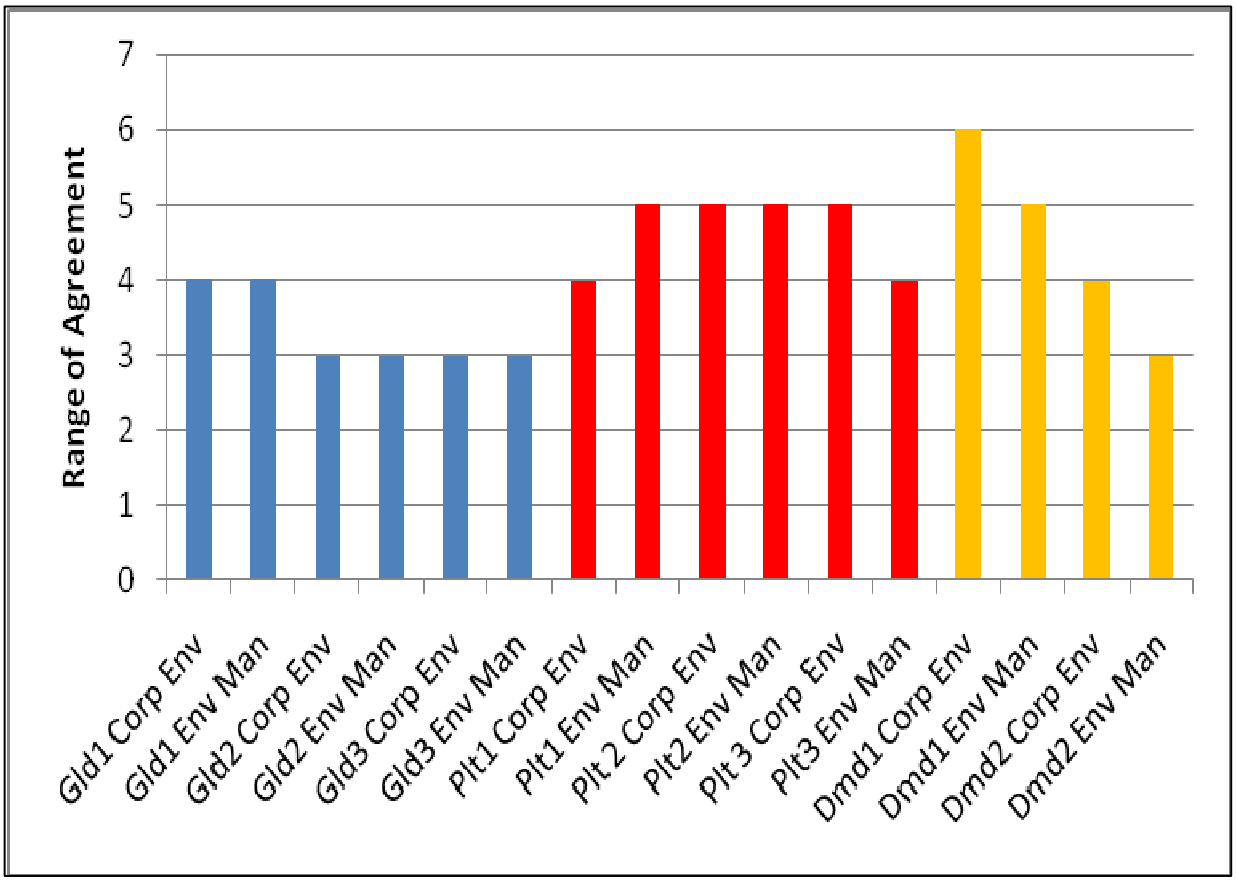
	Construct 11	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env.	Average	3.67	3.33	3.00	3.67	5.00	5.33	5.50	3.67
Manager	Stdev.	1.44	2.89	1.00	0.58	0.00	0.58	0.00	0.58
Environmental	Average	3.80	2.89	3.00	4.83	4.50	4.44	4.78	2.50
Manager	Stdev.	0.92	0.84	1.00	0.80	0.50	0.96	0.19	1.00
Total	Average	3.73	3.11	3.00	4.25	4.75	4.89	5.14	3.08
	Stdev.	0.09	0.31	0.00	0.82	0.35	0.63	0.51	0.82
Descriptive	Correlation	-0.756	-0.803	1.000	0.359	1.000	0.500	0.500	0.866
Statistics	p-value	0.899	0.811	1.000	0.111	0.158	0.242	0.003*	0.155

* Significant difference between the managerial responses and companies on this construct.

From the data presented in Table 5.21b and Figure 5.19 it is clear that the platinum mining industry has embraced this notion of integrating environmental objectives into strategic management. This was also the case for Dmd1, whilst Gld1 'Mildly agreed' with this construct. Surprisingly the CEMs of Dmd2 also 'Mildly agreed' with this construct, although the FEMs 'Mildly disagreed'. There was however either very strong positive or strong negative correlations depicting that there was differences in opinions between the management levels and between the different companies. Gld1 and Gld2 presented strong negative correlations whilst Gld3, Plt2 and Dmd1 presented strong positive correlations. Only the findings for Dmd1 proved presented significant variation in response as the p-value generated for the data representing the findings on this construct was below 0.05.

It would once again appear as if the late regulatory and investor environment and the culture within an industry can largely contribute to the dynamic of the inclusion of environmental issues into strategic management. This can be substantiated on the basis of the gold mining companies being much older and their development time has occurred in a time when environmental regulation and pressure wasn't as strict as in recent times. This is also the case for the diamond mining industry whilst the platinum mining industry has only recently excelled and strategic integration for the latter appears to be more obvious.

Figure 5.19: Data summary for the degree to which company leaders integrate environmental issues into strategic management objectives.



5.5.3.2 Construct 12: Environmental objectives linked with corporate goals and strategies.

As the commitment to sustainable development is one of the requirements for the JSE SRI listed mining companies, these companies should link their corporate goals and strategies with environmental objectives. The degree to which this happens in practice is reviewed through the statements comprising this sub- construct. Table 5.22a, Table 5.22b and Figure 5.20 present the data and graphic presentation for degree to which environmental objectives are linked with corporate goals and strategies on an industry and company specific level.

The data in Table 5.22a reveal that both CEMs' and FEMs were mostly in agreement

with the statements testing this sub-construct (>70%) although it would appear that they disagreed with the same statements, where some of the FEMs even 'Strongly disagreed'. From the range of responses observed, it would not be desirable to present findings from this data set and as the low p-value generated (<0.05) supports the large variation in the responses, the data is assessed on a company specific basis.

Table 5.22a: Data summary for the degree to which environmental objectives are linked with corporate goals and strategies on an industry level.

	Construct12 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Manager	Average	0.0	6.1	12.1	3.0	27.3	30.3	21.2
	Stdev.	0.0	5.2	13.9	5.2	9.1	13.9	13.9
Environmental Managers	Average	7.2	4.3	13.0	1.4	21.7	42.0	10.1
	Stdev.	2.5	4.3	4.3	2.5	7.5	13.3	5.0
Combined	Average	4.9	4.9	12.7	2.0	23.5	38.2	13.7
	Stdev.	1.7	1.7	7.4	1.7	7.8	13.5	7.4
Descriptive Statistics	p-value			<0.001*				

* Significant difference between the companies on this construct.

From the data depicted in Table 5.22b it is once again clear that the platinum industry is largely in 'Agreement' with the linkage of environmental objectives with corporate goals and strategies, as was the case for Dmd1. This was established for both levels of management sampled. The CEM of Gld2 is also committed to this construct although the FEMs are in 'Disagreement'.

The gold sector once again couldn't either 'Mildly agree' or 'Disagree' with the notion of linking environmental objectives with corporate goals and strategies. Dmd2 once again was in 'Disagreement' with this construct.

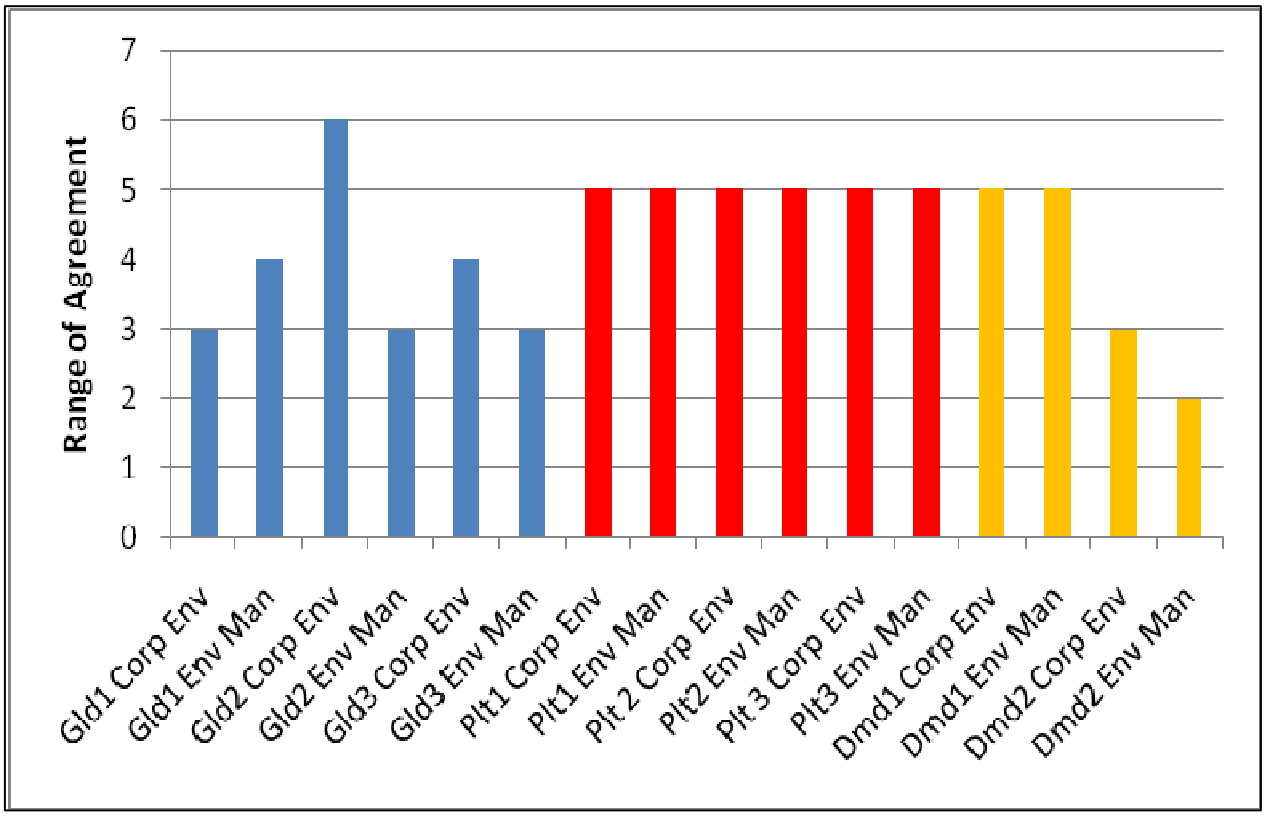
There was only correlations in the opinions of three of the companies sampled, being Gld3, Plt1 and Plt2. Therefore the consensus on this matter for the remainder of the samples is questionable. Only the findings for Gld2 proved to be significantly different from the other samples as the p-value generated for the data representing the findings on this construct was below 0.05.

Table 5.22b: Data summary for the degree to which environmental objectives are linked with corporate goals and strategies for the sample companies.

	Construct 12	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env. Manager	Average	3.33	5.67	3.67	4.50	4.67	5.00	5.33	2.67
	Stdev.	0.76	0.58	1.15	1.00	0.58	1.00	0.29	1.15
Environmental Manager	Average	4.07	3.33	3.33	5.00	4.50	4.78	4.89	1.67
	Stdev.	0.42	0.33	0.58	0.90	0.50	0.19	0.19	1.15
Combined	Average	3.70	4.50	3.50	4.75	4.58	4.89	5.11	2.17
	Stdev.	0.52	1.65	0.24	0.35	0.12	0.16	0.31	0.71
Descriptive Statistics	Correlation	0.052	0.000	1.000	0.693	0.866	0.000	-0.500	-0.500
	p-value	0.218	0.004*	0.678	0.555	0.725	0.725	0.091	0.349

* Significant difference between the managerial responses and companies on this construct.

Figure 5.20: Data summary for the degree to which environmental objectives are linked with corporate goals and strategies.



5.5.3.3 Construct 13: Accountability for environmental performance a central strategic element for company management.

JSE listed mining companies are required to present a section on environmental reporting as part the company's annual report to shareholders. Table 5.23a, Table 5.23b and Figure 5.21 present the data and graphic presentation for degree to which accountability for environmental performance is a central element of company strategy on the industry and company specific level.

Surprisingly there was a higher than expected percentage of 'Disagreement' by both levels of management tested towards the statements comprising this sub-construct, but especially by CEMs. There was on the other hand also 'Strong agreement' encountered as well, especially by FEMs.

Once again it is evident that the range of responses observed in this format would not allow for desirable reporting large variation is encountered. No significant difference between company responses could however be established with a p-value of more than 0.05 (<95% confidence) generated. The data will be assessed on a company specific basis to outline company specific findings.

Table 5.23a: Data summary for the degree to which accountability for environmental performance is a central element of company strategy on the industry level.

	Construct13 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate	Average	0.0	21.2	6.1	0.0	12.1	36.4	24.2
Env. Manager	Stdev.	0.0	29.2	10.5	0.0	13.9	32.8	27.8
Environmental	Average	5.8	11.6	10.1	0.0	11.6	31.9	29.0
Managers	Stdev.	10.0	20.1	10.9	0.0	10.9	26.2	33.2
Combined	Average	3.9	14.7	8.8	0.0	11.8	33.3	27.5
	Stdev.	6.8	23.0	10.6	0.0	11.8	28.3	31.4
Descriptive Statistics	p-value				0.369			

From the data presented in Table 5.23b and Figure 5.21 it is clear that the mining companies sampled have taken accountability towards environmental reporting and also view it as a strategic tool. All the sampled companies 'Agreed' to environmental performance being a central element of company strategy except for Dmd2 that only 'Mildly agreed'. Of interest in the data are the CEMs of Gld2, Plt2, Plt3 and Dmd2 who are only in 'Mild agreement' to this construct.

It appears that accountability towards environmental reporting might only be a regulatory and statutory requirement for these companies and might not have any relevance towards the company's strategic objectives.

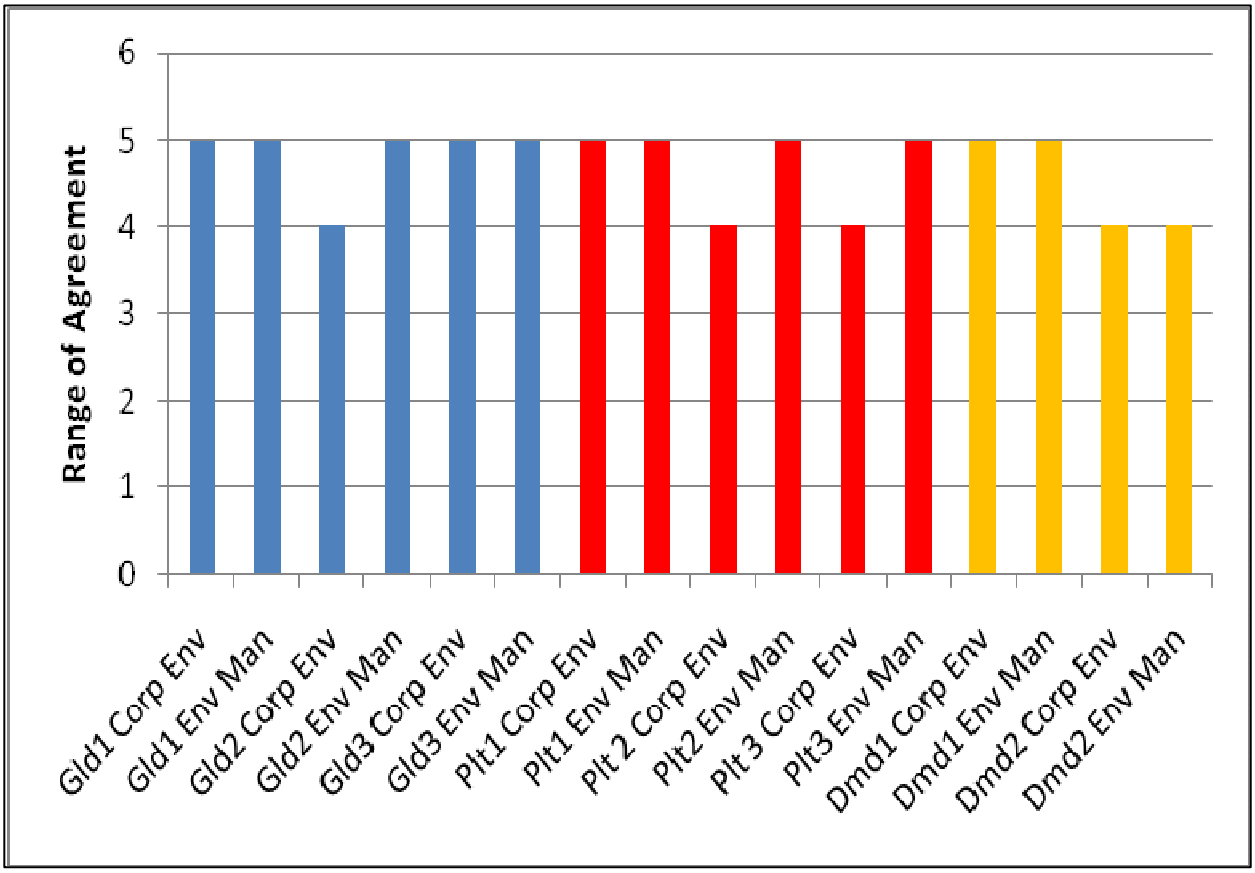
Table 5.23b: Data summary for the degree to which accountability for environmental performance is a central element of company strategy.

	Construct 13	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env	Average	4.83	4.33	5.33	5.33	4.00	4.33	5.00	4.33
Manager	Stdev.	0.76	1.53	0.58	0.29	1.73	1.15	0.87	2.08
Environmental	Average	4.87	5.22	5.33	5.33	4.83	5.33	5.00	4.50
Manager	Stdev.	0.81	0.69	0.58	0.52	0.76	0.67	0.33	1.50
Combined	Average	4.85	4.78	5.33	5.33	4.42	4.83	5.00	4.42
	Stdev.	0.02	0.63	0.00	0.00	0.59	0.71	0.00	0.12
Descriptive	Correlation	0.999	0.839	1.000	0.971	0.945	0.866	-0.866	0.961
Statistics	p-value	0.961	0.411	1.000	1.000	0.488	0.264	1.000	0.916

There was as expected very good positive correlations between the opinions of the two managerial levels (Dmd1 having a high negative correlation though) indicating consensus amongst the tested managerial levels on their opinions on this sub-construct.

There was, however, no statistically significant difference in the responses between managers and companies for this constructs as no p-values smaller than 0.05 were derived.

Figure 5.21: Data summary for the degree to which accountability for environmental performance is a central element of company strategy.



5.5.3.4 Construct 14: World class environmental performance is pursued as a strategic objective.

As the companies sampled for this study are multinational "blue chip" companies, it can be expected that nothing short of world class standards are implemented. This sub-construct tested the degree to which world class environmental performance is pursued as a strategic objective for the company. Table 5.24a, Table 5.24b and Figure 5.22 present the data and graphic presentation for degree to which world class environmental performance is pursued as a strategic objective on an industry and company specific level.

From the data presented in Table 5.24a it is evident that both CEMs and FEMs mostly 'Agreed' towards the statements that tested the strategic inclination of world class

environmental performance although a larger proportion of the statements disagreed to were 'Mildly disagreed' by CEMs.

Table 5.24a: Data summary for the degree to which world class environmental performance is pursued as a strategic objective on the industry level.

	Construct14 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Manager	Average	0.0	11.4	15.9	2.3	18.2	31.8	20.5
	Stdev.	3.4	5.8	7.0	7.1	8.2	12.7	12.8
Environmental Managers	Average	2.2	10.9	5.4	8.7	20.7	39.1	13.0
	Stdev.	2.5	7.5	4.2	9.4	12.5	6.1	7.9
Combined	Average	1.5	11.0	8.8	6.6	19.9	36.8	15.4
	Stdev.	11.0	11.1	10.7	10.9	11.8	14.4	12.8
Descriptive Statistics	p-value				<0.001*			

* Significant difference between the companies on this construct.

This is a surprising finding as CEMs are responsible for environmental reporting and to promote the strategic value of this sub-construct. It should be noted that CEMs 'Strongly agreed' to the largest degree as well.

The large variation in response as indicated by the p-value of less than 0.05, once again warrants that this sub-construct be evaluated on a more company specific basis.

The data in Table 5.24b reveal that only Plt2 and Dmd1 'Agreed' to this construct while most of the remainder of the companies only 'Mildly agreed'. There were only good correlations for Gld3 and Dmd2 indicating that there is no consensus on the strategic imperative of world class environmental reporting between the various levels of management for the remainder of the sampled companies.

This finding might be attributed to the regulatory environment enforcing environmental monitoring and therefore it has become a routine action without any strategic value. As all the firms have to comply with this requirement, it cannot necessarily be regarded as a competitive or branding tool.

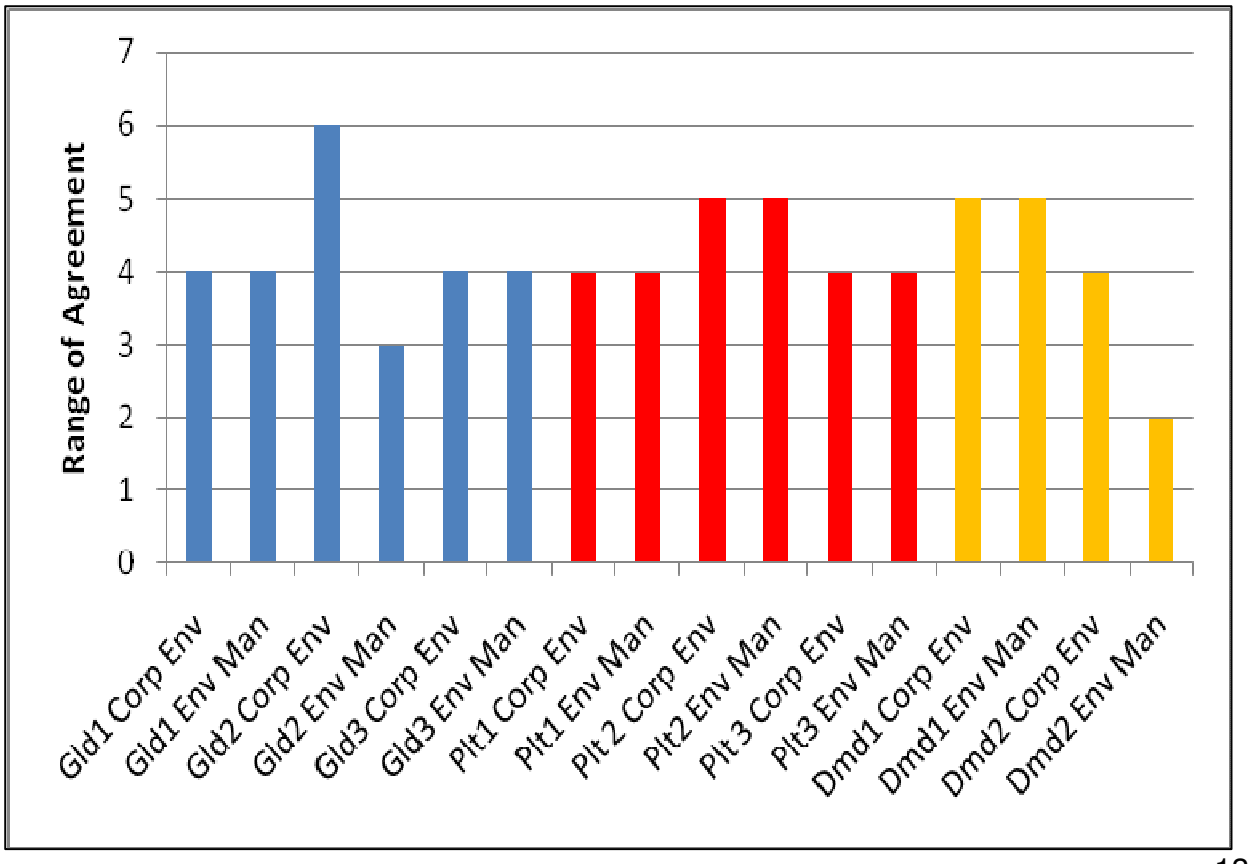
Table 5.24b: Data summary for the degree to which world class environmental performance is pursued as a strategic objective for the sample companies.

	Construct 14	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env	Average	4.00	5.50	3.75	4.00	4.50	3.75	5.25	3.50
Manager	Stdev.	1.22	0.58	1.26	0.41	1.00	2.50	0.29	1.73
Environmental	Average	3.80	3.25	3.75	4.19	4.88	4.42	5.08	2.25
Manager	Stdev.	0.88	1.62	1.26	1.23	0.48	0.83	0.32	1.19
Combined	Average	3.90	4.38	3.75	4.09	4.69	4.08	5.17	2.88
	Stdev.	0.14	1.59	0.00	0.13	0.27	0.47	0.12	0.88
Descriptive	Correlation	-0.309	-0.178	1.000	0.580	0.522	-0.200	0.302	-0.970
Statistics	p-value	0.800	0.040*	1.000	0.782	0.524	0.631	0.468	0.279

* Significant difference between the managerial responses and companies on this construct.

Only the findings for Gld2 proved to be significantly different on a statistical basis compared to the other managerial responses as the p-value generated for the data representing the findings on this construct was below 0.05.

Figure 5.22: Data summary for the degree to which world class environmental performance is pursued as a strategic objective for the sample companies.



5.5.3.5 Construct 15: Environmental competence of managers of strategic importance.

Table 5.25 and Figure 5.23 present the data and graphic presentation for degree to which environmental competence is viewed as strategically important for company management on an industry and company specific level.

Both levels of management were found to be in 'Agreement' to the statements testing this sub-construct although the FEMs were more inclined to 'Mildly disagree' or 'Disagree' as per the data presented in Figure 5.25a. Of note also is the higher degree of uncertainty revealed by FEMs which could be ascribed to a lack of understanding the strategic nature of environmental competence for the mining industry.

The large variation in response as indicated by the p-value of less than 0.05, once again warrants that this sub-construct be evaluated on a more company specific basis.

Table 5.25a: Data summary for the degree to which environmental competence is viewed as strategically important on the industry level.

	Construct15 %	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate	Average	3.0	15.2	6.1	3.0	39.4	21.2	12.1
Env. Manager	Stdev.	5.2	13.9	5.2	5.2	37.8	10.5	5.2
Environmental	Average	10.1	17.4	7.2	5.8	24.6	30.4	4.3
Managers	Stdev.	14.0	11.5	5.0	6.6	6.6	19.0	4.3
Combined	Average	7.8	16.7	6.9	4.9	29.4	27.5	6.9
	Stdev.	11.1	11.1	4.5	6.1	16.4	11.1	4.5
Descriptive Statistics	p-value				0.036*			

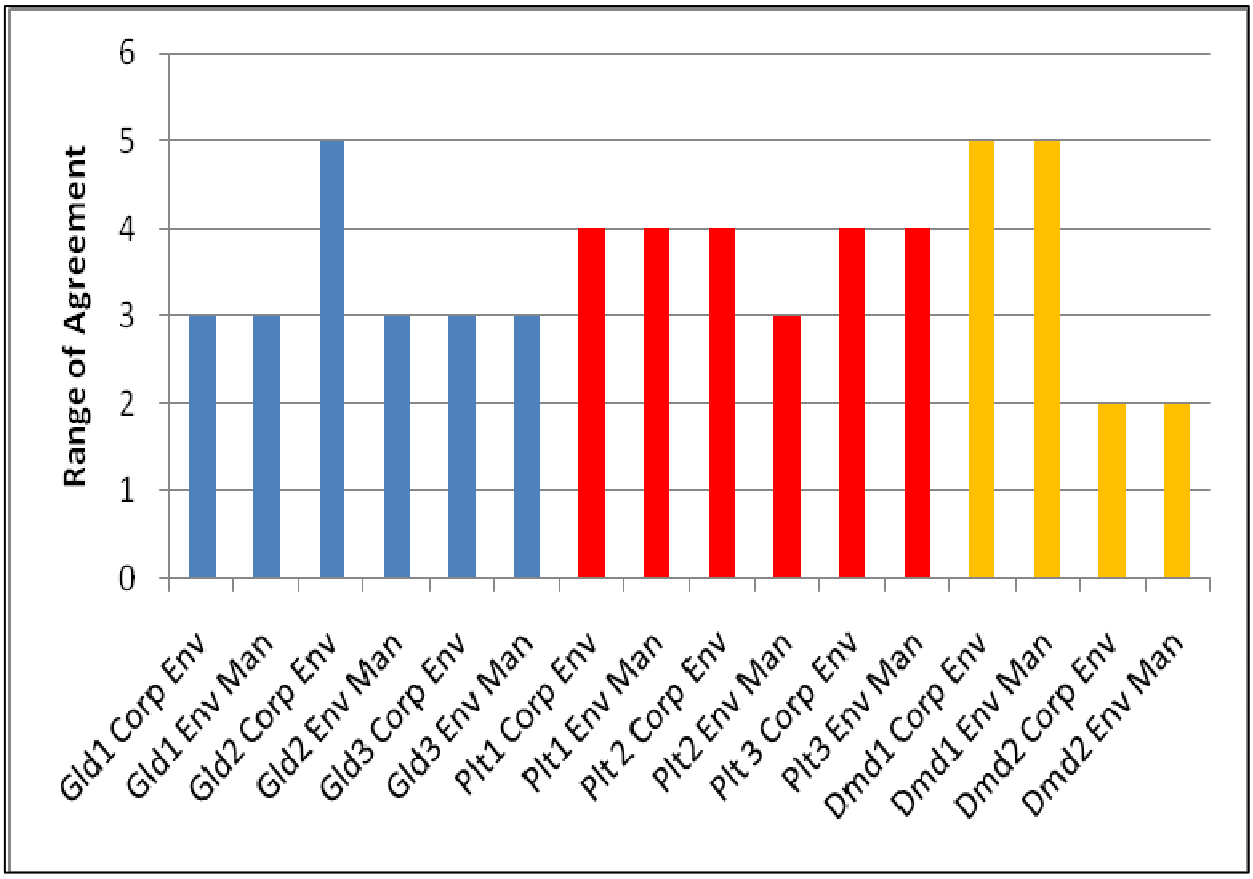
* Significant difference between the companies on this construct.

From the data presented in Table 5.25b it is evident that only Dmd1 and mostly the platinum sector (Plt) regard environmental competence as strategically important for the company. The gold sector however, except for the CEM of Gld2, 'Mildly disagreed' with the construct, as was the case for Dmd2.

Table 5.25b: Data summary for the degree to which environmental competence is viewed as strategically important for the sample companies.

	Construct 15	Gld1	Gld2	Gld3	Plt1	Plt2	Plt3	Dmd1	Dmd2
Corporate Env. Manager	Average	3.17	4.67	3.33	3.50	4.00	4.33	5.00	2.33
	Stdev.	1.89	0.58	0.58	0.50	1.00	0.58	1.00	1.53
Environmental Manager	Average	2.87	3.11	3.33	3.75	3.17	3.89	4.78	2.33
	Stdev.	1.67	1.02	1.53	1.32	0.29	1.64	0.38	1.89
Combined	Average	3.02	3.89	3.33	3.63	3.58	4.11	4.89	2.33
	Stdev.	0.21	1.10	0.00	0.18	0.59	0.31	0.16	0.00
Descriptive Statistics	Correlation	0.931	-0.756	0.945	0.945	0.866	-0.995	0.866	-0.058
	p-value	0.847	0.083	1.000	0.775	0.238	0.682	0.738	1.000

Figure 5.23: Data summary for the degree to which environmental competence is viewed as strategically important for the sample companies.



This finding should be regarded as concerning taking into account that the terms for mining and business have changed and despite the fact that mining should focus on its

core business, the implications of poor environmental management can be far reaching. Therefore the gold mining sector, as well as Dmd2 should heighten the priority of environmental resource allocation and competency investment.

There were once again good correlations between the opinions of the two managerial levels of the companies except for Dmd2. No statistically significant difference in the responses between managers and companies for this constructs could however be established as no p-values smaller than 0.05 were derived by the One-way ANOVA analysis.

It would therefore appear that the sampled companies have acknowledged the importance for linking environmental objectives with corporate strategy by integrating environmental matters into business strategy. Furthermore, the sampled companies have taken accountability for environmental performance but it seems that the strategic channels of world class environmental standards and investing in environmental competence as strategic means has not been leveraged to full extent.

6 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

6.1 CORPORATE ENVIRONMENTALISM IN THEORY AND PRACTICE

The value attached to the different constructs of corporate environmentalism were found to differ on the three levels identified being industry level, inter-commodity level and between the companies comprising the commodity representation. Furthermore, the buy-in into the three sub-constructs discussed also varied according to the perceptions of the two managerial levels tested and between the sampled companies.

6.1.1 Discussion of Environmental Leadership Importance

Environmental business leadership importance has been quantified for the purpose of this study by the degree to which company management views commitment and compliance to environmental policy statements as important, by the assignment of adequate environmental resources, by their buy-in into the business case of environmental leadership, by the degree of involvement of environmental leaders in the development of business strategies and by the support provided by company management to implement business recommendations.

According to Epstein and Roy (1998), the value of environmental leadership importance starts right at the top with the CEO and board. If the environmental value statement is not endorsed and implemented from the highest levels, the environmental drive will not be supported from the bottom up. The personal environmental value systems of the managing executives therefore have a significant influence on buy-in into corporate environmentalism (Gladwin, 1995). On an industry level it was established that the managerial levels mostly agreed with the statements that tested their company management's valuation of environmental leadership importance. The other response categories were also amply represented indicating that some elements of environmental leadership importance are not valued to the extent that it should be and therefore further analysis were conducted on a commodity and company specific basis.

From the combined result for the commodity groupings it was established that Platinum

sector could testify to a larger degree to environmental leadership importance for their company management for both the managerial levels tested compared to the Gold and Diamond mining sectors. This was especially true for the FEM level of the Platinum sector who largely agreed with this construct. The FEMs of the Diamond mining sector on average 'Mildly disagreed' with the statement that environmental business leadership is important for managers. The average response was however 'Mildly agree' for all responses indicating that the value of environmental business leadership hasn't been fully recognised optimally.

As the analysis of the sub-constructs on industry level only provided broad insights into the predisposition of the managers towards environmental leadership importance sub-constructs, and also presented large variance in response, these results will not be added to the discussion but focus will rather be on the company specific responses that provided more clarity on the detail of the research questions.

According to Egri and Herman (2000) environmental business leadership starts with the commitment of company management to a vision of long term environmental sustainability. This is usually implemented through an environmental policy and by adherence and compliance with external and internal standards. As the JSE SRI listing requires companies to publish an environmental value statement and policy, and to report on regulatory compliance, all the sampled companies have these documents in place.

The question however is whether company management is committed to these value statements in their decision-making. Three of the eight sampled companies were in agreement whist the rest of the population either mildly agreed or disagreed. There was also good consensus between the CEM's and FEMs (except for Gld2 and Dmd1). Two of the platinum sector companies and a diamond mining company outperformed the rest indicating that these companies' management demonstrate good environmental leadership by realising the importance of environmental commitments. It would appear that the remainder of the companies sampled only make environmental commitments for the sake of it and the driver for compliance being environmental regulatory laws and fear

of environmental prosecution. The motivation for environmental policy compliance therefore is not necessarily the business value or leadership drive.

Pro-active environmental engagement have however been proven to provide a competitive advantage to companies who have implemented the compliance to environmental policies as strategy (Roy and Vezina, 2001) and therefore the company leadership in question should rethink their environmental leadership approach by abiding by the values of the environmental value statement irrespective of the bottom-line value thereof. Through this approach, environmental ethics of the highest standard can be upheld and sustainable shareholder value can be served.

As mining is the core business of the company, company management usually focus employment and financial resources mainly on getting ore out from underground. Adequate human and financial resources should however be provided to reach the environmental objectives as outlined in the policy stated above and these resources should be provided at the highest level of company management. Resources with regards to non-core functions are almost always constrained and therefore the tendency could be to centralise and minimise these resources. Company management must ensure that adequate resources are provided to the functional or business unit level of operations as environmental leadership input should be integrated on ground level to have a real influence on company operations. These resources will also ensure that environmental reporting is done accurately and efficiently and leadership for environmental improvements can be provided on the operational level.

From the data presented it was clear that the CEMs were mostly in agreement with the adequacy of resources (except for Gld3 and Dmd2) whilst the FEMs only mildly agreed to the statements comprising this sub-construct. There were not very good correlations between the two levels of management. The platinum industry were mostly in agreement compared to the gold industry (which either mildly agreed or mildly disagreed and this can possibly be attributed to the prosperous platinum price (>$1200/ounce) compared to the rather poor price of gold over the past 10 years (<$400 prior to 2006), as well as adaptation to the environmental regulatory requirements by the platinum

sector. There was no comparison between the responses for the two diamond mining companies sampled as Dmd1 was in strong agreement with the adequacy of environmental resources whilst Dmd2 was in disagreement to the construct. Company management should further realise that there is much more value adequacy of environmental resources than environmental compliance, systems management and reporting. If environmental competence can be leveraged, new capabilities can be generated and according to Prahalad and Hamel (1990), it can provide a sustained competitive advantage. Sharma and Vredenburg (1998) found that companies that were environmentally proactive developed unique organizational capabilities. In particular, the proactive companies demonstrated capabilities for stakeholder integration, higher-order learning, and innovation. Mining companies that invest in environmental resource adequacy can stay ahead in terms of environmental compliance and proper risk management and will address environmental challenges long before the regulatory environment changes.

If company management has not bought into the business case for environmental management and protection, it can be argued that very little value can be extracted from corporate environmentalism (Banerjee, 2002). From the data presented in the study, only the company management of Dmd1 believed that there is a business case underlying environmental business leadership. The CEMs from four of the companies agreed to the acknowledgement of the business case, whilst the majority of the FEMs and the remainder of the CEMs either 'mildly agreed' or 'mildly disagreed'. It was also found that the platinum industry has bought more into the business case of environmental leadership compared to the other industries. It can be speculated that recent pressure to reduce environmental capital input has cultured an approach as to how cost reductions in this arena provide increased long term profits and improve the environmental image of the company. The business case for environmental leadership has been proven by Holiday *et al,* (2002), Schaltegger and Wagner (2006) and Epstein (2008) but the returns have been defined as incremental and slow. The cost of environmental capital is also regarded as low compared to other resource inputs and therefore comprises only a small cost to mining companies.

As environmental resources (e.g. water, land and electricity) become scarcer, it will also become more expensive and more regulated to a point where it will influence the business case for the mining operations. Therefore, the lack of buy in into the business case should be ascribed to either a lack of knowledge, ignorance towards the consumption costs and externalities created or taking the current inexpensive natural capital for granted. Company management must therefore be influenced and convinced that environmental leadership can provide some level of competitive advantage in the market place and add value to their future positioning in the micro and macro business environments. This can only be achieved through active pursuit of the cost/value benefit that is derived from environmental leadership and continual lobbying of this matter. From the results it is however clear that the jury is still out on this matter.

Company management may have environmental commitments in place, allocated adequate resources and review the business case for environmental leadership but if the environmental resource base is not included in the process of developing business strategies, long term value cannot be generated from this asset (Schaltegger and Wagner, 2006). From the data it is evident that CEMs in the gold and diamond mining companies 'agreed' to being involved in the development of business strategies, whilst the FEMs of the platinum industry were more readily involved in strategic planning. This phenomenon can possibly be explained by gold and diamond mining nearing the end of mine life in the sampled mining companies and therefore strategic input is required more from a corporate level, whilst the platinum mining companies are still ramping up operations and therefore environmental resources are pulled in to assist with strategic cost, permitting and community issues. By applying effective strategic environmental tools, mining companies can reduce their environmental liabilities on their balance sheets (Carroll and Bucholtz, 2006) and thereby additional value can be created for shareholders (Schaltegger *et al*., 2003).

Furthermore, company management that values environmental leadership should realise the brand value of enhanced environmental performance as reflected in annual triple-bottom-line-reporting which is a direct contribution from the inclusion of environmental management input into business strategies (Roy and Vezina, 2001).

Therefore, the strategic will of company management to act on environmental compliance commitments and the relevant business case thereof should position environmental leadership to contribute to both operational and business strategies of the functional and corporate levels.

Environmental management should also be regarded as an indispensible component of business management (Knights & Morgan, 1992). Companies that value environmental leadership to this degree will understand and acknowledge the implications of the absence of environmental leadership (Shrivastava, 1994). To achieve this environmental maturity level, a paradigm shift towards a culture of environmental thinking based on an alternative value system will be required. To ensure this renewed thought process, company leadership should insist that the business recommendations with regards to the environment be valued and implemented. The accommodation of innovative and cost effective suggestions that can add value to the business processes of the company will then become standard practice for strategic decisions. To initiate this culture is challenging though, especially with managers who are bottom-line orientated and remunerated accordingly.

From the empirical study it was determined to what extent environmental business recommendations are included in management planning. Once again, the data revealed very company specific responses which can potentially be related to either the management culture, management style, degree of ignorance and/or cost sensitivity/budget structuring. The managers from the gold mining industry either 'mildly agreed' or 'mildly disagreed' to their recommendations being valued whilst the platinum industry was mostly in 'agreement', as was Dmd1. Both the FEMs of Plt3 and Dmd2 'disagreed' that their environmental recommendations were valued. From this result it is evident that there is still a long way to go before environmental orientated recommendations will be incorporated as the value of these recommendations can often only be justified on ethical grounds and not on immediate financial grounds (Schaltegger and Wagner, 2006). Therefore, the accommodation of environmental recommendations in business decisions will probably be determined by the personal values of the manager (Flannery and May, 1994), then by the financial incentive, then by the budget

and strategic management framework (Porter, 1990) and by the potential regulatory penalty in contention.

From the data presented on environmental leadership importance and the discussion above, the following generalised order of valuation by company management of the sub-constructs of environmental leadership is proposed:

1. Importance of commitments and compliance to environmental value statements and policies.
2. Involvement of environmental leaders in the development of business strategies.
3. Adequacy of environmental resources to achieve organisational environmental objectives.
4. Belief by company management that there is a business case for environmental leadership.
5. Business recommendations regarding the environment are valued by company management.

From this order it can be argued that that environmental leadership is applied to provide support towards achieving environmental policy objectives and not primarily to drive the business value of environmental management. It would however appear that despite the limited focus on business value of environmental leadership, it is of importance for company management as was outlined by the hypothesis being accepted in Section 5.4.1.

6.1.2 Discussion of Environmental Business Orientation

Environmental business orientation refers to how company management approach environmental matters in their business decisions. Banerjee (2002) state that corporate environmentalism cannot be driven if managers are not orientated towards the inclusion of environmental aspects in their day-to-day management decisions.

It would appear once again from the responses of the CEMs and the FEMs that all the responses indicated only a ‘Mildly agree’ with the statement that environmental business

orientation is important to company management. The FEM level of the Gold sector was surprisingly in 'mild disagreement' with this construct, indicating that environmental business orientation is not such a high priority for the industry.

As the analysis of the sub-constructs on industry level only provided broad insights into the predisposition of the managers towards environmental business orientation sub-constructs, and also presented large variance in response, these results will not be added to the discussion but focus will rather be on the company specific responses that provided more clarity on the detail of the research questions.

Brown and Karagozoglu (1999) and Ramus (2002) asserted that the first step towards responsible environmental business orientation is for company management to accept ownership and responsibility in their business role with regards to the natural environment. In order to achieve this, each manager must view environmental protection as a high priority activity for the company and also realise the implications for not regarding the environment. This drive is once again instilled by senior management as discussed under environmental leadership importance where the values of senior management drive the approach and set the example for lower level management. Therefore, environmental values should be entrenched in the business approach of the company.

As pressure is mounting to improve on environmental performance and to reduce environmental impacts, environmental protection is not an option any longer and whether acknowledged by company management or not, it is vital for the long term survival of the company. This cannot be achieved without a change in the operating culture requiring ownership and business orientation towards environmental management. From the data it was evident that the platinum mining sector has accepted the ownership towards environmental accountability to a mild degree (Plt3 presented the best result) whilst the gold sector 'mildly disagreed' with the notion (Gld2 presented the worst result). The CEMs of the diamond industry 'Mildly agreed' to company management that has accepted this ownership requirement, whilst the FEMs 'Mildly disagreed'.

Therefore it can be concluded that there is still a cultural change required for company management with regards to environmental orientation in their management approach. This cultural change required for environmental orientation can be achieved through focus on environmental sentiment during the recruitment phase whereby environmental views and track records of applicants can be reviewed. Other means can include environmental target management and continual environmental lobbying coupled with financial incentives.

The degree to which company management view the importance of environmental leadership input into business decisions proved to be well acknowledged by most of the participating companies. All three sectors in general agreed to the importance of environmental leadership input into business decisions except for Gld3 and Dmd2. It was also found that company management of most of the sample companies (except for Dmd2) have entrenched environmental values into business decisions. It would therefore appear that environmental leadership input is viewed as important for the sample companies and therefore environmental values are entrenched into business decisions. However, it would appear that company management do not want the responsibility and ownership of this business facet. Egri and Herman (2000) state that environmentally mature company management must take up the leadership requirements of embedding the environmental value system, making environmental responsibility part of the role and thereby changing the attitude of business units towards environmental matters. Outsourcing environmental management to specialists cannot serve the business case of environmental management optimally as the compartmentalisation of business aspects will only lead to prioritisation of all the aspects that need management attention often resulting in environmental issues being sidelined, isolated, postponed and eventually omitted.

Therefore, the commitment of company management to the requirements of the JSE SRI should bring about more encompassing and holistic requirements for management to be measured on. Furthermore, the corporate value system on environmental protection should be reinforced by the executive environmental portfolio committee. Feedback of environmental results achieved through value-based decision-making

should also be published and must provide the standard for future operational activities. This can position the company to be a leader in environmental protection in their industry (Brown and Karagozoglu, 1999; Epstein, 2008).

As the positive findings of buy-in into environmental leadership and entrenchment of environmental values business decisions were largely expected, questions were included to test the degree of environmental ignorance by company management. Corporate green-washing or smoke screens with regards to environmental responsibility are known to be rife in order to convince stakeholders that companies are committed to environmental objectives of reduced environmental impacts. There is however no place for impression management when company management is committed to world class environmental leadership. Furthermore, the long term financial well being of the company may depend on the state of the natural environment during and after operations, especially in the mining industry.

Company management should therefore acknowledge that the natural environment does affect a company's business activities and ignorance towards environmental matters should be pro-actively managed. Environmental protection efforts should be much more than an issue of maintaining a good public image in order to ascribe to the values of world class environmental leadership. From the data it is clear that the sampled companies were mostly in 'disagreement' with the questions that tested environmental ignorance. Especially the responses from the CEMs of the gold and platinum industry were more in 'disagreement' than that of the FEMs. Plt2 and Dmd2 however 'mildly agreed' with their company management being ignorant of environmental matters.

The cost of environmental ignorance can be directly related to the continual increase of the financial liability on the balance sheet of the company and therefore it is wise to downsize this liability through the behaviour of company management in the current financial term and not to discount the environmental cost over the life of the operation (as is current practice for most mining operations).

The basis for the global environmental leadership frameworks is that company profits can never be regarded as more important than tolerating environmental impacts. The sample companies assessed in this study have all committed to JSE SRI and ascribes to the fundamentals of responsible corporate governance as outlined by most of the environmental leadership frameworks. Responsible cash flow management taking into account whats due to the natural environment is part of good governance. Maturity in environmental business orientation is thus reached once company management acknowledge that it is not difficult to be financially successful and to protect the environment at the same time (Banerjee, 2002). This notion of environmental maturity can be extended by the degree to which company management is profit orientated in their short and long term business decisions despite the environmental impact implications.

It should be acknowledged that this facet of business orientation is extremely complex and a balance is required regarding business expansion, profit potential, environmental damage and remuneration decisions. Therefore, the inclusion of environmental thinking into business plans is crucial and the only guide toward decision-making in this regard is company ethic and the environmental values system of decision-makers. From the data it is clear that the platinum sector 'Mildly disagreed' that company management are profits orientated despite environmental impacts. This was however not the case for Gld2, Gld3 and Dmd2 who acknowledged that company management are profit orientated despite potential environmental impacts. It therefore appears that the profit orientation is company specific and might be attributed to the environmental value system of company leadership.

If company leaders are primarily profit orientated in their decision-making despite the environmental implications, environmental expenditures will be minimised and environmental business orientation is expected to be low (Epstein, 2008). However, strategic environmental expenditure has been proven to result in long term economic benefits to companies (Warhurst and Norona, 2000, Epstein *et al.*, 2003). This long term saving brought about by environmental business orientation will serve both shareholders and employees, whilst the responsibility towards environmental protection

is adhered to (Schaltegger and Wagner, 2006). The findings on this sub-construct is however in line with principles of effective environmental management outlined by Schaltegger and Wagner (2006) stating that costs of environmental performance should not be higher than necessary and that the full potential of market revenues should be flowing through the company.

From the data presented on environmental business orientation and the discussion above, the following generalised order of valuation by company management of the sub-constructs of environmental business orientation is proposed:

1. Environmental values are important for company management and entrenched in business decisions.
2. Company leaders acknowledge an environmental leadership approach towards business decisions.
3. Company management are pro-active (not ignorant) in their business orientation towards the environment.
4. Company management are profit orientated despite the environmental implications and therefore financial expenditure in this regard is limited.
5. Company management has taken ownership of their environmental responsibility in their business roles.

From this order it can be argued that that environmental business orientation is a function of the leadership and internal values drive. Therefore the hypothesis that company management is orientated towards environmental matters in their business roles has been rejected (Section 5.4.1).

It would appear that management in general is still more profit orientated despite the potential impact on the environment and that company management is not willing to take ownership of their responsibility towards environmental decision-making. Therefore there is reliance on environmental leadership to guide decision-making according to regulatory and policy requirements as outlined by the high value of en environmental leadership approach and also by the findings in Section 6.1.1.

6.1.3 Discussion of Environmental Strategy Focus

Environmental Strategy Focus deals with the degree to which environmental matters are incorporated into the company's corporate goals and strategic processes, planning and structures (Porter, 1990). Without strategic buy-in into environmental management, the value generated from this support function cannot be leveraged to the detriment of especially the long term objectives of the company (Caroll and Bucholtz, 2006). Therefore, it is imperative that company management drives environmental leadership, value systems, business orientation and continual improvement in environmental performance as a strategic issue.

As the analysis of the sub-constructs on industry level only provided broad insights into the predisposition of the managers towards environmental strategy focus sub-constructs, and also presented large variance in response, these results will not be added to the discussion but focus will rather be on the company specific responses that provided more clarity on the detail of the research questions.

In general the Platinum sector has comparatively acknowledged to a larger degree than the Gold and Diamond sectors that inclusion of environmental matters in the business strategy is important for company management. The CEMs of the Gold and Diamond sectors were more positive towards this notion compared to the FEMs, whilst the FEMs of the Platinum sample responded the most optimistic towards this construct.

Flannery and May (1994) asserted that only by linking environmental objectives with corporate goals will company management be mobilised to derive strategies related to improve on environmental performance. These corporate goals should be directly related to the environmental value statement (Portugal and Yukl, 1994) and the commitments made to regulators and shareholders. The introduction of this approach/process into business plans will streamline the expectations and requirements for environmental impacts, expenditure and resource requirements when dealing with current and future projects. In this way, company management will have insights into the degree of environmental exposure and the costs and benefits based on the environmental risks outlined (Schaltegger *et al.*, 2003).

Once again the Platinum mining industry acknowledged on both managerial levels that their environmental objectives are linked with corporate goals and strategies, as was the case for Dmd1. The Gold mining industry as well as Dmd2 was in rather disarray with regards to this construct with responses varying between 'Disagreement' and 'Agreement' to environmental linkage with corporate goals. From the data it was clear that environmental management is of strategic nature for company management of the Platinum sector whilst the other sectors (except for Dmd1) are rather unsure as to how it should fit in with their strategic business processes.

In order to achieve the corporate environmental goals, company management must ensure that environmental issues are integrated into strategic management objectives at all levels of the company (Porter, 1990). Furthermore, Judge and Douglas (1998) state that companies that integrate environmental issues into the strategic planning process were a key variable that was positively related to financial and environmental performance. From the data it was evident that company management of the platinum and diamond industries does integrate environmental issues into strategic management objectives, which were not the case for the gold mining industry. Gld1 however was an exception by acknowledging the value of integrating environmental issues into business strategy.

Judge and Douglas (1998) state that environmental protection objectives should be part and parcel of a company's strategic planning process and alternatives should be constantly pursued in order to reduce long term environmental impacts. It was also found that the ability to successfully integrate environmental concerns into business planning and operation becomes a strategic capability that can generate competitive advantage. Therefore, if the Gold mining industry does not integrate environmental issues into strategic management, it cannot leverage the advantages of long term liability management and strategic capability which can transpire as competitive advantage in their industry.

In order to meet the strategic environmental goals and objectives, environmental competence of managers should be regarded as a strategic asset for the company

Sharma and Vredenburg (1998). As indicated under the discussion of environmental leadership importance, company management should realise that there is much more value in environmental competence and if leveraged correctly, Prahalad and Hamel (1990) state that it can provide a sustained competitive advantage. Porter (1990) asserts that implementing environmental strategy should start with an effective structure and should be endorsed further by company management in employment decisions. As environmental competence can be viewed as a differentiating core competence, employment decisions should be influenced by environmental concerns. Furthermore, the environmental value system can be reinforced to employees at all levels through frequent environmental initiatives. This can lead to operational managers that are committed and competent to implement the company's environmental goals and could provide the company with the advantages brought about by the environmental resource-based view (Shrivastava, 1995).

From the data it was clear that the company management of the Platinum industry believed that environmental competence is strategically important for the company whilst the Gold industry 'Mildly disagreed'. Dmd1 presented the strongest sentiment towards this construct whilst Dmd2 was in disagreement. There was also good correlations between the responses of the tested managerial levels, except for Gld2, indicating high levels of synergy in the valuation of environmental competence. From the data it can further be proposed that environmental competence is applied by resource-as-strategy pro-active companies for its business value whilst the remainder only view its value from a compliance perspective. Environmental competence of managers can also over time lead to improved environmental performance which is one of the main strategic priorities of corporate environmental management.

Environmental strategy is powerfully linked to environmental performance (Epstein and Roy, 1998) and companies that sincerely wants to change its environmental leadership culture must make the environmental performance of individuals, facilities, and divisions an integral part of their performance evaluation. This must be followed up by accurate environmental reporting.

To achieve world class environmental performance, a company should also have established internal environmental standards as performance criterion for all the facets across the value chain (Schaltegger *et al.*, 2003). These standards should pursue a "beyond compliance" value whereby company management acknowledge that staying ahead of regulation is staying ahead of future costs and competition. Environmental efforts therefore can no longer be motivated only by regulatory compliance as future business opportunities and expansion strategies will be influenced by an environmental track record. Mining companies should therefore pursue environmental performance as a strategic imperative. The data presented in this study reveal that most of the companies were in 'Mild agreement' to this construct. The findings were therefore rather company specific and no derivations could be made about the distinctive industries.

The lack of acknowledgement of the strategic nature of this effort can potentially be ascribed to the regulatory compliance nature of this requirement and by the fact that only a limited amount of data is published by the mining companies. Environmental performance monitoring is probably only regarded as a management tool and the strategic value of this effort must still be proven in the mining industry. Furthermore, it is difficult to achieve maximum environmental performance and goals of sustainability or environmental excellence unless management sends a clear message that environmental performance is a critical part of the companies' management philosophy (Epstein and Roy, 1998).

Company management of mines should therefore culture a management principle of accountability for environmental performance and drive it as a central element of the company's strategy. This can be reviewed by assessing the commitment of company management's quest for continual improvement by implementing environmental business systems as part of the company's strategic initiatives. This will lead to improved environmental performance over time and increased environmental quality will emphasize the company's commitment to their social and environmental licence to operate. Favourable response from shareholders, community members and regulators will be the return on environmental investment (Epstein, 2008).

Accountability for environmental performance as a central element of company strategy was found to be well supported by all the sample companies and by both the managerial levels tested. The respondents were mostly in agreement to this construct indicating that its requirements are well understood and a strategic focus area for their portfolios.
By applying environmental accountability as a strategic element, companies can brand and differentiate themselves through their environmental profile. The annual report to shareholders can then be used as a channel to prove the company's commitment to environmental protection.

From the data presented on environmental strategy focus and the discussion above, the following generalised order of valuation by company management of the sub-constructs of environmental strategy focus is proposed:

1. Accountability for environmental performance is a central element of company strategy.
2. Environmental objectives are linked by company management with corporate goals and strategies.
3. World class environmental performance is pursued by company management as a strategic objective for the company.
4. Company leaders integrate environmental issues into strategic management objectives.
5. Environmental competence is viewed as strategically important for company management.

From this order it can be argued that that environmental strategy focus is driven from an accountability point of view and also through a focus on achieving the company's internal environmental objectives. Therefore environmental strategy focus appears to be a function of good governance rather than strategic incentive as the priority of environmental performance. Strategic integration and environmental competence did not appear to be highly valued by company management. This finding supports the hypothesis being rejected (Section 5.4.1) that mining company management is strategically focussed on the environmental implications of their decisions.

The strategic contribution of environmental management to mining companies therefore still need to be proven in order for company management to take note of the advantages that can be generated. The challenge with this process is the long time-frames involved in obtaining concrete results and therefore, the internal value system of company management will remain the intermediate benchmark for environmental management standard in mining companies.

6.1.4 Valuation summary and corporate environmentalism maturity based on the discussed sub-constructs

The following summary presents the general findings that were derived from the empirical study that evaluated the importance of corporate environmentalism for company management of the sampled mines. The implications of these findings are expanded on to present practical outcomes and focus areas for mining companies on the sub-constructs of corporate environmentalism. The findings are as follows:

- Respondents only 'mildly agreed' with the degree to which company management is committed to the environmental value statement and policy and only 'mildly agreed' with the priority company management place on environmental compliance from a business perspective. A good correlation was found between the two levels of management that responded.
- Environmental resource adequacy was found to be sufficient from the CEMs view, but not sufficient from the FEMs responses.
- Respondents in general only 'mildly agreed' to buy-in from company management into the business case for environmental leadership, especially the FEMs. Some CEMs however did agree with its importance and therefore the interpretation of the importance of the business case can be regarded as company specific.
- Respondents mostly 'mildly agreed' to being involved in the development of business strategies at the mine. The CEMs of gold and diamond mining companies and the FEMs of the platinum mining companies 'agreed' more to being involved.
- The degree to which the environmental business recommendations of the CEMs and FEMs were valued differed on a company specific basis. In general, the CEMs of the gold and diamond mining companies 'mildly agreed' that their recommendations

were implemented whilst this was the case for the FEMs of the platinum sector.

- It was found that there is still a cultural change required for company management with regards to environmental ownership in their management approach. This cultural change required can be achieved through focus on environmental sentiment of managerial applicants during the recruitment phase whereby environmental track records can be reviewed. Other means can include environmental target management and continual environmental lobbying. Financial incentives can also be implemented.
- The degree to which company management view the importance of environmental leadership input into business decisions proved to be well acknowledged and outlined as important to most of the sample companies. The entrenchment of environmental values in business decisions was also viewed as important. It can however be asserted that company management either do not want the responsibility and ownership of this business facet, or is unsure as to how it fits into their business process.
- It was found that company management of the sample companies were not ignorant with regards to environmental matters and that environmental initiatives are for most of the companies not a case of corporate green-washing.
- The analysis of profit orientation of company management despite the potential impacts revealed that the platinum sector was more environmentally mature compared to some gold and diamond mining companies. Respondents from the latter industries acknowledged that their company management are more profit orientated despite environmental impacts. This finding should be qualified within the context of company specific ethics of company managment.
- From the analysis of the degree of linkage of environmental objectives with corporate goals and strategies it was evident that the Platinum industry views environmental management as strategic in nature whilst the other sectors (except for Dmd1) are rather unsure as to how it should fit in their strategic management processes. Furthermore, the Platinum industry consistently integrate environmental issues into strategic management objectives whilst the Gold and Diamond industries have not bought into the inclusion of environmental matters into the strategic management of the company.

- It was found that environmental competence was viewed as strategically important for the Platinum Industry (and Dmd1) whilst the Gold industry (and Dmd2) 'mildly disagreed' with the construct. It was therefore proposed that environmental competence is applied by resource-as-strategy pro-active companies for its business value whilst the remainder only view its value from a compliance perspective.
- An assessment of the strategic importance of environmental performance management and reporting revealed that most of the companies were only in 'mild agreement' to the strategic value of the effort. The findings were also rather company specific. The lack of acknowledgement of the strategic nature of this effort can potentially be ascribed to the regulatory compliance nature of this requirement and by the fact that only a limited amount of data is published. Environmental performance monitoring is probably only regarded as a management tool and the strategic value of this effort must still be proven in the mining industry.
- Accountability for environmental performance as a central element of company strategy was found to be well supported by all the sample companies and by both of the managerial levels tested. The respondents were mostly in agreement to this construct indicating that its requirements are well understood by company management and a strategic focus area for their portfolios.

In order to make practical sense of the outcomes of this study, the sub-constructs comprising the three elements of corporate environmentalism were ranked according to the statements that corporate and functional environmental managers were most in agreement (>5) and disagreement (<4) with on the industry level.

The data in section 5.5.1 - 5.5.3 was used to order the valuation of the sub-constructs accordingly from high value/intensive focus/high managerial priority to low value/low managerial priority/low performance area. The ranking is presented in Table 6.1:

Table 6.1: Ranking of the sub-constructs of corporate environmentalism according to managerial buy-in.

1	Accountability for environmental performance is a central element of company strategy. (Environmental strategy focus).
2	Environmental values are important for company management and entrenched in business decisions. (Environmental business orientation).
3	Importance of compliance to commitments and environmental value statements and policies. (Environmental leadership importance).
4	Involvement of environmental leaders in the development of business strategies. (Environmental leadership importance).
5	Company management are pro-active (not ignorant) in their business orientation towards the environment. (Environmental business orientation).
6	Adequacy of environmental resources to achieve organisational environmental objectives. (Environmental leadership importance).
7	Environmental objectives are linked by company management with corporate goals and strategies. (Environmental strategy focus).
8	Company leaders acknowledge an environmental leadership approach towards business decisions. (Environmental business orientation).
9	Company management are profit orientated despite the environmental implications and therefore financial expenditure in this regard is limited. (Environmental business orientation).
10	World class environmental performance is pursued by company management as a strategic objective for the company. (Environmental strategy focus).
11	Company leaders integrate environmental issues into strategic management objectives. (Environmental strategy focus).
12	Belief by company management that there is a business case for environmental leadership. (Environmental leadership importance).

13	Business recommendations regarding the environment are valued by company management. (Environmental leadership importance).
14	Company management has taken ownership of their environmental responsibility in their business roles. (Environmental business orientation).
15	Environmental competence is viewed as strategically important for company management. (Environmental strategy focus).

From this valuation it is clear that although corporate environmentalism is alive in the sampled mining companies, there is still vast room for improvement. It would appear that the areas of managerial focus hinges around the corporate governance requirements of the Triple-bottom-line and regulatory environment and not as much on the strategic and business value presented by corporate environmentalism.

Environmental performance, ascribing to environmental values and a compliance drive towards environmental policy commitments are all high priority aspects for company management. It would appear that company management is not ignorant when it comes to environmental matters although there is reluctance when environmental expenditure is required that can have an influence on profits.

Furthermore it can be asserted that the business case for corporate environmentalism has not been proven and therefore, business recommendations are not readily implemented by company management. The uptake of ownership regarding the responsibility towards environmental matters for company management proves to be rather slow and it is evident that management rely on specialist support and leadership to handle environmental matters. Environmental competence for company management is also not seen as strategically important.

In order to compare each company's state on corporate environmentalism, the level of maturity in the implementation of environmental leadership, business orientation and strategy focus should be asserted.

The following corporate environmentalism maturity matrix is proposed to classify companies according to their environmental business maturity.

Table 6.2: Corporate Environmentalism Maturity Matrix.

Maturity Level	Characteristics
Level 1	No environmental structure. Environmental management is not considered by company management as a necessity. Environmental management seen as an outsourced function required on an ad hoc basis for permitting and reporting purposes. Sub-constructs of corporate environmentalism is not embedded in the business or operating philosophy of the company. Only environmental effort to comply with minimum criteria of environmental legislation.
Level 2	Environmental structure implemented on a functional level with added safety, health and operational responsibilities. Environmental management tolerated almost as a necessary evil. Regulatory requirements and operational pressure established the need for a limited environmental structure. Environmental personnel can only add value by keeping company out of trouble. Environmental employee not included in business plans. Corporate environmentalism suppressed as a result of short term management philosophy and profit orientated culture.
Level 3	Environmental structure implemented on a functional level and corporate level. Environmental management only regarded as a systems management, public relations (image) and reporting function. Environmental employee only involved on a need to know basis with regards to business matters. Environmental leadership importance start to surface but the other constructs largely ignored.
Level 4	Environmental structure implemented on executive, corporate and functional level. Environmental management driven as a matter of responsible cooperative governance. Environmental portfolio to responsible to manage public perception and environmental risk of company. The main reason for

	employment is to keep shareholders and regulators happy and to ensure accurate reporting. Limited linkage between functions of hierarchic levels and the achievement of strategic goals. Environmental leadership importance and strategy focus part of the operating philosophy but still viewed as a rather distant discipline to incorporate and add value to core business requirements.
Level 5	Environmental structure implemented on an executive, corporate and functional level. Environmental management part of cooperative governance and sustainability management. Corporate environmentalism fully integrated by company management. Environmental business leadership endorsed and driven as a company priority. Managers orientated towards environmental matters in their business decisions. Environmental management part of business strategy. Company lead by example in global environmental leadership.

From these criteria it is evident that none of the mining companies included in this study can be rated as Level 5 companies according to the criteria in this Corporate Environmentalism Maturity Matrix.

The sampled companies for this study can be ranked as follows taking into account their individual responses to the sub-constructs of corporate environmentalism:

- Level 4: Plt2, Plt1, Gld1, Dmd1.
- Level 3: Gld2, Gld 3, Plt3.
- Level 2: Dmd2.

6.2 CONCLUSIONS

The era of corporate environmentalism has dawned in the South African mining industry. The elements of corporate environmentalism were therefore found to be widely recognised, although some of the constructs proved to be more acknowledged in certain industries and companies than others.

The following conclusions can be made regarding the state of corporate environmentalism from this study:

- It was evident from the extant literature that the degree of corporate environmentalism in a company is a function of the values of company management. Therefore the effort and focus on environmental matters will be determined by the drive from company executives and senior leaders. The industry and company culture is also a main contributor to how the environment is perceived and how the priorities of corporate environmentalism will be lived up to.

- It was also found that the constructs comprising corporate environmentalism is extremely intertwined and the management implications thereof can become rather complex. Therefore companies should attempt to implement corporate environmentalism through a theory based pathway which separates the hierarchic functions and channels the required actions through an appropriate leadership gateway. The extant literature on corporate environmentalism was consulted to provide clarity on the requirements of such a pathway. A graphic presentation of this proposed pathway is presented in Figure 3.6. The main constructs comprising the gateways for this study has been identified as environmental leadership importance, environmental business orientation and environmental strategy focus.

- The buy-in and deployment of the sub-constructs of corporate environmentalism was very company specific although there were definite trends in company responses. The companies have been classified according to environmental business maturity based on their responses on a scale of 1 (immature) to 5 (mature). Four companies qualified as Level 4, Three companies as Level 3 and one company as Level 2 according to their environmental business maturity.

- Hypothesis testing revealed that on an industry level, the hypothesis that environmental leadership is important to company management has been accepted. The managerial buy-in into environmental business orientation still proved to be challenging for most of the companies as supported by the hypothesis relating to its importance being rejected. Although the importance if environmental strategy seems to gain some momentum, the hypothesis relating to its importance was also rejected.

- The sample companies identified the strongest with the statements comprising the elements of environmental leadership importance and the hypothesis testing the importance of this construct was accepted based on industry data.

- From the empirical study it was found that the sample companies only 'Mildly agreed' that corporate environmentalism was viewed as a strategic pillar by company management. Furthermore, these companies 'Agreed' that focussed leadership is required for improved environmental performance but they only 'Mildly' agreed to the importance of environmental management for corporate strategy decisions and excellence in business orientation. One would however expect in this time of increasing environmental pressure that company management would assign higher priority to the elements of corporate environmentalism.

- Comparatively, the Platinum mining sector outshined both the Gold and Diamond mining companies regarding the importance of corporate environmentalism. It would however be too much of a generalisation as the construct importance should be discussed on a company specific basis. The data suggested that the platinum sector might have been much more attentive towards environmental matters as a result of the new environmental legislation that was introduced in the last decade (CARA, 1989; MRA, 1991; NEMA, 1996; NWA, 1998; MPRDA, 2002; AQA, 2004) to which the platinum sector had to strictly adhere to during its expansion phase.

- From a sub-construct specific point of view, environmental performance, ascribing to environmental values and a compliance drive towards environmental policy commitments were found to be the highest priority aspects for company management. It would appear that company management is not ignorant when it comes to environmental matters although there is reluctance when environmental expenditure is required that can have an influence on profits.

- Business managers are not yet fully convinced about the business case for corporate environmentalism and therefore, business recommendations are not readily implemented by company management. The uptake of ownership regarding the responsibility towards environmental matters for company management proves to be

rather slow and it is evident that management rely on specialist support and leadership to handle environmental matters. Environmental competence for company management is also not yet seen as strategically important.

- It would appear that the areas of managerial focus within mining companies hinges around the corporate governance requirements of the Triple-bottom-line and regulatory environment and not as much around the strategic and business value presented by corporate environmentalism. Therefore the regulatory command and control mindset is still largely embedded in the managerial paradigm of the companies sampled.

- There was consensus amongst most of the responses between the Corporate and functional environmental managers although some exceptions were noted. The responses from the managerial levels of Gld2 and Dmd1 didn't seem to correlate that well on most of the constructs. From a sub-construct specific point of view, the degree of consensus largely correlated with the findings presented in Table 6.1. Environmental performance, ascribing to environmental values and a compliance drive towards environmental policy commitments presented the largest degree of consensus whilst the uptake of ownership regarding the responsibility towards environmental matters, buy-in into the business case of environmental management and investing in environmental competence provided mixed responses.

- As this study is representative of 34% of the market capitalisation of the South African JSE listed mining companies, the findings could be extrapolated to the broader mining industry that ascribes to the principles of the Sustainability Reporting Index.

6.3 RECOMMENDATIONS

Based upon the outcomes of this study, the following overall recommendations can be proposed:

- Environmental management is no longer simply a regulatory requirement but has already become a business necessity. Therefore it can be recommended that the management paradigm of company management be aligned with the formal objectives of corporate environmentalism. Therefore, despite the assistance and influence of environmental specialists, company management need to take up full ownership for environmental protection and environmental expenditure requirements.

- Corporate environmentalism should be formalized on a much higher level in mining companies. The meaning of the construct, its sub-constructs and its implications must be lobbied from a corporate parenting perspective from the Environmental executive portfolio to the company manager on ground level. It should also form part of the procurement process of suppliers, and environmental business leadership should become a vital part of future mine planning.

- Communication between Corporate Environmental Managers and Functional Environmental Managers with regards to the constructs of corporate environmentalism should be more closely aligned and business value added must be driven as line function. As the timeframe for environmental management stretches beyond managerial periods it is imperative and in the interest of sustainable development that a more holistic view be implemented to attain the company's environmental goals. This can only be achieved through a corporate environmentalism approach.

- Environmental performance should become part of the key performance indicators of mining company management. Environmental performance based remuneration can be implemented to ensure that company management align their business objectives with the environmental protection requirements of the company. This will also ensure that environmental personnel are more readily included in business decisions. Environmental business recommendations will also be taken up more readily.

- It was also clear from the analysis technique applied for this research (Analysis 1 and Analysis 2), that company that specific analysis is required to draw conclusions on

the real state of complex constructs such as corporate environmentalism. Industry wide interpretation in the case of this study proved to be too inaccurate. Although broad trends could be derived, the first analysis often presented favourable results which skewed the true state of affairs.

6.4 LIMITATIONS OF THE RESEARCH

The quest to implement optimised research designs is well known to present serious challenges. This was also the case with this study as the smooth implementation of the research study to reach the study objectives was hindered by the following limitations:

- The lack of response from some of the individuals on the functional environmental level in an already sample constrained population was identified as a major limitation. Despite the high response rates mentioned in Table 5.1, a larger sample size could have provided an even more representative study. It was also disappointing that the coal and chrome industry did not amply respond to the research support request.

- It was evident that some of the participants did not have enough time to put intensive thought into the carefully constructed questionnaire as some of the validity questions revealed contradictions in testing the constructs. This could also have brought about the differences in responses and a lack of correlation between the two managerial levels tested and could have skewed the data.

- Another limitation of the research was the lack of response from operational personnel at the mine, specifically mine and engineering managers who are jointly responsible to implement corporate environmentalism. By including their responses, a more representative analysis could have been conducted as the current response from only environmentally inclined personnel might be subject to bias.

- Level of interpretation of constructs also presents some research limitations. As some of the constructs are rather technically inclined and also focus on access to information that are not necessarily readily available, respondents could either not have knowledge on the meaning of the construct or could have guessed as to what they should answer in the interest to fill out the questionnaire.

- The researcher also has some proof that the respondents within two of the companies communicated about the questionnaire and therefore their answers could have been influenced in some way or another.

- Furthermore, all of the respondents requested anonymity and confidentiality with regards to their responses indicating that either there is an underlying unhappiness pertaining to the buy-in into the value they are adding or they would like to be protected from exposure and victimisation pertaining to their answers. This also brings about the question whether the integrity of the responses are intact. As most of the responses hinged around the 'mildly agree' category, the respondents could have answered in a way to make the company look better than it actually performs on the constructs of corporate environmentalism.

- The research design also brought about some limitations as the questionnaire only allows for standard responses and more detailed views or motivations for answers cannot be provided. Therefore the personality, experience and knowledge of the individuals who responded also became diluted through the data analysis technique as averages and variation on the bulk data were derived and interpreted. An interview methodology could have provided deeper insights into the state of corporate environmentalism in the various mining companies.

- A further limitation could have been the questionnaire design. The length of the questionnaire (45 questions) can be considered as rather excessive. Some of the questions could also have been regarded as either duplication or as dubious. The respondents could have been tempted to rush through the questionnaire in order to finish it as quick as possible.

- The rather large scope of the study also presented some limitations to the study. The assessment and comparison of a rather large segment of the South African mining industry can leads to generalisations and the company specific detail can be lost. Therefore, an assessment of company specific corporate environmentalism attributes may have resulted in a more focussed contribution. However, this study does open up the way for future company specific studies.

- The available literature on mining and corporate environmentalism was also a limiting factor for the research. Most of the work on this construct has been conducted on other industries, which mainly operated on a smaller scale and in medium and low risk environmental impact categories. Therefore, although the principles of environmental leadership, business orientation and strategy focus remain the same, the lack of industry specific case studies and the literature base on implementation of corporate environmentalism was identified as a limitation.

6.5 FUTURE RESEARCH

From the study it is evident that various knowledge gaps still exist pertaining to corporate environmentalism in general and specifically related to mining. The following themes in particular merit further attention:

- Studies should be conducted on the constructs of corporate environmentalism on other South African companies which can be compared to the findings of this study. In this way, corporate environmentalism can be benchmarked in the various industries.

- The environmental value systems of the companies and the business value of environmental value statement and policies should be investigated on corporate, managerial and functional levels.

- The contribution of corporate environmentalism to shareholder value should also be pursued in order to determine the real incentive for environmental management – whether it is only hinging around ethics or if there is a proven short term business case for the implementation thereof.

- Research should also be conducted on the implications of company share value when environmental incidents or rewards are reported.

- The importance of corporate environmentalism should be established on the operational management levels of the mine and should include the views of the mine

manager, engineering managers and technical managers. The views of the board members of mining companies should also be tested and a comparison between the perceptions of these management levels and that of the environmental management levels can provide insights into the real buy-in into the value of corporate environmentalism.

- It should be determined why some of the participants of this study didn't want their identity to be revealed or their participation to be made public.

- The reason why the corporate and functional environmental managers in the companies in this study only 'Mildly agreed' on average should be determined. Only then can a better understanding be gained of the real drivers of corporate environmentalism in the mining environment.

- A study should be conducted on the degree to which corporate environmentalism can provide competitive advantage to mining companies in the emerging market context.

- Industry and company specific studies should be conducted to delineate more detail focus areas of the constructs of corporate environmentalism. These should include the application of environmental management resources in strategic leadership input, environmental value chain management and strategic and financial planning aspects.

- Case study research should be conducted on firms who have implemented the corporate environmentalism pathway presented in Figure 3.6. The state of the construct can be evaluated over time to access the success of the model and to improve on its propositions.

- The environmental business maturity model presented in Table 6.1 should be expanded on. Future assessment criteria that can be included are environmental balanced scorecard performance, sustainability performance and strategic inclusion of environmental matters in managerial decision-making.

- A study should be conducted as to what the real market implications for the rather slow implementation of corporate environmentalism are in the mining sector and what business opportunities can be derived from the slow implementation point of view.

- Research should be conducted on companies who have implemented the natural-resource-base view in the South African context and the implications, constraints and advantages should be investigated.

- The fundamentals for corporate environmentalism training should be evaluated and a management framework should be developed for the various levels of management in South African companies. Corporate environmentalism training could aid in fast tracking the acknowledgement and uptake of the construct in human resource management and business standards.

- A study is also required regarding the market opportunities presented by corporate environmentalism in the mining sector and the possible business opportunities should be outlined as the suit of environmental products and services can be regarded as rather fragmented.

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7.2 APPENDICES

7.2.1 Consistency matrix for questionnaire design

Table 7.1 presents the consistency matrix for the study

Table 7.1: Consistency matrix for the questionnaire design for the study

Sub problem	Perception number	Industry perception	Source of data	Analysis
To examine the importance of environmental leadership and environmental leadership activities for the South African mining industry.	1	Environmental commitment and compliance to policy is important for managers.	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
	2	Environmental resources are adequate to reach the organisational environmental objectives.	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
	3	There is a sound business case for environmental leadership	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
	4	Environmental leaders are involved in the development of business strategies	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
	5	Business recommendations with regards to the environment are valued and implemented.	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
To determine the environmental business orientation and in the South African mining companies' corporate environment	6	Company leaders accept ownership and responsibility in their business role w.r.t. the natural environment.	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests

	7	Company leaders have an environmental leadership approach towards business decisions.	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
	8	Environmental values are entrenched in the business approach of the company	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
	9	Company leaders are primarily profit orientated in their decision-making despite the environmental implications.	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
	10	Company management are ignorant in their orientation towards environmental matters.	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
To examine the environmental strategy focus in the South African mining business environment	11	Environmental issues are integrated into strategic management objectives.	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
	12	Environmental objectives are linked with corporate goals and strategies.	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
	13	Accountability for environmental performance is a central element of company strategy.	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
	14	World class environmental performance is a strategic objective for the company	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests
	15	Environmental competence of managers is of strategic importance for the company.	Quantitative measurement instrument (Linkert scale information)	Anova Post-hoc tests

7.2.2 Covering letter

Fanus van Wyk
Fraser Alexander
0836366464
fanusv@fraseralexander.co.za

Dear Mining Environmental Colleague

Research Project on an Environmental Business Leadership in Mining

I am a final year MBL student at the UNISA Graduate School of Business Leadership (www.sblunisa.ac.za). I am currently working for Fraser Alexander. In order to complete my studies I have to submit a comprehensive piece of research. The research project that I have chosen is entitled: "**Environmental leadership as a framework for environmental business orientation and corporate strategy focus in the South African mining industry".**

Despite the recent alignment of companies to comply with the requirements of the flux of environmental legislation, environmental business leadership is still a relatively new concept to South Africa. This term can be defined as deriving optimal value from environmental protection efforts to position mining companies more favourable with all its stakeholders. The quantification of the value of environmental protection is still largely undefined or viewed within the domain of natural capital management and sustainable development.

Environmental business leadership provides a powerful means to formally address the cost and reputational risk presented by the perception of the legacy of the historic lack of environmental protection referred to in the body of knowledge pertaining to mining environmental management. Environmental performance has also become more of a differentiator for mining businesses and it is imperative to understand how environmental leadership can be leveraged to take strategic advantage of this trend. The question

arises whether mining companies has taken cognizance of the environmental market force and how their leadership has adapted with regards to strategic decision-making. On the back of the overwhelming degree of environmental regulation that has been promulgated in the last decade, mining companies have responded through the implementation of environmental portfolio committees, environmental management systems and environmental reporting. The question arises whether environmental protection has become entrenched in the values, leadership approach, business strategy and operational aspects of the mine's operational framework. As with most strategic initiatives, buy-in from company leadership will determine the focus, effort and resources committed to environmental protection.

A study into environmental leadership in the mining sector of South Africa will therefore contribute to setting a benchmark for leadership in corporate environmental management by taking the opinions of environmental practitioners of mines into account and formalising a realistic view of environmental leadership commitment.

My study will therefore investigate environmental leadership importance in mining companies in South Africa and the degree to which it has influenced environmental business orientation and environmental strategy focus in the leadership realm of mining.

I therefore request that you assist my research by completing the attached questionnaire. It shouldn't take more than 15 minutes of your time to fill out.

Please return the completed questionnaire to me at:

fanusv@fraseralexander.co.za.

I will abide by any confidentiality requirements that you may impose. I will also gladly make available a summary of my study once it is completed (Please indicate your interest of a study summary on your reply e-mail).

An *Executive Summary* of my research proposal and a confidentiality letter from UNISA are attached.

Thank you sincerely for your kind assistance. Please do not hesitate to contact me should you require further assistance or clarification.

Yours faithfully,

Fanus van Wyk
Date: 30/06/2009
Contact: 083 638 6464
Email: fanusv@fraseralexander.co.za.

Programme Administrator: MBL3
Me Beverly Chetty
Office: +27 11 652 0352
Chettb@sbleds.ac.za

7.2.3 Questionnaire

Table 7.2 present the questions based on the literature study that were posed to the corporate environmental managers and the functional environmental managers relevant to this study. They were asked to respond to the following statements by marking the appropriate field alongside the each question.

Table 7.2: Questionnaire used to gather data for the study

Nr	Question	Construct	Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
1	Our company management decisions are based on a policy of world class environmental leadership.	a1							
2	Our company management values the relationship with environmental regulators.	a1							
3	Our company management value internal and external leadership w.r.t. International Sustainability Code principles (e.g. ICMM).	a1							
4	Our company has an active executive environmental leadership portfolio.	a2							
5	Our company management provide adequate resources to provide environmental leadership for all our mining activities.	a2							
6	Our company management values the leadership role played in ensuring accuracy and efficiency of environmental annual reporting.	a2							
7	Our company management realise the business value of environmental leadership.	a3							
8	Our company management believe that environmental leadership will provide a competitive advantage in the market place.	a3							
9	Our company management believe that there is a business case (cost/value benefit) for environmental leadership.	a3							
10	Our company management has a strategic will to act on environmental compliance commitments.	a4							

11	Environmental leaders (managers) are involved in the operational/business strategy of the business units in our company.	a4							
12	Our company management realise the brand value of leadership in triple-bottom-line reporting.	a4							
13	Our company management is pro-active in the recommendations of environmental practitioners to implement required environmental technology.	a5							
14	Our company management motivate/reward the achievement of environmental targets (Individual incentive scheme in place).	a5							
15	Our company management understand what the absence of environmental leadership would imply for mining activities.	a5							
16	Our company makes a concerted effort to involve every manager in understanding the importance of environmental protection.	b6							
17	Environmental protection is a high-priority activity in our company.	b6							
18	It is not difficult for our company to be successful and protect the environment at the same time.	b6							
19	Our company has a clear policy statement urging natural environmental awareness in every area.	b7							
20	It is our company's mission to be a leader in environmental protection in our industry.	b7							
21	Preserving the environment is a central corporate value in our company.	b8							
22	Our company has a responsibility to protect the natural environment.	b8							
23	Environmental protection is vital to our company's survival.	b8							
24	Our company's responsibility to its stockholders and employees is more important than our responsibility toward environmental protection.	b9							
25	In our company profits are not more important than our environmental activities.	b9							

26	Our company management evaluate our environmental efforts by their economic benefits to our company.	b9							
27	The long term financial well-being of our company depends on the state of the natural environment.	b10							
28	The natural environment does currently affect our company's business activities.	b10							
29	In our company, environmental protection is not only an issue of maintaining a good public image.	b10							
30	Our company has integrated protection of the natural environment into our strategic planning process.	c11							
31	Our company is engaged in constant planning and processes that minimize environmental impacts of projects on the natural environment.	c11							
32	Environmental issues have been integrated into all functional areas of our business.	c11							
33	At our company, we link environmental objectives with our other corporate goals and strategies.	c12							
34	Environmental issues are always intently considered when we develop new projects.	c12							
35	Environmental issues are always considered when we discuss strategic business plans in our company.	c12							
36	We emphasize the environmental protection aspects of our operations in our annual reports.	c13							
37	Our company must be accountable for the way our mining actions affect the natural environment.	c13							
38	Our company's environmental efforts do not mainly revolve around compliance with current environmental regulation.	c13							
39	In our company, technology decisions are always influenced by environmental protection concerns.	c14							
40	In our company, ''quality'' includes reducing our environmental impact on the natural environment.	c14							
41	Our exploration and acquisition strategies (future expansion) have been influenced by environmental sensitivity concerns.	c14							

42	Our company has established internal environmental standards as a performance criterion for all our operations.	c14							
43	In our company, employment decisions are always influenced by environmental concerns.	c15							
44	All managerial employees in our company are expected to participate in environmental initiatives e.g. annual training, awareness campaigns.	c15							
45	Operational managers in our company are competent to follow instructions to implementing company environmental goals.	c15							

7.2.4 Condensed results for Analysis 1 – Range of agreement to constructs on Industry level.

		Functional Environmental Managers							Corporate Environmental Managers							Combined						
		1	**2**	**3**	**0**	**4**	**5**	**6**	**1**	**2**	**3**	**0**	**4**	**5**	**6**	**1**	**2**	**3**	**0**	**4**	**5**	**6**
a1	Our company management decisions are based on a policy of world class environmental leadership.	8.7	4.3	4.3	0.0	39.1	39.1	4.3	0.0	0.0	9.1	0.0	27.3	36.4	27.3	5.9	2.9	5.9	0.0	35.3	38.2	11.8
a1	Our company management value the relationship with environmental regulators.	8.7	4.3	0.0	0.0	17.4	47.8	21.7	0.0	0.0	0.0	9.1	18.2	54.5	18.2	5.9	2.9	0.0	2.9	17.6	50.0	20.6
a1	Our company management value internal and external leadership w.r.t. International Sustainability Code principles (e.g. ICMM).	8.7	0.0	8.7	8.7	17.4	43.5	13.0	0.0	0.0	0.0	18.2	18.2	36.4	27.3	5.9	0.0	5.9	11.8	17.6	41.2	17.6
	Average	8.7	2.9	4.3	2.9	24.6	43.5	13.0	0.0	0.0	3.0	9.1	21.2	42.4	24.2	5.9	2.0	3.9	4.9	23.5	43.1	16.7
	Standard Deviation	0.0	2.5	4.3	5.0	12.6	4.3	8.7	0.0	0.0	5.2	9.1	5.2	10.5	5.2	0.0	1.7	3.4	6.1	10.2	6.1	4.5
		1	**2**	**3**	**0**	**4**	**5**	**6**	**1**	**2**	**3**	**0**	**4**	**5**	**6**	**1**	**2**	**3**	**0**	**4**	**5**	**6**
a2	Our company has an active executive environmental leadership portfolio.	0.0	13.0	13.0	0.0	8.7	43.5	21.7	0.0	18.2	9.1	0.0	9.1	36.4	27.3	0.0	14.7	11.8	0.0	8.8	41.2	23.5
a2	Our company management provide adequate resources to provide environmental leadership for all our mining activities.	4.3	17.4	17.4	0.0	34.8	21.7	4.3	9.1	9.1	9.1	0.0	36.4	27.3	9.1	5.9	14.7	14.7	0.0	35.3	23.5	5.9

a2	Our company management values the leadership role played in ensuring accuracy and efficiency of environmental annual reporting.	4.3	4.3	0.0	0.0	34.8	39.1	17.4		0.0	0.0	9.1	0.0	18.2	54.5	18.2		2.9	2.9	2.9	0.0	29.4	44.1	17.6
	Average	2.9	11.6	10.1	0.0	26.1	34.8	14.5		3.0	9.1	9.1	0.0	21.2	39.4	18.2		2.9	10.8	9.8	0.0	24.5	36.3	15.7
	Standard Deviation	2.5	6.6	9.1	0.0	15.1	11.5	9.1		5.2	9.1	0.0	0.0	13.9	13.9	9.1		2.9	6.8	6.1	0.0	13.9	11.1	9.0
		1	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**
a3	Our company management realise the business value of environmental leadership.	8.7	4.3	13.0	8.7	39.1	26.1	0.0		0.0	9.1	9.1	0.0	18.2	36.4	27.3		5.9	5.9	11.8	5.9	32.4	29.4	8.8
a3	Our company management believe that environmental leadership will provide a competitive advantage in the market place.	4.3	8.7	4.3	8.7	17.4	39.1	17.4		0.0	0.0	9.1	0.0	36.4	45.5	9.1		2.9	5.9	5.9	5.9	23.5	41.2	14.7
a3	Our company management believe that there is a business case (cost/value benefit) for environmental leadership.	4.3	8.7	4.3	8.7	43.5	21.7	8.7		0.0	18.2	18.2	0.0	9.1	45.5	9.1		2.9	11.8	8.8	5.9	32.4	29.4	8.8
	Average	5.8	7.2	7.2	8.7	33.3	29.0	8.7		0.0	9.1	12.1	0.0	21.2	42.4	15.2		3.9	7.8	8.8	5.9	29.4	33.3	10.8
	Standard Deviation	2.5	2.5	5.0	0.0	14.0	9.1	8.7		0.0	9.1	5.2	0.0	13.9	5.2	10.5		1.7	3.4	2.9	0.0	5.1	6.8	3.4
		1	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**
a4	Our company management has a strategic will to act on environmental compliance commitments.	8.7	0.0	8.7	4.3	21.7	43.5	13.0		0.0	0.0	0.0	0.0	9.1	54.5	36.4		5.9	0.0	5.9	2.9	17.6	47.1	20.6

a4	Environmental leaders (managers) are involved in the operational/business strategy of the business units in our company.	0.0	8.7	21.7	4.3	21.7	26.1	17.4		0.0	0.0	9.1	9.1	45.5	27.3	9.1		0.0	5.9	17.6	5.9	29.4	26.5	14.7
a4	Our company management realise the brand value of leadership in triple-bottom-line reporting.	0.0	4.3	8.7	8.7	39.1	21.7	17.4		0.0	0.0	0.0	0.0	36.4	45.5	18.2		0.0	2.9	5.9	5.9	38.2	29.4	17.6
	Average	2.9	4.3	13.0	5.8	27.5	30.4	15.9		0.0	0.0	3.0	3.0	30.3	42.4	21.2		2.0	2.9	9.8	4.9	28.4	34.3	17.6
	Standard Deviation	5.0	4.3	7.5	2.5	10.0	11.5	2.5		0.0	0.0	5.2	5.2	18.9	13.9	13.9		3.4	2.9	6.8	1.7	10.3	11.1	2.9
		1	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**
a5	Our company management is pro-active in the recommendations of environmental practitioners to implement required environmental technology.	8.7	4.3	8.7	0.0	39.1	30.4	8.7		0.0	0.0	9.1	0.0	45.5	36.4	9.1		5.9	2.9	8.8	0.0	41.2	32.4	8.8
a5	Our company management motivate/reward the achievement of environmental targets (Individual incentive scheme in place).	13.0	21.7	0.0	0.0	34.8	17.4	13.0		0.0	27.3	18.2	0.0	27.3	18.2	9.1		8.8	23.5	5.9	0.0	32.4	17.6	11.8
a5	Our company management understand what the absence of environmental leadership would imply for mining activities.	8.7	4.3	4.3	4.3	34.8	30.4	13.0		0.0	0.0	9.1	9.1	27.3	45.5	9.1		5.9	2.9	5.9	5.9	32.4	35.3	11.8
	Average	10.1	10.1	4.3	1.4	36.2	26.1	11.6		0.0	9.1	12.1	3.0	33.3	33.3	9.1		6.9	9.8	6.9	2.0	35.3	28.4	10.8
	Standard Deviation	2.5	10.0	4.3	2.5	2.5	7.5	2.5		0.0	15.7	5.2	5.2	10.5	13.9	0.0		1.7	11.9	1.7	3.4	5.1	9.5	1.7

		1	2	3	0	4	5	6		1	2	3	0	4	5	6		1	2	3	0	4	5	6
b6	Our company makes a concerted effort to involve every manager in understanding the importance of environmental protection.	4.3	13.0	17.4	0.0	26.1	34.8	4.3		0.0	9.1	9.1	0.0	45.5	18.2	18.2		2.9	11.8	14.7	0.0	32.4	29.4	8.8
b6	Environmental protection is a high-priority activity in our company.	0.0	26.1	13.0	4.3	13.0	39.1	4.3		0.0	9.1	18.2	0.0	36.4	18.2	18.2		0.0	20.6	14.7	2.9	20.6	32.4	8.8
b6	It is not difficult for our company to be successful and protect the environment at the same time.	0.0	8.7	13.0	4.3	13.0	34.8	26.1		9.1	0.0	0.0	0.0	9.1	72.7	9.1		2.9	5.9	8.8	2.9	11.8	47.1	20.6
	Average	1.4	15.9	14.5	2.9	17.4	36.2	11.6		3.0	6.1	9.1	0.0	30.3	36.4	15.2		2.0	12.7	12.7	2.0	21.6	36.3	12.7
	Standard Deviation	2.5	9.1	2.5	2.5	7.5	2.5	12.6		5.2	5.2	9.1	0.0	18.9	31.5	5.2		1.7	7.4	3.4	1.7	10.3	9.5	6.8
		1	2	3	0	4	5	6		1	2	3	0	4	5	6		1	2	3	0	4	5	6
b7	Our company has a clear policy statement urging natural environmental awareness in every area.	0.0	4.3	0.0	0.0	4.3	52.2	39.1		0.0	0.0	9.1	0.0	18.2	45.5	27.3		0.0	2.9	2.9	0.0	8.8	50.0	35.3
b7	It is our company's mission to be a leader in environmental protection in our industry.	8.7	8.7	8.7	4.3	21.7	39.1	8.7		9.1	18.2	9.1	0.0	18.2	27.3	18.2		8.8	11.8	8.8	2.9	20.6	35.3	11.8
	Average	4.3	6.5	4.3	2.2	13.0	45.7	23.9		4.5	9.1	9.1	0.0	18.2	36.4	22.7		4.4	7.4	5.9	1.5	14.7	42.6	23.5
	Standard Deviation	6.1	3.1	6.1	3.1	12.3	9.2	21.5		6.4	12.9	0.0	0.0	0.0	12.9	6.4		6.2	6.2	4.2	2.1	8.3	10.4	16.6
		1	2	3	0	4	5	6		1	2	3	0	4	5	6		1	2	3	0	4	5	6

b8	Preserving the environment is a central corporate value in our company.	0.0	4.3	8.7	0.0	17.4	56.5	13.0		0.0	9.1	0.0	0.0	27.3	54.5	9.1		0.0	5.9	5.9	0.0	20.6	55.9	11.8
b8	Our company has a responsibility to protect the natural environment.	0.0	4.3	0.0	4.3	21.7	30.4	39.1		0.0	0.0	0.0	0.0	9.1	45.5	45.5		0.0	2.9	0.0	2.9	17.6	35.3	41.2
b8	Environmental protection is vital to our company's survival.	0.0	0.0	0.0	4.3	34.8	21.7	39.1		0.0	9.1	18.2	0.0	18.2	36.4	18.2		0.0	2.9	5.9	2.9	29.4	26.5	32.4
	Average	0.0	2.9	2.9	2.9	24.6	36.2	30.4		0.0	6.1	6.1	0.0	18.2	45.5	24.2		0.0	3.9	3.9	2.0	22.5	39.2	28.4
	Standard Deviation	0.0	2.5	5.0	2.5	9.1	18.1	15.1		0.0	5.2	10.5	0.0	9.1	9.1	18.9		0.0	1.7	3.4	1.7	6.1	15.1	15.1
		1	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**
b9	Our company's responsibility to its stockholders and employees is more important than our responsibility toward environmental protection	4.3	13.0	8.7	13.0	17.4	34.8	8.7		0.0	9.1	36.4	9.1	18.2	18.2	9.1		2.9	11.8	17.6	11.8	17.6	29.4	8.8
b9	In our company profits are not more important than our environmental activities.	8.7	17.4	17.4	13.0	21.7	17.4	4.3		9.1	18.2	0.0	9.1	45.5	18.2	0.0		8.8	17.6	11.8	11.8	29.4	17.6	2.9
b9	Our company management evaluate our environmental efforts by their economic benefits to our company.	0.0	13.0	21.7	13.0	26.1	17.4	8.7		0.0	18.2	0.0	18.2	27.3	18.2	18.2		0.0	14.7	14.7	14.7	26.5	17.6	11.8
	Average	4.3	14.5	15.9	13.0	21.7	23.2	7.2		3.0	15.2	12.1	12.1	30.3	18.2	9.1		3.9	14.7	14.7	12.7	24.5	21.6	7.8
	Standard Deviation	4.3	2.5	6.6	0.0	4.3	10.0	2.5		5.2	5.2	21.0	5.2	13.9	0.0	9.1		4.5	2.9	2.9	1.7	6.1	6.8	4.5
		1	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**

b10	The long term financial well-being of our company depends on the state of the natural environment.	4.3	17.4	17.4	4.3	26.1	21.7	8.7		0.0	9.1	9.1	0.0	9.1	54.5	18.2		2.9	14.7	14.7	2.9	20.6	32.4	11.8
b10	The natural environment does currently affect our company's business activities.	0.0	0.0	8.7	4.3	17.4	47.8	21.7		0.0	8.3	8.3	0.0	8.3	41.7	33.3		0.0	2.9	8.8	2.9	14.7	44.1	26.5
b10	In our company, environmental protection is not only an issue of maintaining a good public image.	17.4	26.1	17.4	4.3	13.0	17.4	4.3		0.0	9.1	27.3	18.2	9.1	36.4	0.0		11.8	20.6	20.6	8.8	11.8	23.5	2.9
	Average	7.2	14.5	14.5	4.3	18.8	29.0	11.6		0.0	8.8	14.9	6.1	8.8	44.2	17.2		4.9	12.7	14.7	4.9	15.7	33.3	13.7
	Standard Deviation	9.1	13.3	5.0	0.0	6.6	16.5	9.1		0.0	0.4	10.7	10.5	0.4	9.4	16.7		6.1	9.0	5.9	3.4	4.5	10.3	11.9
		1	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**
c11	Our company has integrated protection of the natural environment into our strategic planning process.	4.3	4.3	0.0	8.7	26.1	43.5	13.0		0.0	0.0	0.0	9.1	45.5	27.3	18.2		2.9	2.9	0.0	8.8	32.4	38.2	14.7
c11	Our company is engaged in constant planning and processes that minimize environmental impacts of projects on the natural environment.	0.0	4.3	21.7	4.3	13.0	43.5	13.0		0.0	0.0	18.2	9.1	18.2	45.5	9.1		0.0	2.9	20.6	5.9	14.7	44.1	11.8
c11	Environmental issues have been integrated into all functional areas of our business.	4.3	26.1	8.7	4.3	17.4	30.4	8.7		0.0	18.2	9.1	0.0	18.2	45.5	9.1		2.9	23.5	8.8	2.9	17.6	35.3	8.8
	Average	2.9	11.6	10.1	5.8	18.8	39.1	11.6		0.0	6.1	9.1	6.1	27.3	39.4	12.1		2.0	9.8	9.8	5.9	21.6	39.2	11.8
	Standard Deviation	2.5	12.6	10.9	2.5	6.6	7.5	2.5		0.0	10.5	9.1	5.2	15.7	10.5	5.2		1.7	11.9	10.3	2.9	9.5	4.5	2.9
		1	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**

c12	At our company, we link environmental objectives with our other corporate goals and strategies.	4.3	0.0	8.7	0.0	17.4	56.5	13.0		0.0	9.1	0.0	0.0	27.3	45.5	18.2		2.9	2.9	5.9	0.0	20.6	52.9	14.7
c12	Environmental issues are always intently considered when we develop new projects.	8.7	8.7	13.0	0.0	17.4	39.1	13.0		0.0	0.0	9.1	9.1	18.2	27.3	36.4		5.9	5.9	11.8	2.9	17.6	35.3	20.6
c12	Environmental issues are always considered when we discuss strategic business plans in our company.	8.7	4.3	17.4	4.3	30.4	30.4	4.3		0.0	9.1	27.3	0.0	36.4	18.2	9.1		5.9	5.9	20.6	2.9	32.4	26.5	5.9
	Average	7.2	4.3	13.0	1.4	21.7	42.0	10.1		0.0	6.1	12.1	3.0	27.3	30.3	21.2		4.9	4.9	12.7	2.0	23.5	38.2	13.7
	Standard Deviation	2.5	4.3	4.3	2.5	7.5	13.3	5.0		0.0	5.2	13.9	5.2	9.1	13.9	13.9		1.7	1.7	7.4	1.7	7.8	13.5	7.4
		1	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**
c13	We emphasize the environmental protection aspects of our operations in our annual reports.	0.0	0.0	8.7	0.0	13.0	56.5	21.7		0.0	9.1	0.0	0.0	9.1	63.6	18.2		0.0	2.9	5.9	0.0	11.8	58.8	20.6
c13	Our company must be accountable for the way our mining actions affect the natural environment.	0.0	0.0	0.0	0.0	0.0	34.8	65.2		0.0	0.0	0.0	0.0	0.0	45.5	54.5		0.0	0.0	0.0	0.0	0.0	38.2	61.8
c13	Our company's environmental efforts do not mainly revolve around compliance with current environmental regulation.	17.4	34.8	21.7	0.0	21.7	4.3	0.0		0.0	54.5	18.2	0.0	27.3	0.0	0.0		11.8	41.2	20.6	0.0	23.5	2.9	0.0
	Average	5.8	11.6	10.1	0.0	11.6	31.9	29.0		0.0	21.2	6.1	0.0	12.1	36.4	24.2		3.9	14.7	8.8	0.0	11.8	33.3	27.5
	Standard Deviation	10.0	20.1	10.9	0.0	10.9	26.2	33.2		0.0	29.2	10.5	0.0	13.9	32.8	27.8		6.8	23.0	10.6	0.0	11.8	28.3	31.4
		1	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**

c14	In our company, technology decisions are always influenced by environmental protection concerns.	4.3	21.7	8.7	0.0	30.4	30.4	4.3		0.0	27.3	18.2	0.0	18.2	18.2	18.2		2.9	23.5	11.8	0.0	26.5	26.5	8.8
c14	In our company, "quality" includes reducing our environmental impact on the natural environment.	0.0	8.7	8.7	4.3	30.4	39.1	8.7		0.0	18.2	18.2	9.1	27.3	9.1	18.2		0.0	11.8	11.8	5.9	29.4	29.4	11.8
c14	Our exploration and acquisition strategies (future expansion) have been influenced by environmental sensitivity concerns.	4.3	8.7	0.0	21.7	4.3	43.5	17.4		0.0	0.0	9.1	0.0	9.1	54.5	27.3		2.9	5.9	2.9	14.7	5.9	47.1	20.6
c14	Our company has established internal environmental standards as a performance criterion for all our operations.	0.0	4.3	4.3	8.7	17.4	43.5	21.7		0.0	0.0	18.2	0.0	18.2	45.5	18.2		0.0	2.9	8.8	5.9	17.6	44.1	20.6
	Average	2.2	10.9	5.4	8.7	20.7	39.1	13.0		0.0	11.4	15.9	2.3	18.2	31.8	20.5		1.5	11.0	8.8	6.6	19.9	36.8	15.4
	Standard Deviation	2.5	7.5	4.2	9.4	12.5	6.1	7.9		0.0	13.6	4.5	4.5	7.4	21.6	4.5		1.7	9.1	4.2	6.1	10.6	10.3	6.1
		1	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**		**1**	**2**	**3**	**0**	**4**	**5**	**6**
c15	In our company, employment decisions are always influenced by environmental concerns.	26.1	30.4	4.3	13.0	17.4	8.7	0.0		9.1	27.3	9.1	9.1	9.1	27.3	9.1		20.6	29.4	5.9	11.8	14.7	14.7	2.9
c15	All managerial employees in our company are expected to participate in environmental initiatives e.g. annual training, awareness campaigns.	4.3	8.7	13.0	0.0	26.1	39.1	8.7		0.0	18.2	9.1	0.0	27.3	27.3	18.2		2.9	11.8	11.8	0.0	26.5	35.3	11.8

c15	Operational managers in our company are competent to follow instructions to implementing company environmental goals.	0.0	13.0	4.3	4.3	30.4	43.5	4.3		0.0	0.0	0.0	0.0	81.8	9.1	9.1		0.0	8.8	2.9	2.9	47.1	32.4	5.9
	Average	10.1	17.4	7.2	5.8	24.6	30.4	4.3		3.0	15.2	6.1	3.0	39.4	21.2	12.1		7.8	16.7	6.9	4.9	29.4	27.5	6.9
	Standard Deviation	14.0	11.5	5.0	6.6	6.6	19.0	4.3		5.2	13.9	5.2	5.2	37.8	10.5	5.2		11.1	11.1	4.5	6.1	16.4	11.1	4.5

7.2.5 Condensed results for Analysis 2 – Company specific analysis

Results for the sampled Gold Mining Companies

		Gld1 Corp Env	Gld1 Env Man	Correlation	p-value	Gld2 Corp Env	Gld2 Env Man	Correlation	p-value	Gld3 Corp Env	Gld3 Env Man	Correlation	p-value
a1	Our company management decisions are based on a policy of world class environmental leadership.	4.50	4.00	0.866	0.035	6.00	3.67	-0.500	0.018	4.00	4.00	0.866	0.643
a1	Our company management value the relationship with environmental regulators.	5.00	4.20			5.00	4.33			5.00	5.00		
a1	Our company management value internal and external leadership w.r.t. International Sustainability Code principles (e.g. ICMM).	5.00	4.40			6.00	4.33			4.00	3.00		
	Average	4.83	4.20			5.67	4.11			4.33	4.00		
	Standard Deviation	0.29	0.20			0.58	0.38			0.58	1.00		
a2	Our company has an active executive environmental leadership portfolio.	5.00	4.40	0.991	0.550	6.00	3.33	0.000	0.116	2.00	5.00	0.500	0.329
a2	Our company management provide adequate resources to provide environmental leadership for all our mining activities.	3.50	3.20			4.00	3.33			2.00	2.00		
a2	Our company management values the leadership role played in ensuring accuracy and efficiency of environmental annual reporting.	5.00	4.60			5.00	4.33			4.00	5.00		
	Average	4.50	4.07			5.00	3.67			2.67	4.00		
	Standard Deviation	0.87	0.76			1.00	0.58			1.15	1.73		
a3	Our company management realise the business value of environmental leadership.	5.00	4.00	-0.381	0.043	6.00	2.33	-0.866	0.010	4.00	4.01	0.000	0.374
a3	Our company management believe that environmental leadership will provide a competitive advantage in the market place.	4.50	3.80			5.00	3.00			4.00	3.99		
a3	Our company management believe that there is a business case (cost/value benefit) for environmental leadership.	5.00	2.60			5.00	3.67			3.00	4.00		
	Average	4.83	3.47			5.33	3.00			3.67	4.00		
	Standard Deviation	0.29	0.76			0.58	0.67			0.58	0.00		
a4	Our company management has a strategic will to act on environmental compliance commitments.	5.50	4.00	0.866	0.123	6.00	4.67	0.982	0.052	5.00	4.01	0.866	0.116
a4	Environmental leaders (managers) are involved in the operational/business strategy of the business units in our company.	4.00	3.80			5.00	3.33			4.00	3.99		
a4	Our company management realise the brand value of leadership in triple-bottom-line reporting.	5.50	4.20			5.00	3.00			5.00	4.00		
	Average	5.00	4.00			5.33	3.67			4.67	4.00		

	Standard Deviation	0.87	0.20			0.58	0.88			0.58	0.00		
a5	Our company management is pro-active in the recommendations of environmental practitioners to implement required environmental technology.	4.50	3.80	0.993	0.631	5.00	3.67	0.866	0.040	4.00	4.01	0.655	0.725
a5	Our company management motivate/reward the achievement of environmental targets (Individual incentive scheme in place).	2.50	2.40			4.00	1.67			2.00	3.99		
a5	Our company management understand what the absence of environmental leadership would imply for mining activities.	4.50	4.00			5.00	2.67			5.00	4.00		
	Average	3.83	3.40			4.67	2.67			3.67	4.00		
	Standard Deviation	1.15	0.87			0.58	1.00			1.53	0.00		
b6	Our company makes a concerted effort to involve every manager in understanding the importance of environmental protection.	4.50	3.80	0.981	0.784	4.00	2.67	0.945	0.202	2.00	4.00	0.500	0.024
b6	Environmental protection is a high-priority activity in our company.	3.50	3.40			4.00	2.33			3.00	4.00		
b6	It is difficult for our company to be successful and protect the environment at the same time.	2.00	2.00			2.00	1.67			3.00	5.00		
	Average	3.33	3.07			3.33	2.22			2.67	4.33		
	Standard Deviation	1.26	0.95			1.15	0.51			0.58	0.58		
b7	Our company has a clear policy statement urging natural environmental awareness in every area.	5.00	5.40	1.000	0.946	6.00	4.00	1.000	0.642	4.00	5.00	1.000	0.553
b7	It is our company's mission to be a leader in environmental protection in our industry.	4.50	4.20			3.00	3.33			2.00	3.00		
	Average	4.75	4.80			4.50	3.67			3.00	4.00		
	Standard Deviation	0.35	0.85			2.12	0.47			1.41	1.41		
b8	Preserving the environment is a central corporate value in our company.	3.50	5.20	-0.990	0.645	4.00	4.33	-1.000	0.664	4.00	4.00	1.000	0.422
b8	Our company has a responsibility to protect the natural environment.	5.00	4.20			4.00	4.33			5.00	6.00		
b8	Environmental protection is vital to our company's survival.	4.50	4.40			3.00	6.00			5.00	6.00		
	Average	4.33	4.60			3.67	4.89			4.67	5.33		
	Standard Deviation	0.76	0.53			0.58	0.96			0.58	1.15		
b9	Our company's responsibility to its stockholders and employees is more important than our responsibility toward environmental protection	3.00	2.60	0.000	0.492	3.00	4.67	-1.000	0.104	4.99	5.01	-1.000	0.519
b9	In our company profits are not more important than our environmental activities.	3.00	2.20			3.00	4.67			5.01	4.99		
b9	Our company management evaluate our environmental efforts by their economic benefits to our company.	2.00	2.40			4.00	2.00			4.99	5.01		
	Average	2.67	2.40			3.33	3.78			5.00	5.00		
	Standard Deviation	0.58	0.20			0.58	1.54			0.00	0.00		

b10	The long term financial well-being of our company depends on the state of the natural environment.	2.50	3.00	0.918	0.158	1.00	3.33	0.786	0.104	2.00	2.00	0.996	0.834
b10	The natural environment does currently affect our company's business activities.	1.50	2.40			1.00	1.67			1.00	1.00		
b10	In our company, environmental protection is not only an issue of maintaining a good public image.	2.50	3.40			2.00	4.33			4.00	5.00		
	Average	2.17	2.93			1.33	3.11			2.33	2.67		
	Standard Deviation	0.58	0.50			0.58	1.35			1.53	2.08		
c11	Our company has integrated protection of the natural environment into our strategic planning process.	4.50	2.80	-0.756	0.899	0.00	3.67	-0.803	0.811	4.00	4.00	1.000	1.000
c11	Our company is engaged in constant planning and processes that minimize environmental impacts of projects on the natural environment.	2.00	4.60			5.00	3.00			3.00	3.00		
c11	Environmental issues have been integrated into all functional areas of our business.	4.50	4.00			5.00	2.00			2.00	2.00		
	Average	3.67	3.80			3.33	2.89			3.00	3.00		
	Standard Deviation	1.44	0.92			2.89	0.84			1.00	1.00		
c12	At our company, we link environmental objectives with our other corporate goals and strategies.	4.00	4.40	0.052	0.218	6.00	3.67	0.000	0.004	5.00	4.00	1.000	0.678
c12	Environmental issues are always intently considered when we develop new projects.	2.50	4.20			6.00	3.00			3.00	3.00		
c12	Environmental issues are always considered when we discuss strategic business plans in our company.	3.50	3.60			5.00	3.33			3.00	3.00		
	Average	3.33	4.07			5.67	3.33			3.67	3.33		
	Standard Deviation	0.76	0.42			0.58	0.33			1.15	0.58		
c13	We emphasize the environmental protection aspects of our operations in our annual reports.	5.00	5.00	0.999	0.961	4.00	4.67	0.839	0.411	5.00	5.00	1.000	1.000
c13	Our company must be accountable for the way our mining actions affect the natural environment.	5.50	5.60			6.00	6.00			6.00	6.00		
c13	Our company's environmental efforts do not mainly revolve around compliance with current environmental regulation.	4.00	4.00			3.00	5.00			5.00	5.00		
	Average	4.83	4.87			4.33	5.22			5.33	5.33		
	Standard Deviation	0.76	0.81			1.53	0.69			0.58	0.58		
c14	In our company, technology decisions are always influenced by environmental protection concerns.	3.00	3.40	-0.309	0.800	6.00	2.33	-0.178	0.040	2.00	2.00	1.000	1.000
c14	In our company, ''quality'' includes reducing our environmental impact on the natural environment.	3.00	4.20			6.00	3.67			4.00	4.00		
c14	Our exploration and acquisition strategies (future expansion) have been influenced by environmental sensitivity concerns.	5.50	2.80			5.00	1.67			5.00	5.00		
c14	Our company has established internal environmental standards as a performance criterion for all our operations.	4.50	4.80			5.00	5.33			4.00	4.00		
	Average	4.00	3.80			5.50	3.25			3.75	3.75		
	Standard Deviation	1.22	0.88			0.58	1.62			1.26	1.26		

c15	In our company, employment decisions are always influenced by environmental concerns.	1.00	1.00	0.931	0.847	5.00	2.00	-0.756	0.083	3.00	2.00	0.945	1.000
c15	All managerial employees in our company are expected to participate in environmental initiatives e.g. annual training, awareness campaigns.	4.50	3.40			4.00	4.00			3.00	3.00		
c15	Operational managers in our company are competent to follow instructions to implementing company environmental goals.	4.00	4.20			5.00	3.33			4.00	5.00		
	Average	3.17	2.87			4.67	3.11			3.33	3.33		
	Standard Deviation	1.89	1.67			0.58	1.02			0.58	1.53		

Results for the sampled Platinum Mining Companies

		Plt1 Corp Env	Plt1 Env Man	Correlation	p-value	Plt2 Corp Env	Plt2 Env Man	Correlation	p-value	Plt3 Corp Env	Plt3 Env Man	Correlation	p-value
a1	Our company management decisions are based on a policy of world class environmental leadership.	4.50	4.75	0.904	1.000	5.00	4.00	1.000	0.488	6.00	4.67	0.882	0.659
a1	Our company management value the relationship with environmental regulators.	5.50	5.75			5.00	4.50			4.00	5.00		
a1	Our company management value internal and external leadership w.r.t. International Sustainability Code principles (e.g. ICMM).	4.50	4.00			5.01	5.50			0.00	3.00		
	Average	4.83	4.83			5.00	4.67			3.33	4.22		
	Standard Deviation	0.58	0.88			0.00	0.76			3.06	1.07		
a2	Our company has an active executive environmental leadership portfolio.	3.50	5.25	-0.866	0.374	5.00	3.50	0.500	0.152	5.00	5.67	0.277	0.692
a2	Our company management provide adequate resources to provide environmental leadership for all our mining activities.	4.50	5.00			4.00	3.50			5.00	4.33		
a2	Our company management values the leadership role played in ensuring accuracy and efficiency of environmental annual reporting.	5.50	5.00			5.00	4.50			4.00	4.67		
	Average	4.50	5.08			4.67	3.83			4.67	4.89		
	Standard Deviation	1.00	0.14			0.58	0.58			0.58	0.69		
a3	Our company management realise the business value of environmental leadership.	4.00	4.50	-0.500	0.094	5.00	3.50	0.000	0.025	5.00	2.67	-0.240	0.746
a3	Our company management believe that environmental leadership will provide a competitive advantage in the market place.	4.00	4.25			5.00	4.50			5.00	5.00		
a3	Our company management believe that there is a business case (cost/value benefit) for environmental leadership.	3.00	4.50			5.01	4.00			3.00	4.33		
	Average	3.67	4.42			5.00	4.00			4.33	4.00		
	Standard Deviation	0.58	0.14			0.00	0.50			1.15	1.20		
a4	Our company management has a strategic will to act on environmental compliance commitments.	5.00	5.00	0.189	0.230	5.00	5.00	0.756	0.417	4.00	5.00	0.945	0.155
a4	Environmental leaders (managers) are involved in the operational/business strategy of the business units in our company.	3.50	5.00			4.00	3.50			5.00	5.67		
a4	Our company management realise the brand value of leadership in triple-bottom-line reporting.	4.00	4.50			5.00	4.00			4.00	4.67		
	Average	4.17	4.83			4.67	4.17			4.33	5.11		
	Standard Deviation	0.76	0.29			0.58	0.76			0.58	0.51		

a5	Our company management is pro-active in the recommendations of environmental practitioners to implement required environmental technology.	4.50	4.75	1.000	0.219	4.00	4.50	0.500	1.000	5.00	4.33	-0.803	0.205
a5	Our company management motivate/reward the achievement of environmental targets (Individual incentive scheme in place).	4.50	4.75			5.00	5.00			2.00	4.33		
a5	Our company management understand what the absence of environmental leadership would imply for mining activities.	3.50	4.50			5.00	4.50			0.00	5.00		
	Average	4.17	4.67			4.67	4.67			2.33	4.56		
	Standard Deviation	0.58	0.14			0.58	0.29			2.52	0.38		
b6	Our company makes a concerted effort to involve every manager in understanding the importance of environmental protection.	3.50	4.00	0.971	0.692	4.00	4.50	0.655	0.882	6.00	5.33	0.993	0.843
b6	Environmental protection is a high-priority activity in our company.	4.00	4.00			5.00	3.50			6.00	5.00		
b6	It is difficult for our company to be successful and protect the environment at the same time.	2.00	2.50			2.00	2.50			2.00	2.67		
	Average	3.17	3.50			3.67	3.50			4.67	4.33		
	Standard Deviation	1.04	0.87			1.53	1.00			2.31	1.45		
b7	Our company has a clear policy statement urging natural environmental awareness in every area.	4.10	5.75	1.000	0.317	5.01	5.00	1.000	0.421	5.00	6.00	1.000	0.293
b7	It is our company's mission to be a leader in environmental protection in our industry.	3.90	4.25			5.00	2.50			4.00	5.00		
	Average	4.00	5.00			5.01	3.75			4.50	5.50		
	Standard Deviation	0.00	1.06			0.00	1.77			0.71	0.71		
b8	Preserving the environment is a central corporate value in our company.	5.00	4.50	-0.217	1.000	5.01	5.00	1.000	0.114	5.00	5.33	0.982	0.749
b8	Our company has a responsibility to protect the natural environment.	6.00	5.25			5.00	4.50			6.00	5.67		
b8	Environmental protection is vital to our company's survival.	4.50	5.75			5.00	4.50			4.00	4.67		
	Average	5.17	5.17			5.00	4.67			5.00	5.22		
	Standard Deviation	0.76	0.63			0.00	0.29			1.00	0.51		
b9	Our company's responsibility to its stockholders and employees is more important than our responsibility toward environmental protection	2.00	2.75	0.000	0.261	3.00	4.00	0.756	0.346	3.00	2.33	-0.988	0.882
b9	In our company profits are not more important than our environmental activities.	2.50	3.50			3.00	3.00			3.00	2.00		
b9	Our company management evaluate our environmental efforts by their economic benefits to our company.	3.00	2.75			0.00	2.50			2.00	4.00		
	Average	2.50	3.00			2.00	3.17			2.67	2.78		
	Standard Deviation	0.50	0.43			1.73	0.76			0.58	1.07		
b10	The long term financial well-being of our company depends on the state of the natural environment.	1.50	3.25	0.359	0.218	5.00	3.00	0.189	0.607	2.00	2.67	-1.000	0.404

b10	The natural environment does currently affect our company's business activities.	1.50	1.75			2.00	3.00			2.00	1.33		
b10	In our company, environmental protection is not only an issue of maintaining a good public image.	2.50	3.00			4.00	3.50			2.00	5.00		
	Average	1.83	2.67			3.67	3.17			2.00	3.00		
	Standard Deviation	0.58	0.80			1.53	0.29			0.00	1.86		
c11	Our company has integrated protection of the natural environment into our strategic planning process.	4.00	5.75	0.359	0.111	5.00	5.00	1.000	0.158	6.00	5.00	0.500	0.242
c11	Our company is engaged in constant planning and processes that minimize environmental impacts of projects on the natural environment.	4.00	4.25			5.00	4.50			5.00	5.00		
c11	Environmental issues have been integrated into all functional areas of our business.	3.00	4.50			5.00	4.00			5.00	3.33		
	Average	3.67	4.83			5.00	4.50			5.33	4.44		
	Standard Deviation	0.58	0.80			0.00	0.50			0.58	0.96		
c12	At our company, we link environmental objectives with our other corporate goals and strategies.	4.50	5.75	0.693	0.555	5.00	5.00	0.866	0.725	5.00	5.00	0.000	0.725
c12	Environmental issues are always intently considered when we develop new projects.	5.50	5.25			5.00	4.50			6.00	4.67		
c12	Environmental issues are always considered when we discuss strategic business plans in our company.	3.50	4.00			4.00	4.00			4.00	4.67		
	Average	4.50	5.00			4.67	4.50			5.00	4.78		
	Standard Deviation	1.00	0.90			0.58	0.50			1.00	0.19		
c13	We emphasize the environmental protection aspects of our operations in our annual reports.	5.50	5.50	0.971	1.000	5.00	5.00	0.945	0.488	5.00	5.33	0.866	0.264
c13	Our company must be accountable for the way our mining actions affect the natural environment.	5.50	5.75			5.00	5.50			5.00	6.00		
c13	Our company's environmental efforts do not mainly revolve around compliance with current environmental regulation.	5.00	4.75			2.00	4.00			3.00	4.67		
	Average	5.33	5.33			4.00	4.83			4.33	5.33		
	Standard Deviation	0.29	0.52			1.73	0.76			1.15	0.67		
c14	In our company, technology decisions are always influenced by environmental protection concerns.	4.00	4.25	0.580	0.782	3.00	4.50	0.522	0.524	5.00	4.33	-0.200	0.631
c14	In our company, ''quality'' includes reducing our environmental impact on the natural environment.	3.50	4.00			5.00	4.50			0.00	4.67		
c14	Our exploration and acquisition strategies (future expansion) have been influenced by environmental sensitivity concerns.	4.00	2.75			5.00	5.50			5.00	5.33		
c14	Our company has established internal environmental standards as a performance criterion for all our operations.	4.50	5.75			5.00	5.00			5.00	3.33		
	Average	4.00	4.19			4.50	4.88			3.75	4.42		
	Standard Deviation	0.41	1.23			1.00	0.48			2.50	0.83		
c15	In our company, employment decisions are always influenced by environmental concerns.	3.00	2.25	0.945	0.775	3.00	3.00	0.866	0.238	5.00	2.00	-0.995	0.682

c15	All managerial employees in our company are expected to participate in environmental initiatives e.g. annual training, awareness campaigns.	3.50	4.25			5.00	3.50			4.00	5.00		
c15	Operational managers in our company are competent to follow instructions to implementing company environmental goals.	4.00	4.75			4.00	3.00			4.00	4.67		
	Average	3.50	3.75			4.00	3.17			4.33	3.89		
	Standard Deviation	0.50	1.32			1.00	0.29			0.58	1.64		

Results for the sampled Diamond Mining Companies

		Dmd1 Corp Env	Dmd Env Man	Correlation	p-value	Dmd2 Corp Env	Dmd2 Env Man	Correlation	p-value
a1	Our company management decisions are based on a policy of world class environmental leadership.	5.50	4.67	0.000	0.346	3.00	2.00	0.866	0.656
a1	Our company management value the relationship with environmental regulators.	5.00	5.33			0.00	1.50		
a1	Our company management value internal and external leadership w.r.t. International Sustainability Code principles (e.g. ICMM).	6.00	5.33			0.00	1.00		
	Average	5.50	5.11			1.00	1.50		
	Standard Deviation	0.50	0.38			1.73	0.50		
a2	Our company has an active executive environmental leadership portfolio.	6.00	5.33	0.277	0.270	2.00	2.50	0.000	0.815
a2	Our company management provide adequate resources to provide environmental leadership for all our mining activities.	5.50	4.33			1.00	1.50		
a2	Our company management values the leadership role played in ensuring accuracy and efficiency of environmental annual reporting.	5.50	5.67			3.00	1.50		
	Average	5.67	5.11			2.00	1.83		
	Standard Deviation	0.29	0.69			1.00	0.58		
a3	Our company management realise the business value of environmental leadership.	5.49	4.67	0.866	0.061	2.00	1.00	0.500	0.230
a3	Our company management believe that environmental leadership will provide a competitive advantage in the market place.	5.50	5.33			3.00	2.00		
a3	Our company management believe that there is a business case (cost/value benefit) for environmental leadership.	5.50	5.00			2.00	2.00		
	Average	5.50	5.00			2.33	1.67		
	Standard Deviation	0.00	0.33			0.58	0.58		
a4	Our company management has a strategic will to act on environmental compliance commitments.	5.50	3.00	0.277	0.159	6.00	2.00	-0.500	0.456
a4	Environmental leaders (managers) are involved in the operational/business strategy of the business units in our company.	5.49	3.67			0.00	2.50		
a4	Our company management realise the brand value of leadership in triple-bottom-line reporting.	5.50	5.67			4.00	1.00		
	Average	5.50	4.11			3.33	1.83		
	Standard Deviation	0.00	1.39			3.06	0.76		

a5	Our company management is pro-active in the recommendations of environmental practitioners to implement required environmental technology.	5.00	5.33	0.500	0.795	3.00	1.00	-0.500	0.038
a5	Our company management motivate/reward the achievement of environmental targets (Individual incentive scheme in place).	5.00	5.00			3.00	2.50		
a5	Our company management understand what the absence of environmental leadership would imply for mining activities.	5.50	5.33			4.00	1.00		
	Average	5.17	5.22			3.33	1.50		
	Standard Deviation	0.29	0.19			0.58	0.87		
b6	Our company makes a concerted effort to involve every manager in understanding the importance of environmental protection.	5.50	4.00	0.977	0.678	4.00	2.50	0.982	0.341
b6	Environmental protection is a high-priority activity in our company.	5.50	4.67			2.00	2.00		
b6	It is difficult for our company to be successful and protect the environment at the same time.	1.50	1.67			6.00	3.50		
	Average	4.17	3.44			4.00	2.67		
	Standard Deviation	2.31	1.58			2.00	0.76		
b7	Our company has a clear policy statement urging natural environmental awareness in every area.	6.00	4.67	-1.000	0.214	4.00	5.50	1.000	0.808
b7	It is our company's mission to be a leader in environmental protection in our industry.	5.50	5.33			1.00	1.00		
	Average	5.75	5.00			2.50	3.25		
	Standard Deviation	0.35	0.47			2.12	3.18		
b8	Preserving the environment is a central corporate value in our company.	5.50	5.00	1.000	0.279	4.00	2.50	0.982	0.341
b8	Our company has a responsibility to protect the natural environment.	5.50	5.67			6.00	3.50		
b8	Environmental protection is vital to our company's survival.	5.50	5.00			2.00	2.00		
	Average	5.50	5.22			4.00	2.67		
	Standard Deviation	0.00	0.38			2.00	0.76		
b9	Our company's responsibility to its stockholders and employees is more important than our responsibility toward environmental protection	5.50	3.67	0.945	0.532	3.00	6.00	-0.500	0.457
b9	In our company profits are not more important than our environmental activities.	2.00	1.67			6.00	5.50		
b9	Our company management evaluate our environmental efforts by their economic benefits to our company.	5.50	4.67			6.00	6.00		
	Average	4.33	3.33			5.00	5.83		
	Standard Deviation	2.02	1.53			1.73	0.29		

b10	The long term financial well-being of our company depends on the state of the natural environment.	2.00	2.33	0.982	0.332	4.00	5.50	-0.786	0.456
b10	The natural environment does currently affect our company's business activities.	2.50	3.00			5.00	1.50		
b10	In our company, environmental protection is not only an issue of maintaining a good public image.	3.00	4.33			4.00	3.00		
	Average	2.50	3.22			4.33	3.33		
	Standard Deviation	0.50	1.02			0.58	2.02		
c11	Our company has integrated protection of the natural environment into our strategic planning process.	5.49	4.67	0.500	0.003	4.00	2.50	0.866	0.155
c11	Our company is engaged in constant planning and processes that minimize environmental impacts of projects on the natural environment.	5.50	4.67			4.00	3.50		
c11	Environmental issues have been integrated into all functional areas of our business.	5.50	5.00			3.00	1.50		
	Average	5.50	4.78			3.67	2.50		
	Standard Deviation	0.00	0.19			0.58	1.00		
c12	At our company, we link environmental objectives with our other corporate goals and strategies.	5.50	5.00	-0.500	0.091	2.00	3.00	-0.500	0.349
c12	Environmental issues are always intently considered when we develop new projects.	5.00	5.00			4.00	1.00		
c12	Environmental issues are always considered when we discuss strategic business plans in our company.	5.50	4.67			2.00	1.00		
	Average	5.33	4.89			2.67	1.67		
	Standard Deviation	0.29	0.19			1.15	1.15		
c13	We emphasize the environmental protection aspects of our operations in our annual reports.	5.50	5.00	-0.866	1.000	2.00	3.00	0.961	0.916
c13	Our company must be accountable for the way our mining actions affect the natural environment.	5.50	4.67			6.00	6.00		
c13	Our company's environmental efforts do not mainly revolve around compliance with current environmental regulation.	4.00	5.33			5.00	4.50		
	Average	5.00	5.00			4.33	4.50		
	Standard Deviation	0.87	0.33			2.08	1.50		
c14	In our company, technology decisions are always influenced by environmental protection concerns.	5.50	5.00	0.302	0.468	2.00	3.00	-0.970	0.279
c14	In our company, ''quality'' includes reducing our environmental impact on the natural environment.	5.00	4.67			3.00	3.00		
c14	Our exploration and acquisition strategies (future expansion) have been influenced by environmental sensitivity concerns.	5.00	5.33			6.00	0.50		
c14	Our company has established internal environmental standards as a performance criterion for all our operations.	5.50	5.33			3.00	2.50		
	Average	5.25	5.08			3.50	2.25		

	Standard Deviation	0.29	0.32			1.73	1.19		
c15	In our company, employment decisions are always influenced by environmental concerns.	4.00	4.33	0.866	0.738	1.00	1.00	-0.058	1.000
c15	All managerial employees in our company are expected to participate in environmental initiatives e.g. annual training, awareness campaigns.	6.00	5.00			2.00	4.50		
c15	Operational managers in our company are competent to follow instructions to implementing company environmental goals.	5.00	5.00			4.00	1.50		
	Average	5.00	4.78			2.33	2.33		
	Standard Deviation	1.00	0.38			1.53	1.89		

7.3 PUBLISHABLE ARTICLE

In this section, the empirical part of the research study is reformatted into a draft publishable article. The essence of the literature review related to corporate environmentalism and its constructs are presented and but the major focus is on the methodology, findings, conclusions and recommendations of the research. (The article however only includes the findings on the industry and sector level and not on the sub-construct specific level as this warrants another article). The article is 23 pages in length.

The state of corporate environmentalism in the South African JSE listed Gold, Platinum and Diamond mining companies.

S.J. van Wyk.

Unisa Graduate School for Business Leadership

Abstract

This paper examines the importance of corporate environmentalism – the process by which company management integrates environmental concerns into their business decisions – in the South African JSE listed gold, platinum and diamond mining industries. The importance of the constructs of corporate environmentalism for company management of the sample mining companies was tested by posing a structured questionnaire to corporate environmental managers and functional environmental managers of the participating companies. Three main constructs comprising of environmental leadership importance, environmental business orientation and environmental strategy focus were evaluated.

From the results it was clear that the degree of corporate environmentalism was company specific for the different mining companies tested. The sample companies identified the strongest with the statements comprising the elements of environmental leadership importance and the hypothesis testing the importance of this construct was accepted based on the industry data. The managerial buy-in into environmental business orientation still proved to be challenging for most of the companies as supported by the hypothesis relating to its importance being rejected. Although the importance of environmental strategy seems to gain some momentum, the hypothesis relating to its importance was also rejected. Of concern was the fact that the majority of the participants were only in 'mild agreement' with most of the statements comprising the constructs implying that company management has not yet fully bought into the business value of environmental management and is only responsive to the regulatory and reputational risks assigned to environmental matters. Further research should focus on the views of operational personnel on corporate environmentalism and the reason for the company specific orientation of corporate environmentalism should also be investigated.

1. Introduction

There is an increasing awareness that the attitudes and actions of business leaders and managers play a crucial role in determining environmental responsibility outlook of mining companies (Brown and Karagozoglu, 1998). Given the complexity of regulatory, shareholder and community pressure facing the mining industry, it is important to understand how company leadership in mining companies interpret the relationship between the biophysical environment and their business objectives and how environmental management is currently applied by company management to add value to business strategy and performance.

Although there is a marked improvement in environmental awareness and reported progress in meeting environmental milestones, it is still widely acknowledged by industry and stakeholders that progress in environmental optimization is rather slow (Warhurst and Noronha, 1999). Environmental incidents still frequent environmental audit reports of mining companies and there is a need for drastic rather than incremental change to raise the bar in environmental conformance. This change in business approach of mining companies has been largely motivated by significant alterations in the external environment of market systems in South Africa over the past decade which mainly included increased regulatory force, stricter shareholder requirements and public pressure for environmental concern. The environmental playing field has therefore undoubtedly changed for mining companies and the implication of a lack of environmental performance has become a significant business risk as the violation of mining permits can lead to the shutdown of operations and associated environmental fines, which could tarnish the public image of the company and result in decreased investor confidence.

The question needs to be asked though to what extent has management of mining companies valued corporate environmentalism and to what extent they have adapted their business approach to influence mining operations to act in an environmentally responsible way. The business case for corporate environmentalism, whereby the cost saving elements of environmental optimization is pursued, and the importance of environmental initiatives to shareholder value is also unclear and the paradigm of company management pertaining to these elements should be understood to determine

the degree of buy-in into the value of environmental management. Furthermore, environmental concerns need to be translated into strategy if corporate greening is to occur (Coddington, 1993) and therefore these changes in market forces should be incorporated into corporate business strategies.

According to Banerjee (2002), corporate environmentalism is one way in which businesses can address environmental matters. Corporate environmentalism can be defined as the recognition and integration of environmental concerns into a company's decision-making process.

This construct has been formalised and tested for several industries (Gladwin *et al*., 1995; Shrivastava, 1995a; Ramus, 2002; Banerjee, 2002) but the mining industry has not been included in these previous studies. Therefore this study assessed the state of corporate environmentalism in the JSE listed mining companies of South Africa. The objectives of this study were:

- To provide a theoretical overview for corporate environmentalism and to apply its principles to the context of responsible management of mining companies.
- To test hypothesis regarding the importance of environmental leadership, environmental business orientation and environmental strategy focus for company management of selected JSE listed mines.
- To empirically determine and evaluate the importance of the sub-constructs of corporate environmentalism.

2. Literature review and hypothesis development

Corporate environmentalism provides the academic interface for environmental leadership and environmental strategy which can be defined on a high level as the leadership provided for the recognition and integration of environmental concerns into a company's strategic decision-making processes. Banerjee (2002) points out that the construct of corporate environmentalism is founded in environmental business orientation and environmental strategy focus. The contribution of environmental leadership importance to drive the goals of corporate environmentalism was however acknowledged from the extant literature on the subject and added as part of the foundation for this study.

The complexity of environmental issues facing the mining industry requires a holistic understanding to how decision-makers responsible in a mining organization interpret the relationship between the biophysical environment and their organization and what factors influence their environmental strategies and actions. Corporate environmentalism provides a potential platform to change existing ways of environmental thinking in organizations and organizational members are important agents of change in this process and therefore a contribution in the field of mining with regards to this construct will add considerably to assess the value of environmental business leadership in this industry. Starik and Rands (1995) have asserted that senior managers have helped to develop and implement environmental leadership strategies in several types of companies. Thus, understanding how managers interpret environmental issues facing their mining company is an important step in attempting to understand the development of pro-corporate environmentalism behavior as it is the attitudes and behaviour of managers that will shape corporate behavior and buy-in into environmental protection priority paradigms (Smith, 1991).

Currently the leadership direction for environmental performance of multinational mining companies hinges around environmental commitments required by the regulatory and stakeholder environment. These commitments are based on corporate governance views, local environmental legislation, internal operating standards and participation in Global Sustainability Initiatives e.g. the JSE Sustainability Reporting Initiative (prerequisite to be noted on stock exchange) and the International Council for Mining and Metallurgy (ICMM) sustainability code. Secondly operational environmental management systems (e.g. ISO14001) are widely acclaimed systems embedded within the requirements of the above mentioned codes and provide the basis for the implementation of the codes. Mainly three pathways are followed to optimise environmental performance which is 1) environmental policies with a moral and ethical appeal for sustainable development driving corporate governance and guiding the environmental objectives and continual improvement requirements. These are measured and maintained through 2) an environmental management/reporting system and regulatory defined indicators and channeled through 3) public reporting to highlight comparative environmental achievements (FTSE_4_Good, 2008).

The preferred channel how corporate environmentalism is currently incorporated into business plans and company strategies are through institutionalised environmental management channels. These dedicated environmental organisational entities provide leadership and technical input into the functional and corporate structures of the company. This alignment has largely happened in the South African mining industry but is mainly systems orientated, leaving the contribution to business strategy and ultimately business value rather inert. It is therefore only through a concerted leadership drive and strategic focus that the concept of corporate environmentalism can be included in the operating domain of companies (Holliday *et al.,* 2002).

As corporate environmental leadership requirements are qualified in relation to the results interface of this systemized approach (Hermanus, 2007), the question should be asked what the business value of these environmental protection initiatives are as corporate influence and decision-making is often driven by bottom-line value. The various components of environmental systems which are deduced in the sustainability codes are however extremely complex and corporate leadership do not always take account of the dynamic relationship between the components inherent to the systems.

This complexity can only be promoted by environmental management portfolio groups and it can therefore be hypothesized that the value of the system can be optimised through the managers operating within the corporate structure which can inform the nature of the dynamic environmental relationships. The question should therefore be asked how corporate environmental managers influence corporate decision-making and how the complexity of mining environmental management is conveyed to get the desired environmental focus of company's executive boards. The sustainability of a forced environmental ideology can also be questioned and therefore the value drive behind environmental protection initiatives - whether it is simply carried out as a result of regulatory force and stakeholder expectation, or if it is included as part of the business strategy of the company to reduce cost and gain competitive advantage – should be understood in more detail to outline the bottom-line value of corporate environmentalism.

It is essential for mining companies to apply their business acumen and resources to achieve alignment of environmental management goals and production targets in a cost effective and sustainable way (Warhurst, 1999). To be realistic however, it should be acknowledged that leadership towards environmental protection should be exercised both within the environmental systems and the business sphere and for effective corporate environmental management, these two constructs should be aligned. Both of these constructs are characterized by their inherent components and the complexity of decision-making sets in when the dynamics of the components of the constructs are interfaced (Hermanus, 2007). This alignment starts with corporate leadership and goals and then permeates down to other levels of system operation. The question however is what constitutes the middle ground of alignment between the environmental systems requirements and the business sphere, and according to Banerjee (2002), it should be pursued within the framework of corporate environmentalism.

The corporate environmentalism management framework consists of three pillars namely environmental business leadership, environmental business orientation and environmental strategy focus.

Environmental leadership lies at the heart of corporate environmental responsibility which should drive corporate environmental policy, influence environmental value systems, promote the business case of compliance with regulatory environmental objectives, ownership of the implementation of environmental protection procedures and monitor environmental performance trends. A new breed of environmental leaders is emerging to address the complexities of mining and the environment (Knights & Morgan, 1992). These environmental leaders, corporate or individual, infuse their desire to protect the natural environment into their strategic decision-making and action processes. The strategy formulation process often becomes the opportunity for individual organizational members (e.g., top management) to state their convictions and influence the future direction of the organization or exert their “corporate strategic leadership” (Knights & Morgan, 1992). Therefore, because top managers set company strategies and allocate resources, they often are the crusaders of an organization’s environmental leadership initiative. Flannery and May (1993) asserted that leading

environmentally orientated companies go beyond environmental regulations; they assume a stewardship orientation toward the natural environment. Types of pro-environmental leadership activities demonstrated by these firms include: Protection of the biosphere; Sustainable natural resource use; Reduction of waste; Marketing of safe products, processes and services; and assessment and annual environmental audits of their operations.

Environmental leadership is also required to provide strategic direction to unlock the efficiency of the required systems and to manage beyond the set systems to the ultimate advantage of the natural environment.

The question is whether and how environmental business leadership influences organizational strategy and operational activities. Some explanation is provided by corporate environmentalism and subsequently environmental leadership paradigms provide further insights into the leadership approach required to influence environmental responsible business practices in mining.

The following hypothesis will therefore be tested:

> Hypothesis 1: Environmental leadership is important for company management of mining companies.

Banerjee (2002) asserts that environmental business leadership in an organisation cannot exist without **environmental business orientation**. Environmental business orientation refers to the notion of responsibility toward the environment, the importance of recognizing the impact a company has on the environment, and the need to minimize such impact through focussed business decisions. Environmental orientation is a corporate value, akin to corporate environmental/ social responsibility. It involves respecting and caring for the environment and being responsive to external stakeholders as well as being good corporate citizens. Shrivastava (1995) have identified two sub-themes of environmental business orientation of which the first focuses on the company's outflow of internal values, standards of ethical behaviour, and commitment to environmental protection. This theme highlights an environmental orientation that is internally focused often reflected by environmental mission statements that appear in the company's annual reports. The second theme reflects managers' perceptions of external stakeholders and the need to respond to stakeholder interests. Sustainable

development, protecting the environment for future generations, responsibility to the community and to society, and the need for a positive company image are elements that constitute this theme (Gladwin et al., 1995; Hart, 1995). Cliff and Wright (2000) state that companies in industries with low environmental business orientation will start to face a competitive disadvantage if stringent environmental regulation burdens them with higher compliance costs –relative to total production costs- than other industries. This is a challenge that specifically the mining industry faces.

The following hypothesis will therefore be tested:

> Hypothesis 2: Environmental business orientation is embedded in business decisions of company management of mining companies.

Environmental strategy focus reflects the degree of integration of environmental issues into the strategic planning process of a company. The level of strategy focus in companies can differ and some companies integrate environmental issues at higher levels of strategy than other. One of the main driving forces behind strategic environmental thinking is the change in the external environment that and companies were forced to some degree to integrate environmental issues into their strategic planning process. Among the strategic actions influenced by environmental concerns are new product development, location of new exploration or manufacturing areas, increased R&D investments, technology development (especially in pollution prevention and waste management), and changes in product and process design.

Product-market decisions are also driven by environmental concerns in companies with a higher level of environmental strategy focus. By developing new processes that are less environmentally damaging, companies can take advantage of the growing market for environmentally responsible products and services (Dechant and Altman, 1994). Significant cost advantages can result from environmental improvements such as superior waste management, use of cheaper recycled raw materials, and pollution prevention which limits the costs of compliance with environmental regulations (Smith, 1991). Thus, higher levels of strategic focus can result in what Shrivastava (1995) calls ‘‘ecologically sustainable least-cost strategy’’ and ‘‘ecologically sustainable niche strategy’’ to achieve competitive advantage.

As company management decide upon an environmental strategy, managers need to evaluate how it will affect their long-term competitive positioning. Competitive priorities such as cost and quality can be endangered as a result of environmental pressures (Epstein, 2008). Further, the pursuit of a particular priority may affect the type of environmental standard it will adopt. For example, in the case of cost leadership, cost-driven firms may be less likely to invest in new, cleaner technologies. Some will have already invested in highly specialized and expensive production equipment and may be unwilling to re-invest in newer technologies to raise local environmental standards to an unnecessary and constraining global corporate level. Companies pursuing a differentiation strategy may on the other hand wish to raise environmental standards to a global corporate level as environmental products can be perceived as products of higher quality (Epstein and Roy, 1997a). Raising local standards to a global environmental standard often results in both improved corporate environmental performance and improved worldwide image whereas meeting the lowest legal limit in a country may result in negative market reactions.

Companies with a higher environmental strategy focus tend to have well developed frameworks for addressing these environmentally strategic related issues (Judge and Douglas, 1998). Thus, a study into the field of corporate environmentalism as a strategic issue should be based on managerial perceptions of the strategic importance of environmental issues as well as the level of integration into strategy (Banerjee 2002).

The following hypothesis will therefore be tested:

> Hypothesis 3: Environmental strategy focus is an important part of business management for company management of mining companies.

The question should therefore be asked how these dynamic constructs crystallize in the South African mining industry on a corporate and functional level and how these aspects are incorporated into corporate business strategies of mining companies. This can only be achieved by understanding the management approach whereby mining businesses address environmental issues and can provide a contribution towards influencing corporate strategy and changing environmental behavior of these companies.

3. The study

3.1 Scale and compilation of the survey

The respondents for this study comprised the corporate environmental managers (CEMs) and functional environmental managers (FEMs) of JSE listed (Sustainability Reporting Index committed) gold, platinum and diamond mining companies (referred to as "sample companies" for the remainder of the paper).

The participants of this study had at least two years experience in their role and also required a tertiary education in environmental management to form part of the survey. Three Gold mining companies, three Platinum mining companies and two Diamond mining companies formed part of this study. A total of 34 Participants from 8 mining companies took part in the study (11 corporate environmental managers and 24 functional environmental managers comprised the population). These companies represented 34% of the mining market capitalisation in South Africa.

A structured questionnaire (45-item questionnaire used a 7-point Linkert-type scale) was compiled from the extant literature on corporate environmentalism and participants had to answer questions regarding their company management's view on the sub-constructs of this subject. The sub-constructs tested are summarised in Table 3.1.

Table 3.1: Summary of the sub constructs of corporate environmentalism

Environmental leadership importance	1) Commitment and compliance to environmental policy, 2) Resource adequacy, 3) Business case, 4) Environmental leadership involvement, 5) Implementation of environmental recommendations)
Environmental business orientation	6) Accepting ownership and responsibility, 7) Environment taken into account in business decisions, 8) Environmental values entrenched in decisions, 9) Profit orientation despite environment, 10) Environmental ignorance.
Environmental strategy focus	11) Integration of environment into strategy, 12) environment part of corporate goals, 13) importance of environmental performance recognised, 14) strategic value of world class environmental performance, 15) environmental competence as strategic asset.

A condensed questionnaire is included in the Annexure to this paper.

3.2 Data Analysis

The results were assessed on construct, sub-construct, managerial and industry level. Firstly, One-way ANOVA analysis was conducted on the average responses on the industry level for the two managerial levels. This was done to test for the hypothesis that the constructs were important for company management as revealed by the responses of the Corporate and Functional environmental managers.

Following this analysis, the variation in the means of the responses presented by the degree of statistical significance in the population is investigated in depth by means of post-hoc testing on mining sector level. For the purpose of this analysis and interpretation, all questions marked as UNSURE (4) in the first analysis were assigned a 0 as uncertainty about the questions on this managerial level is unexpected for companies that are committed to world class environmental performance. Therefore the revised range of agreements for the second analysis is as follows:

0 – Unsure 1 – Strongly Disagree 2 – Disagree 3 – Mildly Disagree
4 – Mildly Agree 5 – Agree 6 – Strongly Agree

The correlation between the responses within companies was also established as a control measure for the consensus on the constructs for company management.

4. Empirical Results and Discussion

4.1 Industry wide results

To understand the importance of corporate environmentalism for company management of mines the responses from all 34 participants to the 45 questions were aggregated and are presented in Table 4.1. A data summary for the average responses to each of the sub-constructs per sample company is also presented in the Annexure to this paper.

As an introduction it should be stated that the combined data reveals ‘Agreement’ as the main response category whilst construct specific analysis reveals ‘Mild agreement’ as

the main response category. Therefore it is imperative to report on the data on a commodity and company specific level to ensure that the results pertaining to this study is not skewed.

From the combined results it is clear that on a high level, both Corporate Environmental Managers (CEMs) and Functional Environmental Managers (FEMs) agreed to the importance that company management attach to corporate environmentalism with 78% of the answers being in agreement with the posed statements. The two levels of management 'strongly agreed' to 35% of the questions whilst 23% of the questions were 'mildly' agreed to. Of concern was the 'disagreement' and 'mild disagreement' of 9.2% respectively as the questions were structured to reveal positive affirmation for good environmental acceptable practice. Of note also is the p-value lower than 0.05 indicating that there was significant variance in the responses between companies.

Table 4.1: Combined data summary for the importance of corporate environmentalism for managers on an industry front.

		Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Managers	Average	1.11	8.82	9.33	3.18	23.82	35.98	17.76
	Stdev.	0.87	3.26	1.27	0.40	2.32	4.09	0.24
Environmental Managers	Average	5.07	9.76	9.15	4.40	22.73	34.44	14.44
	Stdev.	1.40	2.18	1.31	0.65	5.92	1.91	2.22
Combined	Average	3.09	9.29	9.24	3.79	23.28	35.21	16.10
	Stdev.	2.41	2.53	1.16	0.82	4.07	2.98	2.30
Summary			Disagreement 21.6				Agreement 78.4	
Descriptive statistics	P-value			<0.001*				

* Significant difference between the companies on this construct.

The results regarding the degree to which company management has bought into environmental leadership importance, environmental business orientation and environmental strategy focus is further discussed. The data in Table 4.2 depict the combined data relating to each of the sub-problems for this study.

From the data presented in Table 4.2 it is clear that on an industry level, company management of mining operations have acknowledged the environmental implications for their business but only mild agreement towards the valuation of corporate environmentalism could be established from the respondents.

Table 4.2: Combined data summary for the sample companies tested for each sub-problem.

		Environmental Leadership Importance	Environmental Business Orientation	Environmental Strategy Focus
Corporate Env. Manager	Average	4.61	3.70	4.25
	Stdev.	0.77	1.15	0.86
Environmental Manager	Average	3.61	3.83	4.04
	Stdev.	0.77	1.01	0.98
Combined result	Average	4.11	3.76	4.15
	Stdev.	1.07	1.08	0.92
Descriptive Statistics	Correlation	-0.43	0.71	0.65
	p-value	0.868	0.000*	0.002*

* Significant difference between the companies on this construct

The Corporate Environmental Managers (CEMs) for all the companies testified stronger towards the importance of environmental leadership for company management than the Functional Environmental Managers (FEMs) did. This could perhaps be ascribed to bias from the CEMs responses as a weak negative correlation was established between the opinions of the two managerial levels which indicate opposing views towards the importance of environmental leadership. The CEMs mostly 'agreed' with the questions testing this hypothesis whilst the FEMs were only in 'mild agreement'. On average the data present only 'mild agreement' with the importance of environmental leadership for company management of mines.

No significant variation in responses of the populations could be established when all the data was analysed by means of One-way ANOVA testing for environmental leadership importance. As the p-value generated was higher than 0.05 (<95% confidence), the hypothesis that environmental business leadership is important for company management of mining companies is accepted.

It should be qualified though that sector and company specific analysis must be carried out in order to reveal the importance for the respective categories.

Assessing the data presented on Environmental business orientation on an industry basis it appears that this construct has received the least buy in from the sample companies compared to the other two constructs (Table 4.2). This should also be qualified as sector and company specific but from the correlation of 0.71, there is consensus from all the CEM's and FEMs that they are only in 'mild agreement' that their company management is orientated to environmental matters in their business roles.

Large variation in responses was however encountered as resembled by the p-value (of less than 0.001) indicating that the hypothesis that company management is orientated towards the environment in their business decisions should be rejected.

FEMs were however more in 'mild agreement' than were CEMs for this construct indicating that there is slightly more buy-in into environmental business orientation on ground level than on corporate level on an industry basis. This might be ascribed to the focus on ground level to save costs and evade financial penalties in order to increase profits whilst the focus on corporate level might be more on parenting and governance issues.

The data presented in Table 4.2 once again only indicate 'mild agreement' towards the focus on environmental matters in strategic business decisions by company management. CEMs however felt more involved in strategic planning than did FEMs and an acceptable positive correlation were established between the opinions of the CEMs and the FEMs (0.65). There was once again large variation encountered in the responses to this construct and between sectors and companies that the hypothesis that mining company management is strategically focussed on the environmental implications of their decisions can be rejected.

A p-value of less than 0.0025 was generated through One-way ANOVA testing indicating that there are significant differences in the responses towards this construct by the respondents.

It appears that despite the pressure for improved environmental performance on mines, the application of corporate environmentalism hasn't yet matured in the culture of company management and therefore buy-in into the business value that this construct can add appears to be rather low. Corporate environmentalism is therefore included in business leadership, orientation and strategy, but not to the level where it is a central part of corporate decisions or competitive strategy. It can be speculated that it is rather regulatory compliance orientated and not yet based on an internal value system.

4.2 Mining sector results

Environmental Leadership Importance per sector

On average, CEMs agreed to the importance of environmental leadership by company management to a larger extent than FEMs. FEMs were on more occasions inclined to 'mild agreement', 'Disagreement' and even 'Strong disagreement' (Table 4.3). Large variation in responses was however encountered for the responses from the tested managerial levels for this sub-problem as a p-value of less than 0.05 was encountered.

Table 4.3: The combined result for environmental leadership importance on an industry front as revealed by the sampled companies.

Environmental leadership		Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Managers	Average	0.61	5.45	7.88	3.03	25.45	40.00	17.58
	Stdev.	1.36	4.98	4.60	3.71	5.91	3.95	5.83
Environmental Managers	Average	6.09	7.25	7.83	3.77	29.57	32.75	12.75
	Stdev.	3.30	3.69	3.78	3.49	4.98	6.77	2.79
Combined	Average	4.31	6.67	7.84	3.53	28.24	35.10	14.31
	Stdev.	2.03	4.01	2.50	2.46	4.67	5.34	3.30
Descriptive Statistics	P-value				<0.001*			

* Significant difference between the companies on this construct.

It can also be derived from the data that environmental leadership importance should be investigated more in depth and cannot be accounted for on a generalised basis. Therefore the responses per sector for this sub-problem are outlined in Table 4.4.

From the data depicted in Table 4.4 it is evident that there was neither good correlations between the responses of the tested managerial levels and no large variation could be encountered in the responses on environmental leadership importance for the distinctive sectors. From the data it is clear that the platinum sector is more in 'agreement' with the importance of environmental leadership to their company management than the gold and to a lesser extent the diamond mining sectors. The CEMs of the gold and diamond mining industries do believe that environmental leadership is important but the FEMs of these sectors are less convinced. Of concern however is that the average response was 'mildly agree' where one would expect more positive response from JSE listed companies on this matter. Of even more concern is the average response from the FEMs of the diamond mining sector who 'mildly disagreed' with this statement indicating that environmental leadership is not as important for their company management on operational level as it should be.

Table 4.4: The combined response data ordained per mining sector tested for environmental leadership importance.

Environmental leadership		Gold Sector	Platinum Sector	Diamond Sector
Combined results	Average	4.14	4.41	3.61
	Stdev.	0.75	0.58	1.73
Corporate Env. Manager	Average	4.53	4.29	3.93
	Stdev.	0.79	0.71	1.75
Environmental Manager	Average	3.75	4.53	3.29
	Stdev.	0.44	0.41	1.74
Descriptive statistics	Correlation	-0.195	0.013	0.150
	p-value	0.298	0.653	0.996

These findings imply that although environmental leadership is important for company management as outlined by the hypothesis being accepted, it is a function of sector and company management's internal value system rather than a business necessity. As

there was no correlation between the response levels of management between sectors, this sub-construct should be evaluated on a company specific level. It would however appear that environmental leadership is mostly applied to provide support towards achieving environmental policy objectives and not primarily to drive the business value of environmental management.

Environmental business orientation per sector

Environmental business importance appears to be well supported by company management on an industry level as revealed by the response of more than 36% on both managerial accounts. This data is depicted in Table 4.5.

Table 4.5: The combined result for environmental business orientation importance on an industry front as revealed by the sampled companies.

Business orientation		Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env.	Average	3.03	6.06	9.09	0.00	30.30	36.36	15.15
Managers	Stdev.	5.25	5.25	9.09	0.00	18.92	31.49	5.25
Environmental	Average	1.45	15.94	14.49	2.90	17.39	36.23	11.59
Managers	Stdev.	2.51	9.05	2.51	2.51	7.53	2.51	12.55
Combined	Average	1.96	12.75	12.75	1.96	21.57	36.27	12.75
	Stdev.	1.70	7.40	3.40	1.70	10.33	9.45	6.79
Descriptive Statistics	P-value			<0.001*				

*Significant difference between the companies on this construct.

From the information in Table 4.5 it is evident that a large portion of the 'mild agreement' category by the CEMs is however split over 'mildly disagree and 'disagree' by the FEMs, which is concerning as more than 30% of the FEM responses indicate that company management is with regard to the specific statements not orientated towards the environment in their business decisions. The large variation in response with regards to this construct ($p < 0.05$), however, indicates that the intricacies of this construct should be investigated in more detail as to explain the drivers for the variation. As is outlined in the section to follow, it can most probably be explained by commodity and company specific responses.

Table 4.6 present the data for the combined data for environmental business orientation for the distinctive mining sectors tested. From the data it is evident that the average response to environmental business orientation of management of mining companies was 'mildly agree'. There were good positive correlations established for all three the sectors involved implying that the CEMs and the FEMs that took part in this study had similar opinions on this matter for the specific mining sector.

Significant variance in responses was established for the gold and platinum sector between the combined responses of the two managerial levels sampled with p-values of less than 0.05. The CEMs of the gold sector 'mildly disagreed' with the notion that their company management includes environmental thinking in their business orientation. The CEMs of the diamond industry were mostly in 'agreement' with this construct.

Table 4.6: The combined response data ordained per mining sector tested for environmental business orientation.

Business orientation		Gold Sector	Platinum Sector	Diamond Sector
Combined results	Average	3.60	3.78	4.00
	Stdev.	1.05	1.10	1.10
Corporate Env. Manager	Average	3.41	3.66	4.21
	Stdev.	1.08	1.22	1.09
Environmental Manager	Average	3.79	3.89	3.80
	Stdev.	1.02	0.99	1.12
Descriptive statistics	Correlation	0.685	0.825	0.691
	p-value	0.001*	0.000*	0.471

* Significant difference in the response of the CEM and the FEM on this construct.

The findings for environmental business importance indicates that the state of environmental business orientation in mining might be more a function of the culture and nature of the business rather than the company specific traits, although the variation in response in the gold and platinum sector warrants further investigation towards company specific orientation.

It can further be argued that that environmental business orientation is a function of the leadership and internal values drive. Therefore the hypothesis that company management is orientated towards environmental matters in their business roles has

been rejected. It would also appear that management in general is still more profit orientated despite the potential impact on the environment and that company management is not willing to take ownership of their responsibility towards environmental decision-making. Therefore there is reliance on environmental leadership to guide decision-making according to regulatory and policy requirements as outlined by the high value of en environmental leadership approach.

Environmental strategy focus per sector

The inclusion of environmental issues in company strategy in the mining industry appears to be more important for company management from the CEMs response compared to that of the FEMs. The data on this construct is presented in Table 4.7. The data further reveals that the FEMs Strongly disagreed as with environmental leadership importance on some of the statements that tested company management buy-in on this construct. The CEMs also 'mildly disagreed' and 'disagreed' to the same extent, but no 'strong disagreement' was encountered. As with the other two preceding sub-problems tested, significant variation was found in the responses as indicated by the p-value which is lower than 0.05. To understand the reason for the variation, the constituents of the sub-problem will be analysed in more detail.

Table 4.7: The combined result for importance of environmental strategy focus on an industry front as revealed by the sampled companies.

Strategy focus		Strongly Disagree	Disagree	Mildly Disagree	Unsure	Mildly agree	Agree	Strongly Agree
Corporate Env. Managers	Average	0.61	11.97	9.85	2.88	24.85	31.82	18.03
	Stdev	1.36	6.44	4.22	2.17	10.37	6.94	5.58
Environmental Managers	Average	5.65	11.16	9.20	4.35	19.49	36.52	13.62
	Stdev	3.26	4.63	2.94	3.55	4.89	5.06	9.20
Combined	Average	4.02	11.42	9.41	3.87	21.23	35.00	15.05
	Stdev	2.56	4.57	2.15	2.80	6.40	4.77	7.64
Descriptive Statistics	P-value				<0.001*			

* Significant difference between the companies on this construct.

Table 4.8 present the data for environmental strategy focus for the distinctive mining sectors tested. The platinum sector has comparatively ascribed more to the inclusion of

environmental issues as part of business strategy than the other two sectors included in this study as they are more in 'agreement' with this construct. On average, the platinum sector is more in 'agreement' on both levels of management compared to the other two sectors. There was however only a good correlation between the opinions of the respondents from the diamond sector. Significant variances were encountered in the responses from the gold and platinum sectors (p-values of less than 0.05) and the reasons for these findings should be further investigated.

From the information depicted in Table 4.8 it is also evident that the CEMs of the gold and diamond sectors were more in 'agreement' with their company management's environmental strategy focus compared to the FEMs of these sectors.

Table 4.8: The combined response data ordained per mining sector tested for environmental strategy focus.

Strategy focus		Gold Sector	Platinum Sector	Diamond Sector
Combined results	Average	3.92	4.46	4.02
	Stdev.	0.86	0.58	1.27
Corporate Env. Manager	Average	4.11	4.39	4.26
	Stdev.	0.89	0.59	1.15
Environmental Manager	Average	3.73	4.52	3.78
	Stdev.	0.81	0.59	1.39
Descriptive Statistics	Correlation	0.387	0.407	0.934
	p-value	0.001*	0.002*	0.781

* Significant difference in the response of the CEM and the FEM on this construct.

Environmental strategy focus is often a function of good governance rather than strategic incentive. It would appear that the strategic contribution of environmental management to mining companies still need to be proven in order for company management to take note of the advantages that can be generated.

This finding supports the hypothesis being rejected that mining company management is strategically focussed on the environmental implications of their decisions. The challenge with this process is the long time-frames involved in obtaining concrete results and therefore, the internal value system of company management will remain the benchmark for both the short and long term corporate environmentalism standard.

5. Conclusion, limitations and future research

The era of corporate environmentalism has dawned in the South African mining environment. The elements of corporate environmentalism were therefore found to be widely acknowledged, although some of the constructs proved to be more alive in certain industries and companies than others. The main constructs comprising the basis for this study has been identified as environmental leadership importance, environmental business orientation and environmental strategy focus. These constructs were found to be extremely intertwined and present some complex management issues for mining companies.

It was evident from the extant literature that the degree of corporate environmentalism in a company is a function of the values of company management (Knights and Morgan, 1992; Gladwin, 1993; Egri and Frost, 2000). Therefore the effort and focus on environmental matters will be determined by the drive from company executives and senior leaders. The industry and company culture is also a main contributor to how the environment is perceived and how the priorities of corporate environmentalism will be lived up to. It would therefore appear that although environmental leadership is in place, its business value is not yet acknowledged and therefore several challenges can be encountered in lobbying and implementation of corporate environmentalism.

From the empirical study the hypothesis that environmental leadership is important for company management was accepted whilst the hypothesis that company management is environmentally orientated in their business decisions and that the natural environment forms part of their strategic focus have been rejected. The buy-in and deployment of the sub-constructs of corporate environmentalism was found to very company specific although there were definite trends in company and industry responses. It was further evident that the sampled mining companies only ‘mildly agreed’ that corporate environmentalism was viewed as a strategic pillar by company management. Furthermore, the sampled managerial levels ‘agreed’ that focussed leadership is required for improved environmental performance but they only ‘mildly agreed’ to the importance of environmental management for corporate strategy decisions and excellence in business orientation.

One would however expect in this time of increasing environmental pressure that company management would assign higher priority to the elements of corporate environmentalism. Comparatively, the Platinum mining sector outshined both the Gold and Diamond mining companies regarding the importance of corporate environmentalism. It would however be too much of a generalisation as the construct importance should be discussed on a company specific basis. The data suggested that the platinum sector might have been much more attentive towards environmental matters as a result of the late environmental legislation that was introduced in the last decade to which the platinum sector had to adhere to during its expansion phase.

As this study is representative of 34% of the market capitalisation of the South African JSE listed mining companies, the findings could be extrapolated to the broader mining industry that ascribes to the principles of the JSE Sustainability Reporting Index.

It was also clear from the analysis technique applied for this research (Analysis 1 and Analysis 2), company that specific analysis is required as industry wide interpretation proved to be too inaccurate. Although trends could be derived, broad analysis through Analysis 1 often presented favourable results, skewing the true state of affairs. Analysis 2 presented a more accurate representation of the tested constructs.

Some limitations regarding this research have been identified and included the lack of response from some of the individuals on the functional environmental and industry level. The level of interpretation of constructs also presents some research limitations. As some of the constructs are rather technically inclined and also focus on access to information that are not necessarily readily available, respondents could either not have knowledge on the meaning of the construct or could have guessed as to what they should answer in the interest to fill out the questionnaire. The available literature on mining and corporate environmentalism was also a limiting factor for the research. Most of the work on this construct has been conducted on other industries, which mainly operated on a smaller scale and in medium and low risk environmental impact categories. Therefore, although the principles of environmental leadership, business orientation and strategy focus remain the same, the lack of industry specific case studies

and the literature base on implementation of corporate environmentalism was identified as a limitation.

It is was therefore evident from this study that various knowledge gaps still exist pertaining to corporate environmentalism in general and specifically related to mining. Firstly, the reason why the corporate and functional environmental managers in the companies in this study only 'Mildly agreed' on average should be determined. Only then can a better understanding be gained of the real drivers of corporate environmentalism in the mining environment. Secondly, the importance of corporate environmentalism should be established on the operational management levels of the mine and should include the views of the mine manager, engineering managers and technical managers. The views of the board members of mining companies should also be tested and a comparison between the perceptions of these management levels and that of the environmental management levels can provide insights into the real buy-in into the value of corporate environmentalism. On a more holistic level, the real contribution of corporate environmentalism to shareholder value should also be pursued in order to determine the real incentive for environmental management – whether it is only hinging around ethics or if there is a proven short term business case for the implementation thereof.

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Paper Annexure

Questions composing the sub constructs for the study

Environmental Leadership Importance

Construct	Question1	Question2	Question3
Environmental commitment and compliance is important for managers.	Our company management decisions are based on a policy of world class environmental leadership.	Our company management values the relationship with environmental regulators.	Our company management value internal and external leadership w.r.t. International Sustainability Code principles (e.g. ICMM).
Environmental resources are adequate to reach the organisational environmental objectives.	Our company has an active executive environmental leadership portfolio.	Our company management provide adequate resources to provide environmental leadership for all our mining activities.	Our company management values the leadership role played in ensuring accuracy and efficiency of environmental annual reporting.
There is a sound business case for environmental leadership	Our company management realize the business value of environmental leadership.	Our company management believe that environmental leadership will provide a competitive advantage in the market place.	Our company management believe that there is a business case (cost/value benefit) for environmental leadership.

Environmental leaders are involved in the development of business strategies	Our company management has a strategic will to act on environmental compliance commitments.	Environmental leaders (managers) are involved in the operational/business strategy of the business units in our company.	Our company management realise the brand value of leadership in triple-bottom-line reporting.
Business recommendations with regards to the environment are valued and implemented.	Our company management is pro-active in the recommendations of environmental practitioners to implement required environmental technology.	Our company management motivate/reward the achievement of environmental targets (Individual incentive scheme in place).	Our company management understands what the absence of environmental leadership would imply for mining activities.

Environmental Business Orientation

Construct	Question1	Question2	Question3
Company leaders accept ownership and responsibility in their business role w.r.t. the natural environment.	Our company makes a concerted effort to involve every manager in understanding the importance of environmental protection.	Environmental protection is a high-priority activity in our company.	It is difficult for our company to be successful and protect the environment at the same time.
Company leaders have an environmental leadership approach towards business decisions.	Our company has a clear policy statement urging natural environmental awareness in every area.	It is our company's mission to be a leader in environmental protection in our industry.	
Environmental values are entrenched in the business approach of the company	Preserving the environment is a central corporate value in our company.	Our company has a responsibility to protect the natural environment.	Environmental protection is vital to our company's survival.
Company leaders are primarily profit orientated in their decision-making despite the environmental implications.	Our company's responsibility to its stockholders and employees is more important than our responsibility toward environmental protection.	In our company profits are not more important than our environmental activities.	Our company management evaluate our environmental efforts by their economic benefits to our company.
Environmental leaders are ignorant in their orientation towards environmental matters.	The long term financial well-being of our company depends on the state of the natural environment.	The natural environment does currently affect our company's business activities.	In our company, environmental protection is not only an issue of maintaining a good public image.

Environmental strategy Focus

Construct	Question1	Question2	Question3	Question 4
Environmental issues are integrated into strategic management objectives.	Our company has integrated protection of the natural environment into our strategic planning process.	Our company is engaged in constant planning and processes that minimize environmental impacts of projects on the natural environment.	Environmental issues have been integrated into all functional areas of our business.	
Environmental objectives are linked with corporate goals and strategies.	At our company, we link environmental objectives with our other corporate goals and strategies.	Environmental issues are always intently considered when we develop new projects.	Environmental issues are always considered when we discuss strategic business plans in our company.	
Accountability for environmental performance is a central element of company strategy.	We emphasize the environmental protection aspects of our operations in our annual reports.	Our company must be accountable for the way our mining actions affect the natural environment.	Our company's environmental efforts do not mainly revolve around compliance with current environmental regulation.	
World class environmental performance is a strategic objective for the company	In our company, technology decisions are always influenced by environmental protection concerns.	In our company, ''quality'' includes reducing our environmental impact on the natural environment.	Our exploration and acquisition strategies (future expansion) have been influenced by environmental sensitivity concerns.	Our company has established internal environmental standards as a performance criterion for all our operations.
Environmental competence of managers is of strategic importance for the company.	In our company, employment decisions are always influenced by environmental concerns.	All managerial employees in our company are expected to participate in environmental initiatives e.g. annual training, awareness campaigns.	Operational managers in our company are competent to follow instructions to implementing company environmental goals.	

Data summary for the average responses of CEMs and FEMs on the constructs tested for this study per company

Environmental Leadership Importance		**Gld1**	**Gld2**	**Gld3**	**Plt1**	**Plt2**	**Plt3**	**Dmd1**	**Dmd2**
Environmental policy commitment and compliance importance.	Average	**4.52***	**4.89***	4.17	4.83	4.83	3.78	5.31	1.25
	Stdev.	0.45	1.10	0.24	0.00	0.24	0.63	0.27	0.35
	Correlation	0.866	-0.500	0.866	0.904	1.000	0.882	0.000	0.866
Environmental resources are adequate.	Average	4.28	4.33	3.33	4.79	4.25	4.78	5.39	1.92
	Stdev.	0.31	0.94	0.94	0.41	0.59	0.16	0.39	0.12
	Correlation	0.991	0.000	0.500	-0.866	0.500	0.277	0.277	0.000
Business case for environmental leadership.	Average	**4.15***	**4.17***	3.83	4.04	**4.50***	4.17	5.25	2.00
	Stdev.	0.97	1.65	0.24	0.53	0.71	0.24	0.35	0.47
	Correlation	-0.381	-0.866	0.000	-0.500	0.000	-0.240	0.866	0.500
Environmental portfolio involvement in business strategies.	Average	4.50	4.50	4.33	4.50	4.42	4.72	4.81	2.58
	Stdev.	0.71	1.18	0.47	0.47	0.35	0.55	0.98	1.06
	Correlation	0.866	0.982	0.866	0.189	0.756	0.945	0.277	-0.500
Business recommendations regarding environment valued and implemented.	Average	3.62	**3.67***	3.83	4.42	4.67	3.44	5.19	2.42
	Stdev.	0.31	1.41	0.24	0.35	0.00	1.57	0.04	1.30
	Correlation	0.993	0.866	0.655	1.000	0.500	-0.803	0.500	-0.500

* Significant difference between the managerial responses and companies on this construct.

Environmental Business Orientation		**Gld1**	**Gld2**	**Gld3**	**Plt1**	**Plt2**	**Plt3**	**Dmd1**	**Dmd2**
Environmental ownership and responsibility in business role of management.	Average	3.20	2.78	**3.50***	3.33	3.58	4.50	3.81	3.33
	Stdev.	0.19	0.79	1.18	0.24	0.12	0.24	0.51	0.94
	Correlation	0.981	0.945	0.500	0.971	0.655	0.993	0.977	0.982
Acknowledgement of environmental leadership input for business decisions.	Average	4.78	4.08	3.50	4.50	4.38	5.00	5.38	2.88
	Stdev.	0.04	0.59	0.71	0.71	0.88	0.71	0.53	0.53
	Correlation	1.000	1.000	1.000	1.000	1.000	1.000	-1.000	1.000

Environmental values entrenched in the business approach.	Average	4.47	4.28	5.00	5.17	4.83	5.11	5.36	3.33
	Stdev.	0.19	0.86	0.47	0.00	0.24	0.16	0.20	0.94
	Correlation	-0.990	-1.000	1.000	-0.217	1.000	0.982	1.000	0.982
Profit orientation despite environmental implications	Average	2.53	3.56	5.00	2.75	2.58	2.72	3.83	5.42
	Stdev.	0.19	0.31	0.00	0.35	0.82	0.08	0.71	0.59
	Correlation	0.000	-1.000	-1.000	0.000	0.756	-0.988	0.945	-0.500
Degree of environmental ignorance towards environmental matters	Average	2.55	2.22	2.50	2.25	3.42	2.50	2.86	3.83
	Stdev.	0.54	1.26	0.24	0.59	0.35	0.71	0.51	0.71
	Correlation	0.918	0.786	0.996	0.359	0.189	-1.000	0.982	-0.786

* Significant difference between the managerial responses and companies on this construct.

Environmental Strategy Focus		**Gld1**	**Gld2**	**Gld3**	**Plt1**	**Plt2**	**Plt3**	**Dmd1**	**Dmd2**
Environmental issues are integrated into strategic objectives.	Average	3.73	3.11	3.00	4.25	4.75	4.89	**5.14***	3.08
	Stdev.	0.09	0.31	0.00	0.82	0.35	0.63	0.51	0.82
	Correlation	-0.756	-0.803	1.000	0.359	1.000	0.500	0.500	0.866
Environmental objectives linked with corporate goals and strategies.	Average	3.70	**4.50***	3.50	4.75	4.58	4.89	5.11	2.17
	Stdev.	0.52	1.65	0.24	0.35	0.12	0.16	0.31	0.71
	Correlation	0.052	0.000	1.000	0.693	0.866	0.000	-0.500	-0.500
Accountability for environmental performance a central element of company strategy.	Average	4.85	4.78	5.33	5.33	4.42	4.83	5.00	4.42
	Stdev.	0.02	0.63	0.00	0.00	0.59	0.71	0.00	0.12
	Correlation	0.999	0.839	1.000	0.971	0.945	0.866	-0.866	0.961
World class environmental performance is a strategic objective for the company	Average	3.90	**4.38***	3.75	4.09	4.69	4.08	5.17	2.88
	Stdev.	0.14	1.59	0.00	0.13	0.27	0.47	0.12	0.88
	Correlation	-0.309	-0.178	1.000	0.580	0.522	-0.200	0.302	-0.970
Environmental competence of managers is of strategic importance for the company.	Average	3.02	3.89	3.33	3.63	3.58	4.11	4.89	2.33
	Stdev.	0.21	1.10	0.00	0.18	0.59	0.31	0.16	0.00
	Correlation	0.931	-0.756	0.945	0.945	0.866	-0.995	0.866	-0.058

* Significant difference between the managerial responses and companies on this construct.