

THE ROLE OF ENVIRONMENTAL
ACCOUNTING IN STRATEGIC
COST MANAGEMENT

By

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COST MANAGEMENT

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ABSTRACT

Environmental issues in the world today and often seen in the media are causing a stir in the business world. The effect is that the environment in which businesses operate has significantly changed over the past two decades and businesses are faced with new risks and challenges as well as new opportunities in addressing the needs and claims of stakeholders. Environmental accounting is now on an expansion path with increasing focus on the environment. In order to benefit from the accounting data, strategic cost management can be used as a philosophy to provide competitive strategies. This research paper will describe the environmental component of business and describe the role of environmental accounting in strategic cost management. Furthermore, an assessment will be performed on a South African organisation. The assessment will demonstrate how a South African organisation has reacted and integrated environmental business aspects into their organisation.

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1. Introduction

Hoque (2005) cites Suzuki and Dressel (1999) stating that it is generally accepted throughout the world that the environment is in crisis. Furthermore, Hoque (2005) cites Gray et al (1998) stating that the blame and responsibility for the environmental situation is often targeted at business entities. The environmental issues in the world today and often seen in the media are causing a stir in the business world. Issues such as global warming, human rights, child labor, deforestation, drought, the HIV/AIDS pandemic, CEO bonuses, corruption, genetically modified food, organic food and obesity are regularly discussed. The effect is that the environment in which businesses operate has significantly changed over the past two decades and businesses are faced with new risks and challenges as well as new opportunities in addressing the needs and claims of stakeholders (Louw and Venter, 2006).

Businesses around the world are realising that these issues need to be accommodated in their business models. Quinn and Dalton (2009) cite Hawken (1993) stating that, "Quite simply, our business practices are destroying life on earth and there is no polite way to say that business is destroying the world". Businesses as the core part of modern society and part of the problem must also be part of the solution (Dunphy and Benveniste, 2000). The organisations role as the solution provider is important because organisations are the primary players in economic development and have the financial backing, technological know-how, and the institutional capacity to implement sustainable solutions (Hawken, 1993; Shrivastava, 1995). If they do not proactively incorporate environmental aspects into their business models, they are bound to experience a negative reaction through the media, public perception, brand reputation, government regulation, customer satisfaction, employees, shareholders revolts, communities or organisations trying to protect the environment (Louw and Venter, 2006).

Louw and Venter (2006) quotes Sunter & Vissor (2002), *"Suddenly, the formerly mute public citizen has an amplified voice through technology-enabled networking. The bark of a small NGO watch dog can resonate around the world. We are living through such a time of profound change, and no more so than in the business arena. The old ways, which have dominated for the*

past century or more, are no longer appropriate for the post-industrial, sustainability-driven society. Sustainability is not only a new scientific, political, social and legal concept, but an entirely new business philosophy based on a new mythology. It requires that business thinks differently about its role in society and how it goes about what it does” (p.324).

One key approach that has emerged is the concept of ‘sustainable development’ (Louw and Venter, 2006 and United Nations World Commission on Environment and Development, 1987). Sustainable development has become well accepted worldwide following the 1992 Earth Summit in Rio de Janeiro and the adoption of the United Nations Agenda 21 (United Nations World Commission on Environment and Development, 1987). The Brundtland Commission’s original definition of sustainable development was compactly paraphrased as “meeting the needs of the present generation without jeopardising the ability of future generations to meet their needs (WCED, 1987). Businesses recognised the concept. *The World Business Council for Sustainable Development* was formed by businesses to assist with the development of business strategies that contribute to sustainable development. Implementing sustainable development became an instant challenge for businesses (Louw and Venter, 2006).

The Kyoto Protocol was established in 1996 as a global policy aimed at reducing green house gas emissions. Markets are being established so that companies can exchange carbon allowances. The Carbon credit concept came into existence as a result of increasing awareness to control green house gas emissions (Wiedmann and Minx, 2007).

Shank and Govindarajan (1993) state that a business strategy depends upon two interrelated aspects, (1) its mission or goals and (2) the way the business unit chooses to compete in its industry to accomplish its goals. This gives rise to the businesses competitive advantage. With the increase in sustainable development awareness, businesses are integrating sustainable development issues into their mission and enforcing it throughout the organisation via corporate governance (Louw and Venter, 2006).

Industrial corporations increasingly need to respond to rapidly changing, complex and stringent environmental regulations. In the USA, the 1990s have been characterised as the decade of the environment. Society’s concerns over pollution, resource depletion and other forms of

environmental issues have become widespread (Rezaee et al, 1995). In South Africa, new laws and regulations introduced since 1994 reflecting the democratic constitution have forced significant changes in business. Laws governing labor relations, skills development, access to information, corruption and environmental protection have all necessitated that organisations make significant changes to the way they do business (Louw and Venter, 2006). Environmental costs and obligations are significantly growing and will continue to grow as our society becomes more environmentally conscious, governmental regulations relating to the environment increase and corporations are held more responsible and accountable to be good environmental citizens. Corporate governance and accountability over the environment means that corporations should be good environmental citizens (Rezaee et al, 1995).

Apart from the legislation, the majority of economic studies have found a positive relationship between environmental performance and profitability (Buyesse and Verbeke, 2004). A growing number of firms are attempting to integrate environmental management systems into corporate strategy (Buyesse and Verbeke, 2004). These firms have identified the adoption of advanced environmental practices as critical to strategy formulation. One of the most common global metrics for environmental initiatives is the International Organisation for Standardisation (ISO) 14000 certification (Mollenkopf et al, 2010). Over 27,500 companies have achieved certification worldwide with the majority within Japan, the United Kingdom and Germany (Lawrence et al, 2002).

Most accountants today do not consider the environment relevant to their profession (Shields and Boer, 1997). As the scorekeepers for business, it is logical that accountants would become involved in reporting on corporate environmental issues, evaluating the incentive effects of the environmental movement on environmental management and providing decision-makers with quantitative information on environmental performance (Shields and Boer, 1997). Environmental accounting is now on an expansion path with increasing focus on the environment. Accounting fills an expectation role to measure and report, both internal and external environmental performance (Yakhou and Dorweiler, 2004). With this rise in awareness, accountants are now starting to accept that they too need to understand and

respond to environmental imperatives (Medley, 1997). Environmental accounting is an inclusive field of accounting, where cost or cost objects are defined as the total resources used or sacrificed to accomplish specific objectives. The cost driver is **any factor** that affects the cost object (Hoque, 2005). Accountants today are incorporating activity based costing into life-cycle costing to identify environmental expenditures (Kreuze and Newell, 1994).

In order to benefit from the cost data, strategic cost management can be used as a philosophy to provide competitive strategies. Shank and Govindarajan (1993) states that, "*Strategic cost management is cost analysis in a broader context where the strategic elements become more conscious, explicit and formal. Cost data is used to develop superior strategies en route to gaining sustainable competitive advantage. A sophisticated understanding of a firms cost structure can go a long way in the search for a sustainable competitive advantage*" (p.6).

This research paper will describe the environmental component of business and demonstrate the role of environmental accounting in strategic cost management. Furthermore, an assessment will be performed on a South African organisation. The assessment will demonstrate how a South African organisation has reacted and integrated environmental business aspects into their organisation. The questionnaires framework will be loosely structured Shank and Govindarajan (1993) competitive advantage description consisting of (1) its mission or goals and (2) the way the business unit chooses to compete in its industry to accomplish its goals.

This dissertation sets out to answer the following questions,

- ***How can organisations gain a sustainable competitive advantage using environmental business aspects in their organisations?***
- ***How has a South African organisation reacted and integrated environmental business aspects into their organisation?***

Key objectives to be realised,

- **The role of environmental accounting in strategic cost management can create a sustainable competitive advantage**

- **Strategic cost management can be used as a philosophy to integrate environmental business aspects into the organisation**

The rest of the dissertation is organised as follows: Chapter 2 deals with detailed literature review while chapter 3 presents the research methodology that was followed in gathering data for the assessment. In chapter 4, the results of the assessment are presented. Chapter 5 concludes this dissertation.

2. Literature Review

I find the interrelationship between environmental accounting and strategic cost management comprising a number of themes. In order to give the literature review structure and introduce the reader to the concepts required to understand the environmental accounting and strategic cost management linkages, I have circumscribed my research around the following themes:

- Sustainable development
- Carbon Credits
- Environmental Legislation
- Corporate Governance
- Strategic Environmental Management
- Environmental Management Systems
- Environmental Accounting

Figure 1 represents the inter-relationship between environmental accounting and strategic cost management discussed in this paper.

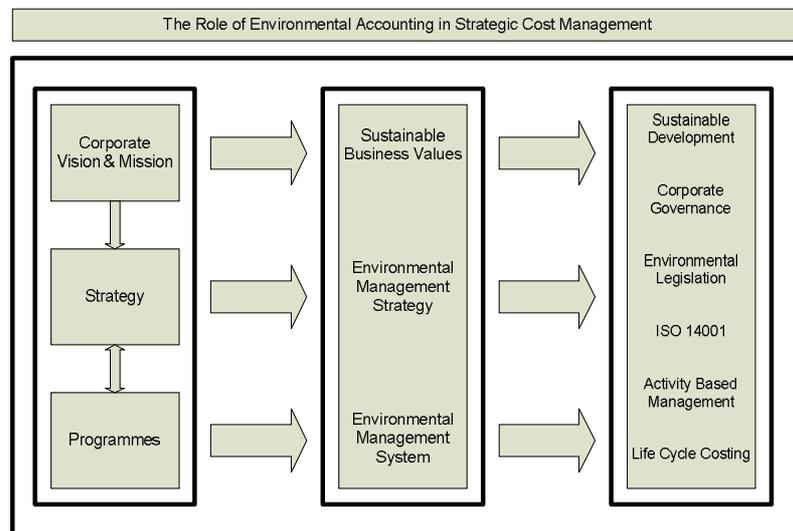


Figure 1: Inter-relationship between environmental accounting and strategic cost management in this paper (source: authors own diagram)

2.1 Sustainable development

Garvare and Isaksson (2001) cites Meadows et al (1997) stating that the question of sustainable development has been an issue for some 30 years. The original issue has developed from having the main focus on limits of economic activity to the realisation that a balance must be found between business excellence and sustainability (Hediger, 1999; Edgeman and Henseler, 2001; Edgeman, 2000).

Sustainable development as a concept was coined in the Brundtland Commission Report (United Nations World Commission on Environment and Development, 1987). It was further debated on and embraced at a meeting in 1992 held in Rio de Janeiro where it was defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. It became an instant challenge for businesses (Louw and Venter, 2006).

At the World Summit on Sustainable Development in 2002 in Johannesburg, businesses needed to demonstrate to the world that they were responsible, had a right to exist, and made positive contributions to the economy, society and environment. The Johannesburg Declaration for Sustainable Development was formed. The declaration placed an emphasis on building a humane, equitable and caring global society cognisant of the need for human dignity for all. There was a welcome and support for the emergence of stronger regional groupings and alliances, such as the New Partnership for Africa’s Development (NEPAD), to promote regional cooperation, improved international co-operation and promote sustainable development (WSSD, 2002). The *World Business Council for Sustainable Development* was formed by mainly large multinational organisations to assist with the development of business strategies that contribute to sustainable development (Louw and Venter, 2006).

Describing and Defining Sustainable Development

There are a number of descriptions which portray the concept to be vague. However, the most common description is “*Sustainable development is development that meets the needs of the*

present generation without compromising the ability of future generations to meet their own needs” (WCED, 1987).

Sustainable development requires both widespread economic prosperity and shared environmental concern. The organisations total activities must add enough value to guarantee everybody a decent life without damaging the ecological system in such a way that the survival of future generations is endangered.

Garvare and Isaksson (2001) define sustainable development as a process to reach a steady state where both humanity and nature thrive. The objective is to achieve satisfied basic needs for all humans in balance with a healthy natural environment.

Quinn and Dalton (2009) cite Gladwin et al (1995) and proposes sustainability as a normative concept in which ethical belief systems converge to limit the moral “free space” of organisations. Furthermore, Quinn and Dalton (2009) go beyond the traditional differentiated view of corporate citizenship that treats social and environmental activities as add on functions of the organisation. Instead, sustainability requires the full integration of social and environmental issues into the vision, values and operations of the organisation. This description is well suited to the strategic cost management philosophy, where the management of costs, or value of the resources sacrificed or consumed are proactively and strategically managed in a specific way in order to achieve the corporate objectives.

Shriberg (2000) summarises three reasons to begin the journey towards sustainability,

- Morality and intergenerational equity: to live only on what is available and not borrow from future generations of people or biota
- Survival: the stresses we are currently placing on ecosystems are too large for the continued wellbeing of any organism. Hence, in the long run sustainable development is a prerequisite to survival and prosperity on this planet.
- Organisational benefits and risks: by embracing sustainability, an organisation positions itself as a “first-mover”. By not embracing sustainability, organisations face consequences in terms of increased economic and social liability.

The literature by Garvare and Isaksson (2001) citing Elkington (1998), Topfer (2000), Walker (2000) and Hediger (1999) state several authors describe sustainability as a triple bottom line or division of focus on economic prosperity, social equity and environmental protection.

Sustainable Development Triangle

During the preparations for the 1992 Earth Summit in Rio de Janeiro, there was lively debate on how the three pillars (economic, social and environmental) might be integrated within development policy. The sustainable development triangle was presented at Rio to emphasize that the sides and interior of the triangle are as important as the three vertices (Munasinghe, 2007). Placing a topic inside the triangle meant that the topic should be analysed using all three dimensions. This provides an easy framework to address sustainable development issues.

The sustainable development triangle encompasses three major perspectives; economic, social and environmental.

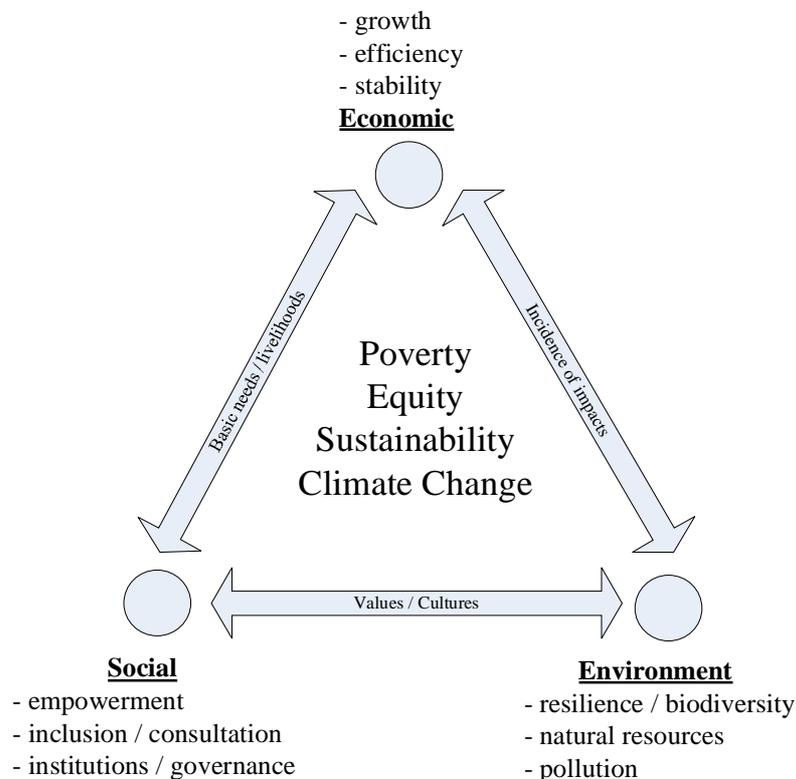


Figure 2: Sustainable development triangle. (Source: Munasinghe, 2007)

Each perspective corresponds to a domain and/or system which has its own distinct driving forces and objectives.

- **Economic Perspective**

The economy is geared mainly towards improving human welfare through increases in the consumption of goods and services.

- **Environmental Perspective**

The environmental perspective focuses on protection of the integrity and resilience of ecological systems.

- **Social Perspective**

The social perspective emphasizes the enrichment of human relationships and achievement of individual and group aspirations.

The sustainable development triangle provides a versatile and easy to use strategic framework for organisations to review or create new activities, products, services or policies. Additional vertices can be added such as technology and/or institutions for some specialised applications.

Measuring Sustainable Development

Many different concepts can be applied as measurement and indicators of sustainable development. Based on research by Garvare and Isaksson (2001) and Compton et al (1998), the following four categories were selected due to the relevance and relation to this paper. The four categories of indicators are divided as follows,

- Driving forces
- State
- Reactive response
- Active response

The indicators aim to cover the triple bottom line previously defined by (Garvare and Isaksson, 2001).

Garvare and Isaksson (2001) explains the four indicators in his research as follows,

“An example of industrial production in the ecology area is generation of waste (driving force) resulting in contaminated land (state) with the response to treat waste (reactive response) and reduce waste generation (active response). An example regarding the management process related to the previous example is public and international pressure for limits (driving force) resulting in legislation and control (state) with one response being fines for rule breakers (reactive) and another incentives for waste reduction (active).” (p.13)

From a strategic cost management perspective, organisations should align all business processes with the above indicators because non-compliance will incur costs. The indicators can be used to construct a framework for analytical purposes. Furthermore, the framework can be used to explore future business scenarios during strategic planning.

Sustainable Development Core Values for Organisational Vision

The following proposed sustainable development core values for management is based on literature by Edgman (1998) and Garvare and Isaksson (2001) and was selected because of their value in strategic decisions and thus should be integrated into corporate vision and mission. The organisational values reflect the effects on the triple bottom line.

Edgman (1998) and Garvare and Isaksson (2001) state the following,

Sustainable stakeholder balance

- Long-term balance between the interests of all stakeholders forms a basis for sustainable development.

Learning Excellence

- Continuous individual, organisational and societal learning is needed to reach sustainable development.

- Good learning creates a climate of improvement and innovation.
- Increased flexibility is needed for adaptation to rapid change.
- Learning the values guiding sustainable development is an integral part of learning excellence.
- Good ability for learning helps with customisation, simplification and developing products consuming fewer resources.

Process performance excellence

- Process performance excellence is defined as managing the processes effectively and efficiently with a result that maximises the value in the long term perspective, while maintaining a balance between the interests of all stakeholders.
- The process view forms the foundation of the systematic view.
- Using process management enables co-ordinated learning and improvement in different parts of the system.
- The system is the global process that transforms stakeholder interest to satisfied stakeholders.

Stakeholders

- Sustainable development is based on integrity and respect for all stakeholders.
- Participation by everybody based on democratic values must be encouraged because everyone has the right to an opinion without fear of retribution.
- Respect and formal authority are earned through competence, maturity, responsible stewardship, humility and faithfulness to core values for sustainable and servant hood.
- The responsibilities and privileges of leadership are to some extent shared by all.

Transparency

- Open and equal information is vital for long-term balance between interests of all stakeholders.

- Corruption is a major development obstacle. It counteracts market forces and stakeholder interests and generally reduces performance.
- Open information of compliance with performance standards for management and employees leads to fair and transparent competition.

Campaigns Needed for Sustainable Development

Businesses need to recognise the importance of sustainable development and incorporate it into the corporate vision. The vision serves as a field around which all the company's processes and activities are organised. The company's key corporate objectives are crafted from the vision statement. Corporate objectives specify the intended growth and developmental guidelines that will enable the company to realise its vision. A strategy is therefore required to organise the organisations resources in specific ways so to achieve the corporate objectives. The corporate objectives are enforced by management. For sustainable development, this has lead to corporate social responsibility, environmental reporting, internationally accepted environmental standards and environmental management systems. Green management policies are being used to drive the requirements for sustainable development.

Green Management Policy

The green management policy should lead social and economic transformation that optimises all aspects of business without jeopardising the potential for similar benefits in the future. Management processes are needed on a personal, organisational and societal level.

Organisations need to integrate environmental legislation into their green policies and be proactive so as to prevent environmental costs.

Garvare and Isaksson (2001) state that Green policies can include improvement strategic tools such as ISO 14000 which require continuous improvement in environmental performance and not only adheres to defined limits, it also contributes to strong sustainability.

ISO 14001 certification provides the organisation with an internationally recognised environmental management system (Zutshi et al, 2008).

There is an increasing requirement to integrate social, ethical and ecological aspects into both traditional cost accounting and into the decision making processes of all companies (Compton et al, 1998). The green policy can use AccountAbility 1000 (AA 1000) which is a voluntary adherence on the part of firms to certain mechanisms or principles that seek to promote a "good society". Also, one of the best ways to control and reduce environmental costs is to use activity based costing method (Atkinson et al, 2007).

Management need to understand the costs or value of the resources sacrificed or consumed in the process of producing a product or provision of a service. Managers require strategic cost management knowledge to help them understand why, when and how cost information can be used to develop strategies that give them a sustainable competitive advantage.

Carbon Footprint

The term 'carbon footprint' has become popular over the last few years and is now often used in the media. With climate change high up on the political and corporate agenda, carbon footprint indications are in strong demand.

A carbon footprint is often expressed in terms of the amount of carbon dioxide gas produced. It also included the amount of other equivalent green house gasses (GHG) produced.

The normative definition is that the carbon footprint stands for a certain amount of gaseous emission relevant to climate change and associated with human production or consumption activities (Wiedmann and Minx, 2007).

An individual's, nation's, or organisation's carbon footprint can be measured by undertaking a GHG emissions assessment. A strategy can be devised to reduce it once the size of the carbon footprint is known. The reduction could be via technological developments, better process and product management, changed Green Public or Private Procurement (GPP), carbon capture or consumption strategies.

The mitigation of carbon footprints through the development of alternative projects, such as solar or wind energy or reforestation represent methods of reducing a carbon footprint and is described as Carbon offsetting.

Research by Wiedmann and Minx (2007) state that there is no consensus on how to measure or quantify a carbon footprint. The spectrum of definitions range from direct CO₂ emissions, to full life-cycle greenhouse gas emissions. Wiedmann and Minx (2007) propose the following definition for the term 'carbon footprint'.

"The carbon footprint is a measure of the exclusive total amount of carbon dioxide emissions that is directly and indirectly caused by an activity or is accumulated over the life stages of a product." (p.4)

This includes "*activities*" of individuals, populations, governments, companies, organisations, processes and industry sectors. Products include goods and services. This definition takes a view of the entire life-cycle. All direct (defined as on-site or internal) and indirect emissions (defined as off-site, external, embodied, upstream and downstream) need to be taken into account.

I chose this life-cycle definition because the intention within strategic cost management is to identify the root causes of cost throughout the life-cycle. This enhances value creation. It also encompasses a supply chain management view which prevents one from looking at an organisation in isolation. This definition can be linked to activity based costing and activity based management. Shank and Govindarajan (1993) says that a firm can enhance its profitability not only by understanding its own value chain, from design to distribution, but also by understanding how the firms value activities fit into suppliers and customers value chains..

Carbon Credit

Kerr (2008) states that the air and water resources we rely upon have special economic characteristics and it is useful to review those economic characteristics for insight into why we collectively allow environmental destruction. Further more, Kerr (2008) states that there is a rational explanation for the declining situation and that it is because we have taken our physical environment for granted because it has been an abundant public good. Public goods and services benefit everyone. A private price cannot be determined because no individual owns the resource. Decisions about public goods end up being political since there is no private market mechanism to regulate them. The political processes provide a platform through which members of a society negotiate the amount and quality of a public good that will be available, letting in how it will be paid for. Carbon credits are a rational way to turn a public good into a private property.

Everyone does not have to understand global warming for the mechanism to work. The external costs of individual actions are incorporated into individual decisions regardless of political affiliation or private beliefs. Unless there is some other unforeseen development that diminishes the desire to produce more green house gasses than the planet can absorb, the carbon market has a high probability of developing into an important economic reality (Kerr, 2008). Thus the carbon credit concept came into existence as a result of increasing awareness to control green house gas emissions.

Kyoto Protocol

The Kyoto Protocol was established in 1996 as a global policy aimed at reducing green house gas emissions. Markets are being established so that companies can exchange carbon allowances.

The Kyoto Protocol provides three mechanisms that enable countries or operators in developed countries to acquire greenhouse gas reduction credit, (UNFCCC, 2008)

- Under Joint Implementation a developed country with relatively high costs of domestic greenhouse reduction can set up a project in another developed country (UNFCCC, 2008).
- Under the Clean Development Mechanism a developed country can sponsor a greenhouse gas reduction project in a developing country where the cost of greenhouse gas reduction project activities is usually much lower, but the atmospheric effect is globally equivalent. The developed country can be given credits for meeting its emission reduction targets, while the developing country would receive the capital investment and clean technology or beneficial change in land use (UNFCCC, 2008).
- Under International Emissions Trading countries can trade in the international carbon credit market to cover their shortfall in assigned amount units. Countries with surplus units can sell them to countries that are exceeding their emission targets (UNFCCC, 2008).

These carbon projects can be created by a national government or by an operator within the country. Kerr (2008) states that in reality, most of the transactions are not performed by national governments directly but by operators who have been set quotas by their country.

Buying Carbon Credits

Carbon credits create a market for reducing greenhouse emissions by giving a monetary value to the cost of polluting. Emissions become an internal cost of doing business and are visible on the balance sheet with liabilities and assets.

For example, a company which owns a factory emitting 100,000 tonnes of greenhouse gas emissions in a year and has a quota of 80,000 tonnes per year must either reduce its emissions to 80,000 tonnes or purchase carbon credits to offset the excess. After costing up alternatives, the business may decide that it is uneconomical to invest in new machinery for that year to reduce emissions. Instead, it may choose to buy carbon credits on the open market from organisations that have been approved to sell legitimate carbon credits.

The effect of an alternative energy source for manufacturing can save the company money. For example,

1. The factory might be a company that offsets emissions through a project in the developing world, such as recovering methane from a swine farm to feed a power station that previously used fossil fuel. So although the factory continues to exceed its quote by 20,000 tonnes of green house gas, it would pay another group to reduce the equivalent of 20,000 tonnes of green house gas emissions from the atmosphere for that year.
2. Another company may have already invested in new low-emission machinery and have a surplus of allowances as a result. The factory could make up for its emissions by buying 20,000 tonnes of allowances from them. The cost of the seller's new machinery would be subsidised by the sale of allowances. Both the buyer and the seller would submit accounts for their emissions to prove that their allowances were met correctly.

As stated earlier, Shank and Govindarajan (1993) says that a firm can enhance its profitability not only by understanding its own value chain, from design to distribution, but also by understanding how the firms value activities fit into suppliers and customers value chains. This methodology allows the company to leverage off its suppliers and customers to lower emissions in the supply chain.

2.2 Environmental Legislation

In the USA, the 1990s have been characterised as the decade of the environment. Society's concerns over pollution, resource depletion and other forms of environmental issues have become widespread (Rezaee et al, 1995).

Research by Rezaee et al (1995) indicate that legislative efforts pertaining environmental issues are generally directed towards,

- Control of environmental contamination or injury to public health
- Clean-up of contamination
- Environmental hazards in the workplace
- Recovery of damages

The environmental awareness has resulted that the USA government enact a number of laws to address and regulate these four environmental issues and to hold entities responsible for their environmental obligations. Some of the currently enacted laws on environmental issues include,

- Resource Conservation and Recovery Act of 1976
- Clean Water Act and Safe Drinking Water Act of 1972
- Federal Insecticide, Fungicide and Rodenticide Act of 1972
- Toxic Substance Control Act of 1976
- Emergency Planning and Community Right to Know Act of 1986
- Clean Air Act and Clean Act Amendment of 1990
- Comprehensive Environmental Response, Compensation and Liability Act of 1980

Rezaee et al (1995) state that these laws provide the necessary authority for the federal government through the Environmental Protection Agency to obligate those deemed responsible for the contamination to clean up the site or seek recovery of the costs of clean-up from the responsible parties.

Furthermore, research by Rezaee et al (1995) indicate that non-compliance with the environmental laws may hold the violating party responsible for,

- Cleaning up the facility
- Undertaking other appropriate action to reduce or eliminate continued contamination
- Reimbursing the Environmental Protection Agency for response costs incurred by that agency
- Paying for damaged to natural resources
- Meeting the designed emissions limits either by acquiring additional allowances or by incurring expenditures to reduce the excess emissions
- Facing tort liability as a result of citizen suits
- Being subject to criminal sanctions

In South Africa, new laws and regulations introduced since 1994 reflecting the democratic constitution have forced significant changes in business. Laws governing labor relations, skills development, access to information, corruption and environmental protection have all necessitated that organisations make significant changes to the way they do business (Louw and Venter, 2006). See Table 1 below for a summary of new legislation affecting business between 1994 and 2004.

Table 1: Co-related legislation introduced between 1994 and 2004

Socio-economic Development	<ul style="list-style-type: none"> • Reconstruction and development Programme Fund Act 7 of 1994 • Development Facilitation Act 67 of 1995 • Mineral and Petroleum Resources Development Act 28 of 2002 • Broad-based Black Economic Empowerment Act 53 or 2003
Environmental, health and safety	<ul style="list-style-type: none"> • Mine Health and Safety Act 29 of 1996 • National Water Act 36 of 1998 • National Environmental Management Act 107 of 1998 • National Environmental Management: Air Quality Act 39 of 2004
Labour, governance and ethics	<ul style="list-style-type: none"> • Employment Equity Act 55 of 1998 • Skills development Act 97 of 1998

	<ul style="list-style-type: none"> • Promotion of Access to Information Act 2 of 2000 • Promotion of Equity and Prevention of Unfair Discrimination Act 4 of 2000 • Prevention of Combating of Corrupt Activities Act 12 of 2004
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Source: (Louw et al (2006) citing Visser (2005:31))

Furthermore, Louw and Venter (2006) identifies the following drivers of corporate citizenship in South Africa.

New industry led initiatives

- The King II Report on Corporate Governance has pushed new strategies for corporate governance.
- The Black Economic Empowerment charters in various sectors have set targets for organisations.
- The signing of the use of energy in organisations.
- The Ethical Wine Initiative and Responsible Tourism Initiative are promoting new business practices to attract new markets

Stock Market Regulations

- The JSE, New York Stock Exchange and London Stock Exchange have introduced new rules for corporate listing that pertain to governance, social and environmental accounting and shareholder rights.

Pressure from society and organisations that represent society's interests

- The campaign against child labour and the use of sweat shops, animal rights, environmental protection, human rights and business operating in zones of conflict.

The media and its impact on brand reputation

- Print media, digital media, the internet and television have contributed significantly to impacts on brands both positive and negative.

Investors and analysts are demanding information on these issues

- Some investors have created new products referred to as Socially Responsible Investing.
- Some choose to exclude certain organisations whilst others invest in any organisation as long as it meets certain criteria.
- Stock Exchanges created new indexes such as the JSE SRI Index, the FTSE4Good index and the Dow Jones Sustainability Index. These are being used as benchmarks for investors.

Shareholder activism

- Although mostly quiet on issues of social and environmental impact, there is an increasing activity in corporate governance and questioning of CEO salaries and bonuses.

Environmental costs and obligations are significantly growing and will continue to grow as our society becomes more environmentally conscious, governmental regulations relating to the environment increase and corporations are held more responsible and accountable to be good environmental citizens. Corporate governance and accountability over the environment means that corporations should be good environmental citizens (Rezaee et al, 1995).

Corporate Citizenship

Louw and Venter (2006) state that there is often a sense that organisation feel that they should focus on making a profit and that there is no value in focusing on corporate citizenship. However, Louw and Venter (2006) further state that there are increasing indications that good corporate citizenship makes good business sense. Wheelen and Hungers (2003:35) report on a McKinsey survey which found investors willing to pay 16% more for an organisation if it is known to have good corporate governance. The reasons given were as follows,

- Over time, good governance leads to good performance
- It reduces the risk of an organisation running into trouble
- Governance is a major strategic issue

The reviewed literature highlighted legislation as the main driver for organisations to integrate environmental aspects into their business policies and procedures. Neglecting to adhere to the legislations can incur environmental costs and affect competitive advantage. Wisner et al (2010) states that incorporating environmental legislation leads to increased financial performance.

Corporate citizenship is enforced via corporate environmental policies.

The Corporate Environmental Policy

Yakhou and Dorweiler (2004) cite Rondinelli and Vastag (2000) making the case for organisations to include legislation in their environmental management policies. Furthermore, corporate environmental policy should be enforced using management control systems. After reviewing the present status of US environmental regulation, as command and control, Rondinelli and Vastag show that the proactive approach to environmental management consists of,

- Life-cycle analysis of products and processes
- Environmental policies of companies in the supply chain
- Recycle, remanufacture and redesign of products
- Monitoring and auditing environmental performance
- Accounting for environmental costs and savings

Environmental management should be part of every business strategy. Not only are there financial benefits to implementing environmental strategies and plans, the programs also reduce and prevent environmental impact.

Environmental policies can be created as a program to lead the organisation towards achieving environmental objects. An environmental management policy or now sometimes referred to as green management policies can be created to drive the environmental management system. An Environmental Management System is a systematic means of assisting organisations to manage

the short-term and long-term impacts of their products, services and processes on the environment.

Link and Naveh (2006) state that if management is committed to a philosophy of sustainable development and is prepared to be proactive in implementing appropriate programs in an era that promotes environmental value, then an environmental management system is a good strategic tool to transform organisations and influence stakeholder thinking towards the adoption of a "triple bottom line" of economic, environmental and social sustainability.

2.3 Strategic Environmental Management

Organisations embrace environmental management strategies for a number of reasons. Government regulation pushes organisations to comply with environmental standards thereby creating the need for a company to manage environmental performance outcomes. Once top management recognises a need for an environmental strategy, choices must be made about how to implement this strategy.

Wisner et al (2010) cites Judge and Douglas (1998) who evaluated the causes and effects of incorporating environmental management issues into strategic planning processes. They reported that the amount of resources allocated to environmental management and the functional integration of environmental issues within an organisation positively impacted environmental and financial performance outcomes.

Strategic Cost Management Perspective

Business Strategies

Shank and Govindarajan (1993) states that a business strategy depends upon two interrelated aspects, (1) its mission or goals and (2) the way the business unit chooses to compete in its industry to accomplish its goals. This gives rise to the businesses competitive advantage.

Research by Hunt and Auster (1990), Hart (1995), Aragon-Correa and Sharma (2003) all indicate that typologies of environmental strategy implementation range from “reactive” organisations which generally commit minimal resources to environmental performance to comply with legal requirements, to “proactive” companies that actively manage their processes to minimise negative environmental impacts and generally succeed regulatory requirements.

Wisner et al (2010) cites Winn and Angells (2000) matrix of “corporate greening” which classifies firms according to their degree of commitment and action. At the lowest degree of corporate greening are those companies that have low commitment and are passive or reactive in planning and responsiveness. The greatest degree of corporate greening, “Deliberate Proactive Greening”, is demonstrated by companies with a high degree of commitment with

proactive planning and responsive cultures. Proactive firms are better described as those in which environmental management is a priority for top management and where top management is actively involved in environmental management decision making (Hart and Auster, 1990). They also respond more decisively to environmental challenges and anticipate environmental impacts of operations (Aragon-Correa, 1998). Wisner et al (2010) cites Barney (1991) stating that firms gain competitive advantage according to how they developed and exert their organisational capabilities and companies that are more proactive toward environmental management have demonstrated positive outcomes in the creation of corporate values (Wisner et al, 2010).

Management Control

Shank and Govindarajan (1993) states that management control systems are part of strategic cost management and are influenced by different strategies. Cost management proactively starts with the identification of what is causing costs, with the objective of taking a proactive approach in managing costs. Costs are defined as the total resources used or sacrificed to accomplish specific objectives. The activities driving costs need to be controlled via the management control system. Management accounting control systems generates and uses information to help decision makers assess whether an organisation is achieving its objectives. The term *control* in management control refers to a set of procedures, tools, performance measures and systems that organisations use to guide and motivate all employees to achieve organisational objectives (Atkinson et al, 2007).

Research on management control focuses on the alignment between strategy, management control and performance outcomes (Dent, 1990) and the effectiveness of management actions and decision making to influence both operational and financial performance (Simons, 1987).

Wisner et al (2010) builds on the Buysse and Verbeke (2004) framework which identifies seven specific managerial processes and actions for environmental proactivity.

Defining Environmental Proactivity

The following is all based on literature reviewed by Wisner et al (2010). These management control actions were inserted due to their relevance and relationship to the strategic element of strategic cost management. The seven specific managerial processes and actions for environmental proactivity are,

1. Resource commitment

Abernethy and Brownell (1999) report that firms which follow an interactive style of budgeting, where the budgeting process is seen as a dialogue intended to create ideas and learning within the organisation, are most effective at implementing strategic changes in the organisation. Hunt and Auster (1990) define proactivist firms as those that freely commit resources to environmental management, as opposed to allocating resources on an as needed basis. Firms may be proactive towards environmental management either because the down sides risk of poor performance may be too costly for the organisation or because they recognise that superior environmental performance creates firm value. Managers are therefore more likely to commit scarce resources to initiatives that are important to the well being of the firm.

2. Employee Involvement

Wisner et al (2010) states that just as total quality management has become everyone's job, proactive environmental management requires employee responsibility and accountability. A structure of decentralised control enables personnel involvement (Birnberg, 1998) and moves decision making downward in the organisation to where the information exists (Govindarajan, 1998). Successful implementation of a pollution prevention strategy requires extensive employee involvement because employees are more familiar with the company's products and processes (Hart, 1995). Environmental management decentralisation is carried out through managerial actions such as employee training, performance rewards systems, and through integrating

environmental accountability throughout functional areas of the firm (Dasgupta et al, 2000)

3. Performance Measurement

Performance measures steer performance by acting as a signal to employees about what outcomes are desired by the organisation. It also provides feedback to employees and managers about actual performance allowing them to take corrective actions when performance indicators show a discrepancy between actual and desired performance. Itter and Larcker (1998) and Kaplan and Norton (2000) state that performance is better controlled by choosing performance measures that link strategic objectives that measure the results of processes the company is trying to manage and drive future value for the organisation. Companies that proactively manage environmental performance are therefore more likely to develop key environmental performance indicators.

4. Public Disclosure

External reporting of performance is a key component of the proactive accountable organisation (Epstein and Birchard, 1999). Disclosure of environmental performance has grown dramatically in recent years due in part to stakeholder pressure for increased transparency and accountability. Research has shown a positive association between quantifiable disclosures of environmental information and environmental performance (Al-Tuwaijri et al, 2001) including environmental disclosures and stock market reaction after an environmental disaster occurred (Blacconiere and Patten, 1994).

Table 2 shows more and more companies in South Africa are reporting on economic as well as social and environmental issues, also known as the triple bottom line reporting.

Table 2: Trends in sustainability reporting of top 100 South African companies

	1998	1999	2000	2001	2002	2003
Annual Financial Reports						
Environmental	48%	49%	52%	55%	49%	68%
Health & Safety (including HIV/AIDS)	-	-	-	52%	40%	81%
Social/community investment	-	-	-	60%	45%	75%
Code of ethics/code of conduct	-	-	-	84%	87%	77%
Human capital development/training	-	-	-	81%	-	78%
Sustainability issues	-	-	-	57%	-	85%
Separate Public Reports						
Environmental, social or sustainability	-	-	-	10%	16%	20%

(Source Louw and Venter (2006) citing Visser (2005:35))

5. Supplier Focus

A firm's value chain is embedded in a larger system that includes suppliers and customers value chains. Shank and Govindarajan (1993) says that a firm can enhance its profitability not only by understanding its own value chain, from design to distribution, but also by understanding how the firms value activities fit into suppliers and customers value chains. The interrelation of organisational value chains is known as the supply chain.

Mollenkopf et al (2010) cites Disney et al (1997) and Jones and Hines (1997) stating that lean processes create value through the elimination of waste in the supply chain. Mollenkopf et al (2010) states that firms are pressured to reduce the amount of waste they produce and citing Azzone and Bertele (1994) and Kovacs (2008), that they need to be more environmentally conscious and to integrate environmental management into their processes and corporate strategies.

Companies that are proactive towards environmental management will actively work with their suppliers to better manage environmental performance (Walton et al, 1998). Maxwell et al (1997) state that Ford and GM announced a requirement for its supplier companies to achieve ISO 14001 environmental management certification as a condition of selling to Ford and GM. Many other companies have adopted similar initiatives (Wisner et al, 2010). Volvo pushes to make the environment a cornerstone of its

product by integrating environmental practices throughout its global supply chain and has developed a very rigorous environmental training program for employees and suppliers (Maxwell et al, 1997). Procter and Gamble (P&G) has integrated global environmental concerns into their business strategy since the 1980s when super-concentrated Lenor detergent was introduced to meet environmental pressures in Germany. In addition to material reduction and recycling programs, P&G also works with suppliers to generate markets for recycled materials hence taking a view of the entire life-cycle (Maxwell et al, 1997). Rock et al, (2008) stated that Motorola implemented environmental practices throughout their supply chain. Rock et al (2008) also stated that it was noted that the effectiveness of the strategy was dependant on the cooperation from suppliers.

Purchase companies are also applying supply chain pressure to mitigate risks with supply chain partners. This includes the risks of supply chain interruption if a poor performer is shut down by regulators and the reputational risk of being associated with an environmentally unfriendly company.

Mollenkopf et al, (2010) cites a number of papers stating that several factors lead firms to pursue green supply chain practices in a global context. These include common global environmental standards such as ISO-14000 (Rappaport and Flaherty, 1992; Rondinelli and Berry, 2000; UNCTAD, 1993; Epstein and Roy, 1998; Miles and Russell, 1997), policies from corporate headquarters (Handlock, 1994; Hansen et al, 2004), effects on environmental performance on firms global reputations (Christmann, 1998), cost reduction (Zhu et al, 2005; de Brito et al, 2008; Dowell et al, 2000; Christmann and Taylor, 2001), pressure from stakeholders (Zhu et al, 2008; Christmann and Taylor, 2001; Maxwell et al, 1997) and competitors (Zhu et al, 2008; Walker et al, 2008).

Vachon and Klassen (2008) states that green supply chain management literature which has examined the importance of working across the supply chain, with both customers and suppliers, on environmental initiatives have shown improved firm performance. This type of environmental collaboration develops knowledge sharing capabilities

(Vachon and Klassen, 2006b) that serve as a resource for a sustainable competitive advantage through environmental efforts (Hart, 1995).

6. Capital Equipment Decision Making

Organisations' pursue environmental performance improvement through adopting technological innovations (Florida, 1996). A proactive strategy focuses on eliminating the source of potential problems rather than addressing problems after they have occurred. Companies that are proactive towards environmental management are therefore more likely to include environmental performance decision criteria in capital equipment decision making (Klassen and Whybark, 1999b).

7. Life-cycle Analysis

Organisations' use life-cycle analysis to identify and manage the ecological impacts and costs of inputs, throughputs and outputs during the entire life-cycle of the product. Life-cycle analysis and the changes in products and processes that result from the evaluation help improve product quality, lower costs and improve competitive advantage (Shrivastava, 1995). A product management approach also benefits companies by identifying product redesigns to reduce liability by helping to develop new products with lower life-cycle costs and by identifying up front environmentally hazardous products and processes (Hart, 1995).

The reviewed literature indicates that the strategic management of resources aids the organisation in achieving the "triple bottom line" of economic, environmental and social sustainability. The strategy can be implemented by means of an environmental management system.

2.4 Environmental Management Systems

Literature reviewed under the environmental management systems theme aims to give the reader an overview of the International Organisation for Standardisation 14001 standard which is one of the most commonly used vehicles to implement environmental strategies (Mollenkopf et al, 2010). Furthermore, it demonstrates a practical implementation of the ISO 14001 standard by Lawrence et al (2002) which revealed several important organisational issues. These important organisational issues aid in the development of an environmental management system. The practical implementation discussed is related to value chain analysis where a value chain is a linked set of value creating activities all the way from basic raw material through to the ultimate end use (Shank and Govindarajan, 1993). Strategic insights are yielded by the value chain analysis. This is achieved through the enhancement of value for the customer by using environmental accounting in strategic cost management.

International Organisation for Standardisation

One of the most common global metrics for environmental initiatives is the International Organisation for Standardisation (ISO) 14000 certification (Mollenkopf et al, 2010). Over 27,500 companies have achieved certification worldwide with the majority within Japan, the United Kingdom and Germany (Lawrence et al, 2002).

ISO 14001 environmental management system is a useful vehicle for integrating sustainable development business practices. The environmental management system integrates environmental functions throughout the organisation.

Mollenkopf et al (2010) states that the environmental management system aims to,

- Reduction of emissions and waste
- Product design for the environment
- Energy efficiency and conservation and
- Opportunities to enhance environmental impacts

ISO 14000 requires procedures for identifying all environmental aspects of the organisations operations. This includes safe handling and disposal procedures for hazardous materials and waste and compliance with relevant environmental legislation (Corbett and Kirsch, 2001).

ISO 14000 is more commonly used among multinationals and these firms also encourage their suppliers to apply for certification (Mollenkopf et al, 2010).

The standard provides both a model for streamlining environmental management, and guidelines to ensure environmental issues are considered within decision making practices. The ISO 14000 standards are also being incorporated into supplier selection processes (Chen, 2005; Miles et al, 1999).

Table 3: ISO development of environmental standards (source: Yakhou and Dorweiler (2004) citing Lally, 1998)

The international environmental management standards are set in the ISO 14000 process. The resulting standards are voluntary for a company and are higher standards of performance than from regulation.

The standard-setting process was set as part of the Global Environmental Initiative in 1992 in connection with the UN Conference on Environment and Development. Key advantages of ISO 14000 are

- (i) to set environmental performance standards above regulation and
- (ii) to set the company as environmentally alert.

The first advantage moves the company above an increasingly complex set of regulations, yet in full compliance. The second advantage puts the company into an internationally competitive position in markets. Both are achieved by incentives to adopt pollution prevention practices.

The following are components of the ISO 14000 standard-setting process:

- ISO 14001 – the basic framework of an EMS; implements corporate environmental policy
- ISO 14004 – a checklist to implement ISO 14001 and method to assess environmental impacts
- ISO 14031 – setting objectives and targets of EMS
- ISO 14010 – guidelines for environmental auditing
- ISO 14011 – guidance for audit procedures
- ISO 14012 – qualification criteria for environmental auditors
- ISO 14020 – standards on environmental labelling
- ISO 14040 – guidance for assessment of product life-cycle environmental impact

Environmental cost accounting (ECA) is the integrating feature of an EMS. All elements of environmental measures are brought together in the ECA calculation. By recognising the complete set of environmental costs, the company can be both environmentally responsible (for example, Responsible Care program) and cost-effective in recouping its costs.

Strategic cost management can be used to enhance value through the analysis of the environmental cost data.

The ISO 14001 is the standard for an environmental management system. Many large businesses, particularly overseas have obtained certification under the standard (Chavan, 2005).

Benefits of certification

Lawrence et al (2002) identifies the following benefits sought by companies considering implementing an Environmental Management System,

- Staying ahead of legislation
- Cost savings and improved management control
- Meeting customer expectations
- Demonstrating commitment to improved environmental performance
- Increased employee motivation

A central element within the ISO 14001 based system is the identification and assessment of environmental aspects and impacts to determine those that may be considered significant. All significant impacts influence environmental objectives set by the company policy and form the basis of a management program that aims to support a commitment to continual improvement.

Chavan (2005) states that the benefits of having ISO 14001 certification are mainly realised by large organisations because as small to medium enterprises have smaller turnover and thus a correspondingly small return on the costs of certification. Chavan (2005) also explains that although a fully certified ISO environmental management system may not be suitable for smaller organisations, it does provide guidelines which assist organisations to consider all the

relevant issues and thus gain the benefit from their own environmental management systems without certification. Small to medium organisations can use the ISO 14001 as a model for designing their own environmental management system.

Larger organisations may find certification more valuable when considering the potential trade and market advantages of an internationally recognised and certified environmental management system. Chavan (2005) states that this was a significant factor for companies seeking certification under the ISO 9000 quality assurance standards and is likely to be a factor in decisions regarding ISO 14001 certification.

Methodology for ISO 14001 Implementation

Lawrence et al (2002) cites the IEM (1996) stating that the ISO 14001 standard does not specify any techniques for identifying the aspects and impacts but guidance from accrediting bodies has stressed that any methodology must be repeatable, systematic, accurate and rigorous.

As per the literature review by Lawrence et al (2002), the two most common methods for identifying aspects and impacts in the UK are mass-balance techniques and exploratory audits.

Strategic Cost Management Perspective

A value chain is a linked set of value creating activities all the way from basic raw material through to the ultimate end use (Shank and Govindarajan, 1993).

Shank and Govindarajan (1993) describe the value chain methodology as follows,

- Identify the industry's value chain and assign costs, revenues, and assets to the value chain
- Diagnose the cost drivers regulating each value activity
- Develop sustainable competitive advantage, either through controlling cost drivers better than competitors or by reconfiguring the value chain

The value chain methodology can be used to identify environmental value.

The following definition of strategic cost management by Shank and Govindarajan (1993) has been adapted (**content in brackets**) to demonstrate the role of environmental accounting in strategic cost management. “*The intention is to proactively identify the root causes of costs (**environmental costs**), with the objective of managing and minimising the total costs (**environmental cost of aspects and impacts**) associated with the production and provision of a product or service. Once this is done, they need to be strategically aligned with business objectives (**implementing an environmental management policy**) which yield a sustainable competitive advantage.*”

This view is considered in detail by walking through the practical implementation by Lawrence et al (2002) of the ISO 14001 using the Mass-balance and Exploratory Audit methods.

Mass-Balance Method

The underlying concept behind the mass-balance is the first law of thermodynamics, which states that energy cannot be created nor destroyed but only converted from one form to another (Lawrence et al, 2002).

In terms of environmental management, this means that all materials and energy entering a site will at some point leave either as product, an emission or waste. Refer to figure 3.

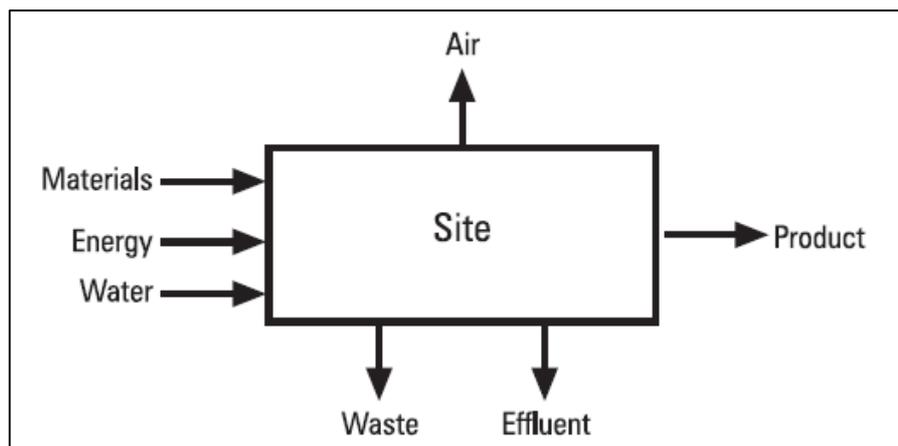


Figure 3: Mass-balance (source: Lawrence et al, 2002)

The mass-balance method quantifies all inputs and outputs of an organisation over a set period of time.

Lawrence et al (2002) identified a wide range of sources to obtain information. Incoming materials can be quantified using computerised resource planning systems. Quantities of energy and water consumed, and wastes and effluents generated can be sourced from bills, legal records and monitoring systems.

The mass-balance methodology identifies aspects and impacts at a site level making it difficult to understand which activities are the main contributors.

However, the method can be modified by segmenting the site into a number of processes, activities or sub-sites. Refer to figure 4.

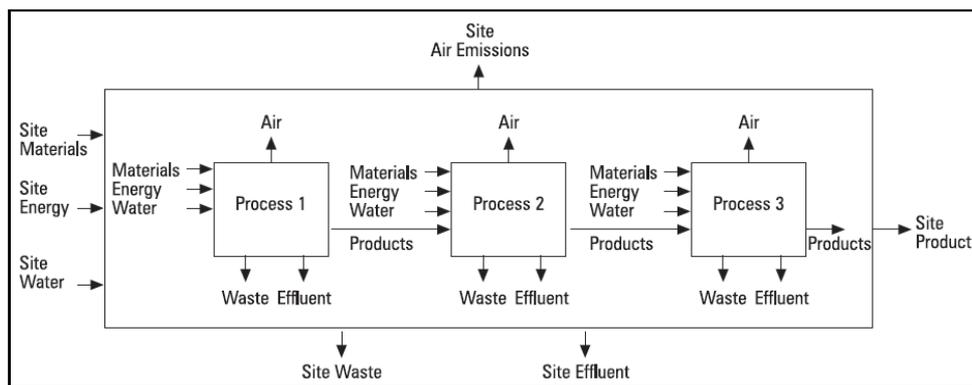


Figure 4: Process and site mass balance (source: Lawrence et al, 2002)

Mass-Balance Report

The following is a summary from Lawrence et al (2002) regarding the mass-balance report on a UK wiring company. *"The mass-balance simply reports quantities. These need to be assessed for their potential impact and the significance of that impact. Significance was determined by their potential impact and the significance of that impact. Significance was determined by considering the quantity and toxicity of the materials, energy and water consumed and the air emissions, effluent and waste generated. These aspects were established through small teams."* (p.43)

Exploratory Audit Method

The following is based on research by Lawrence et al (2002). Its importance in strategic cost management is the method for identifying environmental costs.

The exploratory audit is described by Lawrence et al (2002) as a series of stages.

- Identify product groups
- Identify processing activities and support functions
- Identify direct and indirect materials
- Identify individual activities within process or support functions
- Identify aspect and impacts
- Assess significance (severity x occurrence x detection = significance)

All products or services rendered are to be combined into generic groups. The next stage is to identify the processes and support functions. The main materials within each individual process or support function should be identified. Within manufacturing, these include direct materials that are incorporated into the product and indirect materials that will be used in the process.

Each individual process is then divided into a series of activities that describe all the stages from the materials arriving on the site until leaving as waste, or transferred to the next process.

Within the processes are activities such as transportation, intermediate storage, machine start-up, operation and shut-down, maintenance and emergency activities.

All activities and decisions regarding environmental aspects and impacts need to be identified. Applying this technique involves discussions, interviews and reviewing relevant documentation which can take a considerable amount of time depending on the size and complexity of the site.

Lawrence et al (2002) states that identified aspects and impacts require additional assessment. A numerical risk assessment developed from the failure mode and effects assessment (FMEA) technique satisfies the requirement. In conducting FMEA, small teams of employees need to assess on a scale of 1-10 the likelihood of that aspect occurring, the severity of the potential impact and the effectiveness of current controls in detecting the aspect. Each

aspect scores are multiplied together to determine an overall value. Aspects occurring throughout a process should be considered collectively as the cumulative significance is often different to assessing the aspect on an individual basis. A high level of detail originates from the audit because it is important to identify all potentially significant aspect and impacts.

Mass-balance Results vs. Exploratory Audit Results

Lawrence et al (2002) implemented the two methods in a cable business in the UK. A short summary of the Lawrence et al (2002) findings are presented because it provides a real, practical and constructive criticism which can be used to develop and tailor environmental management systems.

Energy

Both methodologies identified energy consumption as significant. The mass-balance approach identified the processes which consumed the highest quantities of energy. This is useful for targeting improvement activities. The audit method was less clear to identify improvement activities due to lack of quantitative data collected.

Materials

Both methodologies identified the same materials as significant. However, due to the interactive method of the exploratory audit, it identified key improvement teams already in place aimed at minimising material consumption through improvement product design.

Wastes and Effluents

Both audits identified the same types of waste as significant. The mass-balance identified the overall process that was associated with high waste levels where as the audit method was able to go into greater depth and identify the key activities within the processes that generated the highest waste.

Air Emissions

Both methods identified air emissions as significant. Within the mass-balance approach, there was no available data for emissions to air outside the organisation. This was deemed significant due to the absence of appropriate measurement equipment.

The mass balance identified none that were considered significant by the FMEA techniques. The following were not identified by the mass-balance method,

- Spillage controls
- Waste labelling
- Disposal controls
- Preventative machine maintenance programmes
- Supplier performance
- Customer communication

Lawrence et al (2002) states that the types of techniques employed influence the structure and operation of the entire environmental management system. It was important for this to be addressed in the initial stages of development to understand how the system would operate in order to meet the organisations requirements. The generic nature of the issues suggests that the results are relevant to other organisations.

Implementing and maintaining the environmental management system requires auditing the way the organisation produces products and/or renders services. Once the environmental management system has been implemented, the environmental cost drivers can be identified. One of the best methods to control and reduce environmental costs in strategic cost management is to use activity based costing/management methods because the costs are directly linked to the activities driving them (Atkinson et al, 2007).

2.5 Environmental Accounting

The objective of environmental accounting is to measure the effects of the actions of the organisation on the environment and to report upon those effects. In other words the objective is to incorporate the effect of the activities of the firm upon the business environment and to view the firm as a link in a chain, which extends beyond the internal environment to include the whole environment. In this view of the organisation, accounting for the firm does not stop at the organisational boundary but extends beyond to include not just the business environment in which it operates but also the whole social environment. Environmental accounting therefore adds a new dimension to the role of accounting for an organisation because of its emphasis on accounting for external effects of the organisation's activities. (Ngwakwe, 2009)

This provides recognition that the organisation is an integral part of society, rather than a self contained entity which has only an indirect relationship with society. This self-containment has been the traditional view taken by an organisation as far as their relationship with society is concerned, with interaction being only by means of resource acquisition and sales of finished products or services. Recognition of this closely intertwined relationship of mutual interdependency between the organisation and society, when reflected in the accounting of the organisation, can help bring about a closer, and a more harmonious, relationship between the organisation, environment and society. Given that the managers and workers of an organisation are also stakeholders in that society, such as consumers, citizens and inhabitants, this reinforces the mutual interdependency. (Ngwakwe, 2009)

Ngwakwe (2009) states that environmental accounting also provides an explicit recognition that stakeholders other than the legal owners of the organisation have power and influence over that organisation and also have a right to extend their influence to affect the organisation's activities. Environmental accounting therefore provides a mechanism for transferring some of the power from the organisation to these stakeholders and this voluntary surrender of such power by the organisation can actually provide benefits to the organisation (Ngwakwe, 2009).

Environmental Management Accounting

Yakhou and Dorweiler (2004) cite Bartolomeo et al (2000) stating that environmental management accounting is defined as the generation, analysis and use of financial and related non-financial information, to support management within a company or business. Environmental management accounting integrates corporate environmental and business policies, and in doing so provides guidance on building a sustainable business. Environmental management accounting analyses environmentally related financial costs and benefits, which contribute to recognition of the high and increasing levels of capital and operating expenses, for pollution control equipment, and environmental taxes (Yakhou and Dorweiler, 2004). Furthermore, Fryxell and Vryza (1999) identify that possible environmental initiatives are incorporated in analysis and reporting.

Environmental Cost Accounting

An advanced step of development of environmental accounting is development of environmental cost accounting (Ngwakwe, 2009). Yakhou and Dorweiler (2004) sites Lally (1998) defining cost accounting as the use of the accounting records to directly assess costs to products and processes. For this method, costs are accounted for by their specific causes. Environmental cost accounting directly places a cost on every environmental aspect, and determines the cost of all types of related actions. Environmental actions include pollution prevention, environmental design and environmental management. Past approaches on environmental impacts were based mainly on environmental cleanup costs and past product disposal. The contribution of environmental cost accounting is to account for a way of doing business (Yakhou and Dorweiler, 2004). Ngwakwe (2009) states that with environmental cost accounting, arbitrary allocation of environmental overhead is eliminated or reduced, and true costs of products are determined. Environmental cost accounting in producing environmental costs is described in two ways (Yakhou and Dorweiler (2004) citing Grinnell and Hunt, 2000).

- ABC framework - which looks for 'cost drivers' at organisational levels, namely; unit-level, batch-level, product-sustaining and facility-sustaining.

- Cost-of-quality framework - which defines environmental costs in prevention, appraisal and internal and external failure. This cost-of-quality approach supports pollution prevention as an appropriate management strategy.

Another significant contribution of environmental cost accounting is its link to the ISO 14000 standard. The environmental data in an environmental management system based on ISO 14000 standards is consistent with environmental cost accounting. Where a company adopts ISO 14000 standards, environmental cost accounting is a tool, part of a process for treating the environment as integrated with (1) business strategy and (2) decision-making (Yakhou and Dorweiler (2004) citing Lally, 1998).

Environmental remediation, compliance and management have become critical aspects of business practice. The practice now is that all parts of the value chain are affected by environmental issues. Environmental costing issues need to be incorporated into cost management systems and the overall management control system (Atkinson et al, 2007).

Activity based costing and life-cycle costing techniques are the foundation for allocating environmental expenditures to products and services (Atkinson et al, 2007 and Kreuze and Newell, 1994). By identifying the costs of all activities, a company can attempt to eliminate or at least minimise the cost related to those activities that do not add value.

Life-cycle Costing

Life-cycle costing is very strategic as it embodies all facets of the management function. Life-cycle costing does not dwell on accounting only, greater focus is geared toward environmental accountability and the responsibility during product or process design through the entire life-cycle. The emphasis on environmental design is a cautionary measure to control pollution before its occurrence. Ngwakwe (2009) states that not only does it help the firm to be compliant, it places the firm on a firm competitive pedestal in gaining the advantages of cleaner production which includes financial savings, environmental benefits and other benefits.

Financial Savings

- Reduce waste disposal costs
- Reduce handling and transport costs
- Reduce on site waste treatment costs
- Reduce raw materials costs
- Reduce energy costs
- Reduce labour costs
- Reduce time costs
- Improve operating and efficiency and hence production costs

Environmental Benefits

- Efficient use of materials, energy so that your business can contribute to sustainable development
- Reduction in pollution to land, air and water
- Compliance with regulations

Other Benefits

- Improve the market position of your company
- Green supply chain benefits
- Contributes to working towards an environmental management system
- Helps maintain staff motivation
- Contributes towards proactive image for your business

Ngwakwe (2009) states that the environmental accounting function here is provision of related environmental costs associated with the life-cycle stages and if the costs are known well in advance, management would be in a better position to consider them during product design, and consideration of such costs at this stage would definitely reduce the costs much better than when they arise in a contingent manner and become more difficult to manage. Most of the costs associated with the life-cycle are difficult to measure but are likely to wreck havoc on the

firm's competitive position if management is complacent about them for any reason. The accounting function therefore is to anticipate potential environmental costs. Ngwakwe (2009) states that apart from fines, penalties, image and relationship costs, the environmental costs that deserve great attention during design are waste costs because of its potentially hidden nature.

The True Cost of Waste

Research by Ngwakwe (2009) has shown that the real cost of waste can be 5 - 20 times that of the disposal cost and 4% of turnover. Ngwakwe (2009) suggests the following waste reduction methods,

1. How to reduce cost

1. Put in only what is needed
2. Get the most out of what is put in
3. Make the most of what comes out

2. How to Minimise Waste

Reduce waste at source:

1. Saves money – increase your operating efficiency
2. Reduce production costs and reduced disposal costs
3. Improves environmental performance and reduces risk
4. Improves the environment through reduced raw material consumption, reducing other environmental impacts

A great deal of waste is avoidable through improved management of materials and energy. The true cost of waste includes the time, effort and materials to produce the waste and not simply the cost of disposal.

Savings in these areas can contribute to increased profitability and competitiveness, whilst benefiting the environment. (Ngwakwe, 2009)

3. Good Environmental Management

Every company is different, but can improve its overall performance by:

1. Avoiding leaks and spills
2. Better materials handling
3. Redesigning processes and products
4. Involving staff at all levels
5. Auditing of waste generation

The design of a process or product significantly affects environmental costs and performance. (Ngwakwe, 2009) The design process involves cultural, legal and environmental criteria. Many companies are adopting design for the environment or life-cycle design programs to take environmental considerations into account at early stage. In order to do this, designers need information on the environmental costs and performance of alternative product/process designs, similar to information needed when making capital budgeting decisions. Making environmental cost and performance information available to designers can facilitate the design of environmentally preferable processes and products. A proactive company could use research and development effectively to estimate environmental cost of new processes. These costs would include conventional, hidden, contingent, and relationship costs. In the early phases of process development, the cost model prompts process researchers to select and justify process chemistries, operating conditions, and equipment that embody the principles of pollution prevention (Ngwakwe, 2009). The model identifies environmental cost reduction opportunities as the project progresses. This type of environmental cost information provision could provide financial analysts with an economic picture of the potential environmental risk of a new process prior to its commercialisation.

All Life-cycle costing considers the full costs over the products life-cycle, from research through disposal or commonly referred to as from cradle to grave. Most of the cost of a new product is committed after the design stage (Kreuze and Newell, 1994). Manufacturing alternatives can thus only influence a small portion of the total product cost. Life-cycle costing measures the entire 100% of these costs, not just the costs incurred during production. Environmental

impacts have extended product costs well beyond the life-cycle of the product. For example, responsibility for waste lasts forever. The process is to discount all costs to the present to facilitate comparisons in all internal and external activities. Life-cycle costing may reveal that a product with low acquisition costs but high operations, maintenance, environmental, or disposal costs may be a less desirable alternative than a competing product with higher initial cost.

Life-cycle costing process

Cost bearing activities associated with a product throughout its life-cycle time must be identified. The costs of each cost bearing activity must be accumulated and in some instances be estimated. Similar to capital budgeting techniques, future costs are discounted to present day costs. Cost estimates for future expenditures are unavoidable but are needed for evaluation purposes. Kreuze and Newell (1994) states that for estimation, in light of the potential magnitude of environmental expenditures, it may be better to be vaguely right than precisely wrong.

Bailey (1991) and Kreuze and Newell (1994) identified four levels of environmental costs that are important to full costing analysis. Hoque (2005) identified a fifth which I have included because it should be considered for life-cycle costing. They are: *usual and operating costs, hidden costs, contingent costs, relationship and image costs and Societal Costs.*

- **Usual and Operating costs**

Usual costs are associated directly with products, including costs of buildings, equipment, materials, start-up, training, labour and energy costs. Traditionally, these costs have been allocated to products by applying a rate based on direct labour hours.

- **Hidden Costs**

Hidden costs include up front environmental costs such as the search costs relating to finding environmentally conscious suppliers, initial design costs of environmentally preferable products, regulatory costs which are often obscured in overheads costs, future decommissioning and remediation costs. The costs of governmental and

regulatory compliance include notification, reporting, and permitting, monitoring, testing, training and inspection expenditures. Proper cost allocation requires these costs to be allocated to the activities causing the expenditures. It is critical because these costs have the potential of being very large.

- **Contingent Costs**

Contingent costs are defined in probability terms and include fines for breaching environmental requirement, clean up costs, law suits relating to unsound products. These costs are often estimated and companies must be careful not to underestimate these amounts or the likelihood of their occurrences. All companies that generate and release hazardous waste and materials have future contingent costs. When estimating these costs, organisations must accept that environmental regulations will tend to converge upward causing contingent liability costs to increase.

- **Relationship and Image Costs**

These costs are difficult to determine and would seldom be separately identified within an accounting system. They could be expected to have some influence on the value of some intangible assets such as goodwill, brand names and so forth. A company can realise cost savings through increased revenues or decreased expenses due to improved consumer satisfaction, employee relations and corporate image by reducing or eliminating pollution and responding to consumer demands for environmentally friendly products. The growing legislative and regulatory pressure and increasing consumer awareness, companies are altering the way they design, make and market their products so products can be used longer and be reused in part or whole.

- **Societal Costs**

These costs are often referred to as externalities and represent costs that an organisation imposes upon others as a result of their operations. These are typically ignored by the organisation. These costs could include environmental damage caused by the organisation for which they are not held accountable or adverse health effects caused by an organisation generated emissions for which the organisation is not held responsible. It is difficult and sometimes controversial to put a cost on these effects and

with the exception of a few organisations worldwide, most entities ignore these costs when calculating profits.

Reducing Environmental Impacts throughout the Product Life-cycle

Ngwakwe's (2009) investigated how HP integrated environmental business practices into their organisation. Below is a diagram of their product life-cycle.

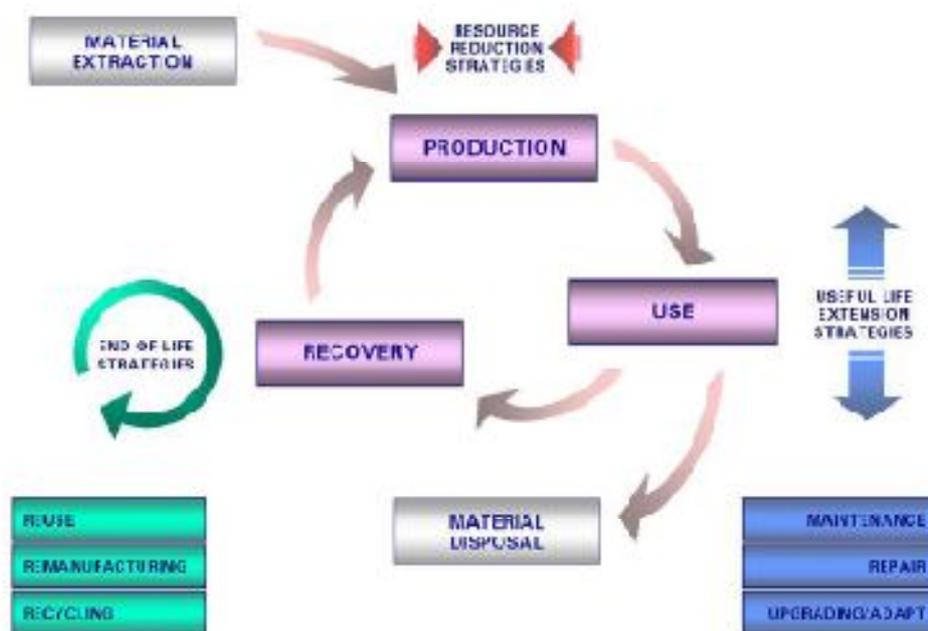


Figure 5: HP Product Life-cycle (Source: Ngwakwe, 2009)

Ngwakwe's (2009) research of Hewlet Packard's product life-cycle management revealed the following environmental reduction impacts in their product life-cycle programme.

- **Design**
 - Conformance to Design for Environment (DfE) standards allows products to meet regulatory requirements
 - Eco-labels demonstrate conformance with international environmental expectations and green procurement criteria
 - DfE increases materials and energy efficiency

- Recycled content is used , where feasible
- Design for Recyclability (DfR) features facilitate disassembly and recycling

- **Raw Materials**
 - Material reduction and use of recycled materials to decrease virgin material use
 - Reduction in the number of different material types used in a single product potentially adds value at end-of-life
 - Reduction in product size uses fewer resources
 - Recycled materials are used in some new products
 - Restricted substances are reduced or eliminate

- **Manufacturing**
 - Supplier Code of Conduct helps suppliers address key HP environmental requirements including General Specification for the Environment(GSE)
 - DfR features typically enable easier product assembly
 - Efficient operations reduce emissions and waste from our operations
 - Global ISO 14001 certification helps in establishing effective environmental management processes

- **Distribution**
 - Smaller, lighter products decrease CO2 emissions and transportation impacts and costs
 - Improved packaging designs increase the number of products per pallet, reducing product transport environmental burden
 - Transportation by sea allows for more efficient shipments with lower environmental impact
 - HP participation in Clean Cargo and Green Freight Groups promotes industry-wide reduction in environmental impact

- **Use**
 - Efficient product design, longer battery life and enhanced power management decrease energy consumption
 - Multi-function products reduce energy and material use
 - Server center optimisation reduces system energy use
 - HP printing products are efficient and reliable, reducing paper waste and cartridge use
 - Products designed for reliability and upgradeability extend functional lifetime, saving IT rollover costs and reducing waste

- **End of Life**
 - HP offers a variety of take-back options, including asset recovery, donation, leasing, remarketing/refurbishment, trade-in and recycling
 - Materials selection and identification increases value at end-of-life and facilitate recycling
 - Design features increase ease of disassembly, recycling and material reuse

Environmental ABC

Activity based costing techniques can provide the means to identify cost bearing activities effectively and to allocate costs to individual products. ABC links costs to activities not products. Costs are allocated to products on the basis of the products demand for those activities. The allocation basis or cost drivers are the quantification of activities performed.

ABC in Life-cycle Costing

The merging of life-cycle costing and ABC is not a revolutionary concept. Consideration of all costs from the introduction phases to product maturity can allow for the development of better design methods, production methodologies, marketing strategies and disposal options. Environmental expenses must be a major parts of those cost considerations.

ABC allocates activities among unit-level, batch-level, product sustaining and facility sustaining activities (Kreuze and Newell (1994); Yakhou and Dorweiler (2004) and Grinnell and Hunt (2000). They also state that environmental expenditures can occur in any part of those levels.

- **Unit level activities** are performed on individual units
- **Batch-level activities** allow batches of units to be processed
- **Product sustaining activities** provide capacity to produce a particular product
- **Facility sustaining activities** sustain a manufacturing capacity

Kreuze and Newell (1994) give a practical explanation of the activities based on their research.

“Isopropyl alcohol left over from the production of computer monitor screens would be a unit-level activity cost. That same alcohol can be used as a solvent to clean casts for steel products making it a batch-level activity cost. Many regulatory and governmental compliance costs would be product-sustaining activity costs, such as reporting of cleaning rag disposal at a furniture shop. Future contingent cleanup costs at waste sites, product-sustaining activities, also should be estimated for complete full costing analysis. Finally, air pollution devices installed on manufacturing facilities create significant facility-sustaining activity costs.” (p.39)

Furthermore, Kreuze and Newell (1994) state that the levels of environmental costs for full costing should be identified and included in the appropriate cost activity level.

3. Research Methodology

The following research methodology questions will be answered in order to give the research methodology structure. Furthermore, answering the questions shall ensure that the methodology selected addresses the research questions, objectives and leads to valuable conclusions.

Research Methodology Questions and Answers

1. What is the research methodology?

The research methodology will take the form of an assessment. The was loosely based on the requirements of a case study.

2. Why was it chosen as the most appropriate approach?

Yin (1994) states that there are a number of approaches for a researcher to conduct social science research, namely experiments, surveys, archival analysis, history and case studies. Each of these strategies' has different advantages and disadvantages depending on different conditions. These conditions are, (1) what type of research questions, (2) whether or whether not the researcher has control over behavioural events and, (3) if the research focuses on contemporary events or historical phenomena (Yin, 1994). Saunders et al, (2000) state that what matters is not the label that is attached to a particular strategy, but whether it is appropriate for the research questions and objectives.

After reviewing the different methods described by Yin (1994), the case study was selected as the most appropriate even though the assessment presented did not go into the detail which usually accompanies a case study.

Researcher Yin (1994) defines the case study as *“research method as an empirical inquiry that investigates a contemporary phenomenon within its real life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used”* (p.23).

Furthermore, Yin (1994) states that a case study approach is best used as a method for gathering data when a “how” or “why” question is being asked about a contemporary set of events over which the researchers have little if any control

Using Yin’s definition, the case study method was selected as the most appropriate approach because the case study methodology provides a qualitative research method to examine a contemporary real life situation and provide the practical basis for the application of strategic cost management.

The reviewed literature was based on specific themes, namely, sustainable development, environmental legislation, corporate governance, strategic environmental management, environmental management systems and environmental accounting. The case study methodology aims to prove that all these themes in the literature review are within the boundaries of strategic cost management and can be integrated into an organisation by using strategic cost management as a philosophy.

The above mentioned reasons make the case study method more than capable for creating an assessment in order to answer the research questions and thereby reach the stated research objectives of this half masters thesis.

3. How was it applied, what were the techniques for data collection and why were they deemed appropriate?

Yin (1989) states that six sources of evidence can be the focus of data collection for case studies. These are documentation, archival records, interviews, direct observations, participant-observations and physical artefacts (Yin, 1989).

Documents could be letters, memoranda, agendas, administrative documents, newspapers articles, authentic internet web-sites or any document that is germane to the investigation.

Yin (1989) stated that documents are useful for making inferences about events. For the above mentioned reasons, information on the organisations web-site will be selected as one of the data sources.

Interviews will also be used for data collection. There are several forms of interviews available. These are, **semi-structured**, **in-depth** and **structured** (Yin, 1989).

In **semi-structured interviews**, the researcher will have a list of themes and questions to be covered although these may vary from interview to interview. This means you omit some questions in particular interviews.

In **in-depth interviews**, there is no predetermined list of questions to work through. The interviewee is given the opportunity to talk freely about events, behaviours and beliefs in relation to the topic area so that the type of interaction is sometimes called non-directive (Saunders et al, 2000).

In **structured interviews**, data is collect via questions which are detailed and developed in advance such as they are in a survey (Yin, 1989).

For this study, in-depth and structured interviews were used. The **structured interview** perspective allowed the researcher to follow a certain set of questions derived from the case study protocol. It also decreased the possibility of misunderstanding between interviewer and informant. The **in-depth interview** perspective opens the informant up to additional questions should the need arise.

The intention of the research was explained and the correct person with the best knowledge of the organisations overall operation and experience in sustainable development, environmental business aspects and business strategy was selected.

The interview was done via a survey containing both structured and in-depth interview questions via email correspondence. Additional questions were emailed in order to probe and direct the in-depth interview questions. This provided record keeping, tracking the direction and answers of the interview and prevented misunderstanding by requesting written clarification to ambiguous responses.

4. What type of data was collected and the reasons there of?

According to Eriksson and Wiedersheim-Paul (1997) there are two kinds of data, namely primary and secondary data. Primary data is data that a person gathers on his/her own with a specific purpose in mind. Secondary data is data that has already been gathered by other researchers with different purposes in mind

Primary data was collected in order to obtain responses specific to this papers research questions and objectives.

5. How was the data analysed and why was that approach deemed most appropriate?

Yin (1994) states that data analysis involves examining, categorising, tabulating or recombining the data. Every investigation should have a general analytic strategy which treats evidence fairly, produces compelling analytic conclusions and rules out alternative interpretations. This analytical strategy should help the researcher to choose a technique that completes the analysis of the research (Yin, 1994).

The nature of this research is relatively new so the analysis was based on the empirical data being compared to existing theory. However, certain areas of data, where applicable to case examples in the literature review, were compared to different cases.

The data concerning the research question was first reduced by selecting and simplifying the essential parts needed in order to answer the research questions. The empirical findings were compared to existing theory and where applicable to case examples in the literature review.

The data was displayed in an organised structure enabling easy conclusion drawing. This was vital in order to draw and verify the final conclusions.

In order to analyse the role of environmental accounting in strategic cost management within the organisation, the following steps were used (1) the organisation's mission or goals and (2) the way the business unit chooses to compete in its industry to accomplish its goals.

6. How was the data presented and why was that seen as the most appropriate way of data presentation?

The data was separated into sections,

- General information
- Environmental Strategy
- Organisations Mission / Goals / Objectives

Each sections data was derived from the questionnaire.

This structured and systematic method of data representation was selected as appropriate because it answered the research questions and objectives.

4. Results of Research

This chapter will display an assessment of how a South African organisation reacted and integrated environmental business aspects into their organisation. It was conducted with the Sustainability and Environment Group Manager. Additional information was collected from the company web-site.

No accounting information was obtained from the company due to a confidentiality and nondisclosure agreement.

4.1 *General Information*

Corporate Profile

- It is wholly South African owned.
- The company operates within the mining industry.
- It was the first of its kind in South Africa.
- It is a market leader in South Africa.
- It trades on the Johannesburg stock exchange.
- It is the leading supplier of its product in Southern Africa.
- Its distribution network extends into the building and construction industry, concrete product manufacturers, hardware stores and DIY centres.
- Turnover is in excess of R1 billion.

Vision

The following values are part of the organisations vision.

- We believe in satisfying our customers' needs
- We supply quality products and services
- We provide a non-discriminatory, healthy, safe and challenging work environment
- We are committed to improving the quality of life for our people
- We act professionally

- We respect the individual
- We strive for security
- We care for the environment and the communities in which we operate
- We act professionally

Business Objectives

- Economic Objectives
 - Ensure cash flow returns that allow for continued reinvestment in and replacement of product capacity
 - Continuously explore ways to reduce costs and improve efficiency of operations
- Environmental Objectives
 - Rehabilitate and obtain closure certificates on all worked-out mining areas
 - Meet all legislated emission level requirements and further reduce emissions
 - Reduce non-renewable resource requirements by increasing the level of extenders in final product
- Social Objectives
 - Assist with the upliftment of disadvantaged communities by using resources from the communities in which the organisation operates
 - Skills transfer in disadvantaged communities for sustainable empowerment
 - Continue to progress with BEE equity and board participation as foreseen in BBBEEE and MPRD Acts.
- Operational Objectives
 - Reduce energy cost by using substitute fuels
 - Increase manufacturing capacity to meet the country's needs

Company Strategy

- Focus on core businesses
- Generate superior cash flows returns
- Achieve global competitiveness

- Develop globally competitive people
- Practice sound corporate, environmental and social governance and build on our strengths through synergistic growth

Environmental Vision

The environmental vision is to minimise the impact of the organisations environmental footprint by providing energy and resource efficient products manufactured by a company that is driven by sustainable development.

Environmental Policy

The organisation is committed to understanding and managing any potential environmental impacts of their activities relating to the sustainable manufacture of products as well as the mining of minerals.

They do this by ensuring that environmental management is an integral part of their operations. They continue to strive to meet the expectations and requirements of all stakeholders through monitoring and managing environmental performance using an integrated and effective environmental management system.

They believe that all employees and everyone associated with the organisation have an important role to play in achieving the environmental objectives and targets.

To this end they are committed to the following,

- Establishing clear accountability for environmental performance
- Continual environmental improvements by providing a customised framework for setting and reviewing environmental objectives and targets based on stakeholder engagement and the identification of significant environmental impacts
- Comply with environmental legislation and other requirements to which the organisation subscribes that enables them to identify and implement resource optimising strategies and technology improvements to achieve a level of environmental performance that meets or surpasses the requirements for regulatory compliance

- Implement effective waste and energy management principles and cleaner technology alternatives throughout the organisation
- Effective and transparent communication for their stakeholders by establishing environmental management stakeholder forums
- Building capacity among their stakeholders to identify, report and act proactively on opportunities to minimise environmental impacts
- Review the environmental policy on an annual basis to demonstrate commitment to ongoing environmental management and update all stakeholders throughout the value chain

4.2 Environmental Strategy implementation

Commitment to corporate action

The board of directors mandated the various operations to indentify and investigate the risks and opportunities of environmental legal non-compliance and develop master projects and programmes with detailed resource requirements.

Appointment of environmental and sustainability managers

The organisation appointed environmental experts at group level as well as at all operational levels. These experts are empowered with the necessary authority and budget to champion their portfolio of environmental and sustainability management.

The aim of appointing site-specific environmental experts was to embed the responsibility of environmental management in the governance structures of each site.

Environmental Management Systems

All plants make use of environmental management systems to facilitate improved overall environmental performance and efficiency.

All except one facility, which is currently awaiting certification feedback, have achieved full ISO-14001 certification.

The ISO 14001 System

The ISO 14000 environmental management standards exist to help the organisation to minimise how their operations negatively affect the environment, namely cause adverse changes to air, water or land, and comply with applicable laws and regulations. An annual review by an independent body verifies the systems implementation.

The ISO14001 certification requires that the organisation periodically take stock of its environmental performance, commit to effective and reliable processes, address environmental impacts and develop sustainable actions plans to deliver on its commitments. This establishes a solid, verified base for the reliable and consistent management of environmental obligations.

The environmental management system (EMS) enables the company to monitor and manage environmental performance throughout the business. The EMS is designed to monitor environmental aspects that are both directly within the factory's control and external to its control but within its sphere of influence.

The company strives to continually enhance its system to improve overall environmental performance in line with the company's sustainability policy. Regular EMS audits enable the company to determine conformance with the ISO 14001 specifications.

All findings identified during the annual audit are addressed by the development and implementation of action plans. Corrective actions are implemented to ensure ongoing compliance with all regulatory requirements and facilitate continual environmental performance.

Environmental Accountability

The board of directors is ultimately accountable for sustainable environmental management. The board is kept abreast of environmental compliance and high level environmental risks through regular reports and presentations. The divisional executive committee has been integrally involved in the development of the company's master projects and programmes to facilitate environmental compliance and continual improvements at all site operations.

In recognition of a globally increasing focus on the environment, requests from nearby communities for environmental forums and environmental-related demands and requirements from different spheres of government, the organisation has increased its resources in the group environment and sustainability department.

This department is responsible for identifying areas of environmental risks and developing high controls to effectively manage challenges. The department also develops implementation plans and reporting deadlines to support the effective execution of the organisations master projects and programmes.

To ensure that all the company's operations performance is aligned with group objectives, regular joint audit protocol and corporate governance audits of all the company's operations are done. Critical risks and liabilities identified during these audits are communicated at a senior level and reported to the board of directors.

Environment and sustainability departments have been created at each operational site in South Africa. Environment managers, who report directly to the general manager of the factory, must implement the master projects and programmes in their locations and areas of responsibility.

An environmental manager was appointed in the project division to manage, lead and drive environmental sustainability in all the commitments and actions plans relating to the major expansion and technology-replacement projects at all operations.

All employees acknowledge that each of them is responsible for operating in an environmentally sustainable and responsible manner to protect the environment that, inevitably, is affected by their actions. The on-site environmental experts support the organisations employees to understand their environmental responsibilities through extensive awareness and training programmes.

Employee Management

The company recognises that their sustainability success relies on their people. Their people are integral to maintaining a sustainable philosophy. The intention is to create a healthy, rewarding and satisfying working environment in which everyone has the opportunity to contribute to the success of the organisation and their own development, and be recognised for excellence.

The passion and unconditional commitment of their employees underpin the growth and transformations.

Stakeholder value is created through the continuous growth and alignment of people with the group's business objectives.

Maintaining Open Dialogue

The company believes in maintaining open and honest dialogue with its employees, and accordingly concentrates on engaging and consulting with its people at all levels. The company acknowledges freedom of association and reliance agreements between the company and various unions.

A fundamental principle is that positive results are easily achieved when employees across all levels are engaged, empowered and held accountable. Accordingly, active involvement and communication take place frequently across the company through well-established organisational systems and processes.

- **Key Leader Summits**

Regular team meetings are held at plant or site level throughout the company, involving all appointed, elected and informal leaders. The aim is to inform employees about plant or site performance, strategic initiatives, challenges and opportunities. In an environment of mutual trust and cooperation's, there is robust and constructive communication and the outcomes of each summit are communicated clearly and promptly down to shop floor level. This process enhances a common vision and direction through out the company.

- **Team Meetings**

Structured, team-based discussions take place daily for teams at shop floor level, weekly at sectional supervisory level, and monthly at departmental level. The discussions communicate elements of vision and objectives, evaluate team performance, analyse obstacles affecting performance and develop actions plans to overcome these obstacles, ensuring targets are achieved. Initiatives such as behavioural safety, educational topics and development are also discussed.

Plant and site level meetings are designed to spread communication both upwards and downwards through out the company. These structures also,

- Enable transparent problem resolution and employee participation
- Encourage teams regularly to stretch outputs and targets by reviewing and assessing team performance
- Capture innovations and suggestions to enhance cost savings, process improvements, efficiency and safety
- Effectively communicate positive recognition
- Capture best practices on a centralised database
- Manage the company climate through team members adherence to the company code of conduct

- **Individual Perception Monitor**

For the past nine years, the company's annual individual perception monitor survey has given all the people the opportunity to express their views and rate the company on critical processes, including understanding its vision, employee benefits, leadership behaviour, remuneration, training, coaching and communication. Participation in the survey is both voluntary and confidential. Importantly, results are analysed by each site and by management on a centralised basis, to identify and address areas of concern and

reinforce positive trends. A healthy positive index average of over 90% has been maintained.

Reducing Greenhouse Gas Intensity

The company intends reducing its GHG intensity by:

- Applying thermal and electrical energy efficiency measures;
- Optimising product composition;
- Using alternative fuels and raw materials; and
- Replacing old kilns with modern, energy-efficient alternatives.

The company will increase its investment in projects and initiatives that lower CO2 emissions through the following initiatives:

1. Clean development mechanism

The company will evaluate opportunities to use the clean development mechanism to improve the financial return of projects that lower its CO2 emissions;

2. Inclusion of the carbon footprint in the company's capex evaluation

The company will evaluate the impact of capital projects on its carbon footprint during the investment decision-making process. A portion of the capital budget will be dedicated to projects that reduce its carbon footprint;

3. Research funding

The company is funding research into the development of technologies that will reduce the carbon emissions from the company's kilns and increase the use of renewable materials in its processes.

4. Monitoring and reporting

The company will establish an energy working group to monitor the GHG emissions of the company and track its progress in achieving the targets set in the climate change strategy.

The company will monitor the direct and indirect GHG emissions from all its operations according to the latest measurement protocols of the World Business Council for Sustainable Development.

Because of the specific nature of the company's various operations, only direct and indirect emissions that stem from them will be monitored. Emissions derived from administrative functions in the company will be estimated once and then become the reported emissions figure.

The company will include its GHG emissions and, if necessary, plans for their significant improvement, in the annual report. Moreover, the company will continue to participate in the Carbon Disclosure Project, which is an independent not-for-profit organisation that acts as an intermediary between shareholders and corporations on all issues related to climate change.

5. Climate Change & Carbon Footprint

According to the World Wildlife Fund's G8 climate scorecards (2009), climate change is the greatest threat to development and prosperity on this planet, endangering people and cultures as well as the natural base of life. The climate scorecard emphasizes South Africa's strong dependence on coal, and the fact that approximately 27% of people have no access to electrical energy. In South Africa, emissions per capita are only slightly below the average of industrialised countries, but well above averages for developing countries. Production of the company's main product accounts for 5% of global emissions. At the company, they acknowledge climate change as a strategic risk and have taken action to reduce carbon emissions.

The company uses the World Business Council for Sustainable Development (WBCSD) CO2 protocol to calculate its carbon footprint. The company's footprint from 1990 to 2008 is depicted below.

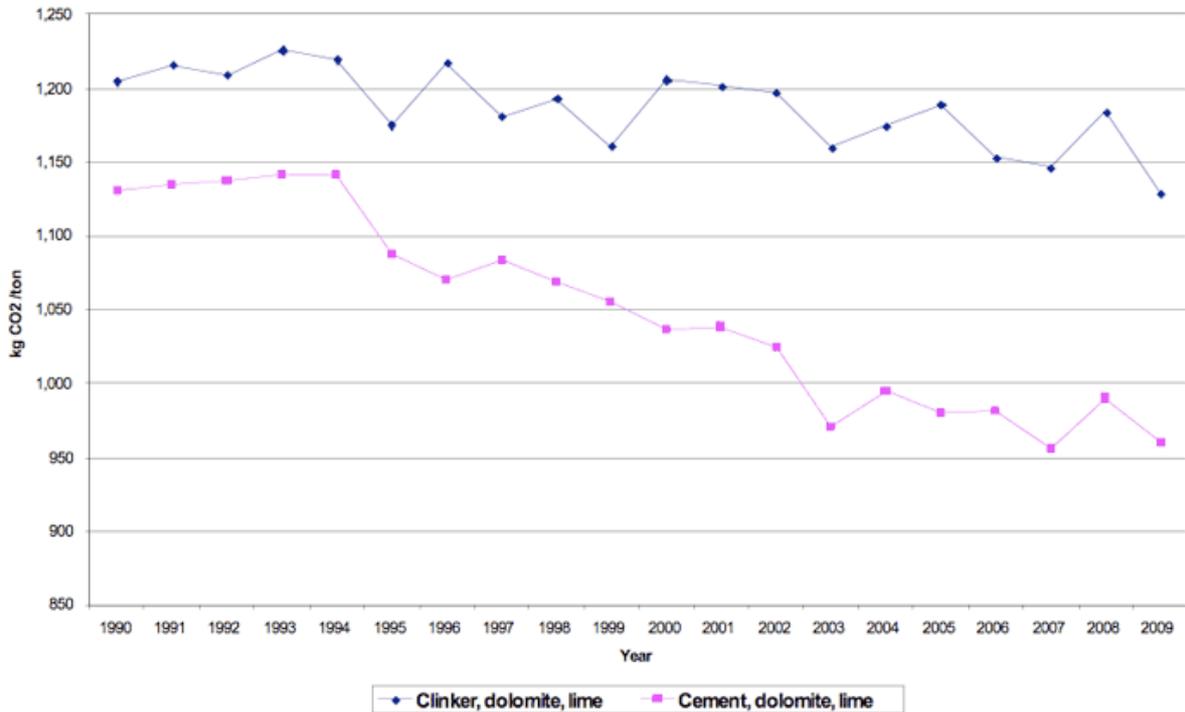


Figure 6: Carbon Footprint from 1990 to 2008

The company's carbon footprint is based on both scope 1 (direct) and scope 2 (indirect) emissions. The company has decreased its carbon footprint by 3% from 2008 to 2009 through lower fuel consumption due to the new kiln at a company plant and the decrease in tons of slag milled at a company plant. The CO2 per ton of cement, lime and dolomite for 2009, including both scope 1 and scope 2, and the company's carbon footprint of 883kg for cement, for 2009, is better than the world average of 890kg CO2/ton cement. The company's direct emissions are from the burning at high temperatures in the product kilns and using fuels such as coal and diesel. Electricity consumption forms the basis for indirect CO2 emissions. Emission was 960kg.

The CO2 for clinker, lime and dolomite for 2009, including both scope 1 and scope 2 emissions, was 1 128kg CO2/ton.

The company climate change strategy to reduce CO2 emissions by 15% per ton by 2020, using 2008 as a baseline, is under review.

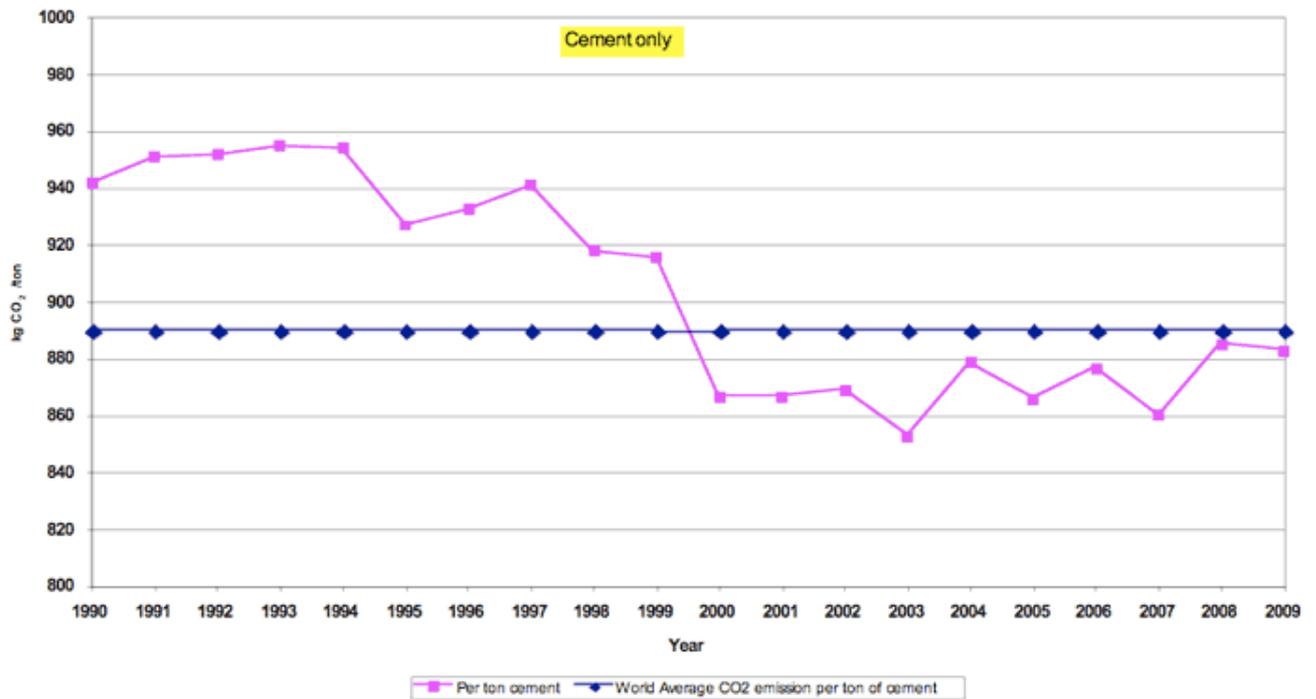


Figure 7: The company CO2 emissions for main product

The company is contracting an external service provider to undertake greenhouse gas audits at all sites using the GHG protocol. This will provide a clearer understanding of the company's impact on scope 2 (indirect) and scope 3 (travel) emissions. Once the audits have been completed, the company will be able to identify its material impacts and develop mitigation strategies.

Environmental compliance and incidents

There were no fines issued to the company. An emergency incident report required in terms of section 30(5) of the National Environmental Management Act (Act No. 107 of 1998) was lodged with the Department of Environmental Affairs during September 2009. During the monthly reconciliation of diesel stocks at the company Slurry, it was discovered that about 3509 Liters of

diesel was unaccounted for during the month of August. An investigation was then conducted to trace the diesel and it was discovered that the underground transporting pipes were leaking. The area has since been rehabilitated and the transporting pipes have been moved to the surface to prevent reoccurrence.

Environmental non-conformances on site are managed through the ISO 14001/ASPASA EMS system, which involves recording, investigating and implementing remedial measures.

In June 2009, the Department of Mineral Resources published a national energy efficiency strategy for South Africa. The company, in conjunction with the Association of Cementitious Material Producers, provided comments on this document to the authorities. The company supports proposed recommendations for major energy savings, namely replacing old technologies with new and employing best-management practices.

The target for energy reduction at the company is in line with the energy efficiency accord of 15% below 2000 levels by 2015. The company was unable to provide me with their current energy record.

Water management

Acknowledging that South Africa is a water scarce country, the company is committed to conserving the quality and quantity of water at all group operations. Their operations are focused on monitoring usage, measuring quality changes and calculating site-specific water balances to enable water-saving initiatives. The total amount of water consumed by the nine plants in South Africa this year, as reported through the GRI, is 2 675 000 kilolitres. Water-saving targets will be determined as soon as water balances have been established for all plants.

Biodiversity management

Any negative impact on the environment is identified through the environmental impact assessment process and mitigated accordingly. In terms of their mines, the company subscribes to the principles of concurrent mine rehabilitation, that is rehabilitating as the quarry is mined.

Waste Minimisation

The company is currently developing site-specific waste management plans. All operations are actively involved in creating awareness on waste management and implementing the principles of the waste hierarchy of reduce, reuse and recycle.

The company has a waste sorting project. A survey was conducted in early 2009 to establish the quantities of various waste types generated over a specified period. This information was used to engage with potential service providers ahead of appointing a company to sort and recycle waste.

A dedicated area was fenced off for all recycling activities with two entrance gates to facilitate easy access for trucks to remove full skips. A shelter was erected to enable the service provider to work in a covered area under adverse weather conditions.

To facilitate separation at source, color-coded 210-litre drums and wheeled bins were selected for use throughout the site:

- Red - hazardous waste (oily rags, oil containers, grease containers, old personal protective equipment, etc)
- Blue - plastic, glass, cans and paper (soft drink cans and bottles, copier paper, etc)
- Green - domestic waste (left-over food, wrappings, etc)
- Cardboard boxes - photocopy paper in the offices
- Wheeled bins - domestic waste in the administration block.

Suitable locations for waste collection were identified throughout the plant in consultation with

all staff. Concrete slabs were cast to elevate drums to highlight their location. Each location is identified by a white number painted in a green block. These numbers are plotted on a site map indicating the location of the drums.

The waste drums around the plant are swapped for empty drums daily by the service provider to prevent spillage of any waste material in the site. The drums and wheeled bins are taken to the waste-recycling area for further sorting. Recyclables are removed and non-recyclables are placed in multi-waste skips for disposal. Hazardous waste is placed in a dedicated skip for disposal. All safe disposal certificates are filed on site. All recyclable waste removed from site is weighed and recorded by the service provider to demonstrate the volumes recycled instead of going to a landfill site.

A large quantity of waste produced on site is recycled, namely scrap metal, wooden pallets, old printer cartridges and old oil. Supported by a multi-level communications campaign, the project has already produced positive results and improved housekeeping within the plant.

To promote sustainable information technology, the company IT department selected a project on recycling of old and redundant equipment. In the past, the practice was merely to dispose of redundant equipment via a disposal company. Following a feasibility study on waste-management options, recycling was highlighted as a viable alternative.

Based on a number of selection criteria including legal compliance, a service provider was appointed. The contract involves removing redundant equipment from the company's premises thus providing one-stop convenience for recycling e-waste, with the assurance of technology protection and environment-conscious recycling methods. All electronic waste is manually stripped, disassembled and sorted to avoid cross contamination. Items for recycling are not shredded as whole units, thus avoiding a mix of plastics, ferrous and non-ferrous metals. Sophisticated dust extractors are used to recover precious and non-ferrous metals. Shredding and pulverization ensures that all metallics are separated and all plastics sent to plastic recyclers.

This project has been running smoothly for the past six months, with multiple benefits. The company saves on disposal costs and contributes to less solid waste disposal on landfill sites, while supporting small business development.

4.3 Environmental performance, results and feedback

Saving Costs through employee innovations and suggestions

During the review period, over 3000 value adding suggestions were generated. Of these, more than 60% were evaluated, accepted by management and implemented. An estimated R20 million was saved through these suggestions in 2009, taking the four-year total to R72 million in cost savings.

The company achieved a 17% reduction in energy consumption per ton of cement, lime and dolomite against the 2000 baseline. This implies that the energy efficiency accord targets have been met ahead of the compliance timeframe (2015).

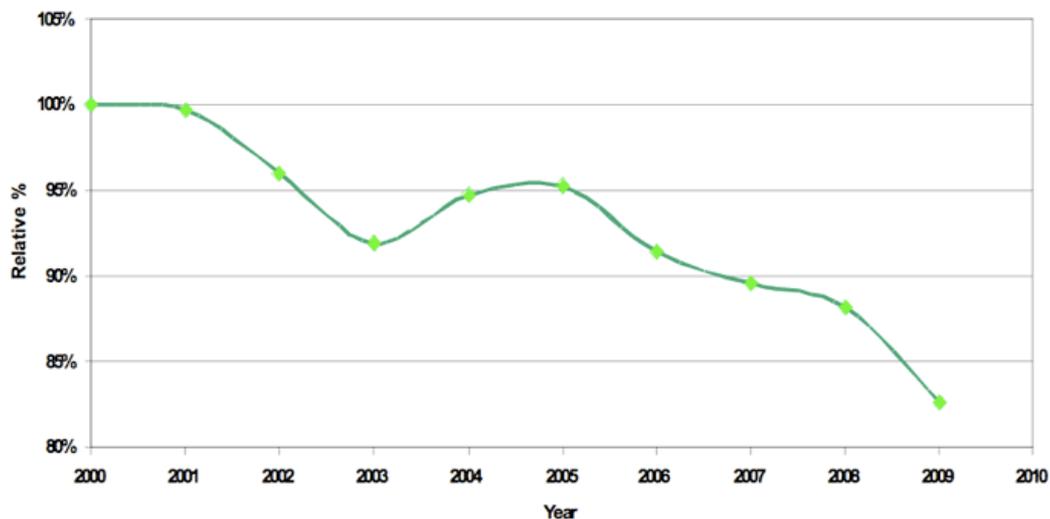


Figure 8: The company energy consumption vs. 2000

The company's energy consumption

The company has decreased its energy consumption per ton of cement, lime and dolomite by 6% from 2008 to 2009 through lower fuel consumption due to the new kiln at a plant and the decrease in tons of product waste.

Through the internal auditing process, the company has identified and corrected energy-consumption levels reported in previous annual reports. The company will continue to improve on the accuracy and transparency of data reported through more rigorous assurance processes.

The breakdown of energy sources in the production process is roughly 89% from coal consumption, 8% from electricity consumption, 2% from diesel consumption and 1% waste material from the aluminium industry used as an input material in the company operations.

The company is also implementing best practices to ensure all new capital projects achieve an energy efficiency certificate rating as defined by the National Energy Efficiency Agency.

All plants are participating in an energy audit to identify areas for improving energy consumption and efficiency. A project implemented at a company plant involves intergrinding fly ash: because fly ash is so fine, it does not all need to be milled, and is therefore fed into separators and only the coarse fraction milled after milling. This has produced significant energy savings.

IT Developments

The company's IT department has implemented a virtualisation project. Virtualisation is the process of placing more than one operating system or 'guest' onto a single server. Each guest is independent of the other guests, yet has access to common components on the host server.

This introduces efficiency while driving down operating costs.

Benefits of virtualisation per site include reducing the number of servers from 10 physical units to three virtual servers. Virtual services generate 10% of the heat and need 10% of the cooling required by the physical units.

What does this mean for green computing?

- Less power used
- Increased efficiency
- Longer replacement cycles
- Lower cooling requirements
- Fewer disposals of environmentally unfriendly pieces of metal.

A pilot project was initiated in June 2009. The company intends rolling out this project across the group with final implementation by May 2010.

Resource Optimisation

To limit the use of natural resources, the company investigated the substitution of natural materials with synthetic or secondary ones. At a company factory, natural sand is replaced by sand recovered from old mine dumps, and iron is replaced by magnetite, a by-product of the phosphorous industry. This preserves natural resources, and the use of mine sand also provides a solution for sand removal from a gold-mining operation located in the factory's vicinity. In the year under review, the company recovered 19 844 tons of sand for use.

Environmental highlights

- 15% reduction of CO₂ emissions per ton cement, lime and dolomite from 1990 to 2009
- 17% reduction in energy consumption per ton of cement, lime and dolomite versus year 2000
- Energy efficiency accord target achieved before target date (2015)
- All sites have environmental stakeholder forums and management committees

- All environmental management systems remain externally certified (ISO 14001 or ASPASA)
- Significant spend on technology upgrades resulting in environmental improvements

5. Conclusion

A comprehensive literature review was done. The role of environmental accounting was extensively researched and in doing so highlighted a number of important environmental business aspects. The pros and cons of incorporating environmental business aspects into business processes and systems were extensively described. The review also indicated that the use of strategic cost management as a philosophy can create alignment within the organisation thus steer the organisation towards a sustainable future.

A research methodology was performed and aligned with the research questions and objectives. The research methodology was prepared in order to perform an assessment on a South African organisation.

An assessment on a South African company was performed. No accounting information was obtained due to a confidentiality and nondisclosure agreement. The results of the assessment suggest that the South African company recognizes the need for environmental business aspects. They have clearly integrated environmental business aspects into their vision and allocated resources to aid its implementation throughout the organisation. In terms of strategic cost management, it is difficult to emphatically state that strategic cost management is being implemented due to the lack of accounting information.

In conclusion, businesses around the world are realising that environmental issues need to be accommodated in their business models. If they do not proactively incorporate environmental aspects into their business models, they are bound to experience a negative reaction by organisations trying to protect the environment. Strategic cost management as a philosophy can integrate cost management initiatives with business strategy. As a philosophy, it addresses all business aspects thus help the organisation meet sustainable development requirements.

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