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A review of eco-efficiency

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Sustainable Business Practices: A review of eco-efficiency

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Summary

The current demanding business environment requires corporations to act fast in finding effective solutions to problems given the myriad of challenges they face (Dyllick & Hockerts, 2001). The challenges include the impact of climate change on business practices, natural resource consumption, chemical pollution, technological change etc. Moreover, the forces of globalization, heightened concerns about the deteriorating quality of the physical environment and increased stakeholder power are also increasingly having a real influence on business practices (Rainey, 2008).

Since 1992, the World Business Council for Sustainable Development (WBCSD) has encouraged the adoption of the concept of ecological efficiency (eco-efficiency) to support business efforts aimed at addressing some of these challenges. The aim of eco-efficiency is to reduce the amount of energy and materials used in production processes to achieve economic and environmental benefits (WBCSD, 2000). In particular, eco-efficiency indicators (EEI) were developed, some tailored for business purposes while others have generic application. The aim of this study was to investigate how corporations with ambitions of achieving sustainable development use the concept of eco-efficiency. Specifically this involved an assessment of the application of eco-efficiency indicators within corporations to illustrate their effectiveness when utilized to achieve sustainable development.

A qualitative approach based on a literature review formed the basis of the research approach. Empirical data for the study was derived from journal articles reviewed from the Swedish University of Agricultural Sciences (SLU) library and other organization websites. The triple bottom line perspective which requires corporations to pay attention to economic, social and ecological aspects (Elkington, 1999) was used as the grand theory for the thesis.

The findings were that: corporations in different sectors use different eco-efficiency indicators which presents a challenge of comparing best practice; the triple bottom line framework does not provide enough grounds for understanding the required cooperation and manifest interdependencies between the different domains of sustainable development (SD); eco-efficiency indicators are inadequate as a solution for corporations especially small companies, to move towards sustainable development, because of the high costs, data intensity and lack of attention to social development, associated with their implementation.

In view of the above findings, the study proposes that more needs to be done to find sustainable and affordable democratic indicators, tools and concepts that capture all the aspects of sustainable development.

Sammanfattning

I takt med förändringar i samhället möter företag ett stort antal utmaningar som är förknippade med förväntningar på uttryck för ansvarstagande. Till dessa utmaningar hör miljöförändringar, teknisk utveckling och sociala frågor som blivit allt mer internationella till sin karaktär. Globalisering bidrar till komplexitet i vilken politiska, etiska och miljömässiga aspekter av företagande blir allt mer viktigt i såväl strategiska som operativa beslut.

Sedan 1992 har en internationell organization, WBCSD, World Business Council for Sustainable Development arbetat med hållbarhetsrelaterade frågeställningar ur ett företagsperspektiv. De uppmuntrar företag att arbeta med effektivitetsfrågor speciellt miljöeffektivitet. Som ett led i deras arbete har de utarbetat så kallade miljöindikatorer (eco-efficiency indicators, EEI). Några av dessa indikatorer är generella och andra är mer skraddarsydda för speciella industriella behov.

Syftet med studien är att kartlägga hur resultaten från studier av företag med hållbarhetsambitioner inbegriper miljöeffektivitet. En gedigen litteraturgenomgång av akademisk litteratur som är tillgänglig vid Sveriges lantbruksuniversitet, webbsidor och böcker inom området utgjorde empiri i studien. Den teoretiska ramen för genomgången bygger på Elkingtons väl etablerade "triple bottom line" (1999) – i vilken ekonomi, miljö och sociala värden balanseras med hållbarhetsmål i åtanke.

Resultaten visar industriell specialisering vid mätning av miljöeffektivitet, vilket utgör en utmaning i jämförelser av resultat. Vidare innebär en fokusering på miljöeffektivitetsmål risk för en suboptimering om målet är hållbarhet, eftersom optimala miljölösningar inte alltid innebär optimala ekonomiska eller sociala lösningar. En ytterligare utmaning är att hitta indikatorer som kan fungera för både små och stora företag. Många redskap utvecklas med stora företags behov och förutsättningar i åtanke, vilket inte alltid gör dem lämpliga för små företag.

Genomgången inom området pekar på behov av att utveckla redskap, hjälpmedel för företag som balanserar indikatorer som visar olika hållbarhetsaspekter, är tillämpliga i företag av olika storlekar och i olika kulturella kontexter.

Nyckelord: företag, hållbarhet, indikator, miljöeffektivitet, strategi

Abbreviations

ANT	Actor-Network Theory
CBA	Cost benefit analysis
CIDA	Canadian International Development Agency
CSD	Commission on Sustainable Development
EEA	European Environmental Agency
EEI	Eco-efficiency Indicators
EF	Ecological Footprint
GRI	Global Reporting Initiative
IUCN	International Union for Conservation of Nature
MDG	Millennium Development Goals
NGO	Non Governmental Organization
OECD	Organization for Economic Co-operation and Development
SD	Sustainable Development
SLU	Swedish University of Agricultural Sciences (Sveriges Lantbruksuniversitet)
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
WBCSD	World Business Council for Sustainable Development

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1 Introduction

This chapter presents the problem background and an explanation of the problem area followed by the aim and research questions and delimitations. The rationale for this is to provide a logical perspective regarding the context of the study. Then, definitions of key concepts and terms are provided to familiarize the reader with their conceptual and empirical relevance to the study. Lastly, contributions and outline of the study are presented.

1.1 Problem background

Corporations are more and more finding it hard to concentrate on economic objectives while paying little or no attention to social and ecological issues (pers, com, Jackson, 2011). Moreover, while striving to achieve their current needs defined by their mission and strategy, corporations have to be mindful of the impact of their actions on future generations (Isaksson *et al.*, 2010). These developments coupled with the influence of other factors such as globalization, technological change, and increased stakeholder power, call for smart solutions (Rainey, 2008). In order to compete in this environment, business management practices are changing. Rather than focus on internal performance indicators such as profitability and return on investment, managers are adopting broad strategic management orientations focusing on entire value networks and emphasizing partnerships thus broadening the scope of their involvement beyond the traditional financial motives (*ibid.*). Consequently, environmental and social issues are no longer treated as *ex post* regulatory requirements but are treated as *ex ante* business imperatives. Accordingly, businesses now conduct their activities with the awareness that social and environmental concerns are as important as the economic objectives which have been their traditional focus area (Rainey, 2008; Demimonde & Popoff, 2001).

With the spotlight refocused on sustainable business practices, new strategic management solutions that enhance sustainable development have become essential. It is in pursuance of this objective that the World Business Council for Sustainable Development (WBCSD) encouraged its members to adopt the concept of ecological efficiency (eco-efficiency) whose main thrust is to reduce the amount of energy and materials used in production processes to achieve economic and environmental benefits (WBCSD, 2000). To operationalize the concept, a number of eco-efficiency indicators (EEI) were developed, some tailored for business purposes while others are meant for generic application. Besides the concept of EEI, there are tools such as cost benefit analysis, environmental impact assessment and social impact assessment, among others, used by corporations to assess different aspects of corporate sustainable development (Mark-Herbert & Rorarius, 2010). The concept of eco-efficiency is a recent addition to the measures used to evaluate corporate sustainable development efforts (WBCSD, 2000a) and therefore offers new potential for debate regarding its application and relevance.

1.2 Problem

Prior to the 1970's, corporations perceived sustainable business practices as a problem and risk factor with limited strategic value. Since then, business stakeholders have become more aware of the environmental and social consequences of business activities. In turn, many businesses have embraced the sustainable development concept although there is evidence that not enough progress is being made towards its full realization (IUCN, 2006). The

challenges to the implementation of sustainable business practices range from corporate executives' perception that implementing sustainable development strategy diminishes the company's ability to compete to an apparent lack of understanding of the value to be derived from corporate sustainable development practices (Porter & van der Linde, 1995).

These challenges notwithstanding, the intersection of environmental and economic aspects of sustainable development (Isaksson *et al.*, 2010; Searcy, 2009; Weick, 1987) has alerted corporations to the potential of concepts such as ecological efficiency to achieve sustainable development (Elkington, 1999). Eco-efficiency has received particular attention because of its promotion by the influential WBCSD. It is promoted as having the potential to reduce harmful materials from production processes and improve environmental outcomes to support their competitive position (Porter & van der Linde, 1995; Verbally & Bidwell, 2000). The results from its application are still scanty given its recency (*ibid.*).

The adoption of eco-efficiency indicators to achieve sustainable development by corporations presents a number of explicit and hidden benefits. The former category includes cost reduction, increased market share, better image and long term success (Demimonde & Popoff, 2001, p.25). Hidden benefits on the other hand are difficult to demonstrate and quantify since they are often realized in form of intangible assets, such as improved image and better brands. However, while eco-efficiency indicators are presented as a necessary requirement in moving corporations towards sustainable development, a number of questions remain unanswered regarding its relevance in different business settings. Moreover, concerns have also been expressed regarding the extent to which eco-efficiency as a whole can be used to measure sustainable development efforts given that it focuses on economic and environmental issues and gives less attention to the third pillar of sustainable development; social progress (Green, 1995). The concept fails to promote the achievement of social objectives such fair distribution of income, human rights, women empowerment etc. The unanswered questions create room for an investigation into these and other matters related to the efficacy of eco-efficiency in moving corporations towards sustainable development.

1.3 Aim and research questions

The aim of this study was to investigate how corporations with ambitions of achieving sustainable development given the varied stakeholder interests use the concept of eco-efficiency. This implies an assessment of the application of eco-efficiency indicators in corporations to illustrate how they are used to achieve sustainable development within a business context. With this aim in mind, the study addresses the following specific research questions:

- How is the concept of eco-efficiency used to achieve corporate sustainable development objectives?
- What is the relevance of eco-efficiency in achieving corporate sustainable development objectives?

1.4 Developing markets perspective

While business practices across the world are converging, the different economic and social realities between developing and developed markets militate against their uniform application. This is an implicit recognition that any measures developed to achieve business goals should be seen in this light. For this reason, this literature review, although not specifically focused on developing country business setting, is influenced by the developing markets perspective.

1.5 Delimitations

In order to undertake this study a number of methodological, theoretical and empirical delimitations were made.

1.5.1 Methodological delimitations

This thesis relied on the inductive approach to determine the use of eco-efficiency indicators in achieving sustainable development by corporations. The choice of this approach is motivated by the fact that while the use eco-efficiency is gaining ground as a business practice, it is still relatively new and there is as yet no consensus regarding the suitability of some eco-efficiency indicators given the diversity of business settings. A purely deductive approach which departs from a pre-designed hypothesis would be inappropriate as there is still a paucity of consistent data on the application of eco-efficiency indicators. However, while the emphasis is on the inductive approach, this delimitation does not rule out the use of some elements of other methods as the study progresses. In any case there is no study that relies purely on one approach (Perry, 1998; Coffey & Atkinson, 1996).

Inevitably, the choice of literature for this study was to some extent selective. The sources relied upon to obtain information for empirical evidence were not based on a primary study by the writer. There was an over-reliance on different opinions, views and understanding of other writers. Moreover these views and opinions were generated from studies and analysis of different business situations at different times. This serves as a methodological limitation in terms of the outcomes of the study given the nature of the data relied upon to draw conclusions.

1.5.2 Theoretical delimitations

Theoretically, this thesis was located within insights gleaned from the following theories: stakeholder theory, motivation theory, actor-network theory, political economy and ethical theory. These theories were selected for their potential to explain the relations between different actors related to a corporation and how these relations affect decisions by individual actors and organizational strategy. It should be pointed out that these theories borrow heavily from other perspectives such as economics, sociology and political science. For purposes of this study however, the theories are discussed from the triple bottom line perspective (Elkington, 1999) to illuminate its importance in explaining sustainable development. This also implies that the analysis was confined within the limitations of the triple bottom line framework.

1.5.3 Empirical delimitations

This thesis was solely based on a literature review of secondary material accessed from the Swedish University of Agricultural Sciences (SLU) library at Ultuna and from other professional websites. Most of the literature used dates back from the early 1990s to the present. This limitation may imply that other materials that were of relevance to the aim of the study were not accessed and may limit the efficacy of the conclusions derived.

1.6 Definitions

In order to provide more understanding of the major concepts to be encountered in the thesis, this section contains definitions of some key concepts. These definitions are meant to locate the concepts within the broader realm of sustainable business practices and familiarize the reader with the application and relevance of the concepts and their relation to the aim of the study. These concepts are defined below.

1.6.1 Sustainable development

The concept of sustainable development means a lot of things to different people, which makes it difficult to concretely operationalize (O’Riordan & Voisey, 1998). Goldsmith *et al.*, (1972, p.23) affirmed that a sustainable society is “*a stable society – one that to all intents and purposes can be sustained indefinitely while giving optimum satisfaction to its members*”. Elkington (1999, p.20) defines sustainable development as “*the principle of ensuring that our actions today do not limit the range of economic, social and environmental options open to future generations*”. Meadows *et al.*, (2006, p. 254) see a sustainable society as “*one that can persist over generations; one that is far seeing enough, and wise enough not to undermine either its physical or its social systems of support*”. Clearly, this definition reinforces the systems perspective and the intergenerational equity imperative embedded in most definitions of sustainable development. There is also an overarching recognition that human progress should recognize the needs of future generations.

While all the above definitions are equally notable, it was the Brundtland report that catapulted the concept of sustainable development to the global policy agenda. In this report sustainable development was defined as “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*” (WCED 1987, p.48). This definition has received a lot of attention and continues to influence policy debates at individual level, within corporations, governmental and international fora.

This definition, and a few others that appeared later, captures the objectives of sustainable development that were missing from earlier attempts to conceptualize social and environmental stewardship. These objectives include; intergenerational and intragenerational equity, and social justice. For this thesis, the WCED (1987) definition is adopted with the resulting implication that environmental management strategy requires the integration of social, ecological and economic goals, incorporation of short and long term aspects and a focus of current consumption on income rather than capital (Ehnert, 2008; www, Defra, 2011).

1.6.2 Sustainable development and corporate conduct

Sustainable development requires that a corporation’s actions should reflect a good balance between its concern for economic, social and environmental considerations both in the present and distant future. When the concept of sustainable development is extended to business, it is

defined as achieving the needs of a business's primary and secondary stakeholders, without reducing its ability to meet the needs of future stakeholders (Dyllick & Hockerts, 2002).

This proposition is important since corporations that only emphasize wealth generation at the expense of the environment might find it hard to survive in the long-term. Equally, it is very unlikely that a corporation that pursues a prudent environmental agenda without economic returns can survive the rigors of the market place. Finally, meeting social objectives such as poverty reduction and the promotion of human rights at the expense of economic and environmental concerns also seems untenable. Corporations have to find the right balance between the three pillars of sustainable development by following the triple bottom line approach that recognizes social, economic and environmental issues in corporate decision making (Elkington, 1999).

1.6.3 Eco-efficiency and sustainable development

Eco-efficiency is one of the concepts that corporations follow to reduce inefficiencies and thereby increase their environmental management footprint and lead to sustainable development in the long run. The phrase "*eco-efficiency*" was first used by Schaltegger and Sturm in 1990 (WBCSDb, p.11) to illustrate efforts required to reduce pollution and waste. Thereafter, the WBCSD adopted it in 1992 and it is now widely applied by businesses across the world (Verbally & Bidwell, 2000).

The concept of eco-efficiency is associated with several meanings and implications to business practices. The WBCSD (2000, p. 7) envisions that "*eco-efficiency is achieved by the delivery of competitively-priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life-cycle to a level at least in line with the earth's estimated carrying capacity*". Derwall *et al.*, (2005, p.51) define eco-efficiency as "*the economic value a company creates relative to the waste it generates*". The OECD (2001) defines eco-efficiency as the ratio of an output (value of products and services produced by a firm) divided by the input (total environmental demands generated by the firm). These issues will further be discussed in chapter five.

The connection between the concepts of eco-efficiency and sustainable development lies in the fact that businesses applying it strive to achieve more value using fewer inputs with the aim of causing the smallest amount of emissions. In other words, inefficiencies such as partial material utilization, defects and other forms of waste are avoided with environmental improvement efforts resulting from improved resource productivity (Porter & van der Linde, 1995). To put into practice the concept of eco-efficiency, many corporations rely on innovation as part of the solution. Such corporations embrace new technologies that allow them to produce superior products and invest in better supply chain practices. However, the concept of eco-efficiency does not unambiguously recognize the social aspect which raises important questions about its relevance as a measure of corporate sustainable development.

1.6.4 Eco-efficiency indicators

"*Indicators are the specific measures of an individual aspect that can be used to track and demonstrate performance*" (WBCSD 2000a, p.8). Eco-efficiency indicators are employed by corporations following recommendations by the WBCSD to determine economic and environmental improvements required in order to cause economic prosperity while utilizing fewer resources and yielding lower emissions (*ibid.*). Indicators are different from statistics in that they include reference values such as targets (Moldan & Dahl, 2007). However, the

increase in the number of corporations using eco-efficiency to direct management towards sustainable business strategy requires an increase in the robustness of their accuracy and application.

1.7 Contributions

This thesis exposes the salient features that underpin the concept of eco-efficiency and the application of eco-efficiency indicators to support sustainable business strategy. In the process, it offers an empirical contribution to the corporate sustainable development debate within the wider context of sustainable development. It also points out the limitations of current efforts to achieve sustainable development through the concept of eco-efficiency. The study also has both theoretical and practical implications given that it raises awareness of the changes necessary to lead to sustainable business practices and ultimately sustainable development.

1.8 Outline

The outline of the thesis is presented in figure.1.8. Chapter 1 provides the background to the research area and also includes the aim, problem definition, an outline of the study, contribution and definitions of key terms. In chapter two a theoretical framework is presented to introduce the concepts necessary to contextualize the choice of method.

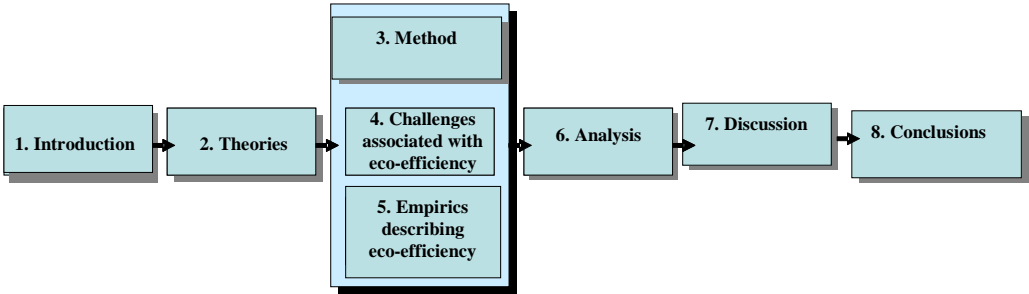


Figure 1.8 Outline of the study

The third chapter gives a summary of the method used in the study, including the research approach, collection of secondary data and data analysis. Chapter four discusses the empirical background. Chapter five presents the empirical information specifically related to eco-efficiency. Chapter six contains the analysis of the study followed by the discussion in chapter seven. Finally, conclusions and suggestions for future research are presented in chapter eight.

Since this study is grounded in a literature review, a deliberate choice was made to present the theories before the method chapter to help in consolidating the understanding of the theoretical justification for the choices made in the methods chapter. The theoretical framework follows in the next chapter.

2 Theoretical perspective

This chapter offers a theoretical framework. The facts, concepts and principles within the different theories are deemed necessary to act as a platform for the evaluation of the concept of eco-efficiency in order to answer the research questions.

2.1 The triple bottom line

Realizing that answers to environmental and social problems could not be found in neoclassical economics, debates started to emerge in search of an appropriate philosophy to guide business actions towards sustainable business strategy. One of the influential orientations in this regard is the concept of “the triple bottom line”. This concept is largely attributed to Elkington (1994) who argued for the incorporation of social justice, environmental quality and economic development objectives into business strategy. The conception of the triple bottom line framework was a major departure from the traditional neoclassical economic paradigm that emphasized shareholder returns at the expense of social and environmental concerns.

In the traditional business sense, the metaphor of the bottom line is used to refer to the profits that a corporation earns which is normally shown in financial statements (Elkington, 1999). It is from this metaphor that the concept of the triple bottom line evolved to reflect concerns for economic, social and ecological issues by corporations. Corporations have conventionally followed subjective traditional accounting conventions which do not recognize environmental and social costs, commonly referred to as externalities. This characterization of environmental and social costs is in part due to the scarcity of indicators and tools to measure social and ecological aspects but also because traditionally, corporations and stakeholders did not realize the need to internalize social and ecological costs (*ibid.*).

Much of what informed environmental strategy in organizations during the past century was shaped by the neoclassical economic ideology (Söderbaum, 2000) which in turn forms the basis of the capitalist mode of production which thrives on profit maximization. The traditional conception of the role of a corporation is heavily influenced by capitalism and gives disproportionate weight to profit maximization. At the same time, this approach regards all actors within society as rational utility maximizing agents and relegates the social and ecological concerns to external parties, specifically the government, while the corporation concentrates on paying taxes (see Friedman, 1970). While this view still has wide admiration, it has come under intense criticism because of its failure to recognize the interests of other stakeholders and reducing the reasons for a corporation’s existence to simply financial survival.

As shown in section 2.2, a corporation has many stakeholders whose interests are varied and may change from time to time. For instance, until the early 1990s, environmental concerns did not occupy a high position on corporate management agenda, let alone that of other stakeholders. With the increase in environmental-related negative impacts resulting from business activity, many stakeholders have emerged as powerful players within the business community demanding accountability from corporations for their actions. These demands have in turn shifted the focus of business strategy to incorporate environmental responsibility as a major strategic objective. As seen in Figure 2.1, corporations are now increasingly expected to espouse social, economic and environmental objectives. This expectation is

informed by wider stakeholder expectations and the changing business dynamic. Elkington (1999, p.69) posits that the greatest challenges for corporations desirous of achieving sustainable development are found not “*within*” the areas covered by social, economic and environmental issues but “*between*” these areas. In figure 2.1 these areas would be the “*equitable*”, “*durable*” and “*viable*” with the *sustainable* area as the ultimate objective.

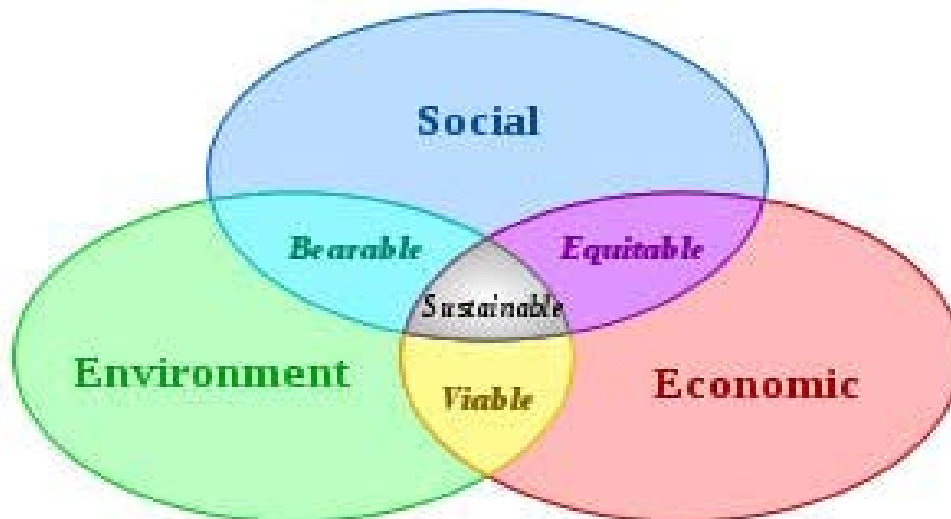


Figure 2.1 The triple bottom line (IUCN, 2006) in Todorov & Marinova 2009, p. 1218)

Unfortunately, corporations using eco-efficiency to achieve sustainable development mostly operate in the *viable* area in Figure 2.1. While many such corporations continue to strive to move to the sustainable area, using eco-efficiency indicators to achieve this goal is a constraint in itself since many indicators are either focused on the economic or the environmental domains.

There are conflicting interests between organizations and individuals located within and between each of the domains in Figure 2.1. The next section will attempt to shed more light on the nature of these relationships and expectations by discussing stakeholder theory, its relevance to the triple bottom line framework and application to sustainable development.

2.2 Interests of stakeholders

“*Stakeholders are persons or groups that have, or claim, ownership, rights, or interests in a corporation and its activities, past, present, or future*” (Clarkson 1995, p. 106). Corporations have primary stakeholders such as employees, managers, board members, shareholders, and customers. They also have secondary stakeholders including, suppliers, and competitors, environmental groups, governments, local community, the media etc. (Freeman, 1984). The existence of divergent stakeholders makes an organization a collection of similar and competing interests linked to certain essential values (Donaldson & Preston, 1995). The sheer number of interactions among stakeholders (see Figure 2.2) is a pointer to the intricacy which makes a business relationship with various sections of society complex. Given their position within organizations, managers have to find ways to harmonize these diverse interest and intricate relationships on a constant basis (Carroll & Buchholtz, 2008).

Stakeholders influence the corporation through their ability to support or damage the firm's capacity to create value (Schneider, 2002; Rebitzer *et al.*, 2004). As a society becomes more developed in material terms, better educated and acquires a higher level of public consciousness through the media and education, stakeholders tend to set higher expectations of institutions such as corporations (Carroll & Buchholtz, 2008). This is the case in many countries in Western Europe and North America. On the contrary, in developing countries the expectations of stakeholders in terms of sustainable development are lower for the reasons mentioned above.

All stakeholders are motivated by certain interests which should in theory, be given equal priority (Donaldson & Preston, 1995). In Figure 2.2 these assumptions are reflected by the fact the corporation (*company*) is at the centre with all the stakeholders positioned separately at various points in the circle depending on their interests (Roberts, 2003). Corporations depend on their various stakeholders to get the resources required to create value (Elijido-Ten, 2010). This relationship, rooted in dependence theory, creates a power relationship, which determines the influence that corporations have over stakeholders and vice versa (Frooman, 2005). The degree of influence then determines which of the stakeholders have more power to have their objectives met over and above those of others. For this reason, it is not by accident that stakeholder interests in the economic domain tend to take precedence over other interests because of the power asymmetry between actors in the three domains. However increase in awareness regarding the role of business in sustainable development has raised the influence of other stakeholders which has transformed their participation in decision making into a democratic right (Reed, 2008).

Against this backdrop, stakeholder theory emphasizes collaboration implying that under normal circumstances, a corporation that practices stakeholder management will achieve better outcomes on conventional measures of performance such as profitability and growth (Donaldson & Preston, 1995). However, corporations that adopt eco-efficiency actively seek to satisfy the interest of stakeholders in the environmental and economic domains leaving out social issues for the most part. This neglect speaks of the limited power and influence of stakeholders interested in social issues. Thus shareholders who reside in the economic domain wield enormous power because they participate in the selection of the board and influence strategy. Since their main interest is economic returns, it's clear that these will take precedence over other issues.

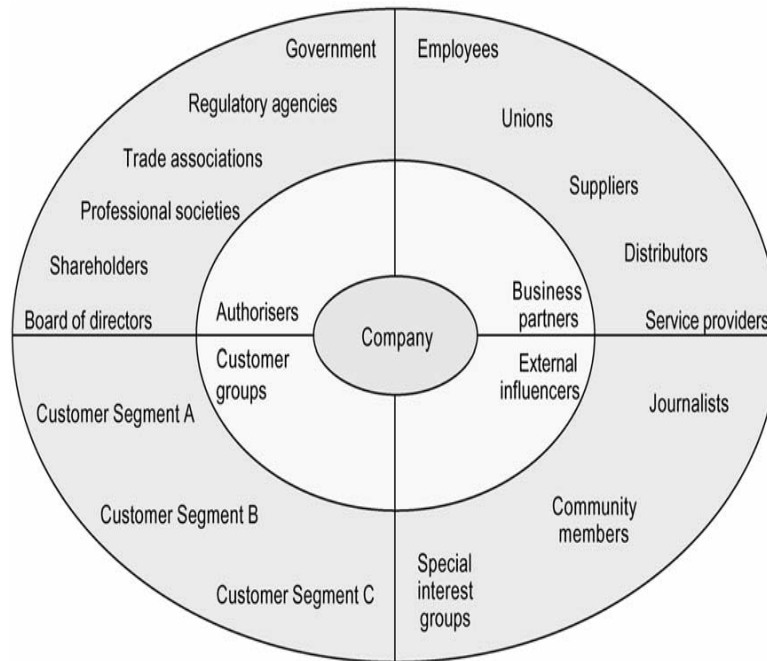


Figure 2.2: Corporate stakeholders (Roberts 2003, p. 162)

On the other hand, today's highly heterogeneous society creates dynamic relationships between business and society. In this kind of society power is broadly spread among different stakeholders resulting into a diversity of power concentration (Carroll & Buchholtz, 2008). The benefits arising from this social system include more room for expression and checks and balances to reduce the abuse of power. The downside however is that varied institutions may follow their own egotistic interests making it complicated to aggregate the actions of independent organizations. For instance powerful environmental groups have successfully lobbied or litigated to stop the construction of manufacturing plants in areas considered environmentally sensitive at the expense of social objectives such as employment creation or housing. Additionally, the power and benefits that accrue to different stakeholders vary in different legal jurisdictions and depends on other factors such as ideological orientation, level of development (Donaldson & Preston, 1995) and power relations between a corporation and its stakeholders (Roberts, 2003). Therefore, it would be simplistic to assume that following a stakeholder approach to management necessarily yields optimal sustainable development outcomes for all stakeholders.

2.2.1 Categories of stakeholder theory

A corporation and its stakeholders can be analyzed using different methodologies and criteria (Donaldson & Preston, 1995). Following the descriptive approach, stakeholder theory is used to explain certain behaviors and actions of actors within a corporation (Brenner & Cochran, 1991). By using descriptive theory together with descriptive data, the relations between stakeholder management and the attainment of traditional corporate goals such productivity and growth (Donaldson & Preston, 1995) are assessed. This approach serves to highlight emerging areas of corporate governance practices which could be used to arrive at useful analytical suggestions (*ibid.*). Unfortunately because this approach is so dependent on data, its usefulness in determining progress towards corporate sustainable development goals is limited. It requires a lot of qualitative data to draw any meaning conclusions on corporate sustainable development efforts. Moreover the focus of this approach is on traditional corporate goals which renders its relevance in assessing corporate sustainable development efforts minimal.

Another way to look at stakeholder theory is to take an instrumental approach. This approach suggests that adopting stakeholder principles and practices allows a corporation to perform better on traditional measures of performance better than what would be achieved were the corporation to follow other approaches. The better performance is explained by the close attention paid to the needs of all stakeholders who have a stake in the corporation (Kotter & Heskett, 1992). This normative approach to stakeholder theory is rooted in ethical or philosophical tenets. Ethical beliefs are seen as acting as a guide to the management of corporations (Carroll, 1989; Friedman, 1970).

In general, stakeholder theory emphasizes the importance to incorporating the interests of stakeholders while crafting corporate sustainable development strategy. In many ways this framework encourages democratic decision-making, takes into account changing circumstances and reflects a diversity of aspirations from different actors (Reed, 2008). The lesson here is that by embracing the interests of all stakeholders corporations stand to gain their support which ultimately positively affects their performance.

The next section will take a close scrutiny of the motivation structure within which different corporate stakeholders operate and how this influences them in their choice of corporate sustainable development strategies.

2.3 Motivation theories

Motivation refers to inner factors that drive action and external causes that can act as stimulus to action (Locke & Latham, 2004). Motivation theories help to explain the reasons behind the actions taken by various role players within a corporation to cause certain outcomes. The three facets of action influenced by motivation include the “*intensity*”, “*direction*” and “*duration*” of behavior (Locke & Latham 2004, P.388). In this regard, using motivation theory, it is possible to ascertain why some individuals are more interested in financial rewards than helping the communities where their businesses are located to overcome social and environmental problems.

The ability of employees to acquire skills and the extent to which they employ their talents and capabilities abilities can be influenced by motivation (Locke & Latham, 2004). Some theories of motivation are anchored on the notion of reinforcement. In order to explain it, motivation theories rely on concepts like tension, physiological needs and psychological desires. On the other hand, direction is explained by the use of concepts like associative bonds and purpose (*ibid.*). With these theories as a guide, the behavior of corporate executives in as far as they are willing or unwilling to appreciate the need to pursue sustainable development strategy can be understood. By understanding what motivates decision-makers within a corporation their actions can be interpreted as supportive or otherwise of corporate sustainable development efforts.

Other theories such as Vroom's theory focus on explicit emotional processes such as organizational behavior adaptation (Luthans & Kreitner, 1975) which emphasizes the role of rewards and feedback on the interest of workers. Goal theories and theories based on the valence of expected outcomes (Deci, 1992) also fall in this broad category and propose that the behavior of an individual can be explained by what they hope to achieve. Goal theory suggests that the existence of specific but challenging goals is an important incentive for the attainment of the goals (*ibid.*). As such, goal theory focuses on the regulation of the cognitive ability of actors and is concerned with the end result. Using goal theory it is possible to

understand the behavior of corporate executives regarding their choices of corporate sustainable development strategy. For example an estimate can be made whether financial performance overrides social and environmental considerations when future investment strategies are planned. In addition incentive structures within organizations provide good ground for understanding the behavior of different organizational stakeholders towards certain organizational goals such as sustainable development (Locke & Latham, 2004).

Another influential motivation approach is that of McClelland & Winter (1969) which is located within personality-based approaches to motivation. Accordingly, subliminal motivation, specifically the need for achievement is seen as a major driver of motivation. Again this theory could serve as a useful guide to understand the actions of corporate executives who attempt to maximize financial returns at the expense of social and environmental objectives and thus negating the concept of sustainable development. Over the past few decades others like Barrick & Mount (2000) have sought to position conscious, self-reported traits such as conscientiousness as another significant driver of motivation.

Motivation theories are not far removed from ethical theory since they are both profoundly influenced by psychology and sociology. Ethical norms are major drivers of corporate action, influencing organizational stakeholders to embrace or reject broader goals such as those related to sustainable development. Ethical theories are discussed in the next section.

2.4 Ethical theory

The role of ethics in business has become very important over the past couple of decades (Lozano, 1996) because of the rising power of business, increasing stakeholder interest in the actions of corporations and the growing awareness among corporations that self-regulation is a better way to control ethical conduct, *inter alia* (*ibid.*).

At the basic level ethics can be defined as “*the general beliefs or standards that guide customary behaviour*” (Des Jardins 1997, p.16). This definition highlights the role of traditional beliefs, attitudes and standards that prevail in every society. At a more abstract philosophical level, however, ethics tries to follow a reasoned examination of what customs prescribe regarding human existence (*ibid.*). Des Jardins goes further to introduce *normative ethics* that appeals to some form of standard and *ethical theory* which tries to provide answers raised by normative ethics. Traditional beliefs influence the way corporations as forms of social organizations approach the fulfilment of their aims and objectives. Normative ethics on the other hand has influenced the development of environmental and social standards which corporations follow, albeit for different reasons.

Ethical theory is a contested area with different theories attempting to give answers to corporate behavior and environmental strategy. Environmental ethics in particular presupposes that norms are the guiding principles behind behaviour towards the natural environment (Des Jardins, 1997). In this regard, the *anthropocentric* ethical orientation holds that while human beings have responsibilities towards the environment it is only they who have the moral value. In other words, human beings have no direct responsibilities towards the environment. This ethical orientation is often used to justify the actions of corporate executives that take no interest in the ecological consequences of business activity (*ibid.*). However, the *anthropocentric* view of ethics recognizes the moral imperative of ensuring intergenerational equity. *Nonanthropocentric* ethics on the other hand, recognizes the responsibility of human beings towards the environment with the result that corporate

executives with this ethical orientation try to support actions aimed at alleviating environmental damage resulting from business activity (*ibid.*).

2.4.1 Ethical traditions

The utilitarian tradition associated with John Stuart Mills and Jeremy Betham and the forerunner to the modern ethical concept of consequentialism, points out the importance of evaluating consequences of any actions and looking for the good by urging the maximization of the “*greatest good for the greatest number*” (Des Jardins 1997, p.24).

Another ethical tradition is deontology associated with Immanuel Kant. According to this approach, individuals should base their decisions on principle rather than consequences, i.e. duties and rights. Unlike utilitarian ethics which is faulted for holding people responsible for what they cannot control, Kantian ethics assumes that people are rational beings and stipulates that a person can only be held responsible for the things they can control (Des Jardins 1997, p.24). In order to distinguish ethical from nonethical behaviour Kant introduced the concept of “*categorical imperative*” by which he argued that to be ethical means to “*act only in those ways that all rational beings would find acceptable*” (*ibid*, p.28). Kantian ethics cautions against treating other human beings as means to an end (Boatright, 2009). However it does not reject the treatment of non human entities as means to an end. Using Kantian ethics corporations justify their treatment of the environment as a means to an end (such profitability, growth etc.).

2.4.2 Ethics in business

The importance and complexity of business ethics has been brought to the fore by the nature of the structure of corporations. Businesses often have to reconcile differences between employees and organizational ethical standards. Most organizations do this by subjecting their new employees to a socialization process (Fritz *et al.*, 1999). Once developed and internalized, an organization's ethical standards guide employees' internal relations and influences relations with external stakeholders (*ibid.*). The challenge related to this arrangement is that employees come with their social values from their personal and social environments which might create a dilemma in having to reconcile their ethical beliefs with those of the corporation, a different type of social structure. The differences in ethical values between the individual and the corporation can be attributed to differences between an individual's ethical values within a small group they are accustomed to (such a family or neighborhood) and the ethical values demanded by a diversified group (such as a big corporation) (Cullen *et al.*, 1989; Valentine *et al.*, 2002). The inevitable divergence between individual and organizational ethical standards may sometimes culminate in employee's failure to reconcile their ethical values with those of the business leading to their resignation or challenging the ethical principles of the organization (Primeaux, 1992).

In order to understand an organization's ethical context, one has to examine the ethical principles espoused by organizational members, what is regarded as righteous behavior and the ethical codes that guide corporate strategy (Hunt *et al.*, 1989; Werhane & Freeman, 1999). It may also be useful to understand the two broad categories of applied ethics: the external and internal approaches (Zajac, 1996). The external approach, also referred to as the compliance approach, is based on the belief that individuals are guided by rules, policies and norms in the execution of their duties (*ibid.*). However, this approach fails to recognize that there are certain behaviors which are not subject to legal control including personal integrity and virtue which form the basis of the internal approach. Some writers argue that these internal controls cannot be regulated by regulations or ethical codes (*ibid.*).

In order to deal with the ever rising level of concerns about corporate ethical conduct by organizational stakeholders, the concept of social accounting or ethical accountability has come to the fore. Through this concept, corporations attempt to measure, assess and communicate social and ethical performance (Rasche & Esser, 2006). This has in turn led to an increase in the number of accountability standards which include Social Accountability 8000 (SA 8000), Global Reporting Initiative (GRI) which present common frameworks to evaluate, validate and communicate accountability-related information (*ibid.*). One of the major challenges managers face is to determine the most appropriate accounting standard to adopt and to do in a transparent manner (*ibid.*).

As the foregoing account indicates, there are different views about ethics and business conduct. There are those who argue that businesses have no role in pursuing corporate sustainable development since this distracts them from pursuing their core activity; maximizing value for the owners of capital (shareholders) (Friedman, 1970). Going by this view, businesses should pay taxes and pursue economic objectives and leave environmental and social causes to the government and society in general. Carroll (1989) on the other hand believes that businesses cannot be expected to make money while ignoring broader social goals in society. After all, society provides the workers and the material that business uses to generate wealth for shareholders.

The foregoing discussion has shown that ethical theory offers useful insights in explaining the behaviour of organizational stakeholders towards sustainable development objectives. However it does not fully explain the role of broader and distant factors in influencing the behaviour of corporate stakeholders. The next section discusses political-economic influences to highlight their role in shaping the behaviour of organizational actors towards sustainable development.

2.5 Political-economic influences

Since the emergence of capitalism and specifically the market as a new form of social organization and the values associated with it, the interconnection between politics and business has taken on added importance (Worster, 1988). The capitalist economic ideology focuses on production, promotes the exclusive interests of the owners of capital (shareholders) and largely ignores the destructive aspects of business (Shrivastava, 1995). Individual owners of capital have the freedom to sell it to the highest bidder at a profit. This ideology is hinged on the free market philosophy with the market mechanism as the balancing force between resource abundant entities and resource scarce entities.

The ontological and ethical foundation of capitalism and its relation to the environment can be summarized in the belief that “*the earth is inert and passive and therefore legitimately exploitable*” (Gladwin *et al.*, 1995, p.882). The capitalist economic ideology promotes massive production and consumption of goods (Shrivastava, 1995) which leads to considerable resource exploitation. The development of modern communication and transportation facilities has widened the scope of world markets, increased the quantity of goods traded globally and exacerbated the decline in the carrying capacity of the global environment (Meadows *et al.*, 2006). These developments have increased pressure on resources and made corporate sustainable development efforts more important as different stakeholders attempt to minimise the impact of business actions on the environment and society.

Development history provides evidence to show that capitalism has been a major driver of human and social progress during the past century. This progress has however been compromised by the adoption of environmentally degrading industrialization as a transformative tool by western industrial powers (Naess, 1995). For this reason, efforts to persuade or coerce developing countries to adopt sustainable business practices is often associated with the neo-colonial agenda (Newton, 2002) further complicating efforts to create sustainable business solutions. As Worster (1988, p.17) points out, the communist ideology by promoting more consumption by all, leads to “*more pollution, more crowding, more depletion, more extinction*”.

If both capitalism and communism do not provide the right framework to ensure sustainable development, which political-economic ideology better supports sustainable development causes? Söderbaum (2000) argues that since conceptual frameworks are a social construction based on the reigning power relations within society, this presents an important challenge for the goal of sustainable development. Moreover, conceptual frameworks influence the way people perceive certain problems such as sustainable development.

As one of the solutions to tackle emerging challenges such as sustainable development, Söderbaum (2000) proposes a transdisciplinary, evolutionary approach. He advocates for institutional arrangements as a key part of the solutions to move corporations towards sustainable development. Institutional arrangements refer to “*formal and informal rules, organization and power relationships*” (ibid, p. 22). The formal rules could include environmental regulations, compulsory product safety standards, and labour laws. Informal rules include voluntary standards. These rules might have the net effect of galvanizing efforts of corporations and other stakeholders to achieve sustainable development.

Explaining the role of the institutional approach, Hockerts (1999) argues that there are both economic benefits and environmental efficiency gains to be derived from recreating institutional arrangements by emphasizing the service component while providing goods to meet customer needs. These benefits are all associated with the fact that products and services are inexorably linked. In other words, there are no product offerings that do not encompass a service offering and vice versa and satisfaction with additional services influences the future product purchase intentions of consumers (Smith, 1998). At the organizational level, Hockerts (1999) introduces the service concept based on institutional arrangements to define the interests of consumers and producers before and after the purchase and links it with value of interaction between consumers and producers to realize maximum financial and environmental benefits.

The downside of the political economy framework, however, lies in its conception of a complex global phenomenon such as sustainable development as dependent on aggregate actions of self-interested individuals or corporations acting independently. It fails to recognize the interdependencies among different actors within society. The next section which highlights the nature and implication of Actor-Network Theory (ANT) will attempt to address some of these concerns.

2.6 Actor-network theory (ANT)

Actor-network theory (ANT) recognizes relations among a wide variety of political, economic, social, cultural, technological and natural actors (Busch & Juska, 1997). The analytical stand point of ANT is based on the fact that all actors are equal (at least in theory). Networks are delineated by relationships that are being enacted between the central elements (actors). ANT is interested in translation between dual entities for instance between human and non-human actors (such as technology and organizational structures). Through translation for example, humans turn nonhuman actors into material manifestations which increases the power of human actors. This explains the actions of corporate entities over nature. Corporations are always trying to turn nonhuman actors into useful products and services.

Law & Hassard (2004) define an actor as “*any agent, collective or individual, that can associate or disassociate with other agents. Actors enter into networked associations which in turn define them, name them and provide them with substance, action, intention and subjectivity. [...] it is via the networks in which they associate that they derive their nature*” (p.1). This implies that all actors are part of a network which is itself based on a system of relations. This view is at variance with the traditional conception of actors as independent of the networks in which they operate. The function of the actor network theory (ANT) is embedded in “*semiotics*” (Law, 1999. p.3). According to this archetype, “*entities take their form and acquire their attributes as a result of their relations with other entities*” (*ibid*, p.3). This entails that no actor within a corporation can be independent because corporations are made up of a complex web of interdependencies among people, creating what Newton, (2002, p.530) refers to as a “*networked agency*.”

Thus actor-network theory recognizes the interplay of all factors — the basic assumption being that all actors influence and are influenced by others. That is, human and non-human (such as technology, prices, eco-systems) aspects should be integrated into the same conceptual framework and allocated equal amounts of agency. By doing this, it is possible to develop a complete explanation of the mechanisms that hold the network together, while allowing for an objective treatment of all the actors (Newton, 2002). In the same way, Söderbaum (2000) argues that every person in their individual capacity or acting on behalf of an organisation take on a specific role in relation to environmental, social and economic issues. In agreement with this view, Newton (1996) argues that agency is best understood from the standpoint of interdependent networks, between individuals, within a particular organization or across corporations. These different roles in turn culminate in a set of relationships, giving rise to certain motives and activities. The presence of different actors implies conflict, arising from the fact that different actors possess certain subjective views about environmental and other issues. The arising conflicts are resolved through the power relations within organizations and society in general.

Law & Hassard (2004), Callon (1999), Elias (1970) and Newton (2002) incorporate the agency of nonhuman actors (e.g. major environmental disasters, knowledge and technology) into decisions related to environmental issues and recognize them as actors in their own right. They reject the “*homo clausus*” (person closed in on himself) conception of a person and instead embrace the “*Homines Aperti*” (person exists within an interdependent network) form of agency as a superior orientation of the theory (Callon 1999, p. 185).

Underlying the actor-network-theory is the concept of power. As such, human action is influenced by power relations (Elias, 1970) given that “*power is exercised only over free*

subjects" (Foucault 1982, p. 221) and is dependent upon material manifestations. Going by this logic, without material manifestations power disappears. The power that comes with material expressions is responsible for the decisions that are taken regarding the environment and other facets of life.

Elias (1970) gives assumptions that must be fulfilled if power is to be exercised; one party should not have total control over another. This leads to a situation where "*the participants always have control over each other*" (p. 81); the parties are interdependent which makes it difficult for anyone actor to determine the destiny of all, in the long run, given the moderating influence of others (*ibid.*). It should be stressed that these conditions only hold at the analytical level. In the real world, some participants within a network may have more power than others and are therefore able to determine the destiny of other actors.

As an example, in the real world, attempts by individual actors or organizations to pursue certain environmental risk management strategies will be moderated by ambitions of other actors. In other words, the ANT recognizes the important role of interdependent action to tackle complex phenomena such as sustainability which requires the participation of many entities. Moreover, network interdependence requires that individuals and organizations intent on creating change within corporate sustainable development arena have to recognize that their efforts are interwoven with those of many other actors (Newton, 2002) further complicating the possibilities of success.

To evaluate the effectiveness of eco-efficiency indicators in moving corporations towards sustainable development, given its complexity and the diverse theoretical orientations, a model developed by Caplice & Sheffi (1994) will be used. It is presented in Figure 2.7.

2.7 Features of useful performance indicators

Measuring a complex phenomenon is an intricate task in itself. The sustainable development framework is yet to be fully understood (Newton, 2002). In order to understand the effectiveness of eco-efficiency indicators in measuring progress towards corporate sustainable development goals, Caplice & Sheffi (1994, p.14) model will be used. Caplice & Sheffi propose that effective indicators should meet the following eight criteria which they judge to be useful in determining whether a performance indicator is efficient and effective or not. These criteria together with their descriptions are presented in Table 2.7.

The usefulness of this model lies in that fact that it can be used to explain the relevance of eco-efficiency and eco-efficiency indicators within the context of the triple bottom line taking a stakeholder approach. For instance if an indicator is judged to be valid this would imply that it accurately captures the three pillars of sustainable development. It would also mean that such an indicator satisfies the needs of all stakeholders. These and more issues will be discussed in chapter six.

Table 2.7 Features and definitions of “useful” performance indicators. (Caplice & Sheffi 1994, p.14)

Criterion	Description
<i>Validity</i>	The metric accurately captures the events and activities being measured and controls for any exogenous factors.
<i>Robustness</i>	The metric is interpreted similarly by the users, is comparable across time, location, & organizations, and is repeatable.
<i>Usefulness</i>	The metric is readily understandable by the decision maker and provides a guide for action to be taken.
<i>Integration</i>	The metric includes all relevant aspects of the process and promotes coordination across functions and divisions.
<i>Economy</i>	The benefits of using the metric outweigh the costs of data collection, analysis, and reporting.
<i>Compatibility</i>	The metric is compatible with the existing information, material, and cash flows and systems in the organization.
<i>Level of Detail</i>	The metric provides a sufficient degree of granularity or aggregation for the user.
<i>Behavioral Soundness</i>	The metric minimizes incentives for counter-productive acts or game-playing and is presented in a useful form.

However, Caplice & Sheffi (1994) acknowledge that although the characteristics are presented individually there are inevitable tradeoffs which render them interdependent. Therefore they should not be seen in isolation of each other.

The theoretical framework in this chapter was intended to create a broad structure within which to anchor the analysis. The next chapter discusses the methods and approach used. The intention behind positioning the method after this chapter is to build on the theories presented in this chapter to allow for a good understanding of the influence of the later on the former and vice versa. Moreover, given that eco-efficiency is still a new concept trying to find its rightful place and role in the sustainable development discourse, the system of thought contained in theoretical framework should aid the understanding of the choices made regarding the method and approach.

3 Method

In this chapter the procedures adopted in conducting this research are discussed. The approach is explained followed by a justification for the use of a literature review. Then the collection of secondary data and how the data was analyzed are explained.

3.1 The approach

The inductive qualitative approach informs much of this study. This approach is preferred when the problem under investigation is new and complex (Mark-Herbert, 2002). As stated before, the application of eco-efficiency indicators is still new with many challenges related to the relevance of the tools. This reality diminishes the value of other approaches such as the deductive approach which departs from pre conceived hypothesis.

3.1.1 The qualitative approach

Qualitative research “involves the studied use and collection of a variety of empirical materials” [...] (Denzin & Lincoln, 1993, p.3). It “includes both field observations and analysis of texts” (Ambert *et al.*, 1995, p. 881). As such, qualitative researchers do not begin with *a priori* hypothesis and set out to find data to prove or disprove it (Bogdan & Biklen, 2003; Ambert *et al.*, 1995). Instead the theories are grounded in data and emerge from the “bottom up” rather than “top down” (*ibid.*, pp. 2-3). In other words, the focus of qualitative research is the “empirical world” and the aim is “to convey its workings in its phenomenological integrity” (Ambert *et al.*, 1995, p.880). This means that at the beginning of the research process there are so many unknowns and specific theories emerge as the research progresses (*ibid.*).

Choosing the qualitative approach for this thesis was motivated by the following reasons. First, the nature of the research problem calls for the gathering of descriptive data on the application of eco-efficiency indicators and the challenges in its implementation by corporations (Denzin & Lincoln, 1993). This objective can be fulfilled with the chosen research approach (Miles & Huberman, 1994). Secondly, part of the inspiration for the adoption of the qualitative approach is that while the use of eco-efficiency indicators is gaining ground (Verbally & Bidwell, 2000) it is also true that this is a relatively new development. This reality implies a paucity of information and data on its application and therefore supports the use of the selected approach. Thirdly as observed by Ambert *et al.*, (1995, p. 880) “qualitative research seeks depth rather than breadth”. In this case particular attention is directed towards understanding one particular phenomenon—eco-efficiency indicators. The focus on one particular concept makes this study less appealing to other methodologies specifically the quantitative methodology.

The objective of this thesis was to understand the application of the evolving concept of eco-efficiency and its relevance in achieving corporate sustainable development objectives. To fulfill this objective required a holistic approach (Miles & Huberman, 1994) whereby insights from other disciplines such as economics, sociology, management, political science etc. are integrated to gain a full understanding of the phenomenon under study.

Furthermore, the choice of a holistic approach is also reflected in the choice of the theoretical framework for this thesis. The theories used in this thesis are quite diverse anchored within the triple bottom line framework and stakeholder theory.

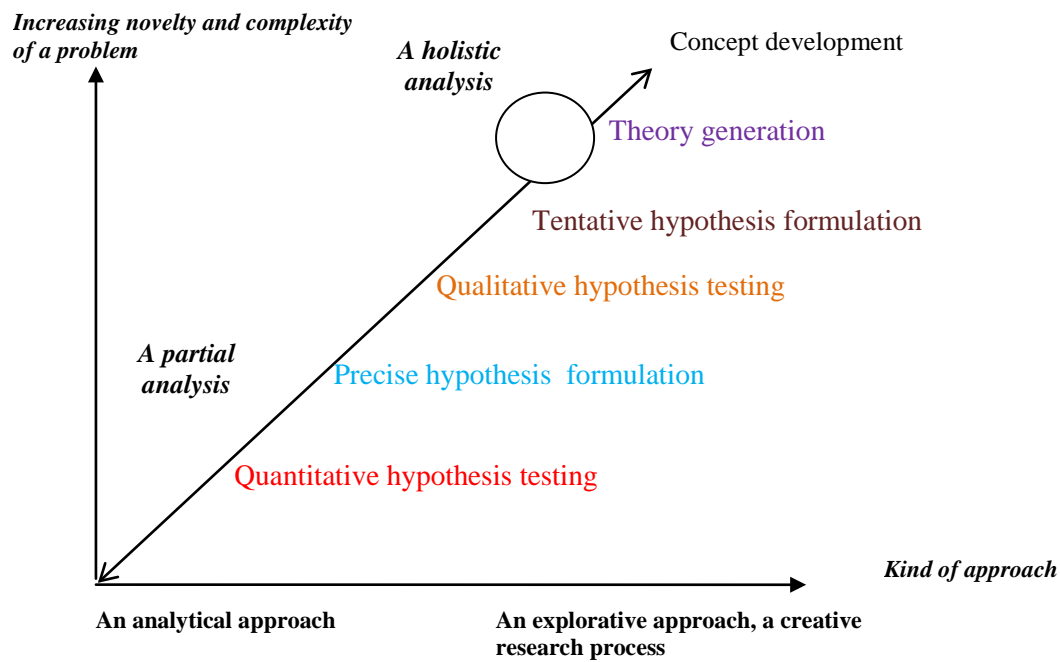


Figure 3.1 How increasing novelty & complexity of a problem affects the research approach & desired research contribution (Nyström in Mark-Herbert 2002, p. 17).

Moreover, the concept of eco-efficiency was conceptualized to support efforts of corporations desirous of realizing sustainable development goals. Since sustainable development is a multidisciplinary concept that “*pushes management research toward interdisciplinary and transdisciplinary modes of inquiry*” (Gladwin *et al.*, 1995, p.897) this makes it complex and ideologically loaded (Bebbington *et al.*, 2006). The combination of these different disciplines and ideologies increased the complexity and novelty of the problem to position this thesis within the circle in Figure 3.1.

3.1.2 Quality control

The qualitative approach has been criticized for low reliability and validity (Bryan, 1988; Silverman, 2000). Consequently, a number of measures were undertaken to take care of these concerns. These measures included peer debriefing and support (Robson 2002), instituting a rigorous audit trail (Merriam, 1995; Robson, 2002) that clearly illustrates the methods of data collection, the types of data and how they were generated and the choices made about different aspects of data during the study (Whittemore *et al.*, 2001). To meet these objectives a clear study design was articulated influenced by the basic assumptions of the proposed research question. While all the above measures were necessary to minimize concerns regarding reliability and validity, generalizing the results to the entire population was not the main goal of this qualitative study. Therefore, validity and reliability carry less weight (Whittemore *et al.*, 2001; Merriam, 1988).

Furthermore, studies that rely on singular perspectives may be questioned for their lack of rigor and credibility (Robson, 2002). To counter this problem, different theories (“*theory triangulation*”) (*ibid*, p. 174) were used to gain several perspectives to understand the application of eco-efficiency and thus increase the credibility of the findings.

To further enhance the robustness of the chosen research approach, only peer reviewed journal articles and trusted website information were used for the thesis. And, while the qualitative approach is stated as the core approach adopted for this thesis, Coffey & Atkinson (1996) note that this should not preclude the use of other data collection and analysis methods

since “*a variety of perspectives is inherent in the qualitative approach in general*” (p.5). Indeed, Perry (1998) observes that it is practically impossible to follow either an inductive or deductive approach in conducting research since the two approaches inform one another as the research progresses. In this regard, at various stages of the study, there were influences by developments in different research approaches.

3.2 Literature review

This study was based on the format of a literature review which entails a thorough analysis and “*summary of existing knowledge*” (Hart 1998, p.19). A literature review is meant to “*locate the research project, to form its context or background, and to provide insights into previous work*” (Blaxter *et al.*, 2006, p. 122). This consideration supports the adoption of this format of qualitative research for this study given that the research objective is exploratory in nature. Following this approach it was possible to investigate how corporations use eco-efficiency indicators and assess their limitations.

Ridley (2008, pp. 16-17) identifies the following as the main reasons for undertaking a literature review:

- To provide a historical background to the research
- To give an overview of the current context of the research through reference to current debates
- To introduce appropriate terminology and provide definitions to clarify how the terms are used in the study
- To describe related research in the field and show how current research extends this or addresses gaps in work already done
- To provide supporting evidence for a practical problem which the research is addressing

Given the fact that the broader context of sustainable development within which the concept of eco-efficiency is located is theoretically eclectic, all the above motives played a role in choosing the literature review. However, not all of them received the same level of attention while writing the thesis. They acted as inspiration at different stages of the study (Ridley, 2008). In general however, an extensive literature review provided grounds for gaining a good understanding of current developments within the field of environmental management and eco-efficiency in particular. This understanding was used to position the research within the broader realm of knowledge based on previous research.

The theories that underpin the conceptual framework for the study were deliberately chosen for their ability to provide insights into the actions of corporations as they relate to the triple bottom line framework given its theoretical position within the sustainable development framework. This position is in line with Clarkson’s (1995, p. 94) recommendation that “*a theoretical framework must be applicable to the conditions that it is attempting to describe, analyze, or predict*”.

3.3 Data collection and analysis

In order to get optimal benefits from the inductive qualitative approach, Cooper (1998) proposes that a systematic review of literature should precede more refined literature searches. In order to fulfill this requirement, the following databases were explored in an iterative manner, to gain access to relevant journal articles; JSTOR, Business Source Premier, EconLit, Emerald SpringerLink, and Science Direct. These data bases were chosen because they

contain a lot of journal articles that relate to sustainable business strategy and in some instances, sustainable development.

The qualitative analysis (Robson, 2002) of peer reviewed journal articles played a key role in describing, explaining and analyzing concepts and issues related to the study. The choice of this type of analysis was influenced by the ontological conception that “*phenomena exist not only in the mind but also in the objective world*” (Miles & Huberman, 1994, p.4) as observed by the writers of the articles reviewed. Moreover, the iterative nature (*ibid.*) of qualitative analysis made it suitable to study an emergent, complex concept such as eco-efficiency.

As indicated in table.3.3a the qualitative analysis involved data reduction, data display and conclusion drawing (Robson 2002, p.476).

Table 3.3a: Components of data analysis used (Robson 2002, pp. 475-481, author’s illustration)

Data reduction	Data display	Conclusion drawing/verification
Summarize articles & topics to guide in deciding: <ul style="list-style-type: none"> • What issues are covered • Relevance to research question • Implication for subsequent data collection 	<ul style="list-style-type: none"> • Matrix/chart to provide a visual feel & reduce errors as data increases 	<ul style="list-style-type: none"> • Constantly noting patterns during & after data collection • Counting to determine how many of the readings contain key terms • Clustering reading with similar characteristics e.g. theory, business type

It is important to note that although the components of data analysis table 3.3a may appear separate they were undertaken iteratively.

Furthermore, text books were also reviewed in order to uncover the different applications of the concept of eco-efficiency and understand the linkages to eco-efficiency indicators as employed by corporations. To facilitate the search, the following search terms were used.

Table 3.3b: Search terms

TX All Text		TX All Text
Eco-efficiency	AND	Eco-efficiency indicators
Sustainable		Practice
Sustainability		Strategy
Environmental		Risk
Business		Development
Ecological		Performance
Economic		Ecological performance

Since some useful information might not be included in published electronic journal and books, “*grey literature*” sources such as reports, thesis, company websites and conference papers, *inter alia*, were also consulted (Ridley 2008, pp. 32-33).

3.4 Generalization of the study

Generalizability can be conceived from both internal and external perspectives (Robson, 2002). With regard to the former, which deals with the setting being studied, this study does not claim to be generalizable because the empirical material used is too broad as it was obtained from diverse sources and contexts. This makes it difficult to demarcate a clear setting being studied to provide grounds for generalizability. The second category of generalizability relates to whether the conclusions can be generalized beyond the study setting. The objective of this study was to investigate how corporations use the concept of eco-efficiency to achieve sustainable development using a literature review. This objective precluded the selection of a representative sample and therefore on practical grounds, rules out the possibility of “*empirical*” generalizability (Sims, 1998, p.350). However, as pointed out by Sims (*ibid*, p.350) the theoretical insights that emerged from the data used for the study may contain elements of “*theoretical*” generalizability that may be leveraged to other situations.

3.5 Reflection on empirical material used

The articles reviewed for this thesis all agree about the need to adopt the triple bottom line framework in order to achieve sustainable management. However there is notable omission of some issues that need to be addressed to achieve sustainable development. One of these is the failure to give prominence to the cultural and institutional aspects of sustainable development in most of the writings. Yet these form important robust foundations for progress towards sustainable management (CIDA, 1997).

Furthermore it is not clear from the literature how service-oriented businesses would utilize eco-efficiency indicators. There seems to be a bias in the literature towards manufacturing, agriculture and other sectors that directly depend on materials from nature. This is despite the fact that in terms of the structure of the world economy, the services sector constitutes well over 50% share of GDP in most countries (Dee, 2001, p.2). Moreover one of the key requirements for the success of the concept of eco-efficiency is an increase in the service component of the product.

Notable too is the limited number of female writers on the subject of eco-efficiency (less than 20%) (*author's estimation*). According to the World Bank (2010, p.1) the labour force participation rate for women (proportion of the population aged 15 and older that is economically active) is over 50% in most countries with the ratio even higher in developing countries. The low rate of representation among women in writing about sustainability issues is attributed to a number of reasons which are not the subject of this thesis. However it is remarkable that a greater proportion of the world population that would potentially implement and ensure the success of eco-efficiency is excluded from debates around it. This raises legitimate questions about the “sustainability” of the concept and calls into question the possibility of its success.

Another important observation is that most of the research on the concept of eco-efficiency is biased towards developed country markets. Yet developing countries are increasingly taking a prominent role in global economic development consuming huge amounts of resources in the process. To increase the plurality of views and increase trust and awareness in the concept of eco-efficiency and its supposed economic and environmental benefits, there is need to

undertake research aimed at developing countries so that they too can meaningfully participate in the debate on this and other concepts and tools aimed at enhancing sustainable business practices.

Having presented the method adopted for the study and the limitations thereof, the next chapter describes relevant challenges associated with the concept of eco-efficiency in order to further highlight the intricacy of applying it to achieve sustainable development at the corporate level.

4 Challenges associated with eco-efficiency

This chapter offers a brief introduction to the empirical study by presenting the challenges posed by the use of the concept of eco-efficiency in general and eco-efficiency indicators in particular to achieve sustainable development from a corporate perspective. The *raison d'être* is to give context to the concept of eco-efficiency which is central to the study. These challenges are discussed in relation to the triple bottom line framework.

4.1 Conceptual challenges—defining sustainable development

The usefulness of any indicator intended to measure progress towards sustainable development depends on whether it can be defined correctly in the first place (Karlsson *et al.*, 2007). Eco-efficiency indicators are meant to serve as universal concepts to support the progress of corporations towards sustainable development. Given that there is as yet no universal agreement on the meaning of sustainable development (Gibson, 2005; Haila & Levins, 1992 and Dyke, 1988) it is debatable whether we should attempt to develop concepts to measure something we cannot define.

Reservations have also been expressed regarding the conceptual framework used to define sustainable development and accordingly, influence the type of indicators developed to measure progress towards it. Karlsson *et al.*, (2007) express doubts whether a complex concept such as sustainable development that means different things to different people, can indeed be measured with a linear model such as the triple bottom line which only has three pillars. In other words, using the triple bottom line framework leads to the common accusation that it does not take into account cultural and institutional domains. For this reason, the Commission on Sustainable Development (CSD) (2004) argues that these two domains should be added and given a prominent role to constitute the fourth and fifth pillars respectively.

However, the attempt to broaden the scope of sustainable development by CSD does not diminish the inadequacy of the model. For, within and across the pillars of sustainable development, significant challenges still remain. As an example, Karlsson *et al.*, (2007) note that it is not clear how the intricate factors that lie at the bottom of the social pillar support or hinder sustainable development and suggest an alternative systems-based approach. The systems approach recognizes that sustainable development is characterized by feedback loops, numerous linkages and interdependencies (Rainey, 2008). Adopting this approach offers the opportunity to conceptualize sustainable development from a multidimensional, multidisciplinary and systemic standpoint which again leads to another challenge of incorporating the different facets of the concept.

4.2 Making choices at different levels

According to Bossel (1998, p.7) sustainable development has “*physical, material, ecological, social, cultural, psychological, and ethical dimensions*”. Accordingly, sustainable development can only be achieved with collective efforts at all these levels. However, this is a difficult proposition to achieve given the dynamic nature of society, the environment, technologies and cultures (*ibid.*). In essence this complexity communicates the complex nature of the concept of sustainable development. For this reason, Bossel (1998) and Bebbington *et al.*, (2006) call for an expanded definition of sustainable development that

recognizes the dynamic nature of societies. Also, using eco-efficiency indicators to measure progress towards sustainable development requires a good understanding of the choices made at different levels within the business. This is a difficult challenge given the dynamic nature of the business environment and changing customer needs.

At the same time, achieving sustainable development goals in business is bedeviled with challenges. These challenges are compounded by the multi-layered nature of current business entities, making sustainable development efforts of a single company that relate to a single product insufficient. More essential are efforts at the scale of an entire corporation's product portfolio embracing the value network or even eco-industrial parks where by-products of one industry can be used by a nearby business (Bossel, 1998).

4.3 Financial markets

The benefits of incorporating eco-efficiency into a corporation's strategy have not yet been fully understood. This lack of awareness explains why many corporations are still reluctant to embrace it. These reservations notwithstanding, Derwall *et al.*, (2005) demonstrated that contrary to conservative investment theory, companies reap considerable rewards when they incorporate eco-efficiency measures into the investment process. These benefits include superior stock portfolio performance by eco-efficient companies. They also found that companies that are eco-efficient tend to be big, perhaps alluding to the resource intensity requirement associated with its implementation.

It is also revealed that the lack of understanding is further exacerbated by the behavior of capital markets that request for different rates of return for short-term *vis-à-vis* long-term investments. Capital markets demand high short-term rates of return which discourages long-term sustainable investments. Derwall *et al.*, (2005) also found that markets were unable or unwilling to allocate a price premium to eco-efficiency. For this reason, the EEA (1993) hypothesized that this was the explanation for the misallocation of the eco-efficiency premium by financial market participants between environmentally sensitive sectors where the benefits of eco-efficiency are obvious on the one hand, and environmentally less sensitive sectors where the benefits are obscure.

4.4 Data requirements

The EEA (2001) notes in one of its reports that eco-efficiency is data-intensive and that sometimes the data used cannot be said to be reliable. This creates an additional challenge in that monitoring its progress may be compromised if questionable data is utilized. Although the EEA report's focus was on national aggregated data, there is reason to believe that data challenges could be manifested at corporate level. In the context of a small business undertaking with limited resources, collecting the data required to make decisions pertaining to eco-efficiency is a big challenge. Since eco-efficiency is meant to have global application to be of any meaningful value, its successful application in developing countries with limited resources is therefore debatable.

4.5 Social values and technology

The WBCSD (2006) reported that there was growing adoption of the concept of eco-efficiency to enhance innovation and sustainable development within corporations. In fact the scope of the application of eco-efficiency is also expanding beyond a single company's boundaries to include upstream and downstream activities—involving supply and product value chains (*ibid.*). This development presents challenges of integrating systems, values, and cultures of different organizations. Moreover the fact that different companies are staffed with managers who have a different sustainable development mindset regarding product development, purchasing and marketing creates additional execution challenges that corporations have to deal with (*ibid.*).

Again the WBCSD reckons that for the concept of eco-efficiency to work it has to be conceived as a central part of strategy (WBCSD, 2006). In other words, the eco-efficiency agenda should begin with the business itself (DeSimone & Popoff, 2001). For this to happen, business activities and actions need to change to reflect an eco-efficiency mindset. Business strategy should focus on “*technological and social innovation, accountability and transparency, as well as on cooperation with other parts of society*” (*ibid.*, p.4). At the moment companies are already grappling with transparency and accountability issues in the traditional areas of business (such as finance and human resources). The adoption of eco-efficiency measures and the subsequent incorporation of the additional requirements stated by WBCSD would add another layer of accountability and transparency. For small to medium businesses with fewer resources this may be seen as creating an additional burden.

Furthermore, the successful implementation of eco-efficiency strategy to achieve sustainable development rests on the total commitment of employees (WBCSD, 2006). This requires the company to demonstrate the importance of following an eco-efficient approach to employees. The awareness should be complimented with more training as its successful implementation rests on the acquisition of skills and capabilities (*ibid.*). The necessary skills range from understanding definitions and problems, evaluating different stakeholder standpoints in order to perform life-cycle assessments, conceptual skills to understand the linkages across business operations, collaborating and bargaining with external partners and measuring and assessing impacts (*ibid.*). This again presents a challenge in terms of required resources. Moreover this view is contested by Newton (2002) who argues that it is unrealistic to expect all employees in organizations to suddenly think alike with regard to sustainable development when they might have different viewpoints.

The EEA (1993) notes that there is a pervasive misalignment of values and culture which results in producers and consumers not paying the full costs of using environmental resources (EEA, 1993). This misalignment is reflected in the prevailing market incentives which discourage rather than promote eco-efficiency through wrong signals to business and consumers about the significance of SD. Besides, tax regimes in most countries are not designed to encourage resource preservation and pollution prevention by increasing taxes on unsustainable practices and reinvesting the earnings in more sustainable practices (“*referred to as the double dividend hypothesis*”) (UNEP 2011, p.101). And there are limited attempts to internalize environmental costs into the final price of products. To make matters worse, most developed country governments continue to obstinately subsidize businesses in the agricultural, energy and transportation sectors thus wasting resources and negating the idea of sustainable development (*ibid.*).

Another obstacle to the implementation of eco-efficiency is the reluctance of consumers to change their consumption habits (DeSimone & Popoff, 2001; Guo, 2001). Although eco-efficiency is dependent on changes in consumer lifestyles accompanied by major changes in the type of goods and services businesses produce, markets for these types of goods and services is not guaranteed (EEA, 1993). Moreover social and institutional changes are slow compared to the urgency with which the issue of sustainable development should be dealt with. This situation has created the now insidious lack of action on the part of individuals and corporations.

Additionally, the technological dependence of the developing countries on developed countries militates against efforts aimed at entrenching sustainable business practices. In the majority of cases, this co-operation results in the promotion of the imitation of the unsustainable business models, technologies and “*desirable*” lifestyles of the developed world (EEA, 1993, p.39). Incentive structures, product designs, advertising messages are all designed to mirror developed country markets. Clearly these practices lead to resource wastage and constrain efforts to promote sustainable development at corporate level.

4.6 Market forces and trade rules

Eco-efficiency is a global concept which presents both opportunities and challenges. The opportunities relate to the fact that the concept allows for the tackling of sustainable development from a global perspective thus ensuring wider participation. The challenges relate to how corporations can align a global concept like eco-efficiency to local and regional circumstances. For instance, there may be products such as cars that are deemed to be eco-efficient. However, under certain use conditions, and owing to the collective behavior of consumers, it could have undesirable effects on the environment (EEA, 1993). Moreover, measuring eco-efficiency at the corporate level is still in its infancy and there is a notable lack of comparability of corporate reports (EEA, 1993)

Another related challenge is the role of market forces in deciding the difference between needs and wants, and deciding how they should be met. The role of government is critical in supporting and encouraging judicious resource use and eco-efficiency innovation. Using measures such subsidies and taxes the government may either constrain or support efforts aimed at enhancing eco-efficiency efforts within businesses. Using carefully crafted environmental regulations that encourage innovation, government can thwart efforts of “*environmental free riders*” (DeSimone & Popoff 2001, p.16). The problem however is that the role of government is given less prominence in the triple bottom line framework which underpins the concept of eco-efficiency.

Markets are notoriously flawed in responding to human needs. In the rare instances when this happens, only those needs that can be assigned prices are considered. In trying to resolve this problem, the tendency is to hand over decision-making authority to a “*bureaucratic elite*”, whether at international or local level thus negating another key requirement for the success of eco-efficiency—involvement of consumers and citizens in decisions over needs and how to meet them (EEA, 1993, p.40). In other words, resorting to undemocratic means whose ultimate outcome is sure failure.

A notable anomaly exists regarding the successful implementation of the concept of eco-efficiency. One of the solutions proposed in order to improve efficiency is to increase the

service component of a product. However, most business scorecards measure and reward success based on number of products sold rather than services delivered (EEA, 1993). Indeed companies in mature industries protect themselves behind regulations, standards and procurement practices that encourage resource intensity and increase the barriers to new entrants to maintain the status quo (*ibid.*).

The rules governing the global trading system do not recognize whether the traded commodities are produced based on short-term exploitation of natural resources or on “*real environmental surpluses*” (EEA, 1993, p.40). In addition, the developed countries favor trade policies that encourage material-intensive commodity exports from developing countries further promoting the short term exploitation of natural resources and limiting the implementation of eco-efficiency (*ibid.*). Since trade is seen as an important avenue to increase the participation of business entities from poor countries in the world economy (World Bank, 2010), it is clear that without their involvement limited success will be achieved.

4.7 Eco-efficiency as a change process

Many corporate executives are weary of changes that are required to monitor progress towards eco-efficiency. They express concerns regarding its perceived negative impact on the economic objectives of a business, costs of implementation and the discomfort of being pushed in unfamiliar territory requiring new methods of decision-making involving different aspects of sustainable development (Gibson, 2005). Complex policy choices have to be made involving the need to balance environmental protection, business growth and social justice. All these requirements create a new strategy dynamic within a corporation that requires time to implement and realize.

This chapter has highlighted the challenges associated with the implementation of the concept of eco-efficiency and the broader goal of sustainable development. The challenges cited create the need for broadening the context within which eco-efficiency and sustainable development should be understood. For this reason, the next chapter will attempt to shed more light on other issues related to the concept of eco-efficiency.

5 Empirics describing eco-efficiency

In this chapter, a discussion of the relevance of the theoretical framework chosen to support the analytical part of the study is provided followed by a presentation of three case studies on the application of eco-efficiency indicators to demonstrate how they are used in practice.

5.1 The triple bottom line and sustainable development

Initially, the sustainable development discourse only focused on economic and social aspects (Klöpffer & Ciroth, 2011). This explains why earlier writings on the subject such as those of Carroll (1979) and Friedman (1970) show social and economic biases respectively. However, over the past two decades, spurred by interest in environmental issues by corporations, (Bansal, 2002; Hendry, 2005) the focus of writers has moved on to incorporate environmental issues.

The elevation of environmental management to the centre of organizational strategy and the shift to reflect triple bottom line imperatives is also partly attributed to the attention given to sustainable development (SD) as an umbrella goal at national and international levels. This came after businesses were tasked with the implementation of sustainable-development strategy. For this reason their collaboration in achieving sustainable development practices is seen as a matter of necessity (Bansal, 2002; Elikington, 1999). This realization has dominated the ontological orientations of most writers starting from the 1990's onwards.

Before the 1990's, sustainable management strategy was compliance-driven whereby business entities mostly made efforts to comply with externally imposed regulations. During this period corporate sustainable development efforts only went as far as existing laws and regulations prescribed. Therefore this approach did not take full cognisance of the importance of framing business strategy to reflect triple bottom line requirements (Bansal, 2002). Since then, a shift has occurred with the adoption of a positive posture involving efforts to adopt cleaner production to move corporations towards sustainable development. Since 1992 when the WBCSD embraced the concept of eco-efficiency, there has been a clear shift towards the triple bottom line framework (Hukkinen, 2001).

To broaden the scope sustainable development, business and governments have recently focused attention on sustainable livelihoods. The implication of this shift is that corporations are striving to go beyond simple recognition of the importance of each of the three pillars that constitute the triple bottom line framework. They are ever more stressing the significance of the interdependent and systemic nature of the concept of sustainable development and the need for partnerships across a wider spectrum. In addition, given the important role of cultural and institutional aspects (CIDA, 1997) in achieving sustainable development, these too are being incorporated into the sustainable development framework.

Despite all the above developments, a number of writers (see Karlsson *et al.*, 2007; Gibson, 2005; Bosselmann, 2008) have questioned the ability of the triple bottom line framework to deliver sustainable development. Therefore while there is a general consensus that the triple bottom line framework has a role to play in achieving sustainable development, there is an emerging agreement that it is not sufficient on its own.

5.2 Stakeholders and sustainable development

As alluded to in the previous section, the concept of sustainable development has progressively become more commonplace with its scope wider than ever before. The increase in interest and expansion in scope of sustainable development can be attributed to heightened customer demands, competitive pressures and the increased awareness of the impact of the actions of corporations among all stakeholders (Roberts, 2003; Henriques & Sadosky, 1999; Russo & Fouts, 1997).

There is also a growing realization that businesses have to work in tandem with governments and other stakeholders to address some of the sustainable development concerns facing the planet. This calls for smart public policy solutions in form of regulations, economic incentives and encouraging private public partnerships. Smart public policy measures and solutions can act as incentives for the business sector to pursue the sustainable development path (Porter & van der Merwe, 1995).

It is therefore apparent that stakeholders have an important role to play in shaping corporate sustainable development outcomes. It is partly for this reason that the triple bottom line framework was adopted for this study, to understand the central role of stakeholders in influencing business sustainable development strategy (see Figure 5.2). This approach allows for an understanding as to how the stakeholders should be positioned within the framework to play a meaningful role.

If the role of stakeholders is conceived in terms of the triple bottom line framework presented in Figure 5.2, the following picture emerges. Moving from left to right, the first three circles represent the theory, the recognition that there are three pillars to sustainable development, the economic, social and environmental pillars. The next three circles depict current practices, that is, what corporations are doing at the moment. It is clear that there is an overwhelming emphasis on achieving economic returns, followed by social objectives with minimal attention to environmental sustainability as depicted by the size of the circles. Accordingly, stakeholders whose interests fall within the social and environmental circles receive less and minimal outcomes respectively.

The ideal state in Figure 5.2 is envisaged to happen when the size of the area of intersection between the three circles increases. This can only happen if the interests of stakeholders in the economic and social spheres are balanced with those of stakeholders in the environmental domain in the long run. As noted earlier, all the writings that appear after 1990 agree about the need to strive for the needed change to balance the three pillars of sustainable development (Elkington, 1999).



Figure 5.2 “The three pillars of sustainable development, from left to right; the theory, the reality and the change needed to better balance the model” (IUCN 2006, p.2).

The concept of eco-efficiency has the potential to assist corporations to reduce environmental impacts while at the same time increasing economic returns (LeCain, 2000). This is why eco-efficiency indicators were developed within the triple bottom line framework. Indeed, there is widespread consensus that the triple bottom line framework is a useful starting point in undertaking sustainable management strategies since it attempts to incorporate the interests of a diversity of stakeholders (Bosselmann, 2008). Again, as pointed out by Todorov & Marinova (2009) the triple bottom line framework is valuable because the overlapping circles attempt to encapsulate the interdisciplinary and transdisciplinary nature of sustainable development.

However, the triple bottom line framework has been criticized for focusing attention on strengthening individual parts of the framework rather than promoting the vital collaboration and interdependence between the interests of stakeholders that reside within each of the three pillars (Stanners *et al.*, 2007). The neglect of the required cooperation makes the framework vulnerable to criticisms regarding its relevance and effectiveness. Additionally, Stanners argues that the triple bottom line does not give enough weight to the role of institutions and culture which are important in determining the direction and outcome of sustainable development efforts (*ibid.*).

Furthermore, the model does not demonstrate the differences in challenges within and between the three pillars in different areas and particularly between developing and developed countries. In any case it is possible for stakeholders to have similar intensity in interest for social and environmental concerns, for instance. It is also possible that stakeholders in different regions within a country and those in different countries might have their interests skewed towards particular aspects of sustainable development depending on their cultural and economic circumstances. These salient but crucial differences are not recognized by the triple bottom line framework (EEA, 1999).

Elevating the debate further, Levett (1998) contends that it is the environment and not the economy that should occupy a prominent role in the model since it's the earth's life support systems that form the basis of the other two pillars of the model. Moreover, according to Levett, the economy should be taken as secondary to the environment because it is a social construct which only exists because society has created institutions and shaped the assumptions and behaviors which allow it to function as such. Furthermore, Levett argues that it is erroneous to elevate the economy as the principle agent in the model.

To counter the weakness of the overlapping circles model, EEA (1999) and Levett (1998) propose the concentric ring model. This model emphasizes the reliance of the socio-economic system on the environment. It also highlights important exchanges and dependencies necessary to understand the intricate nature of the concept of sustainable development.

Perhaps it is this conception of sustainable development that is responsible for the current dilemma regarding progress towards sustainable business practices. Stakeholders in the economic sphere tend to be seen as more important, derived from the neoliberal economic paradigm, thus making it difficult for others to stake their claims (Meadows *et al.*, 2006).

5.3 The politics and ethics of accountability

The political-economic framework upon which a corporation's existence is based is that of individualism according to neoclassical economic theory. Accordingly, the traditional financial reporting approach is designed to satisfy the economic expectations of shareholders (Elkington, 1999) regardless of the social and environmental impact of their actions. The ethical basis of the traditional accounting framework is quite questionable. The interests of a large number of stakeholders are ignored or assumed to be of secondary importance. Business people achieve "success" by hiring the factors of production which are compensated according to market prices. If any externalities occur (which is more often than not the case) as a result of business actions, these are socialized and taken care of collectively. Moreover, the traditional accounting tools are also conspicuously unsupportive to managers interested in eco-efficiency (EEA, 1993). They reward managers that show short term profits not those that design business practices to reflect long term sustainable growth.

Due to the shortcomings associated with traditional reporting frameworks (Schaltegger & Wagner, 2006) corporations are moving towards other wide-ranging sustainability reporting measures (Castro & Chousa, 2006) which are perceived to be more democratic (Pflieger *et al.*, 2005). This new approach emanates from the contemporary conception of a corporation as having a broader mandate to a wider and expanding number of stakeholders rather being taken as a money-making machine (Pflieger *et al.*, 2005).

Progressively the new reporting frameworks have been incorporated as key requirements in voluntary standards and tools such as the International Organization for Standardization (ISO), the Global Reporting Initiative (GRI), the Association of Chartered Certified Accountants (ACCA) and Business in the Environment (BiE). The outcome of this shift in outlook is the fact that corporations are recognizing that they have to be more accountable to a wider number of stakeholders. This in turn has contributed to the corporate democratization movement and encouraged more participation in decision making.

To support the actions of corporations to incorporate sustainability in strategy the WCSBD developed eco-efficiency indicators which are presented on the next page.

5.4 Eco-efficiency indicators

The eco-efficiency ratio expresses how much benefit is attained from one unit of “nature” (EEA, 1998, p.10). Therefore increasing eco-efficiency requires that fewer resources are used to achieve more. Since this is an important component of corporate sustainable development, having appropriate indicators to measure “benefit” and “use of nature” at corporate level is important (*ibid*, p.10). It is for this reason that eco-efficiency indicators were developed to measure economic and environmental improvements (WBCSD, 2000a).

The eco-efficiency formula is given as (WBCSD, 2000a, p.3):

$$\frac{\text{Product or service value}}{\text{Environmental influence}}$$

Stated another way, eco-efficiency is the ratio of product or service value per environmental influence.

Based on the above formula, the WBCSD identified the following elements for eco-efficiency improvement (WBCSD 2000a, p.7). It is these indicators, *inter alia*, that corporations focus their efforts on in an attempt to reduce resource use and increase energy efficiency. They are divided into *generally applicable indicators* and *business specific indicators*.

Eco-efficiency indicators

Generally applicable indicators

- *Quantity of goods or services produced*
- *Net sales*

Business specific indicators

- *Reducing energy intensity*
- *Reducing material consumption*
- *Reducing water consumption*
- *Reducing green house gas emissions*
- *Reducing ozone depleting substance emissions*
- *Reducing toxic dispersion*
- *Increasing material recyclability (revalorisation potential)*
- *Increasing the service intensity of goods and services*
- *Extending product durability*
- *Maximizing use of renewable*
- *Increasing effectiveness of use*
- *Maximizing sustainable use of renewable resources*
- *Factor 4 (quadrupling energy and resource efficiency using existing technologies)*
- *Factor 10 (reducing environmental impact of industrialized nations by a factor of 10 to cause sustainable use of environmental space)*

For examples of how these eco-efficiency indicators are applied in business, see ***Appendix 1***

The WBCSD (2000a, p.6) proposes that corporations should develop an eco-efficiency profile with related aggregated elements. The intention is to give users background information, methodology of collecting data used in laying claim to efficiency improvements and indicating the situation-specific indicators the companies may be working with.

Below is a summary of the information that is found in a typical eco-efficiency profile.

Eco-efficiency profile

- *Organization profile* – to provide context for eco-efficiency information e.g. number of employees, business sector, primary products and major changes in the structure of the company
- *Value profile* – indicators from the “value” portion of the WBCSD framework, including financial information, the quantity of products, or functional indicators for specific products.
- *Environmental profile* – including generally applicable environmental influence indicators as well as business specific indicators relating to product/service creation and use.
- *Eco-efficiency ratios* – in addition to providing in the previous two elements the basic “numerator” and “denominator” data for estimating eco-efficiency, companies may also wish to provide calculations of eco-efficiency indicators that they consider most relevant and meaningful for their business
- *Methodological information* – covering the approach used to select indicators, data collection methodologies, and any limitations on use of the data

The next section illustrates how eco-efficiency works in practice. The section contains three case studies that show how management systems can be used to support eco-efficiency objectives.

5.5 Case studies

Case 1: Energy Efficiency: Eskom (www, WBCSD, 2011)

“In an effort to ensure uninterrupted power supply for the South African economy, the electricity supply commission (Eskom) launched the Demand Side Management (DSM) program. The DSM aims to influence electricity usage patterns by reducing demand at peak periods (07h00-10h00 & 18h00-20h00) by transferring load to off-peak periods and by reducing total electricity consumption through the installation of energy-efficient equipment and optimizing industrial and commercial use which collectively account for 77% of South Africa’s energy use. Eskom’s overall DSM target is to save 4,255 MW

Over the next 20 years to alleviate the negative impacts on the environment through energy efficiency. Achievements attributed to the DSM in 2004: Savings of 197 MW– a major improvement from the 101 MW achieved in 2003 and exceeding the target of 152 MW by some 30%. The 197 MW was made up of 114 MW of energy efficiency and 83 MW of load management. DSM’s successful marketing efforts saw a 10% increase in initial awareness levels among all target markets over 12 consecutive months”.

Case 2: Car sharing in Switzerland: A customer service with higher resource efficiency in mind (WBCSD, 2000b.p.18)

“Since 1997, the Swiss Federal Railways (SBB) has successfully cooperated with the car-sharing company Mobility. Car-sharing is an innovative service offered to people who frequently want to use a car without buying their own. Mobility cars are parked at predefined places, ready for use by registered clients for a pre-announced period of time. The sharing concept allows people to benefit from using a car in a more efficient way than they would by owning a car themselves. Furthermore, Mobility clients can always get the right car at the right size and for the purpose they need.

Mobility has more than 1,300 cars in 330 communities throughout Switzerland, 250 of them at railway stations. The combined offer with SBB is a step forward in eco-efficient service value. It allows railway passengers to get dedicated mobility options at the arrival point of their journey almost everywhere in Switzerland. SBB offers this combined mobility services at attractive tariffs and provides financial incentives to its customers to use the car-sharing service.

Car-sharing members measurably change their travel behavior. More than two-thirds of their travel is by public transport. Per car-sharing client, the percentage of rail travel grows on average by more than 2,000 km. Active car-sharers consume less than half the amount of fuel than they did when they drove their own car, and the overall distance they travel declines. Mobility today has more than 34,000 clients, of whom more than 12,000 are frequent customers of SBB and benefit from the priority conditions of the alliance. Source: Séverine Wermeille, SBB AG Bern and SBB AG Environmental Report, 1999”

Case 3: Volkswagen Lupo, Germany: Designed for eco-efficiency (WBCSD 2000b, p.17)

“The only thing not re-invented is the wheel. That is how Volkswagen headlines its report on the Lupo 3LTDI passenger car. A completely new car, the Lupo was brought to market in 1999, with a fuel consumption of less than 3 liters per 100 kilometers. It was designed for eco-efficiency and embodies many technical innovations. Indeed, VW says that its performance is optimized throughout its entire life-cycle. It is not just that the Lupo’s engine has low-emissions and low fuel consumption; the cars themselves are built from recycled materials using production methods which minimize waste and emissions. And when the car reaches the end of its useful life, the Lupo’s design also supports the segregation of materials in the dismantling and recycling processes. Moreover, says VW, the car can deliver what customers demand: good driving performance at a remarkably low price”

In the next chapter an analysis of how the concept of eco-efficiency is used and its relevance is presented in order to answer the research questions.

6 Analysis

This chapter addresses the research questions stated in chapter one based on the theoretical framework and the empirical data. This is done by presenting an analysis of the concept of eco-efficiency and eco-efficiency indicators framed within the theoretical framework that was presented in chapter three. The main objective is to answer the research questions which are restated below:

- How is the concept of eco-efficiency used to achieve corporate sustainable development objectives?
- What is the relevance of eco-efficiency in achieving corporate sustainable development objectives?

6.1 How the concept of eco-efficiency is used

Measuring progress towards sustainable development calls for relevant systems, tools and methods to measure and evaluate the actions of corporations and their consequences on the environment and society in general (Rebitzer *et al.*, 2004). The tools developed should reflect the nature of the business values and culture to be effective (Keeble *et al.*, 2003) due to the plurality of the business environment.

Following recommendations of the WBCSD, in 1992 corporations across the world adopted eco-efficiency indicators to internalize sustainable development at corporate level. Subsequently, indicators meant to support efforts of corporations to reduce materials and energy used were put into practice. These eco-efficiency indicators were presented in section 5.4. They include generally applicable indicators and business specific indicators. However the indicators mainly cater for economic and environmental objectives and largely neglect social progress. For this reason they fail to meet the requirements of the triple bottom line framework (Elkington, 1999). This limitation raises the question of the relevance of the indicators in supporting corporate sustainable development efforts discussed further in the next section.

Eco-efficiency indicators are both generic and specific. In theory this reflects an attempt to take into account the different business circumstances (WBCSD, 2000a). In practice however, business specific indicators have limited application even within the businesses for which they are designed. Moreover eco-efficiency indicators are understood and applied differently making the outcomes difficult to demonstrate. For example, in the primary sector such as agriculture, extending product durability is a less relevant indicator if applied to the core activity of this sector. However maximizing sustainable use of natural resources and reducing toxic dispersion are quite relevant indicators in this sector. At the same time it is not clear how efforts of a primary sector-based business can be compared with those of a service-based business to determine the aggregate contribution of corporations to reducing resource wastage.

To illustrate, efforts by the Swiss Federal Railways (SBB) to encourage car sharing in **case 2** in **section 5.5**, show that it is attempting to use eco-efficiency to achieve sustainable development, measured against the following eco-efficiency indicators:

- *Energy intensity* by encouraging many people to use the same car instead of owning one by themselves
- *Green house emissions reduction* through car-sharing thus reducing the number of car on the road
- *Increasing service intensity* by building into its business model a car hire component instead of just selling cars
- *Increasing effectiveness of use* since the cars are used more frequently than would be the case if each client had their own cars
- *Maximizing sustainable use of natural resources* by limiting the number of cars produced using the car sharing model

6.2 Relevance of eco-efficiency

It should be stated here again that corporations use eco-efficiency indicators as a way of putting into practice the concept eco-efficiency in order to achieve sustainable development objectives. To assess their effectiveness or otherwise in reducing resource use and minimizing waste to achieve sustainable development, it is important to determine how “*accurate*” eco-efficiency indicators are. This in turn calls for an understanding of the definition of an indicator. A performance indicator is defined as “*a measurable characteristic that is related to the goal under consideration*” (Apaiah, *et al.*, 2004, p. 205).

Judged on Caplice & Sheffi (1994) criteria, it is clear that various eco-efficiency indicators are not relevant in many respects to move corporations towards sustainable development. This is not to suggest that they are of no value or that they should be abandoned altogether. Rather to demonstrate that since they are inadequate on many grounds their benefits should be touted with caution. Alternatively, this limitation raises the awareness that their value can be enhanced if they are used in conjunction with other tools and concepts (EEI, 1999) in order to yield better outcomes. The next section continues with the analysis of these shortcomings.

6.2.1 Relevance based on Caplice & Sheffi (1994) model

Effective indicators should mirror the objectives that a society seeks to attain and communicate information that is meaningful to decision makers in a form that they and other stakeholders easily understand. On this score, eco-efficiency indicators neglect social development (which is a shared societal goal) and thus fail to satisfy the interests of many stakeholders which renders their usefulness debatable. They thus fail to live up to the triple bottom line requirement as espoused by Elkington (1999). Yet, stakeholder theory prescribes that all the interests of stakeholders should be taken into account (Donaldson & Preston, 1995; Roberts, 2003; Froman, 2005) something that advocates of eco-efficiency indicators fail to recognize. Knowing that stakeholders can support or damage a firm's capacity to create value (Schneider, 2002) and given the fact that the value created can only be said to be just if it is conceived within the triple bottom line perspective (Elkington 1999), eco-efficiency indicators developed thus far cannot be said to be just. For this reason their usefulness is rendered doubtful.

The failure to recognize the social aspect of sustainable development leads to another problem; that of inability to *coordinate* across all functions and to take into account the important role of other stakeholders (Donaldson & Preston, 1995). In fact there is an inherent

contradiction within the espousal of eco-efficiency indicators as concept to achieve corporate sustainable development objectives. Despite the important role played by changes in social behavior for the achievement of sustainable development (WBCSD, 2000b), social justice receives little attention in its implementation. It is not clear how eco-efficiency indicators will bring about the desired savings in energy and resources without the active participation and benefit of one of the pillars of sustainable development.

Furthermore, the triple bottom line framework requires that businesses should operate within the area that is *sustainable* (see figure 2.1). However a business using eco-efficiency indicators to achieve sustainable development would most likely be operating in the *viable* area or at least close to it. Operating in this area, the business is able to meet its economic and environmental objectives to a large extent, but pays no attention to social justice. Because of the inequity associated with this choice, sooner than later, such a business may find itself on the wrong side of progress. In the other words, by neglecting social advancement businesses using the concept of eco-efficiency fail to lead to sustainable development. At the same time, despite the importance of social justice, businesses should shun the *equitable* area in Figure. 2.1 even if activities in this area are perfectly legal and ethical (Brenner, 1977).

It has also been suggested that instead of maximizing the flexibility with which indicators can be used, corporations and individuals might use them to maximize selfish outcomes, a major ethical issue according to Des Jardins (1997). No wonder some businesses have been accused of designing resource use and energy saving efforts to maximize personal expected outcomes (Deci, 1992) such as higher pay. In any case, as Söderbaum (2000) points out, individuals within an organization take on certain roles regarding each of the three pillars of sustainable development. This creates room for the subjective selection of indicators that maximize individual or particular organizational interests instead of the best choices that support broader sustainable management strategy and thus raising concerns regarding *validity* and *usefulness* (Caplice & Sheffi, 1994).

Connections that indicators make with each other should assist in explaining their meaning. This means that indicators should be sufficiently *integrated*. Throughout the past two decades, owing to competitive pressures in domestic markets, many corporations have moved their operations to developing nations where costs of production are lower. In this regard, when a certain indicator is applied by a single corporation this does not necessarily show progress towards sustainable development since it may simply shift its undesirable behavior to another market. To take an example, if a corporation reduces its energy intensity in one of the countries where it has operations, this does not necessarily mean that it is reducing the amount of materials used in its operations. It may just be the case that it is deindustrializing within that country and transferring its manufacturing activities to another country or region (Levit, 1998). Measuring actions of such corporations would require an examination of all their activities in all the countries where they have operations. Besides the elaborate nature of such an undertaking, it would require a lot of time to arrive at a plausible answer.

The *economic* justification of eco-efficiency indicators is also disputable. To assess the effectiveness of eco-efficiency indicators, a corporation has to collect massive data. In many cases this entails a meticulous life cycle assessment (LCA) to determine material flows. Since LCAs take several years to complete even just for a single product, the cost implications in both money and time are enormous. In a rapidly changing business environment this could also have competitive and business survival implications as firms using eco-efficiency indicators would be compelled to undertake LCAs. For small and medium-sized companies

this could be quite inhibiting and may lead to failure if not handled properly. Therefore the high resource commitments required in using eco-efficiency to measure progress towards corporate sustainable development makes it uneconomical and therefore less relevant in many situations.

Different organizations adopt different approaches to implement and measure eco-efficiency (WBCSD, 2000a) which raises questions regarding the *robustness* of the indicators. Given that a measure qualifies to be robust provided it solicits the same interpretation from all users and can be compared across time and among different organizations (Caplice & Sheffi, 1994) eco-efficiency indicators are questionable in this regard. As already pointed out, eco-efficiency indicators are used variously by different entities inhibiting comparability. Combined with the related challenges in the area of *behavioral soundness*, because as argued elsewhere, they can be manipulated for personal or specific business purposes, eco-efficiency indicators lack the robustness needed to make them effective measures towards corporate sustainable development.

6.2.2 Moral gap

Eco-efficiency indicators fail to engender the integration of all the domains of sustainable development which leads to another challenge, the *integrity* of using the indicators. Eco-efficiency indicators cannot be said to validly measure progress towards sustainable development when they are biased against one of the important pillars of sustainable development; social development. Using indicators to pursue a global objective such as sustainable development with no regard to social justice raises moral and ethical questions as well (Carroll, 1989). It is this neglect of social development that has led Söderbaum (2000) to question how corporations can purport to be pursuing sustainable development strategies while at the same time ignoring the social pillar which sits at its core. As already pointed out, sustainable development from a business perspective entails meeting the needs of a business's primary and secondary stakeholders, without reducing the ability of the entity to meet the needs of future stakeholders (Dyllick & Hockerts, 2002). Neglecting social development serves to water down the importance and efficiency of the concept. This omission could also be interpreted as an attempt to entrench corporate arrogance whereby it is assumed that businesses know what is good for society and therefore should be given the leeway to pursue corporate sustainable development unimpeded provided they stay within the law as Friedman (1970) proposed.

6.2.3 Inherent bias

Another glaring omission of the concept of eco-efficiency is its inability to acknowledge that at its core is the inherent desire to promote the interests of certain actors without making it explicitly clear. This concept weighs heavily in favor of certain actors based on their power within a corporation (Elias, 1970; Söderbaum, 2000). Managers and shareholders are more likely to reap the best rewards from the application of the concept since its focus is on efficiency gains which ultimately result into higher profits. This observation is supported by agency theory (Law & Hassard, 2004) as it is in the interest of managers to improve efficiency and productivity and thereby improve their personal fortunes.

Moreover when individuals and corporations save money as a result of prudent energy use, the saved money may be spent on purchasing other things (e.g. paid holidays) which leads to the use of more resources. While it may be true that employee motivation and productivity may increase as a result of time spent relaxing, it can also be argued that one of the outcomes of the efficiency gains in this case could be more resources required to produce more goods to

promote more consumption. This is where advocates of the institutional approach (Söderbaum, 2000) present their case by advocating for the use of economic instruments such as taxes and permits to internalize the externalities in order to change the behavior of corporations and individuals.

6.2.4 Fixing symptoms not the cause

Eco-efficiency indicators have been criticized for providing “*end-of-pipe*” solutions instead of taking the “*cradle to the grave*” approach. Taking the example of Eskom (see case 1, section 5.5), eco-efficiency indicators could be seen as only providing *ex post* solutions to sustainable development. In the case of Eskom, most of South Africa’s electricity supply is generated from coal-fired power stations which utilize huge amounts of coal, a non-renewable resource, and water and produce vast quantities of greenhouse gases (www, WBCSD, 2011). In theory it appears that Eskom is implementing eco-efficiency measures but in reality it is only scratching the surface. This kind of corporate behavior seems to suggest that managers in some organizations take the *anthropocentric* ethical view which holds that while human beings have responsibilities towards the environment it only they who have the moral value to decide what is good (Des Jardins, 1997). They use this to justify their failure to recognize the fundamental unsustainable resource utilization trajectory along which the organizations they lead are positioned.

To the above concerns the following could be added: there is a dearth of information, numerous hidden subsidies and a lot of negative incentives to dilute the benefits arising out of eco-efficiency measures implemented by corporations. For instance, in almost all countries across the world energy use is subsidized so that even if companies innovate to reduce energy use their efforts cannot go far enough. Moreover, due to the information gap between consumers and business entities, it is difficult for consumers to know how much waste is being generated by products which are not well designed (Dresner, 2008).

6.2.5 The free market heritage

Eco-efficiency indicators will always be associated with the neoclassical economic framework within which they were developed. This economic model pervades current business practices and can be deciphered within the theoretical foundation of the concept (Söderbaum, 2000). The neoclassical economic model departs from the presumption that resource overuse is the problem rather than the broader economic paradigm. Additionally, the indicators and their perceived benefits derive most of their support based on the expectation that those who work with them are free from bias and have no ulterior motives, a presumption that is largely contestable (Law & Hassard, 2004). It is already established that managers in corporations undertake corporate strategic management decisions motivated by a range of motives some of which are selfish (McClelland & Winter, 1969). These egotistical motives may not always support sustainable development efforts as they may be informed by corporate executives’ desire to prosper individually thus making the underlying assumptions of the eco-efficiency concept illusory.

As Levett (1998) reasons, it is important to provide background information to allow the user to determine whether improvements brought about by the indicators are good or bad. Unfortunately many organizations do not provide background information thus rendering the indicators less effective. Again referring to the “Car sharing in Switzerland” example (case 2, section 5.5), without contextual information, it is not possible to know the conditions under which the cars are produced. It is after knowing the resource use intensity of car production

plants that one understands car sharing is a very small effort towards solving a bigger problem within the car manufacturing sector.

Outsourcing allows companies to have some of their production activities in other parts of the world. Some companies use this practice to limit their resource use profile in countries where there are stricter regulations and increase them where the regulatory and social environment is less intense. Instead of deindustrializing, such companies simply transfer the problem to another part of the world without reducing its impact on the global environment. This again points to the fact that solutions that will make tangible progress towards corporate sustainable development will have to be systemic and inclusive.

The market is a network and eco-efficiency indicators are used within the context of this network where decision makers act as calculating agents and resolve conflicts through agreed prices (Callon, 1999). Using eco-efficiency indicators entails assigning a price to environmental goods and services in order to estimate the ratio of product or service value per environmental influence (WBCSD, 2000a). This is premised on the assumption that information is available in the right quality and amount. However some of the required information to undertake the calculations is derived from projections about the future state of the environment. For this reason, Callon (1999) argues that it is not possible to calculate the ratio of product or service value per environmental influence when no reliable information on the future state of the environment can ever be available.

Intuitively, it would appear that all corporations would willingly implement the principles of eco-efficiency. After all, does it not make financial sense for a corporation to strive to use fewer resources, save money and reduce emissions for fear of finding itself on the wrong side of the law? However, the reality is different. In developed countries wrong signals from public policy such as subsidies and the failure to punish offenders and reward good practice lessen the effectiveness of the concept (WCSBD, 2000b). In developing countries, due to weak regulations and rent-seeking behavior, corporations simply shirk their responsibility to minimize resource use. From these challenges it is clear that the voluntary nature of most corporate sustainable development efforts is itself unsustainable pointing to the need for some form of public regulatory mechanism.

At this point it can be hypothesized that perhaps the reason why the social domain of sustainable development is ignored by advocates of eco-efficiency is due to the negative associations attached to the idea of assigning prices to environmental goods and services. Results from attempts to develop useful social indicators of sustainable development are yet to bear fruit. For instance the idea of monetizing non economic values such as human life is viewed as morally repugnant by many people. In fact such attempts have been dubbed as attempts at commodifying everything, a development which does not sit well with opponents of eco-efficiency (Bebbington *et al.*, 2007). The next chapter tackles other related issues by comparing and contrasting results from other studies with the current study.

Following the utilitarian approach, it would be perfectly fine for the majority of people to, for example, argue that environmental and social issues should be neglected at the expense of economic concerns. The utilitarian approach suffers from a major weakness in that it is impossible to measure the value of certain goods such as environmental goods and services since they are difficult to quantify. In addition this ethical tradition holds people responsible for things they cannot control since it is not possible to anticipate or control the consequences of one's actions. Moreover going by this approach, as long the majority of stakeholders are

happy that would be sufficient to ignore concerns of the minority. For instance if there is a feeling that corporations are sufficiently rewarding shareholders for their investment, social issues such as income distribution and environmental externalities should be neglected. Clearly this approach is principally counter-intuitive as it clashes with many of the firmly held beliefs by society. (Des Jardins 1997)

7 Discussion

This chapter contains a discussion of how the results from the study agree or contrast with those of other studies. First the need to change current consumption patterns is highlighted followed by a discussion of the dilemma presented by the interconnected nature of human beings and the environment and the SD implications thereof. This is followed by a discussion of the economic system and business practices. Lastly a context is provided regarding the appropriateness of eco-efficiency indicators to developing country business settings.

7.1 Change the “*social logic*”

One would have hoped that the influential WCED (1987) report would have put to rest any doubts about the importance of social justice to the realization of sustainable development. However, eco-efficiency indicators, which are a relatively recent development ignore social advancement but continue to receive attention from corporate sustainable development strategists. This reality raises the question; should corporations even consider using these indicators given that they deemphasize an important aspect of sustainable development? Or are there possibilities of incorporating social justice into the implementation of the indicators? At the moment there seems to be no ready answer to the first question as no study has as yet proposed discarding their use. Regarding the second question however misgivings still abound especially related to the democratic character of the indicators. And since no success has yet been registered with regard to efforts aimed at incorporating social justice within the eco-efficiency concept this question is likely to remain for years to come.

The successful implementation of eco-efficiency strategies by corporations requires adequate investments in innovation and creativity. However, leading sustainable development advocate Tim Jackson (pers, com, Jackson, 2011) argues that while innovation may lead to improved efficiencies in resource use, it may have negative impacts. Jackson argues that while innovation leads to the creation of new products, it at the same time perpetuates a culture of conspicuous consumption aided by marketing and communication efforts of companies and governments. The outcome of these marketing efforts leads to changes in consumer perceptions (“*social logic*”) (pers, com, Jackson, 2011) enticing people to consume products they do not need. As more products are developed, more consumers strive to join the “*trendy wagon*” (pers, com, Jackson, 2011) or consumerism which leads to more resource usage by corporations, in effect negating the concept of eco-efficiency and the goal of sustainable development (Welford, 1995).

Taking the example of the car sharing scheme (see section 5.5), in theory sustainable development outcomes could be derived from its implementation. However, the problems that the Swiss Federal Railways (SBB) is attempting to solve are related to unintended consequences of car use (Newton, 2002) but not the problems associated with car manufacture, ownership and use. Given the global and interdependent nature of car users and the difficulty of forecasting their actions and behaviours, any significant efforts to minimise the social and environmental impact of car users would require a recognition of “*the benefits of acting cooperatively rather than competitively*” (Welford 1995, p. 22) by corporations. Therefore, efforts of one company if not complimented by those of many others seem futile. From this understanding one senses that creating a lasting social-ecological order, free of all detrimental elements such as resource over use, social and economic injustice remains a moving target (Law, 1994).

7.2 Separating human needs from the environment

The effectiveness of eco-efficiency indicators is premised on the desire to separate human needs from the environment. However, it seems impractical to try to separate the concerns of individuals for the environment from their material desires. As Green (1995) states, the desire to engender equality between the environment and human beings reflects a mistaken view, way out of context that attempts to equalize human concerns with natural processes. Human beings may be concerned for the environment but depend on the environment to satisfy their needs and wants. This being the case, and knowing that material needs are largely satisfied by exploiting nature, Hukkinen (2001) argues that it is not realistic to rely on the concept of eco-efficiency to achieve sustainable development because for it to succeed, human needs have to be decoupled from material resources which is impossible to achieve.

Analyzing the concept of eco-efficiency from a communal standpoint, Hukkinen (2001) further posits that eco-efficiency assumes that environmental impacts can be separated from local social, economic and cultural contexts. This assumption is based on the view that environmental impacts can be determined by taking into account the natural resources consumed, thus creating the false notion that the impacts are the same everywhere. This assumption in turn creates another false illusion: that all environmental impacts can be managed through a worldwide governance system such as eco-efficiency indicators (*ibid.*). Moreover, Haila & Levins (1992) and Dyke (1988) argue that prescribing eco-efficiency as a worldwide answer to environmental problems is unrealistic given that the world is characterized by a myriad of limitations because of its complex nature.

7.3 Change the *modus operandi*

The free market system, the dominant form of economic organization during the past century, is praised for its promotion of efficiency. From a utilitarian perspective, efficiency is good given that it encourages the prudent use of limited resources to produce goods and services that increase overall welfare (Boatright, 2009). The use of eco-efficiency indicators is justified by the claim that its application leads to increases in the efficiency of resource use. However, relying on eco-efficiency to achieve sustainable development simply peppers the problem as it does not confront the root cause of the dilemma which is the flawed economic system that supports endless material consumption. Merely making organizations more efficient through cost efficiency is inadequate. Corporations have to significantly alter the way they pursue sustainable development objectives if they are to escape being labeled as pursuing the “greening washing” agenda through the application of eco-efficiency with limited tangible results.

Until recently, eco-efficiency indicators were only positioned in areas under direct management control, even though in reality, there are relevant environmental issues upstream (e.g. with suppliers) and downstream (e.g. in product use and disposal) (WBCSD, 2000). In the current business environment where businesses are interrelated and where co-production and alliances have become ubiquitous, the failure of eco-efficiency indicators to take into account both upstream and downstream actors should be seen as a major shortcoming. Moreover without cooperating with other businesses, corporations cannot adequately revalorize their by-products.

Recent efforts to promote collaboration between businesses prove that corporations have realized that previous efforts to apply the concept of eco-efficiency based on efforts within

individual firms were inadequate (WCSBD, 2000b). The earlier efforts were inspired by the expectation that the financial premium derived from environmental prudence can spur changes in environmental strategy. However, while influences which operate at firm level such as mission and firm strategy, impact on how an organization conducts itself, the impact of external factors such as policy frameworks and cultural values in society can be far-reaching (Bebbington *et al.*, 2006). It is these rather theoretically less-relevant factors that require attention for the effectiveness of eco-efficiency to be enhanced.

Across the world, challenges to the capitalist mode of production are surfacing that are questioning how the value created by corporations run on capitalist's tenets is distributed. The economic crisis that gripped the world in 2008/2009 showed that there is skepticism about the misplaced faith in the capitalist system. For example, questions have emerged about the incentives that corporate executives obtain, especially those related to short term gains on stock markets at times when workers may be facing redundancies (Elkington, 1999). This incentive system, besides being morally questionable, supports massive resource exploitation and runs counter to the principles of eco-efficiency and by extension, sustainable development.

On the other hand, Weick (1987) suggests that a major drawback associated with current efforts to encourage sustainable business practices is that the underlying model of learning upon which it is based is faulty. Instead of educating corporate actors (such as employees, managers and other stakeholders), the best option is to let "*green action*" follow "*green education*" and not the reverse (Newton 2002, p.532).

Despite the emphasis of organizational scholars on bringing industry into harmony with nature, Gladwin *et al.*, (1995b) argue that the biggest challenge lies in bringing industry into harmony with humanity. They posit that genuine sustainable development cannot be achieved without paying close attention to poverty reduction, birth rates, women emancipation, job creation, human rights and equal opportunity on a big scale. All these issues relate to social justice, which is given less prominence by the concept of eco-efficiency. In order to overcome the skepticism that currently pervades the sustainable development discourse because of the shortcomings of current efforts, Dyllick & Hockerts (2001, p.130), propose six criteria that managers with intentions of achieving corporate sustainable development should satisfy. These criteria are: "*eco-efficiency, socio-efficiency, eco-effectiveness, socio-effectiveness, sufficiency and ecological equity*".

7.4 Incentive structures

Under the current reward systems and structures, corporate executives are motivated to ignore social and environmental issues since their pay is largely determined based on economic returns (Boatright, 2009). As noted in section 3.7, the capitalist form of production cannot be relied upon to support the current global changes in human and social values.

The central tenet of the concept of eco-efficiency is to encourage corporations to minimize resource wastage and reduce emissions. This objective in itself is tricky because by encouraging corporations to use less resources and produce more, managers are provided an incentive to hire fewer workers since wages are seen by such managers as a cost that uses up resources and should therefore be minimized.

The WBCSD recommends to its members that for the concept of eco-efficiency to work it has to be conceived as a central part of strategy (WBCSD, 2006). The strategy in turn should focus on “*technological and social innovation, accountability and transparency, as well as on cooperation with other parts of society*” (*ibid*, p.4). While this is a laudable ambition, there are countless challenges to its realization. In an era characterized by growing information and income inequality, it’s doubtful how the myriad of stakeholders with interest in business activity would actively participate and support eco-efficiency measures. In any case, while transparency and accountability are becoming crucial for the survival of corporations, recent environmental scandals have revealed that there is still a long way to go in achieving this objective.

7.5 Eco-efficiency in developing countries

Attempts to implement eco-efficiency measures in developing countries evoke moral and practical questions. Most developing countries are endowed with massive reservoirs of natural resources which they are yet to utilize. If eco-efficiency is adopted in developing countries, it would require a reduction in the quantity of resources used in those countries. For a variety of reasons, developing countries rely on the exploitation of natural resources to provide for their populations. For instance there are businesses in poor countries that depend exclusively on the exploitation of natural resources such as wood. Although such practices may lead to problems as soil erosion and seasonal flooding, given the limited options people in poor countries have and the fact that embracing eco-efficiency would imply discarding such practices, implementing it in this context would be quite daunting.

At a macro level, many developing countries are burdened with large international debt repayment obligations which necessitate them to allocate their meagre financial assets toward servicing these debts. As a result, they may be forced to exploit and export mineral or forest resources with little consideration for environmental and social impacts. Moreover they lack financial resources and intellectual capital to implement eco-efficiency initiatives fully. The point here is not to suggest that efforts aimed at utilizing eco-efficiency in developing countries should be abandoned altogether. Rather to point out the fact that the adoption of any measures should take into account the particular social and economic circumstances of the businesses. This approach will ensure that the needed economic growth rate in these countries is matched with the necessary attention to social and economic objectives.

In view of the above findings a number of conclusions may be drawn. These conclusions should be seen in light the aim of the study: how corporations use the concept of eco-efficiency to achieve corporate sustainable development objectives. These conclusions are presented in the next chapter.

8 Conclusions

This chapter provides the conclusions to the thesis in view of the empirical analysis and the discussion. The aim is to frame the findings of the study around the research question and propose areas for future research.

8.1 Expanded role of stakeholders

Businesses exist to satisfy the needs of stakeholders found within and between the three pillars of the triple bottom line framework. All stakeholders have to play an increasingly prominent role if sustainable development efforts are to achieve the desired outcomes. Other than operating as stand-alone entities, corporations have to work with different partners in the private and public spheres to achieve their goals. This in turns call for a shift in business models and strategy to take advantage of the benefits resulting from this enhanced cooperation. As Meadows *et al.*, (2006, p. 269)) observes, the burden to achieve sustainable development “*is not on the shoulders of any one person or group... but everyone will contribute*”.

Moreover for sustainable development to be realized, a variety of approaches and contributions from different stakeholders will be required. This is what Söderbaum (2000, p.20) refers to as “*conceptual pluralism*”. For this to happen there will have to be better appreciation of the concepts of social equity, environmental justice and social capital. In other words, it will require that we develop other conceptual frameworks beyond the current triple bottom line framework to harness the support and contributions of all actors within society.

8.2 More tools and efforts

Despite its growing use to support sustainable business strategy, the concept of eco-efficiency is still faulted for its failure to incorporate the third element of sustainable development as presented in the triple bottom line framework (Elkington, 1999). This weakness on its own calls the indicators developed on the basis of the underlying objectives of the concept of eco-efficiency into serious question. On its part, the WBCSD (2006, p. 5) concedes that “*eco-efficiency is not sufficient by itself because it integrates only two of sustainability’s three elements, economics and ecology, while leaving the third, social progress, outside its embrace*”. Given that economic objectives that neglect any of the other two pillars cannot be sustainable in the long run (Elkington, 1999) there is need for additional tools and concepts. And while developing suitable measures of social justice remains elusive, efforts in this direction at the business, academic and other levels should be supported.

8.3 The economic system

Most of the challenges that the world faces in attempting to create a sustainable business culture are related to the current dominant economic paradigm. Unless there are significant changes to the neoclassical economic framework, expecting eco-efficiency indicators or any other measure and tools, to yield significant social and environmental outcomes may be too optimistic. The current system rewards more consumption and promotes the production of materially inefficient products (Meadows *et al.*, 2006). Added to this criticism is the expanding role and scope of stakeholders which has resulted in an increase in the number of competing claims to the actions of a corporation. Focusing on the profit motive alone is no

longer sufficient to ensure success. To achieve sustainable business practice, businesses will have to re-engineer production and consumption paradigms to reflect the realities of diminishing resources. This also includes developing a new configuration of corporations' resource and production system to influence how efficiently resources are utilized. With the new orientation corporations will reap ethical, regulatory as well as strategic rewards (Hockerts, 1999).

8.4 Eco-efficiency going forward

Within the present business environment, there are good reasons why corporations might want to trim down their levels of investment in sustainable business practices. First, the recent economic crisis has reduced the demand and consequently the prices for many natural resources. From a business point of view, this has made it difficult to justify investments in resource efficiency, at least in the short term (www, WBCSD, 2011). Second, eco-efficiency efforts vary extensively in the amount of fixed investments required. While most companies have significant opportunities to reduce resource use through improved operational practices, solutions that promise to deliver better economic and environmental outcomes usually require greater investment especially in innovations. For this reason, companies facing financial problems may find it difficult to justify immediate investments expecting to realize savings in the long term (*ibid.*).

Despite all the above concerns, using the concept eco-efficiency to support efforts by corporations to entrench sustainable development practices is an important initial step (Levett, 1998; Bosselmann, 2008). However, developing holistic eco-efficiency indicators based on a broader sustainable development framework would go a long way in supporting business efforts to institute sustainable business practices. From the review of relevant views and theories pertaining to eco-efficiency and its application to achieve corporate sustainable development the following findings are presented:

- Corporations in different sectors use different eco-efficiency indicators which presents a challenge in terms of comparing best practice across sectors.
- Eco-efficiency indicators on their own are inadequate in moving corporations towards sustainable development.
- The high costs and data intensity associated with its implementation make the concept of eco-efficiency out of reach for small companies with limited resources.
- The eco-efficiency indicators developed thus far still require refinement to make them more relevant and useful to specific business situations.
- The triple bottom line framework is insufficient in explaining the inevitable interdependencies and necessary cooperation between different facets of sustainable development needed to achieve the goal of sustainable development.

The broader implication of the above findings is that entrenching sustainable business practices will require striving toward a broader sustainable development framework that encompasses intergenerational and intragenerational equity while recognizing that the environment is the foundation that provides for all human needs. This means that corporations will have to realize the significant connection between their continued success and the need to conserve natural resources.

At the same time, it is important to point out that the concept of eco-efficiency has its limitations. For example, more efficient cars may reduce the cost of driving a car. However, if

all the people in the world could afford to use cars to meet their needs for individual mobility, the benefits of more efficient cars might fail to be realized from an ecological standpoint. In order to avoid this, the focus has to shift from *efficiency* of fossil fuel cars to *effectiveness* (e.g. resorting to solar powered cars) (Dyllick & Hockerts, 2002).

In the final analysis, it is important to realize that sustainable development is so vital to be left to any particular group in society. It should be seen as a *sine qua non* for all human beings and nations and involves a deeper recognition of the interconnections embedded within it. This awareness creates an obligation to approach it from a systemic perspective. For this reason, policy choices have to be made at all levels of society through which social justice, economic progress, and healthy environmental systems support each other. This in turn will require a paradigm shift underlined by a new ethical orientation which recognizes the preeminence of nature over human activities. And while eco-efficiency is a useful step forward, applying it in a real-world business setting to measure progress towards sustainable development will continue to be a challenge for many years to come.

8.5 Epilogue

The main reason cited by corporate executives who pursue the goal of sustainable development is to create conditions within which present and future human needs are satisfied. However, the success of business entities to produce goods and services over the past century has been based on unsustainable models of production and consumption. It is now established that continuing on the current development trajectory will not support the objective of sustainable development. Hence corporations, governments, NGOs and individuals have to take steps to ameliorate the situation through efforts such as those of the WBCSD. From efforts of the WBCSD the concept of eco-efficiency emerged. It is in this context that business entities which contribute significantly to society's welfare (and problems!) should continue to take a leading role in finding solutions to what is already an urgent problem. However, while these efforts may have value, they do not go far enough to move corporations towards sustainable development.

For these reasons, it is proposed that this study should be seen as an initial step that exposes the challenges associated with using the concept of eco-efficiency to achieve corporate sustainable development. It will be interesting for future studies to examine the institutional frameworks that support or inhibit actions of business entities in their effort to achieve sustainable development. Specifically, the power and reach of global institutions and regulatory accounting frameworks and how they impact on corporate sustainable development strategy have not been fully understood. Moreover understanding the impact of these factors from a comparative case study perspective (e.g. comparing actions of corporations operating in developed markets with actions of corporations in developing markets) would be invaluable in broadening the corporate sustainable development discourse.

Lastly, beyond current efforts aimed at increasing the efficiency of existing production methods and systems, there is need to explore possibilities of widening the scope of enquiry by undertaking studies which seek to understand how *effective* business solutions can be rolled out to achieve corporate sustainable development goals as opposed to concepts and tools designed to engender *efficiency* within a corporation. In this regard, it would be valuable to establish the nature of incentives that should be deployed to persuade corporations to engage in effective sustainable business practices such as production practices that rely on renewable energy as an alternative to traditional forms of energy.

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Appendix 1: List of categories, aspects and examples of indicators (WBCSD 2000a, pp.31-32)

Category	Aspect	Example of indicator
Product/ Service Value	Volume	<ul style="list-style-type: none"> • Units (e.g. number sold) • Statistical Unit (e.g. averaged, indexed) • Employees (e.g. numbers, labor hours) • Space (e.g. in building management)
	Mass	<ul style="list-style-type: none"> • Quantity (e.g. kilograms sold or kilograms produced)
	Monetary	<ul style="list-style-type: none"> • Net Sales/Turnover • Gross Margin (Net sales - cost of goods sold) • Value Added (net sales - cost of goods purchased) • Income / Earnings / Profits • Share value • Liabilities (e.g. insurance costs) • Reserves / Provisions • Investments and write-offs • Costs (e.g. cost of goods sold, production, energy, materials, waste disposal, pollution control)
	Function ¹	<ul style="list-style-type: none"> • Product Performance (e.g. laundry loads washed, number of diapers used in a baby's life time) • Services delivered (e.g. standard banking transactions) • Agricultural yield (e.g. bushels harvested) • Agricultural effectiveness (e.g. hectares treated) • Product durability/Lifetime (e.g. vehicle miles traveled) • Transport capacity (e.g. ton-kilometers, passenger-kilometers)
	Other relevant information	<ul style="list-style-type: none"> • Product price • Market share • Margins • Market Mix
Product/ Service Creation Environmental Influence	Energy consumption	<ul style="list-style-type: none"> • Gigajoules consumed • Fossil fuel type (e.g. gigajoules of coal, natural gas, etc.) • Source (e.g. gigajoules of renewable, non-renewable) • Emissions (e.g. tons of SO_x, NO_x, VOC, greenhouse gases)
	Materials consumption	<ul style="list-style-type: none"> • Tons consumed • Type (e.g. tons of raw material indirect/ancillary materials) • Source (e.g. tons of renewable, non-renewable, recycled, virgin, extraction rucksack) • Characteristics (e.g. tons of materials with certain environmental safety/risk characteristics)
	Natural resource consumption	<ul style="list-style-type: none"> • Tons consumed (e.g. water, wood, minerals) • Source (e.g. tons of renewable, non-renewable, m³ of groundwater, fresh surface water, salt water) • Land use (e.g. hectares of biodiversity/species conservation habitat) • Non-process water (e.g. m³ of utility, product consumption)

¹ "This describes the functional value of a product or service to the final user meaning that it is very specific and can only be used for individual products and services"

Category	Aspect	Example of indicator
	Non-product output	<ul style="list-style-type: none"> • Before treatment (e.g. tons of process material inputs minus tons of product output) • Techniques of treatment (e.g. quantity to bio-treatment, incineration, landfill) • Releases to land or water after treatment (e.g. quantity to on-site/off-site treatment, quantity of hazardous/non-hazardous, quantity to surface water, underground injection, tons of effluent BOD5 and/or COD, tons of N&P nitrification emissions) • Air Emissions (e.g. tons of NO2/NOx, SO2/SOx acidification, greenhouse gases, ozone depleting substances, volatile organic compounds) • Priority heavy metals releases (e.g. tons of releases) • Persistent, bio-accumulative and toxic releases (e.g. tons of POPs releases)
	Unintended events	<ul style="list-style-type: none"> • Accidental releases (e.g. number of releases)
Product/ Service creation Environmental Influence	Product/ Service	<ul style="list-style-type: none"> • Characteristics (e.g. recyclability, reusability, bio-degradability, durability safety/risk)
	Packaging waste	<ul style="list-style-type: none"> • Tons sold • Source (e.g. virgin material, recycled)
	Energy consumption	<ul style="list-style-type: none"> • Gigajoules consumed • Fossil fuel type (e.g. gigajoules of coal, natural gas, fuel oil, etc.) • Source (e.g. gigajoules of renewable, non-renewable) • Emissions (e.g. tons of SOx, NOx, VOC, greenhouse gases)
	Emissions during use & disposal	<ul style="list-style-type: none"> • Releases to land, water and air from use and disposal