INCORPORATING SUSTAINABLE DEVELOPMENT PRINCIPLES

Into future direction of the

PETROCHEMICAL INDUSTRIES

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Dedication

This research study is dedicated to the Almighty God, whose ***sure mercies*** similar to that for King David, has been my companion and shield. I thank the Almighty God for His grace, favor and kindness in my life and circumstances. Therefore, this research study is solely dedicated to Him.

This research study is also dedicated to my lovely and delectable wife, **AMUSAN, Adeshola Eniola** whose support is unparalleled. I appreciate her courage at the times most needed.

Finally, this project is dedicated to my three children; **AMUSAN Oreoluwa Adeiye (Miss), AMUSAN Opeoluwa Jadesola (Miss)** and **AMUSAN Olaoluwa David (Master)**. They are source of joy and courage to carry on in the course of life. May the good God keep them and lead them to path of greatness. (Amen).

Acknowledgement

I want to acknowledge my parents that brought me into this world and offered me the education needed to jump start my life on a positive note. They are worth more than gold! My late father who bestrode the world like a colossus left an indelible footprint and always challenges me to accept constraints and convert threats to opportunities. My mother acted as a buffer when most needed for me to continue on the course of attaining the minimum education for my self discovery. Thanks Mum!

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Abstract

Sustainable Development in simple term, according to the definition adopted at the World Council on Sustainable Development, is development that ***meets the needs of the present without compromising the ability of future generations to meet their own needs.[1]***

In recent times, there have been growing concerns on the activities of the Petrochemical Industry towards the concept of Sustainable Development[21]. The reputation of the industry is at the lowest ebb, especially in Nigeria. Public concern is overwhelmingly focused on the environmental and social impact of the industry's products and processes. The local host communities of the industry are consistently at loggerheads with it. Sustainability of the industry is being threatened. The linkage between social and environmental drivers, general public perceptions, and the processes by which the industry is regulated are intertwined and lack of its proper management is currently threatening the industry. There is a general public mistrust about the sectoral performance of the industry in line with the principles and practice of Sustainable Development.

This perhaps has a major impact on the industry's growth prospects as it directly influences or sets the context for its license to operate and grow, its ability to attract and retain the highest caliber of employees with the range of capabilities it needs, its ability to raise finance etc. The current effort of the industry in the area of Health, Environmental and Safety Management has not yielded the much desired result in the area of Sustainable Development. Hence there is need to expand the scope of the engagement of the industry towards the concept of Sustainable Development.

Several literature references were reviewed in addition to consultation with key stakeholders both within the industry and the host community of the case study considered as part of the research.

This research study aims to find means through which the industry can do a front end loading of the principles of Sustainable Development into the business planning process of the petrochemical industry.

The way forward for the industry to engage positively in sustainability arena is by engaging in strategies and alignment frameworks that will help the industry move to a point of active engagement and maturity. A number of common themes in relation to the achievement of sustainability within the industry arose out of the research carried out. These includes poor stakeholder engagement; lack of effective sectoral reporting mechanisms and active engagement in deploying relevant training modules on Sustainable Development, and the need for the promotion of Sustainable Development as a concept throughout the industry and its entire value chain. These themes are packaged as recommended future strategic direction for the industry.

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CHAPTER ONE

1. Introduction

Sustainable development is not a new idea. Many cultures over the course of human history have recognized the need for harmony between the environment, society and economy. That is, in one form or the other, there have been sub-conscious efforts at creating a synergy between the environment, the society and the economy. In the present day, issues surrounding developing sustainably have gained prominence and so, it has become an important issue at various symposia especially for the petrochemical industries.

The petrochemical industry is an important engine of wealth creation. Its products, a major source of energy, are often input to the way in which human society meets its needs and can offer solutions to other sectors of industry in their pursuit of sustainable development. Apparently, this is a plus to the industry.
However, the overall public perception of the industry continues to decline due to the perceived general impression of not developing sustainably. Committing itself to true sustainability offers the industry a number of opportunities, not least to improve the acceptability of its activities by the general public.

A number of common themes in relation to the achievement of sustainability *within* the industry had risen out of several research papers and interviews that were conducted. These included the need to move away from non-renewable, hydrocarbon feedstock and energy sources, the potential for pollutant dispersal during product use (this might have led to the development of Gas To Liquid technology in producing a cleaner diesel that produces less smoke during combustion) and at end-of-life disposal, and the need for the promotion of sustainable development as a concept throughout the industry and throughout the whole value chain.

1.1. Background

Sustainable development is about behaving in a manner in which current efforts to raise the quality of life of a society's citizens (i.e. "development") can be continued (or "sustained") into the future. It is about adopting a development path that improves the quality of life of current generations, while leaving future generations with at least the same capacity and options for development that we have at present.[1]

What is new, however, is an articulation of these ideas in the context of rapid globalization, where there is increasing evidence of economic and social inequality, as well as of significant depletion of valuable ecosystem services. For sustainability to be achieved, decision-makers need to consider the longer-term implications of their decisions and to implement integrated governance systems that recognize the important interdependencies between the line of ***economic*** growth, ***social*** equity and ***environmental*** integrity. Also, the civil society needs to contribute in no small measure to the sustenance of development. The engineers, scientists and technologists play a vital role here in the sustenance of development. Engineers, scientists and technologists will have to develop and implement technologies that gives due consideration to the sustainability of all developmental technologies.

The concept of sustainable development first became the focus of international policy-making with the publication in 1987 of Our Common Future, a report that presents the outcome of the World Commission on Environment and Development and that served as an important foundation for the 1992 UN Earth Summit. The Report provides what is arguably the most frequently quoted definition of sustainable development, namely development that ***"meets the needs of the present without compromising the ability of future generations to meet their own needs".*** [1]

[1] *United Nation Commission on Sustainable Development Report on the Sixth Session, 22 December 1997 and 20 April–1 May 1998*

The influence of sustainable development in the business and industry sector is significant. The business and industry sectors form one of the three important pillars of the society; the other two being the government and the civil society. These sectors of the society have a responsibility towards the whole society to actively engage in the sustainability arena. In this case, there are pressures mounting for the development of operational activities that actively considers and preserves the future.

Similarly, the concept of sustainability has placed some responsibilities on the civil society to live responsibly in order to conserve the resources that are available within their precinct. Sustainable development does not focus solely on environmental issues. More broadly, sustainable development policies encompass three general policy areas: economic, environmental and social. In support of this, several United Nations texts refer to the "interdependent and mutually reinforcing pillars" of sustainable development as economic development, social development, and environmental protection.

A useful way of conceptualising sustainable development is in terms of three embedded spheres comprising ***economic systems*** that are essentially products of, and dependent on ***social systems***, which in turn are products of, and dependent on ***natural systems*** (see Figure below 1 : it provides a visual presentation of the relationship between the four dimensions of sustainable development).

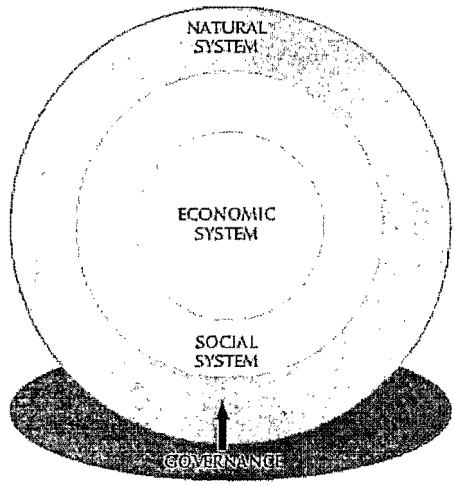

Figure1. Relationship between the economic, social, natural, and governance dimensions of Sustainable Development. [2]

These spheres may be seen as three globes, with the outer ones surrounding, enclosing and supporting the inner ones. This model conveys the notion that our natural resources, and the goods and services provided by these resources and processes, are the key enabling factor for socio-economic development.
These activities and processes rest on, and are influenced by, the prevailing governance system – the fourth dimension.

The **economic** dimension refers to the production of manufactured goods and the flow of these goods and services through the formal and informal sector. Financial capital is also an important component of the economy, enabling the acquisition and trade of good and services through shares, bonds and banknotes. Economic matters included catering facilities, revenue return from sale or disposal of goods/services, use of local and/or durable building materials, operational savings from energy-efficient devices, redevelopment and Greenfield costs, and open plan office issues.

The **social** dimension refers to human capacities, skills and resources which are necessary for productive work and the creation of a reasonable quality of life. It incorporates the institutions, networks and relationships that support human activity

(and human efforts to secure livelihoods) and enables access to resources and participation in decision-making. Social matters included public transport access, centralized services access, disabled persons accessibility, Council performance, and community ownership of and participation in the redevelopment process.

The **natural environment** dimension refers to the natural resources (matter and energy) and ecosystem processes that maintain life and produce and deliver goods and services. They include renewable resources (such as freshwater, fisheries and wood), non-renewable resources (such as mineral deposits and fossil fuel), sinks (that absorb, neutralize or recycle wastes), and ecological processes such as photosynthesis, climate regulation and disease regulation.
Environmental matters included protected species preservation, natural habitat disruption, biodiversity levels, pond water quality, contaminated land removal, employee journeys linked to gas emissions, demolition waste salvage, green space usage and energy consumption.

The **governance** dimension comprises the institutions, processes, systems and mechanisms through which the states, or in the case of South Africa, province's, are managed and through which citizens articulate their interests, exercise their responsibilities, co-operate and/or indicate their differences.

The crisis of sustainability is seen to arise from the fact that our current production and consumption patterns are depleting natural resources and impacting on human and social systems, largely because we fail to assign sufficient value to these assets in our decision-making processes.
By way of example, a country or state could cut its forests and deplete its fisheries, both of which would show up a positive net gain in GDP (a predominant measure of economic well-being) without registering the corresponding decline in ecosystem health and social equity that are more appropriate measures of long-term economic well-being. Likewise in countries where crude oil are natural resources like in Nigeria, Angola, Iraq , Kuwait etc, the activities of the oil exploration companies

have left the natural resources (sea water, land) in a very devastating and unproductive state wherein the inhabitants of the area so affected suffers from several diseases, live unproductive lives and with attendant short life span etc.
Unless the current rates of consumption of natural resources are effectively controlled and issues of access to and ownership of resources are made more equitable, these vital resources will not be sustained over the long-term and the quality of life for the poor majority will continue to decline.

1.2. Problem Statement

In spite of the level of awareness of the concept of Sustainable Development and the corresponding effort at developing sustainably by various sectors of the society, the Petrochemical Industry is still having recurring problems emanating from issues around Sustainable Development. This has resulted in public mistrust, especially within the industry in Nigeria.

- As a result of the growing public distrust, research has to be carried out to confirm if certain statements are true about the image of the industry on Sustainable Development principles and practice
- And if statements are found to be true, carry out research to determine the cause
- And finally, recommend strategy through which corporate thinking can be transformed in order to achieve a behavioral change that is aligned with the principles and practice of Sustainable Development.

1.3. Objectives of the research

The aims of this research study are to:

- Investigate the activities of the petrochemical industries toward Sustainable Development principles and practice.

- Determine and evaluate the existing practice and the current performance of the petrochemical industries in sustainable development agenda.
- To determine the perception of the community where the industry operates on issues relating to Sustainable Development
- To seek methods or ways to transform corporate thinking and behavior such that sustainability principles become an integral part of business strategy and practice for the petrochemical industries.

1.4. Dissertation overview

This research study consists of five chapters. Each of these chapters is described below.

Chapter one: Introduction.

This chapter introduces the reader to the concept of Sustainable Development including background information of the concept. It outlines the research problem, the objectives of the research and dissertation.

Chapter two: Literature Survey.

This chapter reports and discusses relevant literature consulted for the purpose of this research study. It discusses the concept of Sustainable Development and summarizes key literature references reviewed for the purpose of this research study.

Chapter three: Experimental Investigation.

This chapter will discuss the design and methods used in gathering data for the purpose of this research study. It outlines both the primary and secondary sources deployed for the research study. It also discusses errors and contingency plans used while sourcing for the information.

Chapter four: Presentation of results.

In this chapter, all findings emanating from the data collected are discussed and presented. Difficulties encountered during the gathering of the data are highlighted and the approach used to overcome such is sequentially presented.

Chapter five: Conclusions and recommendations.

This chapter is the conclusive part of the research study. It summarizes the research project and recommendations are made here with respect to the project study. Also, all the constraints faced and questions for further research are listed.

1.5. Summary

This chapter has introduced the reader to the background information about the research study. The problem statement, scope of the research, methodology and project beneficiary was outlined in brief. The following chapter, literature survey, will dwell extensively on the study of the subject of Sustainable Development with the review of past conference reports, journals and texts from different authors on the subject of Sustainable Development.

CHAPTER TWO

2. Literature Review

Chapter one explained the background, scope and the purpose of this research study. This chapter review current and authoritative literature on Sustainable Development including past conferences, journals, texts and industry association reports. This is followed with a review of selected company reports on Sustainable Development. Based on the literature reviewed, a sustainable petrochemical industry was conceptualized.

Jacques Chirac, former French President, while addressing World Summit on Sustainable Development, in Johannesburg, August 2002 said: *Our house is burning and we look elsewhere. Nature, mutilated and over-exploited, can no longer reconstitute itself and we refuse to admit it. Humanity is suffering. It is suffering from poor development, in the North as in the South, and we are indifferent. The Earth and humanity are in peril and we are all responsible. It is time now to open our eyes.* [3]

Likewise, David Miliband, Secretary of State for the Environment, Food and Rural Affairs while addressing the Royal Agricultural Show, Stoneleigh, Warwickshire in July 2006 said: *Thirty years ago, if you said the country was living beyond its means, people would have thought about economics. Now, if you talk about the country, or the planet living beyond its means, you think about the environment. We are taking out more than we are giving back. We are consuming energy, water, and other natural resources in a way that is leading to huge and often irreversible damage to the planet. So too are most other developed nations.* [3]

In the light of various position and discoveries about the potential problems that have been experienced and more that are likely to occur, a strong goal was set by world leaders for World Summit on Sustainable Development when they met in

Johannesburg, August/September 2002. This was summarized with this statement: ***To free all of humanity, and above all our children and grandchildren, from the threat of living on a planet irredeemably spoilt by human activities, and whose resources would no longer be sufficient for their needs.*** [3]

Several of these positions have been maintained and push forward at various symposia leading to massive and comprehensive research into the field of sustainable development. In reality, efforts have been geared towards living and doing business in a responsible and sustainable manner that considers the principles of sustainable development agenda into their activities. These are reflected in different literature references that are consulted below.

2.1. Reference Literature

2.1.1. *Literature 1: United Nations Commission on Sustainable Development. [4]*

This session is a continuation of the past sessions that has been held to further the implementation of various outcomes of the Commission like the Agenda 21, Johannesburg Plan On Implementation (JPOI), and the Mauritius Strategy for the Further Implementation of the Program of Action for the Sustainable Development of Small Island Developing States. This fourteenth session focused on the opportunity provided to further identify new and dynamic ways to promote the integration of the three components of sustainable development. That is the economic development, social development and environmental protection as interdependent and mutually reinforcing pillars.

The views expressed by various participants at the session indicated that achieving sustainable development goals requires efficient energy use and industrial development which, in turn are discovered to be the major contributors to air pollution, atmospheric problems and greenhouse gas emissions. (Greenhouse gas

emission was a major part of Shell report on Sustainable Development- see literature 7 of this chapter).

Consequent upon this, the theme of discussion at the fourteenth session centered primarily on energy for sustainable development, industrial development, air pollution/atmosphere and climate change.
Also, the Commission posited that lack of adequate scientific research on the health impacts of many pollutants, as well as the limited research and development capabilities of many developing countries for improving their air pollution monitoring and containment capabilities, is a serious obstacle to minimizing the health impacts of air pollution on the society. That by itself is not sustainable!
It was agreed that establishing a strong and competitive industrial sector for economic growth and social development is vital and core to the fundamentals of Sustainable Development.

The Commission observed that lack of adequate enlightenment campaign and vigorous education of the public by corporate bodies has been a major barrier to combating the effect of air pollution control. The Commission noted this in addition to poverty which can be a serious barrier to mitigate air pollution since poverty compels and blindfold people making them to engage in polluting activities in order to generate income, such as open-air burning of automobile tires to retrieve recyclable metals etc.

Part of the lessons learned by the Commission includes the use of economic incentives and disincentives which has shown some considerable improvements and positive results. Additional lessons learned are the efforts to reduce natural gas flaring and venting and promote energy efficiency usage and investments in the petrochemical and refinery industries. This is still an issue in African countries as natural gas flaring remains a big challenge.
The Commission also noted that with increasing globalization and effort harnessed to improve the scope and practice of Sustainable Development, companies that

comply with norms for corporate social and environmental responsibility have in some cases been able to gain easier access to global supply chains and other financial aid. This was exemplified by the commitment of the International Financial Corporation (IFC), a member of the World Bank. The commitment of IFC to Sustainable Development is discussed in Literature 2 below.

2.1.2. *Literature 2: International Finance Corporation's Policy on Social & Environmental Sustainability. [5]*

The International Finance Corporation is the private sector arm of the World Bank that believes that responsible development makes commercial sense. They believe that environmental and social controversies have the potential to affect the profitability of projects, increase political risk and tarnish the reputations of those who promote and finance them. This led to the development of principles called the ***"Equator Principles".*** The principle as outlined in the document is designed to have impact on the way environmental and social issues are being addressed in project financing and execution. The Equator Principles are essentially a set of categorization, assessment and management standards designed to identify and address any potential environmental and social risks that a proposed project may present.

In other to accomplish its mission, the IFC group seeks to partner with corporate bodies that subscribe to the axiom that "social and environmental opportunities are an integral part of good business strategy." This led to the formulation of policy on Social and Environmental Sustainability.

2.1.3. *Literature 3: Report of the World Summit on Sustainable Development. [6]*

The report focused on the commitment to building a humane, equitable and caring global society that takes cognizant of the need and preservation of human dignity. Three principal areas of the sustainable development agenda were given priority, commitment and reaffirmation to the ideals and concept of Sustainable Development. The three principal areas are the environment, social and economic. This was summarized with this statement: ***"accordingly, we assume a collective responsibility to advance and strengthen the interdependent and mutually reinforcing pillars of sustainable development: economic development, social development and environmental protection at the local, national, regional and global levels."***

The train of Sustainable Development has been moving from Stocklom to Rio where declaration was made and finally to Johannesburg in 2002 where diverse views and opinion of people were brought together in a constructive manner to chart a common path towards a world that respect the vision and embraces the principles of Sustainable Development. Not just to respect the global phenomenon but to implement to the letter the principles contained therein.

Among several resolutions passed at the convention is that human activities have continued to have increasing impact on the integrity of nature that provides essential resources and services for human well-being and economic activities. The task of managing the natural resources base in accordance to the principle of Sustainable Development is a major concern. Consequent upon this, in an attempt to reverse the current negative trend of degradation of natural resource, it is therefore pertinent to implement strategies and approach that protect the natural ecosystems.

The three principal dimensions of Sustainable Development of Economic, Social and Environment is thus classified and discuss in the context of this research study

as the THREE CAPITAL MODEL of sustainable development. The concept of Triple Bottom Line (TBL) [56] which seems to encompass the three dimensional agenda of Sustainable Agenda has become a base case scenario for industries and blue chip companies in attempt to foster the concept of Sustainable Development in their decision making. The Triple Bottom Line proposes that an organization's license to operate in society comes not just from satisfying stakeholders through improved profits (the economic bottom line), but by improving its environmental and social performance also (the other two parts). As such, it encompasses environmental responsibility, social awareness and economic profitability.

The three principal dimensions as referenced in the Triple Bottom Line and which are referred to as the THREE CAPITAL MODEL are:

Natural capital, which is also referred to as environmental or ecological capital is any stock or flow of energy and matter that yields valuable goods and services. It includes resources, some of which are renewable (timber, grain, fish and water), whilst others are not (fossil fuels); sinks which absorb, neutralize or recycle wastes (for example forests sequestrating carbon dioxide); and processes, such as climate regulation. Natural capital is the basis not only of production but of life itself.

Human capital consists of people's health, knowledge, skills and motivation, all of which are required for productive work. Enhancing human capital (for instance, through investment in education and training) is central to a flourishing economy.

Social Capital is all the different co-operative systems and organizational frameworks people use to live and work together, such as families, communities, governments, businesses, schools, trade unions, voluntary groups. Although they involve different types of relationships and organization they are all structures or institutions that add value to human capital, and tend to be successful in doing so if based on mutual trust and shared purpose.

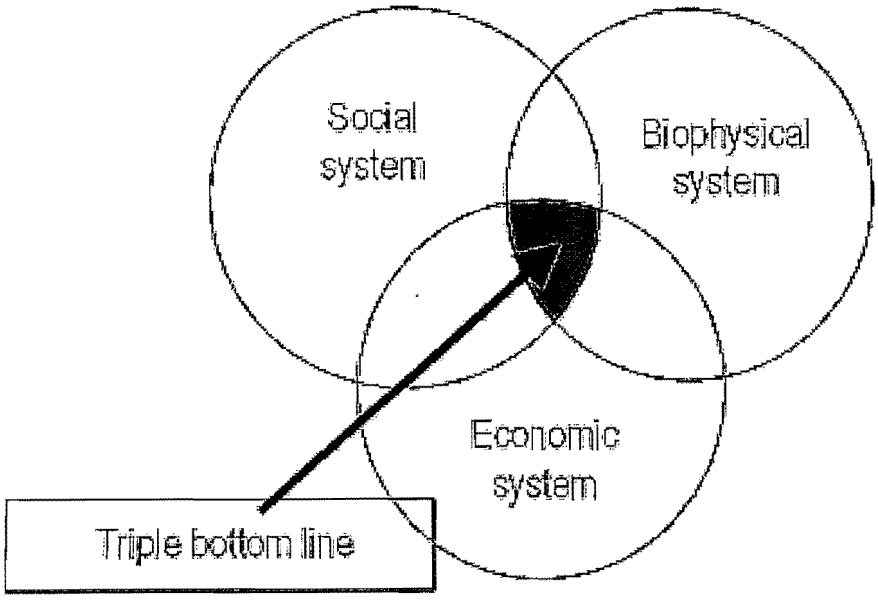

Figure 2 Triple Bottom Line (TBL) **[7]**

2.1.4. *Literature 4: The Sustainability of Chemical Industries. [8]*

The petrochemical industry has been contributing to the needs of the world population in terms of meeting energy demand and products that make living and life worth living. The industry capacity for innovation, technology development and process management has been seen as vital to the pursuit of a sustainable and egalitarian society.

However, the public perception about the petrochemical industries have been on the downward trend due to attendant over-arching impact the activities and operation of petrochemical has on the environment where they operates. Fallout of this is that the benefits and importance of the petrochemical industry are only sparingly referred to by non-governmental organizations, pressure groups and the society at large; but these contributions are enormous.

This public distrust has led to several initiatives being initiated within the industry in an attempt to foster environmental sustainability not only for the industry but to do same for the society where they operate. Several of these initiatives have been in form of developing technologies and processes that will help improve and manage work process in an attempt to reduce the negative impact on the society, an attempt to correct perceived impression and foster sustainability of the environment as well. Correspondingly, individual businesses have experienced process improvements, improved safety management etc. These have culminated in sourcing for alternative and renewable materials, impressive reductions in amount of waste generated, and costs incurred.

Some of these efforts are actions emanating from the survey that was conducted by the European chemical Industry Council in 2002. *"The results of year 2002 Pan European survey assessing the image of petrochemical industry shows that despite higher ratings for pollution control efforts and a growing recognition of the general importance of the industry, the perception of the industry's environmental and social performance is still declining"*.

During the conduct of this survey, about 9000 citizens were surveyed by the European Chemical Industry Council within the period of January to mid March, 2002 in order to track the public image of the petrochemical industry across Europe.

Surprisingly, the year following the outcome of the survey conducted, the industry was faced with a number of high profile incidents emanating from poor management of safety and environmental performance. As a result of these events, though not a retributive action but a form of impulsive action, society has placed the petrochemical sector under severe pressure with a series of agitations so that the petrochemical industry can begin to put measures in place in order to improve its social and environmental performance.

Without proper efforts and consequent results, public trust for the industry will continue to wane. The report further suggested that a call for greater and stiffer regulatory measures and control is most likely in the wake of growing public distrust for the industry. Some of these have manifested in the form of litigations, disruption of work process by communities etc. The report emphasized that lack of follow up action will present further significant risk to the industry's license to continue to operate.

The report concluded with an admonition for the industry. "With concerted effort to integrate and improve the environmental and social performance into its products and processes, and by improving accountability to all its stakeholders, the framework of sustainable development offers a unique opportunity for the industry to begin to regain the public's trust in its operations".

With the foregoing, it is evident that the path of sustainable development is forward looking; it does not suggest that we should return to a pre-industrial period. However, the path to sustainability will provide industry and society with a range of challenges. The key challenge for the petrochemical industry will be to actively seek opportunities for designing and developing products that create high value and long-term financial viability, meet customer needs and improve the quality of life, and to produce them in ways which protect the natural environment. It is clear that if the industry is to meet this challenge it will have to be visionary, strategic, committed to action and integrate the key principles of Sustainable Development into future strategic direction of the industry.

A critical evaluation of the report suggests that environmentally and socially sustainable development is vital to the growth of the industry and the society where they operate notwithstanding the sustainability of the environment. This report

clearly calls for proper integration of sustainable development principles into the management of the petrochemical industry in order for the industry to remain sustainable and remain envisioned to further the cause of humanity in terms of searching solutions to the ever growing need of the society.

2.1.5. Literature 5: *Sustainable Development: Critical issues [9]*

The three-dimensional pillar of sustainable development, otherwise referred to as THE CAPITAL MODEL in this research study was x-rayed by the Organization for Economic Cooperation and Development vis-à-vis policy brief for the member countries. This was summarized with a rhetorical question thus: "are we on a sustainable path?" The policy brief believes that "analysis of sustainable development would be of little interest if current patterns of economic development were judged to be in agreement with sustainable development principles. This is not the case. Truly speaking, strong economic growth, driven by technology advances and by increasing integration between countries and related industries, has lifted the economic and social well-being of billions of individuals. But many individuals and countries have remained at the margin of this process, failing to share the benefits of economic growth.

Further, because of inappropriate incentives to consumers and producers, the higher scale of economic activity has often led to pressures on the local and global environment, interfering with the climate system and leading to biodiversity loss, water scarcity and over-exploitation of marine resources. In all these areas, the risks of approaching critical thresholds in the regeneration capacity of renewable resources, and of overloading the absorption functions of the environment, are posing real threats to the long-term sustainability of economic growth. These trends also pose more immediate and visible economic costs, in the form of health hazards for those exposed to environmental damage.

The report further show that despite the attempt at de-coupling economic growth from environmental pressures, the implementation of effective policies has been hampered due to the existence of some uncoordinated and unsatisfied social requirement and human needs.

Observation has been made that majority of member countries population are living below the poverty line despite the huge potential that abounds. The observed disparity in economic empowerment has over-bearing effect on domestic policy priorities, and the willingness of member countries coming together to address common challenges. Within member countries, recurring problems of social exclusion, poverty and unemployment are taking away the attention required to tackle environmental problems associated with unsustainable development. This is another dimension of the activities of the Petrochemical Industries that has taken its toil on the social dimension of Sustainable Development. This has driven further down the overbearing effect on the environment.

With this in mind and itching down the spine of people, societies are disinterested in agreeing to, and to follow fundamental issues meant to address the proposed paradigm shift of structural adjustment towards environmentally sound society. This suggests that a social perspective is core and paramount to all efforts and discussion about sustainable development.

2.1.6. Literature 6: *The role of Technology in Environmentally Sustainable Development. [10]*

This source was of the opinion that achieving sustainable economic growth will require changes in industrial processes, in the type and amount of resources used, and in the products which are manufactured. The Council believes that the world must move to a more energy-efficient society, one that uses resources more

responsibly and organizes industrial processes in ways that minimize and re-use wastes. While technologies affecting all societal activities must reflect the goals of sustainable economic development, following pathways to sustainability are among the most important.

Energy Sustainability depends on the evolution of energy technologies. In the short term, dependence on fossil fuels is unavoidable. Ultimately, however, the world will need to reduce use of fossil fuels. Technical efforts must be directed to increasing the efficiency of energy supply and energy use and to using fossil fuels in a less-polluting manner. Natural gas, which produces fewer pollutants than either oil or coal, is in abundant supply and can play an important role in the transition to an economy much less dependent on fossil fuels.

2.1.7. Literature 7: Excerpt from SASOL 11th. Report on Sustainable Development. [11]

Sasol annual report on sustainable Development gives comprehensive overview of her commitment to the concept of Sustainable Development. Excerpts from the report:

Excerpts from the report: "We believe that large companies such as ours have an increasing responsibility to demonstrate leadership in addressing social and environmental challenges. Businesses form part of society – and in many instances are an extremely influential part of the communities within which they operate. It is thus in our individual and collective interests to ensure that we make a positive contribution to the sustainable development of these communities. Not only is there a moral imperative, but there are important commercial advantages to acting in a manner that is socially and environmentally responsible and that contributes to

overcoming the legacies of some of our past activities. We believe sustainability practices make good business sense for the following reasons:

Managing risk: On the operational side, a commitment to sustainability encourages us to identify and manage our risks responsibly and to ensure effective compliance with legal requirements. By reducing incidents, we also save on cleanup and other costs, including insurance premiums and legal liabilities.

Enhancing reputation: We recognise that companies – particularly those that operate at global level – are coming under increasing scrutiny from various stakeholders and that there are significant and potentially costly reputation risks associated with any perception of adopting unsustainable practices.

Freedom to operate: By maintaining a sound record of legal compliance and by working constructively towards fostering trust with our stakeholders, we are able to maintain our ability to operate in the communities in which we do business. Being seen as a responsible company assists us in securing permission to expand or build new facilities.

Access to financial markets: The introduction of initiatives such as the Equator Principles, the increasing growth in social investment funds, and initiatives such as the Dow-Jones Sustainability Index (DJSI) and the Carbon Disclosure Project, have made it increasingly apparent that socially responsible practices can improve access to financial markets and reduce the cost of capital.

Staff motivation and retention: Our reputation has an important bearing on our ability to attract and retain the best employees at all levels, which is critical to our sustained growth. Furthermore, we believe employees who are happy at their workplace will tend to develop a greater innovation and productivity.

Eco-efficiency: Through our cleaner production programmes we have achieved valuable savings through improved energy and material efficiency, as well as with reduced waste disposal costs.

Product market opportunities: By being proactive in developing environmentally innovative products – such as our Sasol turbo TM-branded petrol and environmentally superior GTL diesel – we are able to position ourselves favourably in the marketplace, while at the same time contributing to improved environmental sustainability."

Despite the fact that the industry have come to terms with the reality of the concept of Sustainable Development, there is still recurring problems within the industry, especially within Sasol operating areas. There is therefore the need to properly situate the practice of the industry within the principles and practice sustainability. It is amazing that Sasol is not walking the talk. Despite that the level of understanding, Sasol has not done too well in the reduction of Green House Gas Emission. Sasol produces enormous amount of carbon-dioxide (Co2) gas and no commensurate effort has been observed in reducing the amount of Co2 gas emission. This is not a sustainable approach.

2.1.8. Literature 8: Shell Petroleum Development Company Report on Sustainable Development. [12]

One of the focus issues reported in the report was the reduction and possible elimination of Greenhouse Gas Emission. Target was set prior to the year in review to reduce drastically the amount of Greenhouse Gas Emissions from the operations. This feat was achieved mainly by the continuous effort aimed at operational changes to increase associated gas recovery in some operational base and installation of new equipment installed in some other operational locations. This was done to target reduced gas flaring which is major source of emission o the Greenhouse Gas emission.

The report further showed increased effort at taking control and further reduction of the emission of Greenhouse Gas Emission with the energy efficiency drive underway in most of their refineries and chemicals plants. Considerable efforts were recorded for the measures taken at reducing environmental air pollution which was aimed at increasing the quality of air for the environment.

This brought to fore the fact that attempts at minimizing the impacts of continuing oil exploration and its processes are fast gaining momentum and has become an integral part of business strategy for the petrochemical industry. The issue here is that to what extent are these been coordinated? What are the drivers for these actions and to what intent are these goals pursued?

Literature 9: Contributions of Petrochemical Industries to Sustainable Development: The View of an International Oil Company. [13]

The following is an excerpt from the paper presented by the CEO of Chevron Corporation. "Our industry has a responsibility to foster sustained development and to do so in ways that provide energy efficiently as well as contributing to economic and human progress. This is a steep challenge in a world where the population is growing and the gap between rich and poor is wide. The UN recently estimated that the poorest 40 per cent of the world population – the 2.5 billion people who live on less than $2 a day – account for five percent of global income, while the richest 10 per cent account for 54 percent[2]. This is not a sustainable equation. The world's growing population will expect a range of energy-related products, whether it is a simple gas burner, a light switch, a computer, a refrigerator or a car.

[2] UN Development Programme, 2006 Annual Report

They will also expect something more intangible but critically important. Opportunity for education. Opportunity for employment. Opportunity to start a business. Opportunity for a better life.

Our industry can and does play a role in providing this kind of opportunity by building economic and social value in the communities where we operate.

He went further to discuss the five elements of Sustainable Development. He discussed as follows:

"The first is business investment. Second, building a local work force. Thirdly, enabling local supply chains. Fourth, investing in the community . . . and fifth, supporting policies that promote economic growth and a stable investment environment."

The foregoing eminently showed that to the Petrochemical Industry, Sustainable Development means adopting business strategies and activities that meet the needs of the industry and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future. This has reflected in various approaches adopted by the sector and has manifested in form of conducting their business in a socially responsible manner that considers environment as core path of business strategy.

The role of business enterprise in contributing to sustainable development remains indefinite. It is an evolving process. Business enterprises can make a contribution towards its attainment; the ability to make a difference varies by sector, vision, mission and organization understanding of the concept. Some business executive that has taken the principal objective of business as a money making venture will only gloss over the agenda in the name of committing to Sustainable Development without actual commitment to its principles as specified in the conclusive report of the Brundtland Commission on Sustainable Development that has become the pillar of sustainable development all over. Some industry executives looked at the

concept as one of the current world phenomenon that will only take center stage and will soon go into extinction.

2.2. Conceptualizing a Sustainable Petrochemical Industry

The following section provides an analysis of the defining characteristics of a sustainable petrochemical industry. Stakeholder engagement, Sustainable Development reporting, training and manpower development geared towards the concept, creating a vision and integrating the concept throughout the value chain are common themes for the industry.

Stakeholders play an important part in the Sustainable Development initiatives.
There are two major elements to stakeholder management: stakeholder analysis and stakeholder planning. Stakeholder analysis is the technique used to identify the key people who have to be won over. This should then be followed by stakeholder planning. The stakeholder planning will then be use to build the support that will help the industry to succeed.

Although the rationale for the very existence of business is to generate acceptable returns for its shareholders and investors, business leaders need also to understand that they have to satisfy a broader group of interested stakeholders. These include not only shareholders, but also employees, customers/consumers, suppliers, communities and legislators. Such stakeholders have influence and rights. Stakeholders in the process are players (persons, group of persons or organizations) with vested interest in the policy being promoted or canvassed. Then stakeholder analysis is a process of systematically gathering and analyzing qualitative information to determine whose interests should be taken into account when developing and/or implementing a policy or program. The importance of stakeholder analysis is enormous. Policymakers and managers can use the stakeholder analysis to identity the key actors and to assess their knowledge, interests, positions, alliances, and importance related to the policy. This allows

policymakers and managers to interact more effectively with key stakeholders and to increase support for a given policy or program. Stakeholders when identified can provide a leading perspective on key issues, impacts and obligations, and can contribute to finding solutions to some issues thus leading to new opportunities rather than simply managing risks. The process of engagement can also build trust and relationships between organisations and stakeholders. Stakeholder engagement will lead to understanding, exchange of ideas, and an atmosphere of inclusiveness. Engaging with stakeholders to understand their needs, expectations and priorities in relation to the industry economic, environmental and social performance will relive the industry of unnecessary pressure.

There are various tools that can be used in assisting the industry in ensuring a seeming seamless stakeholder engagement. The Institute of Social and Ethical Accountability (ISEA) has developed a process called "**The AA1000 process model**" [52] to assist organizations with stakeholder engagement. "**AA1000**" is promoted as a standard for the measuring and reporting of ethical behaviour in business. It provides a framework that organisations can use to understand and improve their ethical performance, and a means for others to judge the validity of claims to be ethical. It aims to assist an organisation in the definition of goals and targets, the measurement of progress made against these targets, the auditing and reporting of performance and in the establishment of feedback mechanisms. In this process, the involvement of stakeholder groups is crucial to each stage of the process. In fact, stakeholder engagement is the principal issue upon which the process was formulated. Ideally, stakeholder analysis should be performed regularly or even continuously since the relevant stakeholders, their power, their needs and influence may change quickly. It is normally impossible to satisfy all demands of all stakeholders completely. Therefore management becomes necessary.

Sectoral reporting is essential if the industry is to communicate progress towards the overall vision of sustainability. Sustainable Development reporting provides the shop

window where businesses can display their triple bottom line (TBL) performance. It is important that the industry extends the scope of current global Health, Safety & Environmental reporting to include the whole range of sustainability impacts that the industry is responsible for.

For reporting to occur in a consistent and sensible manner at the sectoral level it will be important to agree on a full range of sustainability indicators. The Global Reporting Initiative (GRI) is emerging as the standard for sustainability reporting internationally and is being adopted by a wide range of organizations in all sectors of society. The Global Reporting Initiative (GRI) provides an established template for reporting that could incorporate sector specific metrics. This does not preclude the fact that the industry is currently engaged in Sustainable Development reporting but that the current scope has been found wanting such that it is not sufficient to propel the industry towards active engagement of the concept of Sustainable Development.

As part of the sectoral reporting process, individual businesses within the sector will have to clearly set out their contribution to the industry's overall sustainability initiatives and progress. The public reporting of key issues related to sustainability management, including progress against specific indicators can be used as a pre-requisite of membership to groups that regulates the industry!

Achieving sustainability will also require that the principles of Sustainable Development to be established throughout the value chain, from early conception to research and development through to production, sales, and logistics. It therefore follows that the industry will have to commit to introducing Sustainable Development training programs for existing employees and also incorporate this as part of the initial training for new employees. Maybe, the industry can become involved in the education of science and chemistry more broadly to incorporate Sustainable Development in the curriculum in the colleges / universities.

The industry should endeavor to sponsor employees to function well in their respective professional bodies where current issues related to ethics and performance standards are developed and discussed. Delivering sustainability within the industry will require that everyone involved understands his or her individual responsibilities in achieving improved sustainable development. This will require that employees, whether present or future, have the appropriate competencies to make and implement decisions that encourage sustainable development practices.

CHAPTER THREE

3. Empirical Investigation

The two previous chapters introduced and discussed the concepts of Sustainable Development and reviewed current literature, policy document and conference papers related to Sustainable Development. This chapter discusses the research design, methodologies and the approaches used during the research phase of this study. The data sources, description of the experimental design used for the investigation and the data analysis approach are discussed in this chapter.

3.1. Experimental design

The information contained within this research study is drawn from two sources. During the course of this research, I adopted a range of procedural approaches and diverse literature of research findings. Due to the dynamic nature of this topic, the methodology adopted evolved during the course of the project; though this was influenced by the nature of the research questions and the selected participants that were selected to gather research findings. The research question itself evolved as a result on the need to find reasons for the growing public mistrust and suggest means through which this can be improved.

3.2. Sources of Data

As previously discussed, the data used in this research study were drawn principally from two sources: response to questionnaires and the semi-structured interviews. This is in addition to literature based research on the concept of sustainable Development.

3.3. Questionnaires

The questionnaires were designed to gather relevant information as concise as possible. The questionnaires designed was two folds: one set to gather relevant information on the concept of Sustainable Development in emerging projects in the petrochemical industries and the second set to gather information on current practice within the petrochemical industries and society perception and understanding of Sustainable Development practice by the Petrochemical Industries.

The intent is to be able to determine and appraise the continuing commitment, or otherwise, to the concept of Sustainable Development. The questionnaires were validated by having subject matter experts and other scholars in the field to check the relevance of the questionnaires to the proposed theme of the dissertation.

3.4. Interviews

The interview was conducted with two sets of respondents: Company employees and community representatives:

Company employees: As previously discussed, intellectual property restrictions prevented getting some relevant information especially on the project side of the data gathering, and also information protection policies of some companies. In consideration of this known hitch, the face to face interview created the platform to gather some relevant information, though informal. Though this approach offers the prospect of obtaining some useful information, the data collected were not free from prejudice and bias. This is in addition to an agreement not to divulge any of the company related information and that none of the respondents companies will be mentioned in this research study.

Community representatives: Also, a section of the community representatives were interviewed to gather data on their perception of the disposition of petrochemical

industry to the principles and practice of Sustainable Development. Community leaders, chiefs and other informed members of the community were interviewed to gather data on public opinion about the disposition of the industry to the concept

3.5. Selection of Participants and sampling

The population distribution used for data gathering for the purpose of this research study falls within:

a) Oil & Gas sector of the industry. This becomes necessary in order to gather data on the current practice of the industry.

b) Companies that are involved in the Engineering, Procurement and Construction (EPC) of major contracts within the Oil & Gas sector of the industry. Since technologies are deployed in most cases to take care of the front end loading of likely effects of the operations of the petrochemical industries, having an understanding of the practice during the design and construction stage of the industry are vital to determining the extent of the current practice and understanding of the concept of Sustainable Development.

3.6. De-limitation

During the data gathering of this research study, considering the dynamism of Sustainable Development, boundaries were set and used as a guide to gather relevant and appropriate data. The research questionnaires were set to assess the current practice of the industry in relation to the three dimensions of Sustainable Development and the perception of the host community about the performance of the industry.

3.7. Phases of the research

The research was carried out in three phases and this has been reflected in the mode of data gathering as discussed above. The phases are:

3.7.1. Phase one

This phase of the research was the conventional study of research papers, company reports and other relevant literature on the concept. This phase of the research acted as a spring board and created the pathway for the commencement of the research study.

3.7.2. Phase Two:

During this period, a form of experimental study was conducted with some stakeholders. This phase of the research provided an insight that helps to develop possible questions for the purpose of this research study. This was primarily used to validate the questionnaires designed for the research study.

3.7.3. Phase Three:

This phase of the research includes the deployment of the questionnaires and the face to face interviews with key stakeholders. The overall approach used in these phases of the research is to begin early analysis of data gathered during phase one and two of this research study. In the actual case scenario, the third phase of the research was designed to close apparent gaps and flaws discovered during the administration of the first set of questionnaires. It was during the first questionnaire administration that the issues of intellectual property and information protection came up. To overcome this problem, the face-to-face interview was conducted with selected individuals.

3.7.4. Sources of Error

One noticeable source of error while gathering information for this research study was observed to be due to the reservations expressed by key stakeholders in giving relevant information. Company proprietary policy, intellectual property and information protection policy were key issues during the course of gathering information. Consequent upon this, an agreement was reached with respondents that data obtained from the research will be used for the purpose of the project and no direct link with the affected company will be mentioned. Also, the data that are referred to as classified by respondents were not included in the analysis because of the perceived error and bias expressed by respondents. This helped to reduce the extent to which respondents will tend to avoid right responses.

3.7.5. Chapter Summary

In this chapter, the experimental design approach deployed for this research study has been discussed including the phases of the research, sources of data and its errors, de-limitation and population used during this research study. Various approaches that were used in gathering data were extensively discussed. The next chapter will present the outcome of the data collected, discuss and analyze the results in conformity with the objectives set out at the inception of this research study.

CHAPTER FOUR

4. Presentation of Results and Discussion

The field work for this dissertation has been carried out in order to gather public opinions, the current practice of the industry and determine the cause for the continuing public mistrust of the industry towards the principles and practice of Sustainable Development. This chapter will present the analysis of the data gathered and followed by a discussion of the results with respect to the research questions.

4.1. The Questionnaire Survey

To avoid ambiguity of understanding, a clear definition of Sustainable Development as adopted in this document was made available to all respondents. The definition adopted is thus: "**Sustainable development is defined as *development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*"**

The questionnaires were sent out to selected respondents with a specific time frame to complete and do return the questionnaires. The questionnaires were sent to forty five (45) respondents across the selected companies and industries as indicated in the previous chapter. Forty two (42) of the questionnaires were returned yielding a return rate of 93%. It is worth noting that some percentage figures on this survey results are rounded up or down to the nearest whole number and therefore some consolidated percentages may not total exactly 100%. For example, 76.4% would be shown as 76% and 76.6% would be shown as 77%.

The questionnaire covered the following areas in order to determine the current practice of the petrochemical industries with respect to the concept of Sustainable Development: (see sample of questionnaire attached as appendix 1)

- Training, Awareness and Understanding
- Current Practice of Sustainable Development Agenda. This was further broken down into two components namely:
  - Current practice on emerging projects
  - On current Operations
- Community perception of Current Practice by petrochemical industries
- Company engagement with stakeholders
- Sustainable Development Reporting mechanism

The response profiles of the respondents for the questionnaires are as tabulated in table 4.1 below:

Table 4.1

Response profiles:

Respondents participating companies:

EPC companies*	25 respondents
Operating Companies	17 respondents

Job Title of respondents

Director	4 respondents
General Manager	8 respondents
Project Manager	16 respondents
First line Manager / Equivalent	14 respondents

Respondents No of years in position

15 years above	0 respondents
10-15years	22 respondents
5-10years	13 respondents
0-5 years	7 respondents

Respondents Functional Department

Engineering / Production	21 respondents
Financial Management	7 respondents
Human Resources Management	8 respondents
Information Technology	4 respondents
Others	3 respondents

***EPC- Engineering, Procurement and Construction companies**

4.2. Presentation of Results

The outcome of this research work were documented and analyzed. The documented results are presented here sequentially as set out in the questionnaire. That is, awareness, understanding & training, current practice in the industry, engagement of stakeholders to the concept of Sustainable Development Agenda, community perception of the current practice of the industry and finally, the approach to reporting.

4.3. Survey Results

The survey results are as discussed in the following paragraphs.

4.3.1. On Understanding, Awareness and Training

As indicated in the previous paragraph, all respondents were provided with a guided definition of Sustainable Development. Response profile is as tabulated above.
Of all the respondents that returned the questionnaires, about 77% of respondents have very good understanding and active participation in the concept while 11% are good understanding and the rest 12% had little or no understanding of the concept of Sustainable Development both in principle and application but were able to answer some of the questions based on the understanding of the company operations. **See chart 4.1 below**

Out of the respondents that are aware which represents about 88% of the total respondents, 45% of those that are aware of the concept according to the survey result received formal training and understanding of the concept during their study years while in the university / college, 35% of the sampled population received on the job training in form of module / workshop ethics on Sustainable Development while the rest 21% of this group became aware through professional membership training. **See chart 4.2 below.**

Also, a little over half of total respondents have been involved in the formulation of policy statement and direction on Sustainable Development in one form or the other.

The charts below are the graphical representation of the respondents' demography according to the theme of the questions.

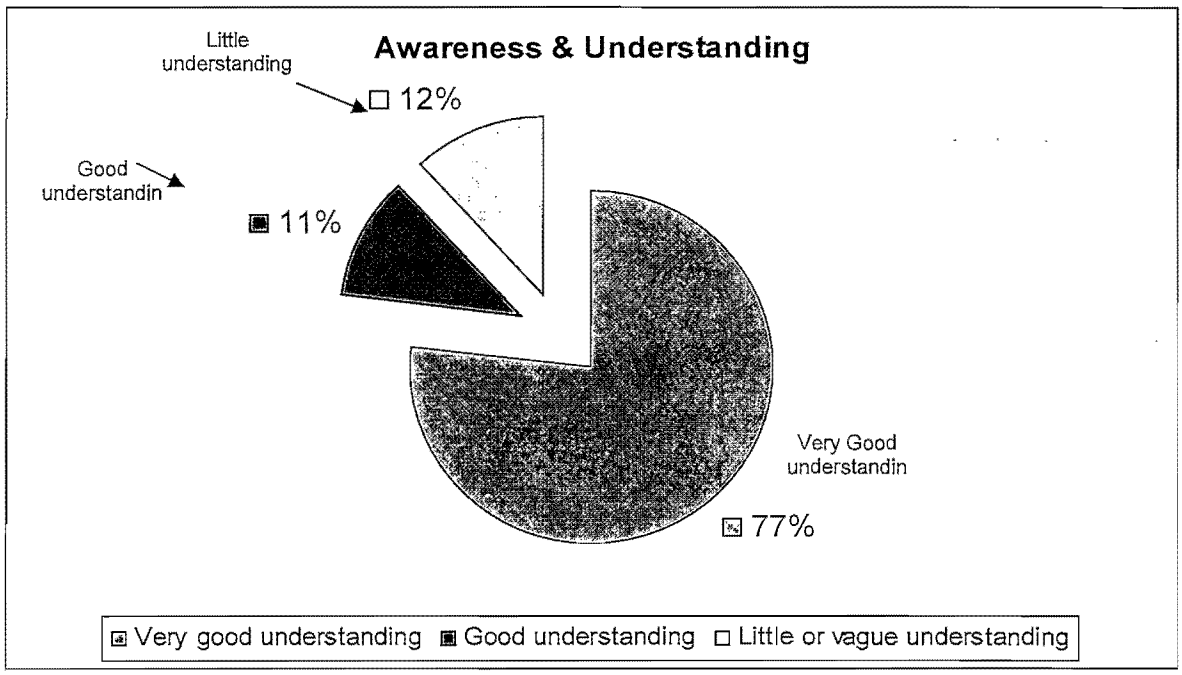

Chart 4.1 Awareness & Understanding of the respondents about the concept of Sustainable Development.

The chart below is population distribution of respondents indicating the means through which the respondents became aware of the concepts of Sustainable Development.

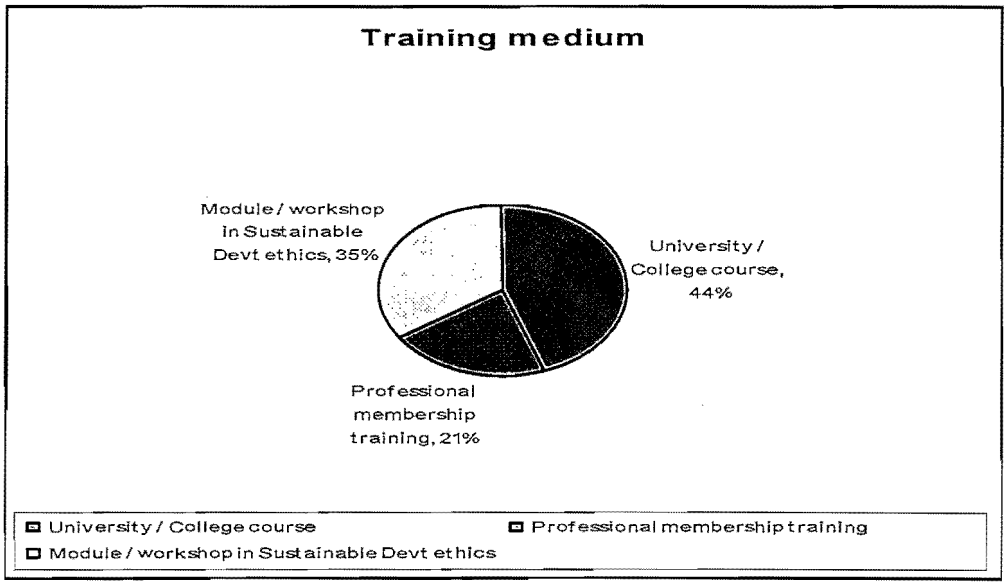

Chart 4.2 Means through which respondents receive training on Sustainable Development

4.3.2. On Current Practice of Sustainable Development Agenda

The actual intent is to check to what extent are the Sustainable Development principles loaded at the front end of major capital projects in the industry. These data were gathered with respect to the industry practice on emerging projects and current functional operations. On emerging projects, 46% responded that Sustainable Development principles are integrated into Front End Engineering Design (FEED) of major capital projects while about 43% of the respondents cannot categorically say if the principles are been integrated into the Front End Engineering Design stage of major capital projects. The level of involvement of this category of respondents is not sufficient for them to categorically say if Front End Engineering Design of their company considers the principles of sustainable Development during major capital project. The rest respondents, about 10%, showed no commitment to the question.

Also, about 41% of the respondents indicated that social and environmental impacts are integrated into the design study and execution stage of the project in majority of cases. A low percentage, about 9%, showed that the standard practice is to have the project analyzed vis-à-vis the impact on the social and environmental while about 48% showed no commitment to the question but on follow up, it was confirmed that the information available to them and their level of involvement are not adequate to respond to the question.

The data gathered on current practice in the petrochemical industry suggested steps have been taken to implement or embed the principles of Sustainable Development throughout the business processes of the industry. This percentage of responses is about 61%. The strategies and / or tools that were examined as part of the current practice deployed by the industry are as depicted in **chart 4.3** below.

The response further showed that 31% have not integrated the principles of Sustainable Development throughout the business for obvious facts that there is an inability to link Sustainable Development to financial success and also that Sustainable Development has not been recognized as a corporate strategic priority for the industry. The percentage response of these two factors coincided with the percentage of respondents that indicated their industry treats Sustainable Development separate from the overall business plan document. That is, Sustainable Development is not integrated into the overall business plan of the industry. Rather, Sustainable Development agenda is treated on a separate document; a stand alone document.

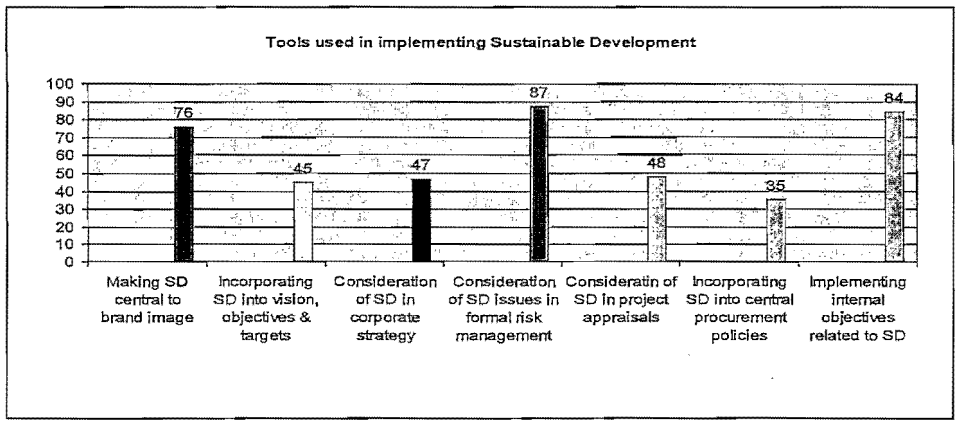

Chart 4.3 Strategies / tools to implement Sustainable Development

A critical look at the responses showed that considerations of Sustainable Development issues in formal risk management, implementing internal objectives and making Sustainable Development central to brand image are the topmost of the strategies that are been employed by the industry. This could rather be referred to as mere participatory and self seeking approach.

In view of this, major factors that act as drivers were surveyed. The response is as shown in the chart below:

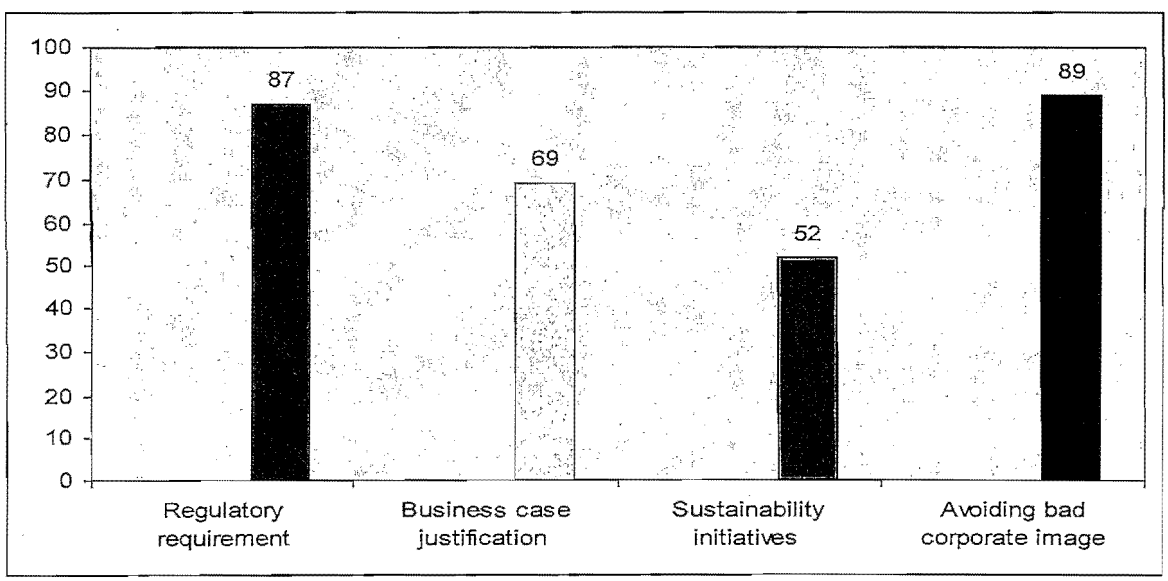

Chart 4.4 Major driving factors towards Sustainable Development

Also, all respondents were asked to consider a list of sustainability drivers and rate which of them they knew the industry rated as very important and least important for ensuring development is sustainable. Chart 4.5 below showed the responses that were gathered on the "very important" pedestal of the questionnaire.

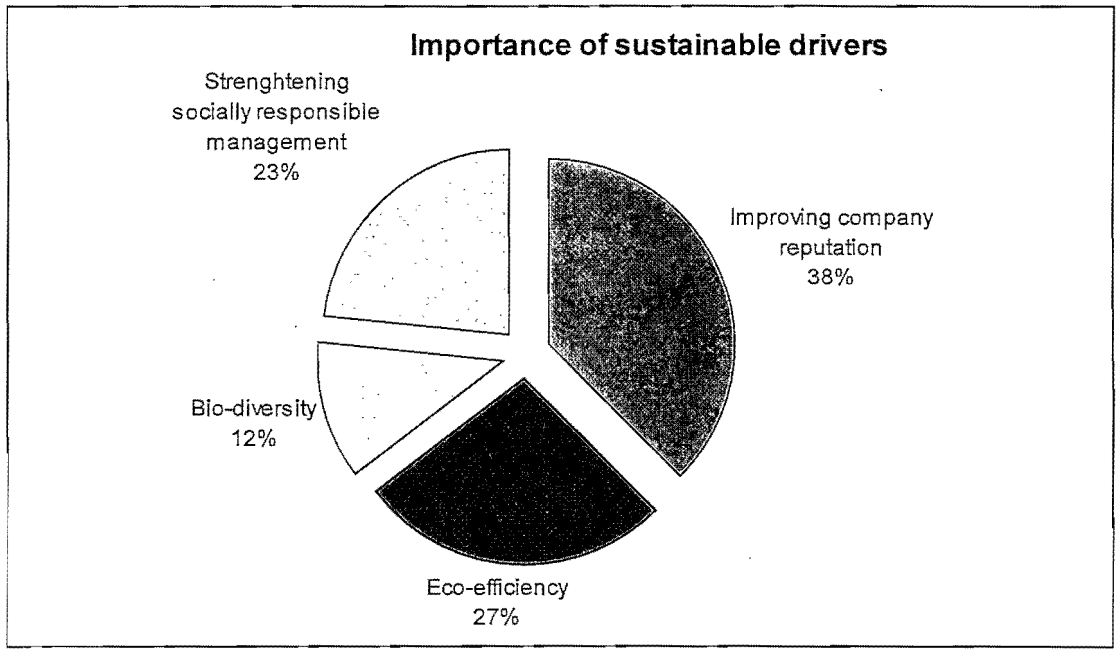

Chart 4.5 Importance of Sustainability drivers (very important)

4.3.3. Community perception of the Industry

About 27 of the total respondents representing 65% of the sampled respondents showed that the communities are somewhat satisfied with the current practice of Sustainable Development Agenda while about 29% showed that the communities are completely dissatisfied with the current practice. Issues raised that are responsible for the apathy are more of ecological degradation and lack of socially responsible management. Other issues, though equally important too, weighted less than these two issues as evidenced from the survey. The survey showed that the level of dissatisfaction shown has resulted in several disruptions in company operations, formal report to government agencies, non-governmental organizations

and other pressure groups. The rest of the respondents, about 5%, showed that the communities are very satisfied with the current practice of the industry. This is a far cry from normal expectations.

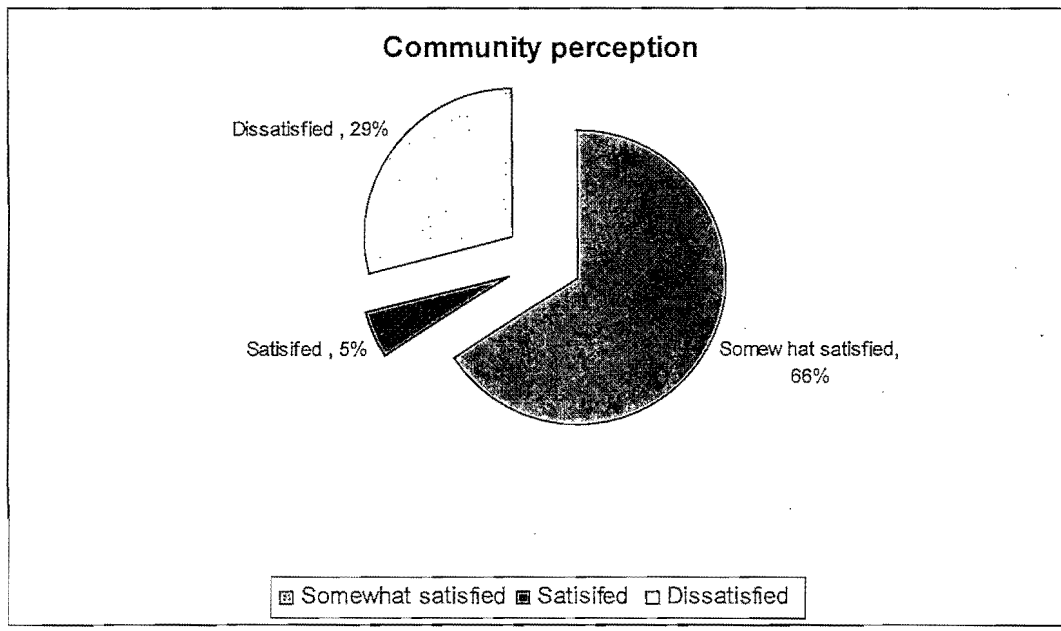

Chart 4.6 Community perception of the Industry to Sustainable Development

4.3.4. Engagement with Stakeholders

The survey showed that all stakeholders identified in the survey were somehow identified by the industry as key stakeholders in the Sustainable Development agenda. But in the aspect of engaging the stakeholders on issues relating to Sustainable Development, data gathered showed that few stakeholders / groups are been consulted on issues relating to Sustainable Development with a response of about 68% of the respondents gathered are in this category. Data gathered showed 6% respondents indicating that relationship with the stakeholders are nurtured through active engagement of all identified stakeholders while the rest 25% showed that stakeholders are casually identified and engaged without establishing a relationship with the stakeholders.

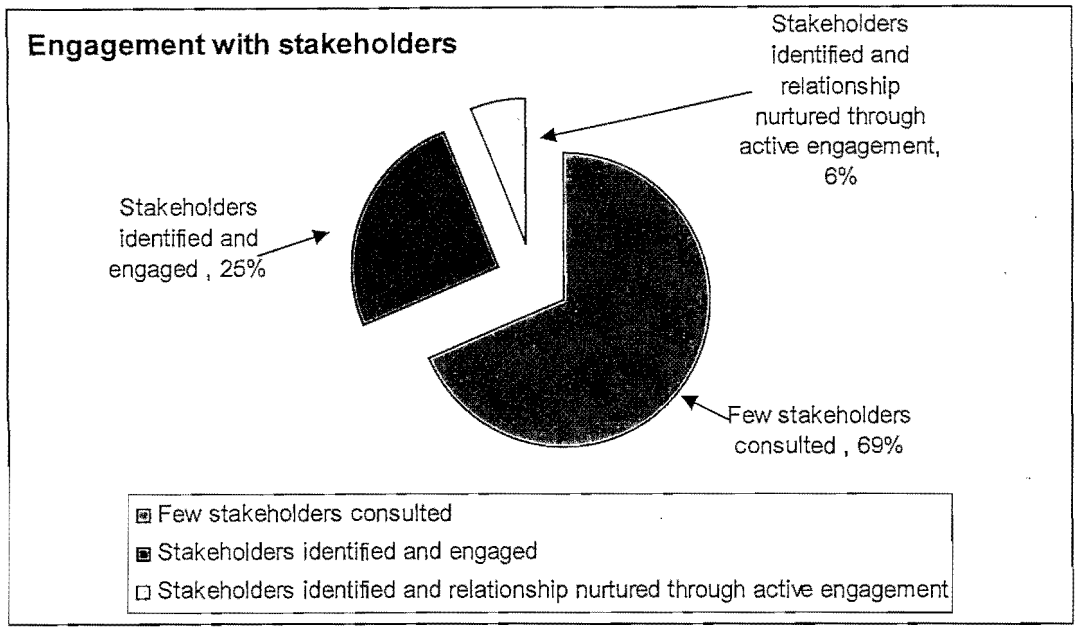

Chart 4.7 Industry engagements of stakeholders on Sustainable Development issues

4.3.5. On Sustainable Development Reporting

The reporting approach of the industry on Sustainable Development was further examined in the light of the current practice. The survey showed about 59% responses indicating that the reporting mechanism are tailored towards internal team members and shareholders only without active engagement of key stakeholders on Sustainable Development issues. 19% of the responses showed that stakeholders receive regular and appropriate reports. This also represents the population that believes that the reporting mechanisms are tailored through active engagement of identified key stakeholders on issues that relate to Sustainable Development.

The remaining response, about 20% showed that the practice has been little or no reporting unless demanded by stakeholders and selective reporting to pre-determined end.

4.4. Discussion of Results

On training and understanding:

For the industry to progress steadily towards maturity, policymakers and implementation team members need to fully understand the concept in order for the application to be meaningful. It is practically impossible for persons to implement policy where the understanding of the driving factor is not fully understood. Data gathered showed that the percentage of respondents who are aware and trained about the concept of Sustainable Development during the formal university / college training and that are involved in formulating policy around Sustainable Development are less than adequate. This is far-reaching in formulating appropriate policy and setting priorities around its implementation. In spite of this, there wasn't commensurate organized workshop training by the industry to bridge the apparent gap in order to get every employee conversant with the concept. This is a systematic and fundamental issue that requires the prompt attention of the industry.

On Current practice:

Notwithstanding the level of awareness and understanding within the industry, the current practice both on emerging projects and the current operations did not guarantee a serious commitment of the industry to the principles of Sustainable Development. It was evident that there was no integration of the principles at the conceptual stage of most major projects in the industry. This ultimately led to a situation where the industry relies solely on the operational stage of the plants to fully implement the principles of Sustainable Development. What majority of the industry tend to rely upon is the backward integration of Sustainable Development principles into process operations. Apparently, there is no foundation for the principles and therefore, operations have to be tailored to accommodate the principles; a makeshift approach. A look at **chart 4.3** showed that the weighted average on efforts at incorporating Sustainable Development into the vision, objectives and policies including procurement policies of the industry is less than that necessary to move the

industry move from a point improved commitment to the level of active engagement. The current practice of the industry is therefore insufficient and inadequate.

The current practice is contrary to principle 17 of Rio declaration on environment and development which says that *"Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment ....."*

On Community perception:

In the foregoing analysis, refer to chart 4, the community felt alienated in the management of sustainability issues within their precinct. The communities felt that they are key stakeholders (and really, they are) and therefore, should be properly consulted when issues are around Sustainable Development are to be discussed. Different from this, the community representatives resorted to setting up pressure groups to mount un-ending pressures on the industry to ensure sustainability in order to minimize the effects of the industry operations, sometimes get discomfited in approach by picketing industries etc.

On stakeholder engagement:

An important factor that is integral to the successful integration of the principles of Sustainable Development is the involvement of stakeholders. This is still handled with levity at the very best. A careful look at chart 4.7 clearly showed that few of the stakeholders are identified, whereas stakeholder engagement is vital to the successful implementation of sustainable development initiatives. Stakeholder engagement according to the survey gathered is very minimal. This is not helpful and also not in accordance to Rio declaration on environment and development, principle 10 which says that "*Environmental issues are best handled with the participation of all concerned citizens, at the relevant level.....*"

A stakeholder analysis is required in order to identify all the parties that are directly or indirectly affected by the industry operations. The analysis sets out the issues, concerns and information needs of the stakeholders with respect to the Sustainable Development activities. The operation of the petrochemical industry and its existence is directly linked to the global environment as well as to the community where it operates. In carrying out its activities, the industry must maintain respect for human dignity, and strive towards a society where the global environment is protected.

In the past, company strategies were directed primarily towards earning the maximum return for shareholders and investors. Then, businesses were not expected to achieve any other social or environmental objectives. Identifying and engaging the stakeholders that have vested interest in the industry is a central component of the integration of Sustainable Development principles, and this will lead to greater corporate accountability. Developing a meaningful approach to stakeholder analysis is a vital aspect of good Sustainable Development management system. Hence, here lies one of the key differences between Sustainable Development management and conventional management practices. What this summarily suggests is that there must be a paradigm shift in the management practices from the conventional style to a more pragmatic approach that considers the overall implication of the business initiatives and the sustainability of the environment.

On Sustainable Development Reporting:

Also, the scope of reporting within the industry needs further broadening in the light of the current of practice. It is important that the industry extend the scope of current reporting to include the whole range of sustainability impacts that the industry is responsible for. The reporting mechanism adopted so far pointed in the area of insufficiency. It could be inferred that most of the issues resulting into protests, calls for stricter regulatory law, disruptions and picketing experienced from the communities, pressure groups and other non-governmental organizations stems from

the reporting approach that tend to give limited report or little consideration in report distribution to the appropriate stakeholders. Though, this may not be unconnected with the current practice within the industry as lack of active commitment.

The Global Reporting Initiative (GRI) provides an established template and guide for Sustainable Development reporting. The global reporting initiative, GRI, and other matrixes are available for use by the industry in formulating a corporate reporting strategy that will help the industry. Sustainable Development should be an integral part of the industry annual report rather than an isolated report for the purpose of reporting. An improved reporting mechanism will guarantee a good reputation for the industry. By improving reputation with a proactive strategy, it will help the industry keep their license to operate, and improve their corporate image in order to maintain brand value, as well as their relationships with local authorities and communities. This also helps to reduce the prospect of inappropriate new taxes and regulations and avoid crises and unnecessary disruption in company operations as evidenced from the data gathered.

4.5. Overall Observations

From the results presented above, it was clearly evident that the concept of Sustainable Development is not a new concept. It has become a global issue and industries are beginning to put priorities around the implementation of its strategic principles. Petrochemicals Industries are already making substantial contribution and participation to Sustainable Development but the industry as a whole lacks a consistent approach towards achieving full engagement of the principles and practices of Sustainable Development The survey gathered showed a considerable level of commitment to the principles as contained in Rio declaration on environment and development, World Summit on Sustainable Development[3]. It was evident that level of awareness is considerably high but training is less than adequate. Also, there has been no commensurate and consistent effort at integrating the ideals and

[3] Rio declaration attached as appendix 2 in this dissertation

principles of Sustainable Development. The industry seems to prefer staying ahead of the game and publishing Sustainable Development policy and objectives rather than the policy and objectives integrated with organizational purpose, vision and values. What is apparently lacking is the active integration of the principles into the decision making process of the industry. Needless to say, business plans of most of the industries do not consider the integration of the core principles while formulating the business plan.

On the overall observation, strategies need to be developed by the industry. A strategy for sustainable development will seldom imply initiating a completely new or stand-alone strategic planning project. Rather than venturing on giant and cumbersome approach, a number of initiatives, taken together, could meet the definition and the principles. Bringing existing initiatives closer to an effective strategy for Sustainable Development integration might involve complementing them with a broad umbrella; a vision and set of coordinated mechanisms and processes to smoothen out inconsistencies and improve their complementarities and fill gaps. An effective strategy for sustainable development will bring together the aspirations and capacities of the different units within the industry and the industries creating a synergy to develop a vision for the future, and to work tactically and progressively towards it. This will identify and build on existing working plans, improves integration between different approaches, and provides a framework for making choices where integration is not possible.

Sustainable development strategies require systematic approaches and iterative processes of learning and doing. They do not have discrete beginnings or ends. They will rarely imply initiating completely new or stand-alone strategic planning project. Different strategic planning processes can be used as starting point for a strategy for Sustainable Development. Their nametag does not matter. What is important is adhering to basic strategic planning principles and having in place a co-ordinated set of mechanisms and processes which ensure their implementation and measure performance. This will help improve convergence between existing efforts

(or strategies), avoid duplication, confusion and straining developing industries capacity and resources.

4.6. Summary

It is noteworthy here that the industry in its characteristic approach to Sustainable Development has done a good job moving from minimum involvement level to an improved commitment level but this is not the desired point. It is envisaged that efforts are geared towards moving the current effort to full engagement. This will be a point of maturity where Sustainable Development principles are subconsciously practiced, a point where relationships with stakeholders are nurtured through active and continued engagement and issues are clearly addressed, information is shared freely between stakeholders rather than giving consideration only to issues that create a competitive advantage and using the issues for corporate image branding. Also, rather staying ahead of the game and publishing Sustainable Development policies and objectives, they lead the market sector on sustainability issues, integrating Sustainable Development policy and objectives with organizational purpose, vision and values.

CHAPTER FIVE

5. Conclusions and recommendations

The research has been carried according to the aims and objectives as set out at the inception of the research study. The current performance of the industry towards Sustainable Development has been determined and this helps in confirming some widely held pubic opinion about the practice of the industry relating to Sustainable Development issues. The cause for the growing public mistrust, host communities and other pressure groups has been determined. Based on the data gathered, recommendation toward future strategic directions are made that will help the industry move forward and engage positively in Sustainable Development area.

5.1. Conclusions

The activities of the petrochemical industries toward sustainable development principles and practices have been investigated and this has helped to determine and evaluate the existing practice and the current performance of the petrochemical industries towards sustainable development agenda. From the data gathered, the current performance is thus far not satisfactory in comparison to expectations as set out in various policy documents governing sustainable development principles and practice. Also, the perception of the community where the industry operates on issues relating to Sustainable Development has been examined and results indicated that there is an ever-recurring issue of less than adequate performance by the industry.

While some of the petrochemical industries have a number of efforts geared towards ensuring compliance with the principles of Sustainable Development, yet there are still pockets of problems and challenges facing the industry in managing Sustainable Development issues. There is lack of sectoral strategies that will effectively co-ordinate all the efforts. Lack of this coordination is evidence of

challenges from the communities where they operate, calls by various pressure groups for stricter regulatory requirement and other attendant problems associated with sustainability issues. There are issues around active engagement of stakeholders, insufficient sustainable development reporting mechanism, and inadequate ethical training.

When stakeholders are identified and engaged, it will help build trust and relationship between the industry and stakeholders which can lead to understanding, exchange of ideas, expectations and priorities in relation to the three dimensions of Sustainable Development. Also, the reputation of the industry within communities will improve when issues around Sustainable Development policies are resolved in conjunction with the community representatives when their opinions, fears and aspirations are adequately allayed. A proactive approach will help the industry keep their license to operate, improve their corporate image in order to maintain brand value and also help the industry to maintain good relationship with the local authorities and host communities where they operate.

In addition, with effective Sustainable Development Reporting (SDR), using relevant templates that have been tested and proved effective just like the GRI template and the **AA1000** process model in reporting Sustainable Development issues, it will support the Health, Safety and Environmental (HES) reporting presently used within the industry in the reporting of Sustainable Development issues. It will broaden the scope of reporting of Sustainable Development issues to reflect all the range of sustainability impacts that the industry is responsible for.

As a matter of strategy, the way forward for the industry to move ahead in Sustainable Development arena is to begin implementation of the future strategies recommended below. By doing so, it will put the industry on a strong pedestal that will help the industry achieve more sustainability results.

5.2. Recommendations towards the industry's future strategic direction

Based on the foregoing, it was observed that the industry is not doing badly in the march towards sustainability but what is apparently lacking is coordination of efforts. Developing such a co-ordination system will assist in integrating all the components of Sustainable Development into mainstream planning processes. Enhanced co-ordination and convergence between different planning frameworks can also relieve the burden on capacity and resources which will add value to any existing sustainability initiative.

The industry should put in place policies and programs that incorporate a front end loading of the concept into every emerging project while attempts should be made at carrying out integration of the core principles into existing and completed projects.

The industry should focus on engaging key stakeholders in indentifying and formulating a forward-looking approach and in formulating policies around Sustainable Development.

Also, the industry should review the reporting mechanism as this will provide a shop window where the industry can display their Triple Bottom Line (TBL) performance within a matrix that can independently map the industry according to the progress made and where gaps are identified. It is also important that the industry extends the current scope of reporting on Health, Safety and Environment to include the whole range of sustainability impacts that the industry is responsible for.

The industry should on a long term consideration commit to training programs for employees aimed at developing skills and build capacity within the industry. Delivering sustainability will require that everyone involved understands his or her individual responsibilities in achieving more Sustainable Development.

5.3. Areas for further research

The following areas are suggestions for further research:

- How can we develop sectoral reporting mechanism for the industry as a whole in the area of Sustainable Development?
- How do we effectively manage external stakeholders within the context of Sustainable development?
- How can self regulatory mechanism be introduced in the industry to act as quality control check?

Appendix 1

QUESTIONNAIRE

SUSTAINABLE DEVELOPMENT IN PETROCHEMICAL INDUSTRIES

This questionnaire is designed to gather data that will help in carrying out a study on the current practice of petrochemical industry to the concept of Sustainable Development.

This questionnaire is part of a research study for a Master Degree in Engineering Development & Management at the North West University, South Africa. The results of this questionnaire and all information provided will remain strictly confidential.

Though, I anticipate that this questionnaire will be completed by a person in the company who has formal responsibility for issues relating to Sustainable Development, however, if your company has no formal definition or policies relating of Sustainable Development, it is likely that your company will have embraced the concept through other approach.

This questionnaire explores your company's definition of Sustainable Development, the issues that are driving Sustainable Development, and how your company has chosen to respond to the concepts of Sustainable Development.

For the purpose of this research study, "**Sustainable development is defined as *development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*"**

Section A: About you

1. What is the summary or title of your job with your company?

a. Director level ☐
b. General Manager ☐
c. Department / Project Manager ☐
d. Middle level manager ☐

2. How long have you been functioning in that capacity?

a. 15 years and above ☐
b. 10-15 years ☐
c. 5-10 years ☐
d. 0-5 years ☐

3. **What functional department of the company are you working?**

a. Engineering / Production ☐
b. Financial Management ☐
c. Human Resources Management ☐
d. Information Technology ☐
e. Others _____(specify)

Section B: On your Training, Awareness and Understanding

1. **Are you aware of the concept of Sustainable Development?**

a. No ☐
b. Yes ☐

2. **Did you receive training in Sustainable Development ethics?**

a. Yes ☐
b. No ☐

3. **If YES, what was the nature of the training?**

a. Formal university / college course ☐
b. Module / workshop in Sustainable Development ethics ☐
c. Professional training ☐

4. **How will you rate your understanding of the concept of Sustainable Development?**

a. Good ☐
b. Little ☐
c. Vague ☐

5. **Are you aware about your company commitment to the principle of Sustainable Development?**

a. Yes ☐
b. No ☐

6. **Have you been involved in formulating policy on Sustainable Development?**

a. No ☐
b. Yes ☐

Section C: On Current Practice of Sustainable Development

On Emerging Project

1. **Does your company conduct economic appraisals of all projects, which include cost benefit analyses relating to environmental and social impacts of project development?**

    a. Yes, this is standard practice for all projects ☐
    b. Yes, in the majority of cases ☐
    c. The company is developing its approach to this issue ☐
    d. No ☐

2. **Does your company plan at the start of a project how the project can impact, positively or negatively, the local community?**

    a. Yes, this is standard practice for all company projects ☐
    b. Yes, in the majority of cases ☐
    c. The company is developing its approach to this issue ☐
    d. No ☐

3. **Does your company include Sustainable Development principles as integral elements during Front End Engineering Design (FEED) of projects?**

    a. Yes ☐
    b. No ☐

On Current Operations

1. **Has your company taken steps to embed or implement principles relating to the concepts of Sustainable Development throughout the business?**

    a. No ☐ (if No, go to Q3)
    b. Yes ☐

2. **If YES, what tools does your company use to embed Sustainable Development practices throughout the business?** *Please tick (✓) all that apply.*

    a. Making Sustainable Development central to corporate brand image ☐

b. Incorporating Sustainable Development into vision and values, objectives and targets, employee awareness and communication programs ☐
c. Consideration of Sustainable Development in corporate strategy ☐
d. Consideration of Sustainable Development issues in formal risk management procedures ☐
e. Consideration of Sustainable Development in project appraisals ☐
f. Incorporating Sustainable Development considerations into central procurement policies ☐
g. Implementing internal objectives and targets related to Sustainable Development ☐
h. Others _____ ☐

3. **If NO, what have been the greatest challenges or obstacles in embedding the principles of Sustainable Development?** *Please tick (✓) all that apply.*
   a. Ability to link Sustainable Development to financial success ☐
   b. Not recognized as a corporate strategic priority ☐
   c. Lack of commitment at Senior management level ☐
   d. Lack of commitment at Middle management level ☐
   e. Lack of commitment at Operational level ☐
   f. Lack of resources ☐
   g. Lack of understanding or agreement about the issues ☐
   h. Others

_____

4. **Does your company have specific policy or value statements that refer specifically to Sustainable Development?**
   a. No ☐
   b. Yes ☐

5. **Is your company approach to Sustainable Development treated on a separate document or integrated into the overall business plan?**
   a. Separate document ☐
   b. Integrated into business plans ☐

6. **How is your company managing Sustainable Development?**
   a. Tick box approach (minimal) ☐
   b. Meet regulatory baseline requirement only ☐
   c. Sees a business advantage in Sustainable Development ☐
   d. Sustainable Development principles embedded at all levels ☐

7. **How will you rate the commitment of your company to the principles of Sustainable Development?**
   a. Excellent ☐
   b. Good ☐
   c. Average ☐
   d. Poor ☐

8. **Which of the followings are included in your company current understanding of Sustainable Development?** *please tick (✓) all that apply*

The economic impact we have on the local communities where we operate	
Considering the long term effects of our decisions on the environment, society and economy affected by our operations	
The impact we have on the lives of the people in the communities (social)	
Our contribution to global environmental impacts (e.g. climate	
change)	
The economic, environmental and social impact of our products throughout their life-cycles	
Educating our employees and local communities on the value our industry provides to society and environment	
This question has not been considered by our industry.	

9. **What major factor drives the commitment of your company to Sustainable Development?** *(mark all that apply)*
   a. Regulatory requirement ☐
   b. Business case justification ☐
   c. Sustainability initiatives ☐
   d. To avoid bad corporate image ☐

10. **Which of the following factors have influenced your company in adopting business strategies to address Sustainable Development?** *Please rank the top 4 (1 = highest priority, 5 = lowest priority).*
    a. Enhanced shareholder value ☐
    b. Opportunity to enhance reputation/brand ☐
    c. Following industry trends ☐
    d. Exploitation of potential competitive advantage ☐
    e. Compliance with legislation / Pressure from stakeholders ☐

f. Cost saving/operational efficiency
g. Improved relationships with local communities ☐
h. Not applicable; the company's business strategy is not currently related to Sustainable Development ☐
i. Others_____

11. **Apart from the economic objectives, which of these are considered important in formulating policy on Sustainable Development?** *(mark all that apply)*
    a. Social equity ☐
    b. Environmental integrity ☐
    c. Government regulation ☐
    d. Accountability to shareholders ☐

12. **How will you rate the following sustainability drivers by your company?**

Factor	Very Important	Important	Not Important
Eco-efficiency			
Biodiversity			
Mangrove restoration			
Strengthening socially responsible management			
Improving company reputation			

Section C: On Community perception of Current Practice

1. **How will you rate the perception of the neighboring community on the current practice of Sustainable Development by your company?**
    a. Very satisfied ☐
    b. Somewhat satisfied ☐
    c. Dissatisfied ☐

2. **If somewhat dissatisfied and / or dissatisfied, how are the grievances made known to the company?**
    a. Written communication ☐
    ☐
    ☐

b. Picketing
c. Report to government agencies

3. **Which of the following are recurring issues or complaints by the neighboring communities?** *(Mark all that apply)*
   a. Aquatic pollution ☐
   b. Air pollution ☐
   c. Noise pollution ☐
   d. Ecological degradation ☐
   e. Lack of employment opportunity ☐

4. **Will you say that the agitation, grievances and / or complaints affect company operational performance?**
   a. Yes ☐
   b. No ☐

5. **If YES, how does it affect company performance?** *(Mark all that apply)*
   a. Impact on company reputation ☐
   b. Disruption in production operations ☐
   c. Payment of fines ☐

<u>Section D: On engagement with stakeholders</u>

1. **Which of the followings are considered as stakeholders by your company?** *(Mark all that apply)*
   a. Neighboring communities ☐
   b. Suppliers ☐
   c. Shareholders ☐
   d. Internal Team members ☐
2. **How will you assess your company involvement of stakeholders on policy relating to the Sustainable Development?**
   a. Few stakeholder / groups consulted ☐
   b. Stakeholders identified and engaged ☐
   c. Relationship nurtured through active engagement ☐

3. **What is your company's understanding of how stakeholders (suppliers, local community, customers etc) perceive your company's current performance in addressing Sustainable Development in comparison to standard performance in your industry?**
   a. Excellent ☐

b. Good ☐
c. Average ☐
d. Low ☐

4. **Are representatives of the community where your company operates considered as part of stakeholders?**
   a. Yes ☐
   b. No ☐

Section E: On Sustainable Development Reporting

1. **How is reporting on Sustainable Development managed?**
   a. Little or no reporting unless demanded ☐
   b. Selective reporting to pre-determined end ☐
   c. Stakeholders receive regular and appropriate reports ☐

2. **Our company produces a social report (either as part of a financial or environmental report, or as a stand-alone document).**
   a. Yes ☐
   b. No ☐

3. **Are the Sustainable Development reports verified by independent external organization?**
   a. Yes ☐
   b. No ☐

4. **Are the reports made available for all stakeholders?**
   a. No ☐
   b. Yes ☐

5. **If YES, are feedbacks sought after from stakeholders?**
   a. No ☐
   b. Yes ☐

6. **If No, why are reports not made available for stakeholders?**
   a. Fear of accusation of a contributor to Unsustainable Development? ☐
   b. Doesn't think it is necessary ☐
   c. Have had problems emanated form the report before ☐

7. Any other remarks: (please write in ink)

Thank you very much for your cooperation. Your time is highly appreciated.

Appendix 2

Rio Declaration on environment and development

United Nations

A/CONF.151/26 (Vol. I)

General Assembly

Distr. GENERAL
12 August 1992

ORIGINAL: ENGLISH

REPORT OF THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT*

(Rio de Janeiro, 3-14 June 1992)

Annex I

RIO DECLARATION ON ENVIRONMENT AND DEVELOPMENT

The United Nations Conference on Environment and Development, having met at Rio de Janeiro from 3 to 14 June 1992,

Reaffirming the Declaration of the United Nations Conference on the Human Environment, adopted at Stockholm on 16 June 1972, a/ and seeking to build upon it,

With the goal of establishing a new and equitable global partnership through the creation of new levels of cooperation among States, key sectors of societies and people,

Working towards international agreements which respect the interests of all and protect the integrity of the global environmental and developmental system,

Recognizing the integral and interdependent nature of the Earth, our home, proclaims that:

Principle 1

Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.

Principle 2

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

Principle 3

The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.

Principle 4

In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

Principle 5

All States and all people shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development, in order to decrease the disparities in standards of living and better meet the needs of the majority of the people of the world.

Principle 6

The special situation and needs of developing countries, particularly the least developed and those most environmentally vulnerable, shall be given special priority. International actions in the field of environment and development should also address the interests and needs of all countries.

Principle 7

States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.

Principle 8

To achieve sustainable development and a higher quality of life for all people, States should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.

Principle 9

States should cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies.

Principle 10

Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

Principle 11

States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries.

Principle 12

States should cooperate to promote a supportive and open international economic system that would lead to economic growth and sustainable

development in all countries, to better address the problems of environmental degradation.

Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade. Unilateral actions to deal with environmental challenges outside the jurisdiction of the importing country should be avoided.

Environmental measures addressing trans-boundary or global environmental problems should, as far as possible, be based on an international consensus.

Principle 13

States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control areas beyond their jurisdiction.

Principle 14

States should effectively cooperate to discourage or prevent the relocation and transfer to other States of any activities and substances that cause severe environmental degradation or are found to be harmful to human health.

Principle 15

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Principle 16

National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.

Principle 17

Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.

Principle 18

States shall immediately notify other States of any natural disasters or other emergencies that are likely to produce sudden harmful effects on the environment of those States. Every effort shall be made by the international community to help States so afflicted.

Principle 19

States shall provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse trans-boundary environmental effect and shall consult with those States at an early stage and in good faith.

Principle 20

Women have a vital role in environmental management and development. Their full participation is therefore essential to achieve sustainable development.

Principle 21

The creativity, ideals and courage of the youth of the world should be mobilized to forge a global partnership in order to achieve sustainable development and ensure a better future for all.

Principle 22

Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.

Principle 23

The environment and natural resources of people under oppression, domination and occupation shall be protected.

Principle 24

Warfare is inherently destructive of sustainable development. States shall therefore respect international law providing protection for the environment in times of armed conflict and cooperate in its further development, as necessary.

Principle 25

Peace, development and environmental protection are interdependent and indivisible.

Principle 26

States shall resolve all their environmental disputes peacefully and by appropriate means in accordance with the Charter of the United Nations.

Principle 27

States and people shall cooperate in good faith and in a spirit of partnership in the fulfilment of the principles embodied in this Declaration and in the further development of international law in the field of sustainable development.

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