FOREIGN DIRECT INVESTMENT INTO CRUDE OIL EXPLOITATION AND ITS IMPACT ON THE ECONOMIC GROWTH AND ENVIRONMENT: CASE STUDY OF NIGER DELTA OIL PRODUCING COMMUNITIES

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ABSTRACT

In spite of the general perception of the debilitating impact of exploitation of crude oil on the economic growth and the environment of a country, from a conceptual viewpoint, evidence of lack of clarity on the solution to the problem of over-exploitation of crude oil in the Niger Delta region of Nigeria abounds. A body of research has consistently pointed out the numerous negative externalities brought to bear on the environment by the oil companies in the region. There is no consensus on the best way to solve the problem of externalities in the Nigerian oil industries. It is important to state that misappropriation of allocated resources, shifting market policy and institutional failure had characterized crude oil exploitation and had resulted in diverse economic and environmental problems.

This study examines foreign direct investment in crude oil exploitation and its impact on economic growth and environment using the case study of the Niger Delta oil-producing communities. The methodology employed Quantitative technique such as structural equation modeling, co integration analysis and regression analysis to validate the propositions.

The findings of the study showed that the path coefficients have higher value for environmental impact relative to that of well-being, which implied that the communities perceived that foreign direct investment into oil exploitation caused more destruction to their environment than the well-being of people. The basic model was extended to further examine the impact of foreign direct investment in the oil sector. Consistent with the basic model, it was found that foreign direct investment in the oil sector impacted more on the environment than on the well-being of the people.

The results of the second proposition showed that a percentage increase in foreign direct investment in oil at lag 3 will increase Nigeria Gross Domestic Products by approximately 2 percent. The level of impact could be traced to foreign investors' influence and management of the oil and gas sector in Nigeria. The Nigerian economy has a high propensity to return on capital and needs lot more of domestic investment to influence its Gross Domestic Products. The trade openness seems to affect the economy adversely since trade liberalization impacted on Gross Domestic Products negatively. The study established that in Nigeria, natural resource endowment determines the level of economic activities and income generation capacity, but does not have any effect on the standard of living.

Furthermore, the thesis also showed that the imposition of fines on the level of flared gas has no significant impact on reducing gas flaring; though it showed the potential to reduce gas flaring. In this wise, the Nigerian government needs to pursue strategies that will enhance effective competition between transnational corporations in the oil industry and indigenous companies without necessarily throwing them into experimental extinction. This should be complemented by persuading the multinationals to be committed to the social responsibilities to the host communities. In addition, government needs to emphasize the goal of achieving economic development through robust economic growth, poverty alleviation and unalloyed commitment to the protection of natural environment.

ABSTRAK

Di sebalik persepsi umum mengenai impak penting eksplotasi minyak mentah terhadap pertumbuhan ekonomi dan persekitaran sesebuah negara, masih terdapat bukti mengenai kekurangan kejelasan dari sudut konsep, cara untuk menyelesaikan masalah lebihan-ekplotasi minyak mentah di daerah delta Niger, Nigeria. Sebuah badan penyelidikan menegaskan secara konsisten bahawa pelbagai kesan negatif terhadap alam sekitar dihapuskan oleh syarikat minyak di daerah tersebut. Menurut, kajian lepas, terdapat kesepakatan dan cara untuk menyelesaikan masalah eksternaliti dalam industri minyak Nigeria. Penyalahgunaan peruntukan yang diberi, polisi pasaran dan kegagalan institusi dalam menyalahgunaan minyak mentah menyebabkan masalah ekonomi dan kemerosotan alam sekitar.

Kajian ini mengkaji pelaburan asing langsung kdalam eksplotasi minyak mentah dan kesannya terhadap pertumbuhan ekonomi dan alam sekitar, kajian kes komuniti penghasilan minyak delta Niger. Tesis ini cuba menjawab persoalan-persoalan ini dengan menggambarkan kesan eksplotasi minyak terhadap masyarakat dan persekitarannya, pertumbuhan ekonomi dalam sector ini yang didorong oleh pelaburan langsung asing, peraturan dan terma syarikat – syarikat minyak ini. Persoalan-persoalan tersebut, kebanyakannya diselesaikan dengan menggunakan teknik kuantitatif. Metodologi yang digunakan ialah: model persamaan struktur, analisis kointegrasi dan analisis regrasi.

Penemuan mengenai pelaburan langsung asing dalam persekitaran komuniti, menunjukkan bahawa nilai pekali yang lebih tinggi untuk kesan terhadap alam sekitar berbanding dengan kesejahteraan komuniti, yang bermaksud, masyarakat menganggap bahawa pelaburan asing langsung terhadap eksplotasi minyak mendatangkan lebih kemusnahan terhadap persekitaran mereka berbanding dengan kesejahteraan dalam

masyarakat. Model asas dilanjutkan dengan mengkaji kesan minyak-pelaburan langsung asing. Konsisten dengan model asas, impak minyak pelaburan langsung asing juga lebih tinggi terhadap persekitaran berbanding dengan kesejahteraan masyarakat.

Hasil dari dua kaedah diatas menunjukkan bahawa peratus peningkatan dalam pelaburan asing langsung dalam industri minyak pada lag tiga akan meningkatkan GDP Nigeria sekitar 2 peratus. Peningkatan impak mungkin disebabkan oleh pengaruh pelabur asing yang mengurus sektor minyak dan gas Nigeria. Ekonomi Nigeria mempunyai kecenderungan yang tinggi untuk kembali kepada modal dan memerlukan lebih pelaburan domestik untuk mempengaruhi GDP.Keterbukaan dalam perdagangan memberi kesan buruk terhadap ekonomi kerana liberisasi dalam perdagangan memberi kesan negatif kepada GDP.Kajian ini membuktikan bahawa dalam kes Nigeria, sumber-sumber semulajadi hanya menentukan tahap aktiviti ekonomi dan kapasiti penjanaan pendapatan, tetapi tidak bagi taraf hidup. Akhir sekali, tiada kesan ketara ditunjukkan dengan mengenakan denda terhadap tahap kebakaran gas walaupun ia menunjukkan potensi untuk mengurangkan kebakaran gas.

Kerajaan Nigeria perlu meneruskan strategi-strategi yang akan meningkatkan persaingan diantara syarikat-syarikat tranasional dalam industri minyak dan syarikat-syarikat pribumi tanpa perlu menyingkirkan mereka. Ini dapat dilakukan dengan perlaksanaan tanggungjawab sosial oleh syarikat asing dan tempatan kepada komuniti. Pelaburan Asing Langsung perlu terus membantu dalam projek-projek pembangunan dan infrastruktur. Disamping itu, kerajaan perlu melaksanakan strategi aksen bagi mencapai pembangunan ekonomi termasuk penilaian alam sekitar yang akan membawa kepada pertumbuhan ekonomi, pembasmian kemiskinan dan pengurusan alam semulajadi.

DEDICATION

To my maker, God Almighty
For His Mercy upon my Life

And

To My Parent Late *Pa, Salami Osho Ogunjobi Apempe* and *Alhaja, Salami Morenike Aminatu,* I will forever be grateful to God for blessing me with this type of parents who believed in me right from my childhood.
Ever forbearing, ever praying and ever loving; Words can never convey my heartfelt message of appreciation. But I do arise this season to call you bless!

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Delight yourself in the Lord and He will give you the desires of your heart

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LIST OF ABREVIATION

ADF	Augmented Dickey Fuller
AG	Associated Gas
Bdp	Barrel per day
CAC	Command-and-Control
CNPC	China National Petroleum Corporation
CO_2	Carbon Dioxide
CVM	Contingent Valuation Methods
DPR	Department of Petroleum Resources
ECM	Error Correction Model
EGASPIN	Environmental Guidelines and Standard for The Petroleum Industry in Nigeria
EIA	Environmental Impact Assessment
EKC	Environmental Kuznets Curve
EPA	Environmental Protection Agency
ERC	Emission Reduction Credit
FDI	Foreign Direct Investment
FDI_{OC}	Foreign Direct Investment in Oil Communities
FEPA	Federal Environmental Protection Agency
FME	Federal Ministry of Environment
GDP	Gross Domestic Production
GHG	Greenhouse Gas
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
LASEPA	Lagos State Environmental Protection Agency
M&A	Merger and Acquisition
MDG	Millennium Development Goals
MEB	Marginal External Benefit
MEC	Marginal External Cost
MNOCs	Multi- National Oil companies
MPB	Marginal Private Benefit
MOU	Memorandum of Understanding
MPC	Marginal Private Cost
MSB	Marginal Social Benefit
MSC	Marginal Social Cost
NEPAD	New Partnership for Africa Development
NNOC	Nigeria National Oil Corporation
NNPC	Nigeria National Petroleum Corporation
NOSDRA	National Oil-Spill Detention And Response Agency
NPE	National Policy On Environment
OECD	Organization for Economic Cooperation and Development
OFDI	Outward Foreign Direct Investment
OPEC	Organization of Petroleum Exporting Countries
SAP	Structural Adjustment Programme
SPDC	Shell Petroleum Development Company of Nigeria Ltd
TEV	Total Economic Value
TNC	Trans- National Corporation
UN	United Nations
UNCTAD	United Nations Conference, Trade And Development
UNDP	United Nations Development Programme

UNEP	United Nations Environment Programme
WHO	World Health Organization
WTAC	Willingness To Accept Compensation
WTO	World Trade Organization
WTP	Willingness To Pay

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The economic performance of any country is a result of the relationship between the advancement of economic, institutional and technological forces that come together in a line of action that propels economic development (Naubahar, 2006).Terrence & Kevin (2005) indicated that the formations of innovative establishments are potential within an evolutionary structural perspective of economic growth. The developing and transition economies have focused more effort to attract quality Foreign Direct Investment (FDI) from the developed nations. Predominantly, the consideration given to priority on foreign direct investment has brought tangible benefits, especially inflow of new technologies and organizational practices.

Many developing and transition economies are in the same situation with regards to foreign direct investment (FDI) and Transnational corporate operations in an effort to incorporate them into their development strategies. Foreign investment is an important part of foreign capital that provides necessitated finance to increase the use of existing capacity and to stimulate new investment in underdeveloped countries. Foreign investment involves the transferred assets in the structure of a portfolio and direct investment mainly from developed countries into underdeveloped ones. Also, it involves the transfer of resources, like management, finance and capital, technology, and expertise, such that the resources extend the production potentialities of the receiving country (Rana & Muhammad, 2010).

Africa is well endowed with abundant mineral resources, especially crude oil and natural gas. This endowment reflects in the number of net oil exporters in Africa as at 2006, Algeria, Angola, Cameroon, Libya, Mozambique, Nigeria and Sudan. Gas and oil capital are the central point of growth in the economy and fiscal situation in the number of African countries. In addition, a lot of these countries have crude-oil and natural gas the control of which have brought many internecine social and political conflicts; mismanagement of revenue and the resource curse syndrome. These had largely eroded the significant gains from higher but volatile export revenue. Africa has about 9.6 percent of the world's crude oil reserves with Nigeria, Sudan, Libya and Algeria altogether accounting for 90 percent of the continent's reserves. About 2.8 percent of the world's reserves come from Nigeria. However, the crude-oil reserves in Africa rose from 53.3 billion barrels in 1980 to 117.0 billion barrels in 2005 and 127.7 billion barrels in 2009 (Anyanwu, 2006).

Furthermore, the four major oil producers in Africa, i.e., Nigeria, Algeria, Angola, and Libya, together accounted for 77% of the continents' production. In global production, the Middle East accounts for the largest production with 31 percent, Africa stands at 12 percent, while Asia, North, South and Central America and Europe and Eurasia in 2009 hold 10,17,8 and 22 percents respectively. (Fernandez, 2009)

Furthermore, out of the global total of crude-oil in 2008African countries exported 19 percent. Accordingly, export receipt percentage of Gross Domestic Products (GDP) grew from 14.4% in 2004 to 22.3% in 2008 (table 1.1). The share percentage of crude-oil was 41 percent of the share of total exports in 2004 and 52.2 percent in 2008. Through export of crude oil, Nigeria's domestic revenue averaged 69% in 2008 with largely positive relationship between real GDP growth and oil export revenue, which implies that oil export revenue, is immediately reflected in the economic growth in

Nigeria. Also the way all other African countries that depend largely on single commodity for foreign exchange earnings.

Okaba, (2005) noted that within the geo-political space of Sub-Saharan African there are ten major oil exporting countries, namely Angola, Chad, Cameroon, Congo-Brazzaville, Democratic Republic of Congo, Gabon, Equatorial Guinea, Nigeria, Sudan and Sao-Tome and Principe. Average oil production in the region for 2008 has been 6.8 million barrel per day (bpd), with increases concentrated in four countries (Nigeria, Angola, Algeria and Equatorial Guinea). In 2005, the Gulf of Guinea region received the world's biggest quantity of offshore hydrocarbon capital investment as seen in Nigeria and Angola. It is obvious that African oil exporting nations have over the years raised so much revenue through royalties; levies, oil taxation, joint venture agreement, signatory bonuses, and share of production. Oil revenue play leading roles in these nations' average GDP (UNCTAD, 2006).

Furthermore, Angola is one of the principal oil exporters in Africa with a proven 9 billion barrels in 2007. Exports from Angola are above 90% of its crude oil to United States of America and China. Angola produced crude oil at an average of 1.7 million barrels daily in 2007 or 2.15% of the world's total productions. The oil major operators in Angola are France's Total, Texaco and Exxon Mobil, UK's BP/ Dutch Shell and Chevron oil Companies. In 1995-2001, oil tax revenue constituted 70% to 90% of state income and over 60% of GDP. Over 97% of oil explored in Angola was located offshore, therefore drastically reducing conflict with oil bearing communities. Angola rank 161 out of 173 in the Human Development Index (HDI) with an average life expectancy of 45 and 68% living below the poverty line (Anyanwu, 2006).

Table 1.1 African Countries' Oil Exports as % of GDP, Total Exports and Government Domestic Revenue, 2004-2008

	Value of oil Export (Billion USD)		Oil Export as % of GDP		Oil Exports as % of Total Export		Oil Exports as % Government Revenue	
Countries	2004	2008	2004	2008	2004	2008	2004	2008
Algeria	31.6	77.1	37.0	45,9	97.7	97.8	102.0	110.7
Angola	12.4	61.7	62.8	72.8	92.3	96.5	170.3	143.8
Cameroon	1.1	2.7	6.9	11.4	40.1	47.3	43.4	55.0
Chad	1.7	3.8	38.8	45.1	78.8	89.6	255.5	164.8
Congo Dem..Rep.	0.4	0.8	5.5	6.8	19.9	11.9	47.8	33.2
Congo Republic	2.7	7.5	58.4	71.0	79.0	95.5	191.3	136.3
Cote d'Voire	1.2	3.0	7.8	12.7	17.5	29.5	42.3	62.7
Egypt Arab Rep.	3.9	11.2	5.0	6.8	37.4	38.2	23.7	27.5
Equatorial Guinea	4.6	14.3	96.1	88.4	97.4	99.3	313.4	182.9
Gabon	3.4	7.5	47.4	52.0	83.5	81.0	161.3	161.6
Libya	19.5	60.5	58.7	72.6	95.7	98.6	109.5	I03.9
Mauritania	0.0	0.3	0.0	9.4	0.0	18.4	0.0	42.4
Nigeria	33.0	74.3	37.6	36.9	89.5	92.2	106.3	109.2
Sudan	3.1	11.9	14.4	20.6	82.8	96.2	73.1	94.4
Africa	120.1	341.6	14.4	22.3	41.0	52.2	53.2	69.2

Source: AfDB database & WEO 2010.

Furthermore, Sudan has established oil reserves of 6.614 billion barrels at 2007. It produced an average of 457,000 of crude oil per day. The presence FDI in oil such as PETRONAS Carigall (Malaysia), China National Petroleum Corporation (CNPC) Tallsman Energy Inc (Canada) and Total (Elf Fina France) are the active Multinational Corporations in Sudan oil's sector. The oil exports represent over 90% of the Sudan's total revenue but internecine conflict and sanction imposed by the United Nations hindered the country's development (UNCTAD, 2006).

In addition, Algeria, one of the leading producers of oil and gas in Africa, has a petroleum industry that is vital to the momentous economic growth that has been witnessed in recent years. In recent years, the economy has been assisted by export revenues from natural gas and oil. The country's growth rate was 4.8% in 2007. About 98% of Algerian exports are from oil and natural gas (by value) in 2006.It bears stating that the ongoing expansions in Algerian oil and gas investments have increased the production capability.

Table 1.2 below shows the export volumes of natural gas by major Africa exporters with Algeria accounting for the highest export volume of 43.5% of the total. Mozambique had the lowest export volume of 2.8%. African countries exported only 11.8% of the global gas export in 2008; this represents some increase from 9.5% in 2004. Gas export as a receipt of a relative to government domestic revenues averaged 7.6% in 2008. Some of the African countries show that the real GDP growth had a poor relationship with natural gas export revenues, an indication that gas export revenue do not have significant positive effects on the countries' economic growth.

Table 1.2 African Countries' Natural Gas Exports as % of GDP, Total Exports and Government Domestic Revenues, 2004 and 2008 Indicator

Indicator	Year	Algeria	Egypt	Equatorial Guinea	Libya	Mozam-bique	Nigeria	Africa
Natural gas Export as of GDP	2004	15.3	0.3	0.0	1.4	0.0	3.0	2.0
	2008	11.5	3.3	10.3	4.0	10.4	3.3	2.4
Natural Gas Export as % of as Total Export	2004	43.5	2.1	0.0	2.2	0.0	7.7	6.8
	2008	26.9	18.9	10.5	5.4	2.8	7.3	6.5
Natural Export as% Government Domestic Revenue	2004	42.2	1.4	0.0	2.6	0.0	8.6	7.3
	2008	27.7	13.4	21.3	5.8	40.7	9.8	7.6

Source: AfDB Statistics and US Energy Information Administration, 2010

Since independence, Nigeria has put in place policy framework targeted at achieving major political and economic transformation of the oil industry. Oil companies from USA and UK were invited to invest in oil exploration in Nigeria. From a modest beginning of 5,000 barrels per day in 1958, by 1960, Nigeria had becoming an energy state with 17,000 barrels per day(Emmanuel, 2010).

Half a decade after independence, at least nine international oil companies had become active in Nigeria, namely Texaco, Shell-BP, Gulf (Chevron) Safrap (now Elf), Mobil, Esso, Philip, Agip and Tenneco. These international oil companies were joined, in the late 1960s, by Occidental, Deminex, Japan Petroleum Union Oil, Niger Oil Resources and Niger Petroleum. With the establishment of Nigerian National Oil Corporation (NNOC), the predecessor of the Nigerian National Petroleum Corporation (NNPC) and Nigeria's admission into the Organization of Petroleum Exporting Countries (OPEC)in July, 1971, Nigeria reached its peak as an oil-producing nation (Emmanuel, 2010).

Crude oil production increased from 17000 bpd to 45,000 bpd in 1966 and shortly after the civil war, production peaked at 1 million bpd in 1970. There were joint venture agreements with several multinational oil companies connected with oil exploration and production activities in the country. To further boost the expansion of the oil sector, government encouraged private sector participation in the development of the industry (Aghalino, 2009).

Nigeria has the 10th biggest reserves in the world at about 25 billion barrels. In terms of daily production and reserves, Nigeria is the 6thlargest OPEC Country. Her current production (as of the year 2012) is 2.6 million barrels per day. Although for more than thirty (30) years Nigeria has established herself as an important producer of crude oil with natural gas reserves above 166 Trillion standard cubic feet (scf), and with present gas production standing at 12 billion standard cubic feet (NAPIMS, 2011). The foreign direct investments into oil exploitation were channeled into exploration, production, refining, transportation and marketing of crude-oil products. Most of these oil industries are based principally in the Niger Delta; a region that has been blighted by colossal environmental degradation.

In critical assessment of the performance of the Nigerian state in the light of the inflow of FDI into the oil sector since 1970s several scholars have described government's response to the challenges of the sector as purely exploitative and irresponsible (Okowa, 2005). According to John, (2011) findings has proved that most countries that are resources poor are known to have developed rapidly than resource rich countries, such that the bigger the dependency on oil and mineral resources the worst the performance. According to the British Petroleum Statistical Energy Survey (2010), Nigeria had proven oil reserves of 36.22 billion barrels, which is 2.29% of the world's reserves. The Nigerian government's policy to develop its reserves level to 40 billion barrels relies on the upstream sub-sector of the oil industry.

Figure 1.1 below demonstrates that Nigeria's real GDP growth had a close relationship with her oil export revenues. This implied that revenue from oil export is hugeand immediately reflected in the Nigeria's GDP.

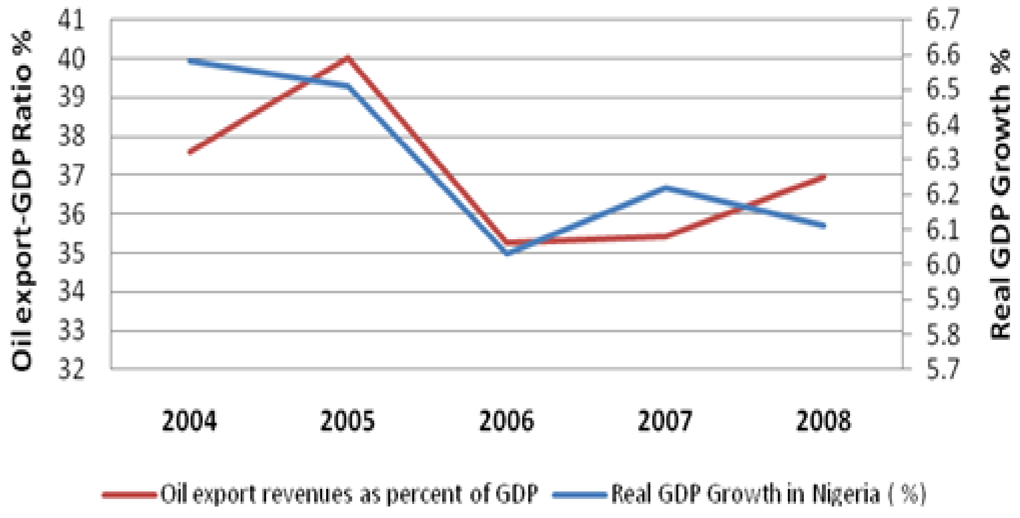


Figure 1.1 Nigeria's Real GDP Growth & Oil Revenues as Percentage of GDP
Source: Statistics Department, African Development Bank (2009)

In addition, Nigeria's oil wealth has been mainly remarkable due to the combined forces of the foremost multinationals oil companies, with the leading foreign companies being Shell. An average of 2.5million barrels of basic mark oil per day was explored in Nigeria in 2007, about 2.92% of the global production.

Nigeria, with a population of 160 million people and 2.5 million bpd, is the leading exporter of crude oil in sub-Saharan Africa, and is ranked only behind the world's giants, Iran, Saudi-Arabia, the United Emirate and Venezuela. Oil revenue accounts for 85% of government export earning, and is put at 55% of GDP. Nigeria, in spite of this enormous wealth, still ranks low in human development index if the worsening socio-economic problems are anything to go by. For example, about seventy percent of her people survive on less than one dollar per day (Okaba, 2005).

1.2 The Economic Growth via Oil Exploitation by FDI

The Nigeria economy depends on the oil sector which has accounted for 85% of the foreign earnings. According to the 2011 report by the International Energy Agency (IEA), Nigeria has proven reserves of 37 billion barrels of crude oil and 187 trillion cubic feet (TCF) of gas, based on the yearly production of 90 million tons. The oil sector has a great influence on the Nigeria culture and structure and remains the foundation upon which the country's economy rests. The production capacity in the sector is based on the joint venture operations. Shell and its joint venture partners are the leading producers that produce about 50% of total oil production. Nigeria's GDP has recorded some success on the back of the sudden increase in oil production; though this has come with a severe cost to the environment.

Petroleum products provide annual revenue of an average US$ 60 to US$ 70 billion depending on market oil price and account for over 90 per cent of the nation's total export earnings in the year 2010.The net export revenue earned by Nigeria in 2010 was US$ 65 billion, according to records from OPEC. Of this, crude exports accounted for 72 percent of current account receipts in 2010 (Lim, 2011).

The oil economy grew enormously due to success in new areas of exploration in deep and ultra-deep areas. Nigeria's experience has shown that natural resource endowment can determine the level of economic activities and income generation capacity of an economy, but not the standard of living (Ian-Gary, 2003). In Nigeria, crude oil production has increased over time with corresponding proportion of crude oil export out of total production being substantial.

Unarguably, most of Nigeria's oil production platforms and infrastructures are located in the Niger Delta region of Nigeria, according to Egborge, 2000, there are 349 oil drilling sites, 22 flow stations and one terminus in the early 1990s and about 10,000 pipelines, 10 gas plants, 3 oil terminals and 1,500 oil producing wells are present in the mid-1990sAs at 2007, there were over 600 oil fields, 5,284 on and offshore oil wells, 10 export terminals, 275 flow stations, 3 refineries and an LNG project. The Niger Delta has seen the most aggressive exploration and production activities since oil was first struck in Oloibiri, Bayelsa State in 1958. The deep water blocks still hold prospect of some additional reserves (Lubeck & Lipschuts, 2007).

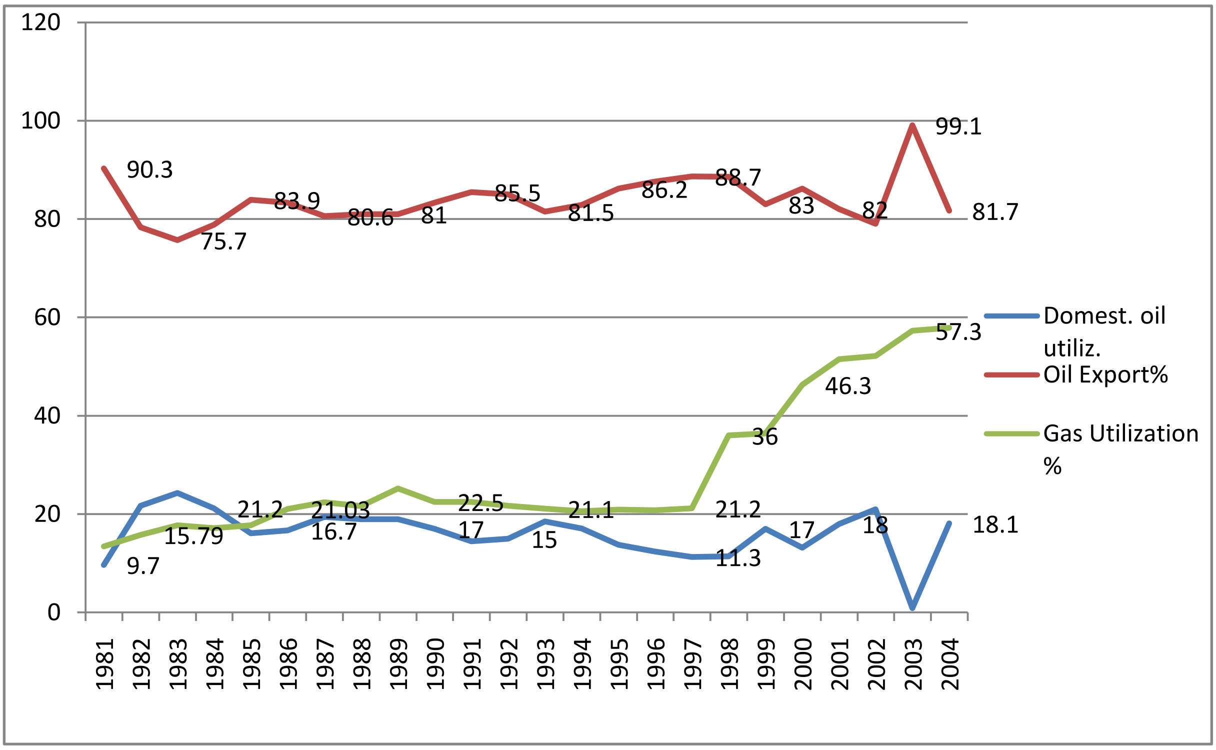


Figure 1.2 Oil and Gas Utilization in Nigeria, 1981- 2004 (Share Of Total Output, %)
Sources: Central Bank of Nigeria data, 2005

The oil and gas industry is successfully developed in Nigeria, due largely to the efforts of the Multinational Corporations' deployment of capital and management expertise. Oil production, therefore, has been associated mainly with the multinational oil companies in Nigeria. However, since 1981, less than one quarter of the oil produced in Nigeria has been utilized at home. Figure 1.2 above shows oil and gas utilization in Nigeria from 1981 to 2004.The federal government, through the state-owned, Nigerian National Petroleum Corporation, attempted to increase the pump price through removal of subsidy on the petroleum products but this action failed to produce the desired effect. Despite increased demand for petroleum products in Nigeria, the government, over the years, has not been able to satisfy the demand, even with the establishment of four (4) oil refineries in the country.

It is obvious that African oil exporting nations (Nigeria and Angola) have, for five decades, raised so much revenue from the oil sector through oil royalties, oil taxes, levies, signatory bonuses, and share of production-sharing agreement. Oil revenue plays leading roles in these countries' economies and accounts for over 85% of government's revenue, export earnings of more than 90% and approximately 40% of the Gross Domestic Product.

The Oil boom has a capacity to considerably raise expectations and thus expands government's spending appetite. The focus of fiscal policies on the oil boom fosters excessive and reckless investment and therefore leads to mismanagement of resources through enormous corruption and rent seeking. The oil boom encouraged loss of fiscal control, spurred inflation and hampered price stability, budgetary discipline, resources distribution and poverty alleviation (Leonor, 2011).

The Multinational Oil Companies (MNOCs) are the major vehicles of investment in exploration, exploitation, production and marketing of Nigeria's oil and gas. They are the main architects in the building up of Nigeria's oil and gas reserves through joint venture and production sharing arrangements. MNOCs operate, manage, contribute funds and produce the bulk of Nigeria's oil and gas. The government began a nationalization policy through acquisition of equity stakes in the MNOCs in 1971. It acquired between 33.33% in Agip and 35% in ELF in 1971 and 35% in Shell BP in1973. By 1974, government had acquired 55% in Mobil Gulf (Chevron), Agip/Phillips, ELF, BP and increased its shares to 60% in 1979; correspondingly, though its stakes in Shell increased to 60% in 1989, these were reduced to 55% in 1993 (Frynas, 2005).

However, the MNOCs still manage and control the operations of the industry. The MNOCs, the technical operators of the companies provide the technology, capital and more specifically equipment and servicing. They are the sole operators and controllers of the Joint Ventures arrangements, even though in the case of Joint Ventures, Nigeria possesses majority ownership. The management and operation of the MNOCs have largely remained foreign.

1.3 Statement of Problem and Motivation of the Study

The socio-economic condition in the Niger Delta presents a different, if worse, situation than other parts of the country. Existing facts confirm the dearth of facilities and a very small percentage of the people in the Niger Delta region have access to safe drinking water and about 30% of households have access to electricity. The unemployment situation in the region remains very high coupled with very low enrolment in primary and secondary schools compared to national figures of 70 % (Okechukwu, 2006).

The Niger Delta suffers from acute shortage or dearth of infrastructure, absence of non-oil industries and non-existent social services. There is widespread neglect of social and economic development as existing primary health care facilities in some communities in the region serve as little as 2% of the population. It should be said that the riverside communities are worst hit with inadequate educational facilities. Rather than attract development, oil has actually devastated and underdeveloped the region (Ikelegbe & Ikeelegbe, 2006). Oil exploitation and distribution have created huge land and water scarcities, dispossessed the oil communities of their rightful heritage and destroyed the traditional mainstay of the local people who are dependent on the primary economies of farming. Massive oil spillages and gas flares have further exacerbated the environmental degradation with its attendant loss of soil fertility, decline in agricultural output, depletion in fishery biodiversity.

The nature and forms of oil exploitation, and the practices and behavior of the MNOC are underpinned by the politics of oil as the driving force of the conflicts in the region. Given, the enormous resources and consequent power and influence that the MNOC exert over the host communities; they are a dominant and significant force that has shaped and re-shaped the local economies, local politics and local conflicts (Kemedi, 2003). This situation has led to high waves of ethnic mass mobilization and nationalistic sentiments across the region. Thus, oil and gas production has brought considerable disruptions seen in the insecure and tense environment.

There is often disparaging environmental transformation emanating from the business and industrialization particularly in crude-oil exploitation which have destroyed the natural resource base, that crucial to sustaining independent indigenous livelihood. In most parts of Niger Delta states, very fertile lands are no longer productive. The peasants have lost the fertility of their lands to oil exploration. The resultant alienations of the people from their homeland have intensified ineffective and inequitable land use practices. In fact, various attempts by the local people to avenge this economic disruption perpetrated by the State and the oil companies have led to frequent conflicts and loss of valuable lives and property. These are some negative consequences that have resulted in socioeconomic shock and disrupted, harsh living conditions of the people (Victor, 2010).

Consequently the region’s natural resources are diminishing and are not being replaced by human and physical capital. With a growing population, the per capita resource based in the region is dwindling. The sustainable economic growth in terms of increases in the per capita availability of resources does not exist.

Ikelegbe & Ikeelegbe (2006) argued that the government pays lip services to the frequent ecological disasters threatening the survival of the Niger Delta people on a regular basis. Social infrastructures in this region are near absent. To worsen the matter, the oil multi-nationals take advantage of the naivety, lack of political will and corruption of the Nigeria State to breach, with impunity, most of the Memoranda of

Understanding (MOU) signed with the oil bearing communities. They also violate municipal and international environmental protection laws. So, the crises between oil companies and host communities between 2003 and 2008 are traceable to the disrespect for MOUs by the oil companies (Okowa, 2005 and Okaba, 2005).The overall implications of the numerous problems identified above on the oil-dependent Nigeria's economy are enormous, unless something urgent is done to reduce the impact of crude oil production on the environment. The author's emphasis in this study is placed on equ-marginal balance between the increase in the productivity of the oil companies and the living standard in the communities and the country in general.

1.4 Research Questions

The question that has been asked by many people is, first, how can the oil companies making billions of dollars in the region shirk their responsibility to the host communities and the environment? Second, how could natural resources end up being used in a manner that appears wasteful and foreclose prospect of development in the future? It must be said though that the level of awareness pertaining to environmental problems has grown tremendously in the mind of people in recent years. One question still remains and that is, how efficiently managed are the environmental resources of the region?

This thesis will try to answer these questions by delineating the impact of crude oil exploitation on the people and the environment, and by examining the economic growth index by the oil sector, the regulations and the level of compliances of the oil companies.

The followings are the key questions about the study:

- Is there any relationship between increase in the oil companies' exploitation activities and the state of the environment and the living conditions of the people in their area of operation?
- What is the effect of the inflow of Foreign Direct Investment and trade liberalization in the oil sector on the economic growth performance?
- To what extent has the imposition of fines on gas flaring affected the level offlaring by oil companies?

Despite some positive growth in the early 1990s, it is believed that the economy is far from achieving sustainable growth. The reason is because most of the analysis of economic growth and development has failed to recognize the importance of environmental degradation to the long time viability of the Nigerian economy. Lopez (1997) argued that economic development is sustainable only if development is modified to take into account its ultimate dependence on the natural environment.

1.5 Objective of the Study

The consideration for economic sustainability suggests that the welfare of the future generation should be as important as the welfare of the current generation. Therefore, the stock of renewable resources should be maintained and the economy should save over and above the depreciation rate of both man-made and natural resource capital (Catarina *et al*., 2010). The strategy of achieving economic development must include mutually consistent objective of economic growth, poverty alleviation and sound environmental management.

The broad objective of this research study is to examine Foreign Direct Investment into crude oil exploitation and its impact on the economic growth and the environment.

Specifically the study attempts to address the following objectives:

- To examine the Foreign Direct Investment into crude oil exploitation and its impact on the environment and people of Niger Delta oil-producing communities.
- To investigate the impacts of foreign direct investment and trade liberalization in the oil sector on economic growth.
- To determine if the imposition of fines on flared gas has affected the level of flaring by oil companies

Nigeria has experienced different attempt at a desired economic management trajectory since independence. The economic management strategy then was aggressively pursued through direct investment expansion as well as through policies and programs that serve as incentives to encourage the development and participation of foreign and local investors in the oil and gas sector of the economy. Following the introduction of Structural Adjustment Programmes (SAP), various reforms have been put in place, in varying degrees and pace, in the financial, agricultural, industrial and public sectors since 1986 (Yilmaz & Charles, 2001). These reforms are in consonance with the main objective of SAP to remove growth-retarding administrative controls and adopt more market-oriented measures and incentives targeted at private enterprise as well as efficient resource allocation and utilization. Despite preponderance of planning in Nigeria, the economy is still bedeviled with weak unorganized, externally dependent and dualist market structure (Okowa, 2007). It is interesting to know that the effects of environmental degradation on economic growth in respect of soil degradation, water pollution and deforestation were not strongly emphasized in the reforms.

1.6 Research Hypothesis

This thesis sets out to assess the extent to which proceeds from oil and non-renewable resources have been used to stimulate intergenerational equity and safety of the environment in the country. The important sectors like health, education, communication, transport and long-term useful capital projects should have attracted more attention in national investment efforts.

The central proposition of this research is to examine Foreign Direct Investment into crude oil exploitation and its impact on the economic growth and the environment. However, the following specific hypotheses will guide the analytical part of the thesis.

Hypothesis 1

- Foreign Direct Investment in crude-oil exploitation will affect the environment and communities in the Niger Delta negatively.

Hypothesis 2

- Foreign Direct Investment in oil in the face of trade liberalization will have no significant effect on economic growth performance.

Hypothesis 3

- The imposition of fines on flared gas will not affect the level of gas flaring by oil companies

The study will determine the optimal in investment of natural resources through measurements of natural resource depletion in the environment and the marginal implication of resource exploitation on the development.

1.7 Methodology

1.7.1 Analytical Models

This study is concerned specifically with Foreign Direct Investment into crude oil exploitation and its impact on the economic growth and the environment. Environmental economic theory is comprehensive as it encompasses and differentiates between all three dimensions of socio-economic development and the environment. It also viewed the concepts of CapitaLand welfare which recognized in existing theories of economics of growth and development.

The accumulation of capital is important to economic growth, capital being one of the three scarce factors of production, labour, land or environmental resources being the others. Capital is considered a main factor in the attainment of economic growth and labour is considered as human capital. Human capital importance has increased, not least, as a result of the new endogenous growth theory which is centered on technological innovation, one of the key factors linked with accumulation of human capital advancement (Romer, 1990). This Endogenous growth Theory is based on modified neo-classical economic model in which the environment is integrated into the economic system. Development is portrayed as an accumulation of human and man-made capital at the expense of a reduction in natural capital. Development is generally deemed sustainable when a balance is struck between these processes of gain and loss, so that capital stocks do not decline (Alexander, 2008). Resource and environment scarcity can be quantified by the market price. In a precise situation, natural resource can always be substituted partially or fully by use of other resources, either manufacturing or natural, supported by progress in technology which continually enhances the scarcity of natural resources.

The foreign direct investment inflow into the oil industry is considered to have direct impact on the exploitation of crude oil, and leads to increase in production capacity of the oil companies in the Niger Delta. There have been direct impacts on growth through an increase in investment into the oil sector by FDI, generating revenue to government and providing employment to the people. The economic growth resulted in environmental pressure that caused negative externalities to the environmental system in which the economy operates. This is in the form of increase in environmental degradation such as air and water pollution, reduction in land fertility, increase in the social capital cost and composite assets (Mohan, 1999). Increase in all these factors impoverishes the people in the Niger Delta. To check all these pressures on the environment, government needs to intervene by regulating and protecting the environment for sustainability. In addition, relatively low incomes and high value given to matters of economic development have undermined priority to achieve environmental improvement. Thus, there is a critical need to assess the benefits and costs of alternative environmental policies and regulation for sustainability (Massimiliano, 2002).

1.7.2 The Study Location: Niger Delta Crude-Oil Producing communities

The Niger Delta Region which occupies an area of 75,000 sq. km is located in the southern part of Nigeria. It stretches Nigeria-boundary in the East by Cameroon; bounded by Ogun and Ondo; West is by Kogi, Enugu, Ebonyi, Anambra, and in the north bounded by Ekiti state and in the south generally bounded by the Atlantic Ocean. It is the world's third largest mangrove forest in Africa and the most expansive unsullied water swamps in Western and Central Africa and Nigeria's major concentration of high biodiversity. The population of the Niger Delta is over 30 million, who live in about 13,400 long-settled aboriginal communities made up of Ijaw, Isoko, Itsekiri, Ishan, Ilaje, Ibibio, Anang, Efik, Ekpeye, Ikwerre, Edo, Ogoni, Ogba

Engeni and Ukwani nationalities. Over 75% of these settlements dwell along the coastal region of Nigeria (Okaba, 2005). Figure 1.3 and 1.4 below show the map of the area of study in the Niger Delta.

The Niger Delta has the largest drainage basin and the largest wetland basin in Africa. Also, the Niger Delta environment has island forests, freshwater swamps and lowland rainforests. It has an uppermost concentration of the biodiversity and well-endowed ecosystem with diverse vegetation, cultivatable topography that can hold a wide array of assorted crops and agriculture tree, and more water species than any ecosystem in Africa (UNDP, 2002).

The Niger Delta's relevance to the survival of Nigeria has attracted national and international concerns partly because it has been the engine of Nigeria's economy for the past 50 years. It is a major source of energy supply and therefore a viable asset to the world's industrial development. The region presents a perfect example of the paradox of severe deficiency and wretchedness in the midst of stupendous wealth, as the resources of the region have barely ameliorated the pervasive impoverishment of the people. Resources misuse has reduced the region into a theatre of bloody confrontation that is not good for national and international peace and business investments (Felix, 2008).

Figure1.3: Areas of Study
Sources: Map of Nigeria Descriptions
http://www.google.com.my/search?q=niger+delta&hl=en&biw, accessed January 26, 2010

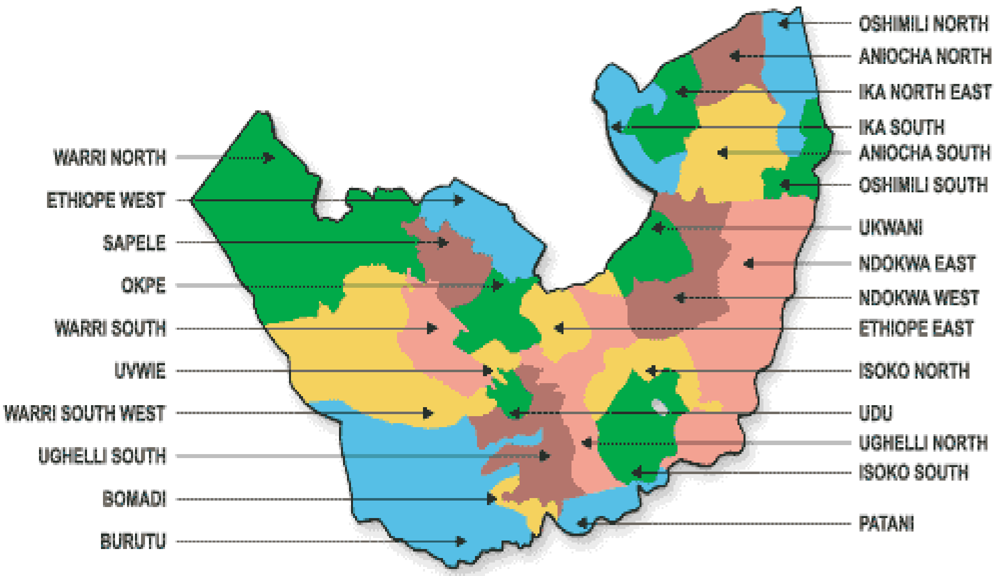


Figure 1.4: Niger Delta Map
Sources: http://www.google.com.my/search?q=niger+delta&hl=en&biw,, accessed January 26, 2010

Furthermore, its difficult terrain and abnormal weather conditions are positively counterbalance by her rich natural resources and associated domestic and industrial potentials for sustainable development. The Niger Delta is not only strategic as the epicenter of the West African economic resource base but it is also lavishly endowed with enormous water resources. Approximately, 21 major rivers connect the region to the luminous Atlantic Ocean, an aquatic highway that opens coastal Nigeria to all the continents of the world. There are clear indications that huge underground lakes of fresh water abound in this area, suggesting that a prosperous water-based export economy can be sustained (Okaba, 2005 and Dara, 2003).

The Niger Delta is a unique constellation of ecological area including sandy coastal ridge barriers, brackish saline mangrove freshwater and seasonal swamp and low lands. It is traversed by a large number of rivers, streams, rivulets and canals, as over 60% of the region is crisis-crossed with creeks and dotted islands while the remainder is a lowland rainforest.

In spite of the concerted efforts by the various tiers of government in Nigeria, the international and local donor and non-governmental agencies in the past five decades to improve the quality of living of the people and sustain the environment of the Niger Delta region, the development challenges confronting the area are still overwhelming (Okaba, 2005).

1.7.3 Analytical Framework and Measurement

The study examined the features of a social optimal model of resource use over time in the approach of social welfare function and established analyses of the polluter's choice of care and polluter's choice of output. The first proposition of the study used communities where the research was conducted based on the high level of oil production activities by the oil companies. Thus, the researcher chose on purpose, the community where the survey was carried out. The analysis of the population in the area of study consisted of 4,500 households, and a sample size of 354 households' heads was obtained with the questionnaire specifically targeted at the households' heads. The survey was restricted to two communities Burutu and Ogulagha in Niger Delta where there were preponderance of oil well/rigs.

The study adopted the Social Cognitive Theory and the theory in Foreign Direct Investment and environment economics in explaining the factors contributing to the welfare of the people and their environment. The first objective is to examine the Foreign Direct Investment into crude oil exploitation and its impact on the environment in Niger Delta oil-producing communities.

Steiger, (2007) and Barribeau *et al.,* (2005) argue that survey research is suitable in the investigative assessment of psychological constructs where data can be used to review and explain the populations' understudy of an issue. The communities was selected on purpose and the survey applied a semi-structured questionnaires based on theories. The questionnaire is therefore designed to generate data on the level of awareness of the people as regards air pollution, oil spillages and land degradation as an environmental problem. In addition, the survey tested the extent of stress occasioned by environmental problems in the communities, examined the environmental impact of the activities of the oil companies on the people of the communities, and studied the general awareness of environmental consequences and the perception of the people on the operation of oil companies in the communities. In addition, the study adopted the structural equation modeling to investigate and predict the causal attribution that explains the relationships under investigation.

In the second proposition, impacts of foreign direct investment and trade liberalization in the oil sector on economic growth performance were measured. Foreign Direct Investment and trade liberalization policy had been the integral preoccupations of Nigerian government since the adoption of Structural Adjustment Policy in 1986.

Studies have attempted to examine the determinant structure and potentials of Foreign Direct Investment in Nigeria (Odozi, 1995; Anyanwu, 2006). The study aims at investigating and evaluating the impacts of Foreign Direct Investment and trade openness on economic growth in Nigeria within the theoretical framework of neoclassical Cobb-Douglass production function. The production function, which has been widely applied in the analysis of Foreign Direct Investment and trade impact on growth, assumes unconventional input such as Foreign Direct Investment and trade openness along the conventional inputs of labour and capital in the model. There is an attempt to determine the impact of foreign direct investment in crude-oil production, and trade openness ultimately on economic growth in Nigeria.

In addition, the third proposition designed approaches for meeting environmental targets which have generally resulted in improving economic efficiency. This is to balance economic benefits and costs, design an economic approach that more closely links firm behaviour to actual economic costs and chosen targets. The third model focused on government's policies on the environment in the light of oil exploration. One of the major protective measures taken by the Nigeria government was the imposition of fine on gas flaring. Therefore, the third proposition aimed to determine if the imposition of fines on flared gas affected the level of flaring by oil companies. This is to examine government's policies on the environment in the light of oil exploitation in the Niger Delta. However, specific hypotheses identified above will guide the analytical component of this thesis and help to evaluate the understated null hypothesis.

1.7.4 The scope of the study

The study sequentially examined the Foreign Direct Investment into crude oil exploitation and its impact on the economic growth and the environment. It identified the impact of oil industry activities on the environment. The study also discussed the diseconomies of environmental basis arising from oil industry activities as well as the prospective impact of these on environmental degradation, health and sustainable livelihood. Importantly, the study looked at the corporate social responsibility of the oil companies in the region and how effective was the companies' response to the large-scale destruction of the environment. The study discussed economic growth attained through the FDI and the trade liberalization policy of the government in the sector. The empirical analysis was made to show the effects of these policies on the standard of living and the environment in the Niger Delta region. In addition, the study explored the environmental regulation policies in the light of the externalities caused by the oil companies' activities and recommended that this should be mitigated. The research maintained that government should be capable of recognizing market failure and should put measures in place that will enhance economic instrument and enhance the market to adjust itself at little cost and make the best of the social welfare.

Compliance to environmental regulation was analyzed in respect to oil companies in the Niger Delta region. The study was divided into three parts according to the proposition, with the first one discussing externalities effect of FDI. The first proposition used semi-structure questionnaire. The second proposition discussed the FDI into crude-oil and trade liberalization policies on economic growth performance using the secondary data that spanned 1981-2010. In the third proposition, environmental regulation and its compliance were examined, using environmental tax/fine as a proxy for environmental regulation using data that spanned 1970 to 2008. The appropriate econometric instruments were used for the analysis.

1.8 The significance of the study

The research has been able to come up with some results and findings that lead to useful conclusions. These findings are significant to academics and researchers as well as practitioners in the areas of environmental economics and performance measurement of the oil companies. The study has several features that distinguish it from previous work. It has not only contributed to the existing literature on Foreign Direct Investment in the oil and gas industry and the environment, but has also advanced the link between economic growth and liberalization policies and the environment for sustainable livelihood.

This research noted the limitations of previous works devoted to the consequence of production on the environment, without developing models to solve the problem of sustainable development. The previous studies failed to show how increase in economic activities and the income generated can raise the standard of living and sustain economic livelihood.

The study discussed Foreign Direct Investment into crude oil exploitation and its economic and environmental consequences. The considerations for sustainability that suggest the welfare of the people should be equitable to growth and the enhancement of sustainable environment. It is a positive and normative approach to evaluate the degree of allocation of proceeds from oil and how it has been used to attain the goals and equity across people (Jim, 2006). Many criteria were used to approximate the effect of environmental loss and sustainable livelihood. This study focused on how economic growth could be achieved through the inflow of FDI in the oil industry and the attendant positive effects of improving the standard of living of the people. The study therefore analysed ways of reducing pressures on the limited environment carrying capacity for economic growth and equitable point using economic instruments where the welfare of the people would be enhanced.

Contribution of the Study in terms of empirical contexts and practice

- ✓ The study identified how oil exploitation encouraged the loss of fiscal control, inflation and then hampers price stability, disciplined resource distribution and poverty alleviation.
- ✓ Using the survey data, the study was able to revalidate adopted instruments for measuring externalities and the impact of the oil industry on the environment. The study also adds to the body of knowledge on environmental management practices and performance measurement practices.
- ✓ The study was able to identify gaps in environmental management in Nigeria.
- ✓ The government can manage the environment at reduced cost by adopting the methods suggested in the study and also pursue economic growth without causing problems to the environment.

1.9 The Organization of Study

The discussion of this study is organized in two parts. Part 1, comprising the Introduction and Chapters 2, 3, 4, and 5, presented the theoretical review and analysis according to the proposition. Part II of the study consists of Chapters 6, 7, and 8 and presented the empirical analysis, the core results, findings and discussion; while chapter 9 presented the summaries, conclusion and recommendation. In respect of the stated hypotheses, the thesis will be structured as follows:

Chapter two was devoted to literature review of the first proposition. It reviewed the theory of valuing the environment, optimal extraction policy, the externalities and environmental theories that ascertained the implication of foreign direct investment on the companies' activities in the area of study; there are sub-sections on modeling of market failure, foreign direct investment and environmental issues, and foreign direct investment and social responsibility.

Chapter Three reviewed foreign direct investment theories; resource curses theories, theories of economic growth and environmental quality, foreign direct investment policy and economic growth in Nigeria. Chapter Four, which looked at the theories of environmental regulation, gave special attention to theories of regulation; conventional solution to environmental problems, economic instrument for environmental management and Nigeria environmental policy and its enforcement

Chapter Five discussed the conceptual framework of the entire study and the interaction between the concepts. This was followed by the discussion of the relationship among the major concepts used in the study, namely: foreign direct investment theory, economic growth theory, environmental externalities, environmental regulation and sustainable livelihood. Chapter Six discussed foreign direct investment (oil companies) and social responsibility and provided research methodology framework used for the first proposition. It provided the theoretical framework based on the model used and explained the analytical framework of the study, research design, sources of data; econometric models and their identification strategies. All details related to the procedures used in the data collection were presented (sampling procedure, identification of the target population; sampling size, procedure for the development of measurement items) and discussed. The chapter also focused on the descriptive and econometric analyses of the propositions and on the discussion for proposition one.

Chapter Seven discussed economic growth and trade liberalization theories and the analysis for the second proposition. The finding and the discussion of the second proposition were carried out in this chapter. Chapter Eight followed with a discussion of compliance with environmental regulation with respect to gas flaring and other environmental issues in Nigeria as well as the findings of the third proposition. Chapter Nine begins with the summary of the major findings based on the three propositions and synthesized the discussion. Policy implication and conclusions were drawn according to the overall findings of the study. Suggestions were made for further research at the end of the chapter.

CHAPTER TWO

THEORY OF ENVIRONMENTAL VALUATION

2.1 Introduction

Despite some positive growth achieved in the country since independence it is believed that the economy is far from achieving sustainable growth (Stern, 1996). This is because most of the analysis of economic development and growth has failed to recognize the importance of environmental degradation to the long term viability of the Nigerian economy. In this vein, the strategy of achieving economic development must include valuation of the environment that leads to economic growth, poverty alleviation and sound natural environmental management.

The evaluation of the environment must include the welfare of the future generation should not be as important as the welfare of the current generation. The stock of renewable resource should be maintained and the economy should save over and above the depreciation rate of both man-made and natural capital resources. The serious degradation and pollution of the Nigeria ecosystem suggests the need for valuing the environment by pursuing the policies that would help to ameliorate the current adverse environmental condition for the survival of the people (Elif - Akbostanc *et al.*, 2009).

In this chapter we reviewed the theory of valuation of the environment as related to natural resources exploitation in Nigeria. The concept of value in Economics associates price with obtaining good and services by the individual. The basic concept of supply and demand is employed to estimate willingness to pay, usually called producer surplus and consumer surplus respectively. The ideas of value and its measure remain consistent whether a market or the state of the environment is at stake. Conversely, environmental valuation and its services are the principal bases of Environmental Economics. Degradation and over exploitation of environmental resources are always caused by lack of economic valuation of environmental goods.

Section 2.3 emphasized the valuation of the natural resource stock and its specification. The resource stock used in the production process is considered as a factor of production and is treated as an asset particularly as a stock of capital. The section reviewed the firm analysis capability and natural stock abundance effects on the production, the environment and the level to generate the extractive flow. Conventional inputs such as labour, energy and capital, are structured upon predictable resource stock levels to generate the extractive flow. Section 2.4 reviewed the literature on resources extraction theory based on what determines the rate of resource extraction using the Hotelling model. Section 2.5 which discussed the optimal extraction policy and reviewed aggregate exploration extraction model, demonstrated the competitiveness of the firm in extraction and exploration decision. The section tried to model the extraction as a process of balancing marginal extraction cost.

Furthermore, section 2.6 discussed the externalities and environmental theories and reviewed the environmental effect of the oil industry activities. Also, FDI and the characteristic extractive nature of the oil and gas industry made the environment all-encompassing in term of implications for sustaining development. The environmental diseconomies from oil companies' activities and the attendant impact from these activities were appraised. Still in the section, market failure modeling and its circular flow model of free market mechanism was analyzed and found to eliminate the inefficiency in the pricing system. In circular flow of the material balance model, the economic activities generate residual that can reveal how pollution is a market failure that alters the classical market outcome.

Moreover, section 2.8 reviewed Foreign Direct Investment and the environmental issues. Considering the importance of FDI in increasing the existing capital and improving the standard of living, FDI impacts the economy by helping in the acquisition of new technologies and method of production and opening the local economy to the international market. The chapter also reviewed the externalities cost and benefit of FDI to the environment and the people of the Niger Delta. This session also reviewed environmental degradation arising from oil company's operations and the impact on the environment. Section 2.9 concluded the discussion on the theories of valuing the environment, market failure modeling and FDI and environmental issues.

2.2 Theory of valuing environment

The term valuation in Economics is the price individual is willing to pay in order to obtain goods and services. The basic economic concept of supply and demand is employed to estimate willingness to pay, usually called producer surplus and consumer surplus. The ideas of value and its measurement remain consistent whether a market or a state of the environment is at stake (Andreas *et a*l., 2012).

Goods and services which are exchanged are measured in terms of their market price and value assessment. However, most of the goods and services like clean air and water resources are not generally valued. The deficiencies in environmental market for environmental services are the most important instances of market failure. The degradation and over exploitation of resources is always caused by lack of economic valuation of environmental goods. However, environmental economic valuation and its services are the central basis of environmental economics (John, 2008).

Rudolf (2002) argued that the allocation of limited resources in the face of unlimited wants, that is, the scarcity of resources, is relevant to the environment's valuation. The fundamental approach of valuation of the environment is the adaptation of the goods and services that the natural environment makes available. Economic valuation is the technique of categorizing the appropriate adjustment in supply and demand arising from a transformation in the quality of the environment, and the changes in the environmental resource provision. For instance, using a river as a waste disposal facility implies an opportunity cost of lost recreation and wildlife benefits, since the river has been polluted.

Furthermore, environmental valuation is one of the major ways of obtaining empirical estimation for environmental assessment. In addition, way of valuing the gains of enhancing river water quality and foremost approach use is based on the concept of Total Economic Value (TEV). The Total Economic Value is generally divided into three groups of value: 1) direct use value; 2) indirect use value; and 3) non-use value. The first two groups are jointly denoted to as "use value" (Richard *et al.*, 2003).

The Direct use value is deduced from goods which can be extracted, consumed or from which consumers directly get pleasure. The non-extractive use value is referred to as indirect use value that an environmental resource provides the services. The key economic principle is to measure the economic value based on the principle of scarcity, allocation of limited resources and principle of efficiency and equity for willingness to pay (WTP) and willingness to accept compensation (WTAC).

Given that resources are scarce and using them in one way implies an opportunity cost, the values of particular resource use can be measured in term of the sacrifice people make in their willingness to have it. At the most general level, the sacrifice is in terms of income, so WTP makes sense as a measure of economic value. These measures are sensitive to changes in the distribution of income. According to Robert, (1997), the difference between WTP and WTAC for most goods should be small and should depend on the relationship between incomes and demand, and on how much of one's income was spent on the goods. Jie & Wang (2012) noted that the differences in term of how goods are substitute exist in a commodity, if there are no good substitutes, and then we could expect large differences between WTP and WTAC. If close substitute exists, then WTP and WTAC should not be that different. Therefore choices should be preferably being made in terms of allocation of property right. If people have right to the current level of supply of goods, then should not ask their WTP to prevent a reduction, but instead ask how much compensation they will demand to agree to this reduction.

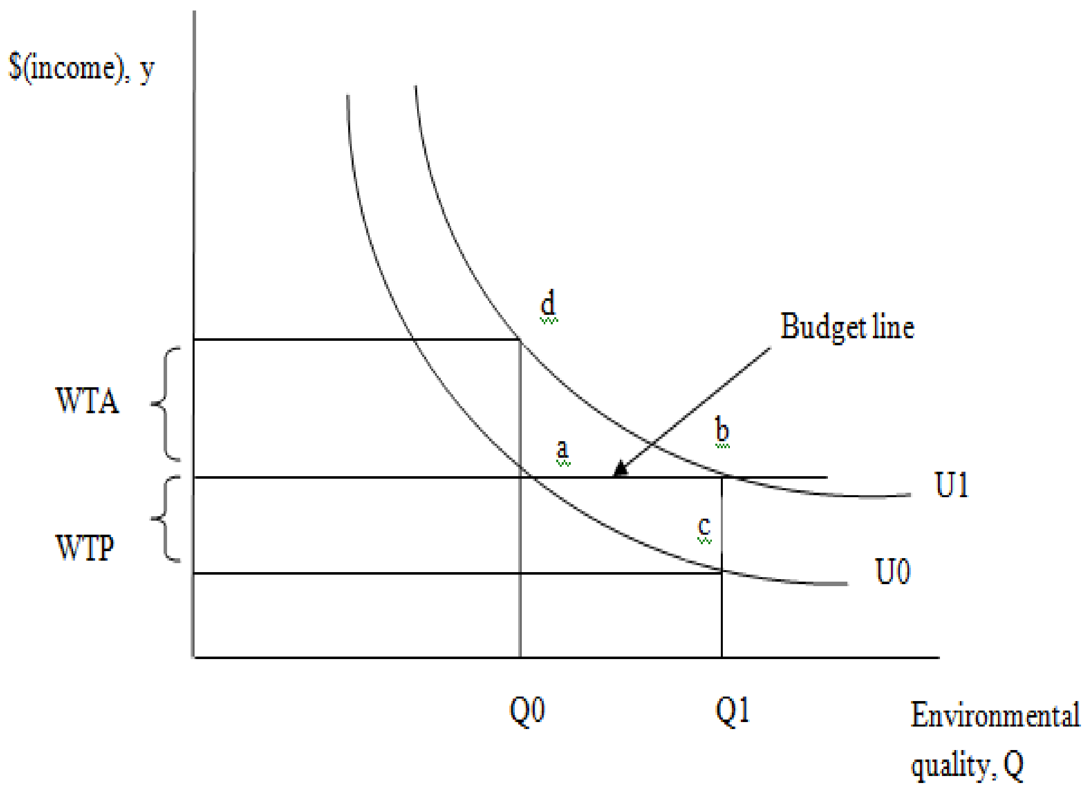


Fig 2.1: Environment Quality.

The figure above shows the derivation of WTP and WTAC for an individual who has offered an increase in environmental quality from Q_0 to Q_1. This utility is shown as being a function of two things, environmental quality, Q, and income, Y, given curves U_0 and U_1 as the indifference curves. They have the right property that along a given indifference curve, utility is constant, and thus this individual is willing to swap income for the environmental quality. The indifference curve is away from the origin, which is the higher the level of utility, thus U_1 is greater than Q_0. Starting at point a, with income of y and environmental quality of Q_0. Suppose environmental quality increases to $Q_1$with the same income, the individual moves to point b, on a higher indifference curve which is thus better off. What is their maximum willingness to pay for this increase in environmental quality? This is the most income they could give up from point 'a' and still have utility equal to U_0. This amount is the vertical distance labeled WTP in the figure, which is the distance (bc).

This diagram can also be used to work out the minimum compensation the individual would have offered to forgo the improvement in environmental quality. Starting at point b, if income rises by the amount shown as WTA, this keeps the individual at utility level $U_{1,}$ even when environmental quality stays at Q_0. The difference *(da)* is equal to WTA. The WTA is greater than WTP in the diagram.

Valuation of the environment is the practice of committing monetary values on environmental goods and service, many of which have no easily practical market prices. Environmental good and services comprise scenic views, biodiversity, coral reefs, and mountain landscapes. Environmental good and services also comprise indirect processes, such as water supply and watersheds, erosion control and forest ecosystem conservation, and sustenance of genetic material. In order to value these goods and services, Clive & Arild (2006) developed valuation technique which classification is as follows: first, there are some techniques that are based on productivity and production like forestry, agricultural lands, forestry, fisheries or human health. Secondly, there some techniques that are based on estimate values by applying survey-based information called “stated preference” methods which are generally referred to as Contingent Valuation Methods (CVM).Thirdly; there are supplementary techniques that apply hedonic markets to estimate values. These comprise property value approaches and land value approaches which are revealed preference. Fourthly, there are Surrogate market approaches, such as the travel cost method which is another revealed preference approach. These techniques are well developed, universally used and relatively strong (John, 2008).

2.3 Specification and Valuation of the Resource Stock

Common-property on natural resources has traditionally been treated like any other input in a neo-classical production technology. Beginning with (Scotta, 1954), the common-property resource stock has been used in the production process as a factor of production and was treated as an asset, particularly as a stock of capital. This approach was applied to both renewable and nonrenewable resources.

McFadden (1978) developed an approach within the framework of the firm's production possibilities set, treating environmental parameters (such as resource abundance) as being similar to disembodied technical change. Also, resource stock places a maximum limit upon the extraction rate. Proper valuation of the common-property resource stock depends upon the specific property-right structure governing its use. The resource externalities associated with a firm’s social cost have private costs along with extraction costs factored into the firm's optimization problem. Market prices, which include the marginal user cost of the resource, are an element of the full extraction cost. Similarly, the cost of user is explicitly considered as a cost when property rights are not assigned but the emphasis is given to social evaluation of productivity growth.

Jie & Wang (2012) argued that in social valuation, surveys are widely used to provide information about the attitudes, concerns, and values of the public on a range of issues related to the management of natural resources. General attitude and opinion surveys have tracked dramatic changes in national environmental concerns. Many detailed surveys have provided insights into the environmental values associated with specific policy initiatives and regulations.

Allie *et al.,* (2012) noted that the means of collecting information about environmental choice surveys, expressed the tendency of reflecting participants' support, opposition or approval of well-understood policies. The surveys also provide analysts with the ability to ask direct questions about the economic value of specific targeted environmental resources, thereby providing information that can be used as part of benefit cost analysis of project and programme alternatives or economic assessments of resource losses.

Contingent Valuation Methods(CVM) is the most widely-used Economics survey approach and is typically a random sample of public respondents, whether in light of the associated benefits and costs, a specified environmental policy initiative that should be undertaken(Peter, 1997).For example, after providing a detailed description of the problem, a CVM survey might ask whether the participant is willing to pay $X in additional taxes for a stated improvement in a specific environmental-quality objective, such as water quality, visibility or species protection.

An economist derives value from the scarcity and usefulness of resources in meeting human needs and aspiration. Valuation of scarce economic goods facilitates rational (optimal) choices about the use of these goods by economic agents. However, economic theory stated that under conditions of perfect competition, there is no need to search for appropriate values (Vernon, 2003). In this situation, existing market prices reflect accurately relative scarcities and the most efficient use of a good by the final consumer at a particular distribution of income. However, the conditions described above hardly exist in reality due to oligopolistic and monopolistic influences and externalities, specific instances of which are the environmental impacts and ignorance about comparative qualities of goods and services. Also, existing distribution of income may be far from desirable. The observed market value may reflect a situation of allocation inefficiency and inequity. The observed prices are no more indicative of relative scarcity (Jos, 2006).

The externalities of environmental destruction and degradation provide further facts to those who doubt the relevance of conventional economics to long-term policies of sustainable growth and expansion. An environmental economist therefore seeks to incorporate into their value system the scarce environmental goods and services. The consumer can thus be encouraged to disclose their favourite for environment services or service deprivations in monetary terms (Allie, 2012).

The deficiency of markets for this classical public good, supply and demand curve is predictable, if not stimulated. Therefore, the economic value concept is to take account of the environmental concerns. The economic values of environmental concerns can be categorized into direct (for current production and consumption) and indirect (for ecological support) use values of environmental functions, as well as non-use (alternative or existences) values consequential from the understanding about conserved ecosystem.

2.4 Optimal extraction policy

The most important economic model which addresses the question of what determines the rate of resource extraction is the Hotelling model. For instance, all firms want to maximize the present value of their profit, where profit is the net price of oil times the quantity extracted. Suppose that, for the time being, oil can be produced at zero cost. The problem faced by firms is how much oil is supplied at each period. The use of a present value of profit implies that delaying oil extraction has an opportunity cost in term of the return (r) that the money tied up in oil reserves could earn from alternative investments.

Therefore, the proportional price rise of oil equals the discount rate. Hotelling‘s rule predicts that oil price will rise through time. What actually derives the price increase will be the market demand combined with all firms reducing their output through time. Collectively, firms will continue extracting at each period until they expect the above condition to be met. This is the basic condition to determine the price and the basic condition to establish the price and the quantity of oil pumped at each period (Hans-Werner, 2008).

To determine the life cycle of oil reserves, there is a need to know the initial stock of oil and the price at which demand falls to zero. The price at which demand falls to zero is known as the backstop price and it can be interpreted as the price of a substitute for the non-renewable resources. In the case of oil, it might be the price at which demand switches to a renewable alternative. Once the backstop price and the initial stock on the basis of Hotelling rule are known, the price and the quantity can be calculated through time.

In the socially optimal resource extraction plans obtainable when the discount rates reflect the current generation's preference for resource use through time. If this is accepted, as long as the discount rate is the social time preference rate then the resource extraction path is at least efficient. If a firm faces imperfect capital market and interest rates or return on other assets are distorted, this may lead to extraction of the non-renewable resources either too rapidly or too slowly. In many countries the interest rate tends to be higher than the rate of social discount due to the inclusion of a premium to cover the risk. Therefore, this implies that firms may be inclined to extract a non-renewable resource too rapidly. This is predicted by the Hotelling's high discount rates rule which leads to a more rapid equilibrium raises in the price and a more rapid decline in the rate of extraction and rapid exhaustion (Rob-Hart, 2012).

An extraction cumulative model is presented when the aggregate model in the sense of the theoretical competitive firm makes most favourable extraction and exploration decisions with respect to reserves aggregated over many deposits. The firm with complete property right assume to acquire exogenous prices, which it can maximize the present value of profits from exploration and extraction operations, which is given by

$$\pi = \int_0^\infty [Pq - C(q,R) - wv]e^{rt}\,dt \qquad 1)$$

Subject to

$$\dot{R}(t) = \dot{X}(t) - q(t); R(0) = R_0, \qquad 2)$$

$$\dot{X}(t) = f[v(t), X(t)]; X(0) = X_0 \qquad 3)$$

In equation (1), P is the price of the extracted resource, w is the unit cost of exploratory effort, r is the discount rate, and C(q, R) is the aggregate extraction cost function. Equation (2) states that the change in aggregate remaining reserves, R(t), is the difference between discoveries, X(t), and extraction, q(t). Equation (3) indicates that the discovery rate depends on exploratory effort v(t), and the level of cumulative discoveries, X(t).

If the usual assumption is made that CR < 0, a number of results follow. First, the major incentive for undertaking exploration in the model is its downward impact on extraction costs. In addition, CR < 0 implies that exploration has a negative influence on market price, a relationship that obviously in the restrictive case of the cost function, C(q, R) = q C(R). Under this assumption, the equilibrium path is

$$\dot{P} = r[P - \overline{C}(R)] + \overline{C}_R(R)\, f(v, x). \qquad 4)$$

If initial reserves are small, then $\overline{C}_R$ will be large (in absolute value), so that small increases in reserves will reduce extraction costs by a large amount. In this case, there is likely to be a period of time when the price decreases. This result has given support to the argument that price paths are U-shaped.

However, the aggregate model can be said to be $\overline{C}_R$ < 0. Although extraction costs tend to rise as reserves are depleted at the intensive margin, these costs also rise as reserves are added at the extensive margin because of the tendency for the best (least costly) deposits to be found first. But since the change in total remaining reserves is the sum of the change at both margins, extraction costs may be either positively or negatively related to the change in aggregate remaining reserves. If CR > 0 because of the dominance of cost effects at the extensive margin, then the main incentive for exploration in the model is lost, price must rise over time in order to satisfy the equation (4) and the model no longer predicts the possibility of a U-shaped price path.

John (2008) tested the hypothesis that $\overline{C}_R$ < 0 using annual aggregate data for the oil extraction industry in Alberta, the major oil-producing region in Canada, for the years

1951-82. Aggregate extraction costs were calculated as the sum of annual operating and capital costs and were converted into real terms. Data for the proven level of oil reserves in the province were used for the reserves variable. The results allowed strong rejection of the hypothesis that $\overline{C}_R < 0.3$.It found a significantly positive relationship between costs and reserves, suggesting that the assumption CR > 0 would be more credible for this set of data than the assumption that has gained acceptance in the literature.

The attempt to extend an aggregate setting to the observation of an inverse relationship between remaining reserves and extraction costs in an individual resource deposit is incorrect. This causes the conclusions of the aggregate model ranging from the basic motive for exploration to the price path of the resource, to be questioned.

Steven(1983) argued that modeling exploration and extraction in this way provide new insight into understanding exploration as a process of balancing marginal extraction costs plus user costs between the intensive and extensive margins. Exploration is a source of increased production that is an alternative to increased exploitation of existing deposits. The preconceptions in the rate of extraction and interest facing dissimilar firms are different. Then the rate at which they would like to extract the natural resource will be different. It is clear that market equilibrium will entail the firm with the highest rate of interest extracting first with the price rising at its interest rate while he is the producer.

Whether the recent rise in the price in oil can be attributed to the factors discussed above remains a controversial question. It might be argued that in this case, governments involved have less access to the capital market than the large oil companies, so that the relevant rate of interest after cartelization was higher; if the oil companies had a notion that there was a significant probability of nationalization, they would have pursued a policy of excessively fast extraction. Rob-Hart (2012)argued that there are firms which produce different extraction costs and apparently different rates of discount simultaneously, this development can be attributed to: (a) cost of marginal extraction is similar, even though regular cost extraction is not; (b) offsetting effects of extraction costs and rates of time preference with low cost of extraction being related to slow down rates of interest; (c) firms (countries) do not face a constant rate of interest which they can lend, borrow or invest; (d) differences in approach towards and judgments of the risks involved in postponing extraction. Tax policy has provided further biases in the rate of extraction between the market solution and the optimal rate of extraction. The most important provisions and the special treatment of capital gains and the depletion allowances may not affect the relative rates of extraction of monopoly and competition.

Lawrence (2010) indicated that, if extraction costs were zero a constant depletion allowance would have no effect on inter-temporal allocation. Since price is growing at the rate of interest, the value of the depletion allowance in present discounted terms is independent of when the oil is depleted. Hence, with the constant elasticity of demand, intertemporal resource allocation of monopoly and competition with and without the depletion allowance are all identical. With positive extraction costs, the depletion allowance encourages excessively fast depletion since rents are rising at the rate of interest. In this situation there are prices are rising but at a slower rate than the rate of interest, though with the present discounted value of the depletion allowance declining.

2.5 Externalities and Environmental Theories

The environment is frequently used to infer to the circumstances in which we live. Composite asset provides a variety of services with which economics view the environment. This asset provides raw materials and energy in the form of input to the industries which are used in the production process. The by-products of these production processes ultimately return to the environment as waste products. Indeed, the environment is a form of social capital which the society manages if it is to maximize its welfare (Adams Jaffe *et al.,* 2000).

The modern extractive industry and its environmental effects have attracted the attention of several researchers in the past. The implication remains sustaining development in an economy from which the main source of environmental diseconomies arises from oil industry activities and their environmental impact. All the major oil companies operating in the Niger Delta have expressed a commitment to sound environmental practice in an area in which they work. On the contrary, oil majors' activities have been known to be destructive on a monumental scale to both to the environment and the means of livelihood of the Niger Delta people living in the oil communities (Onosode, 2003, and Orubu, 2002).

By 1992, the global damage to the human environment had reached a crisis point and this prompted the United Nations (UN) to hold a Conference on Environment and Development with a view to putting in place viable strategies and modalities for alleviating the global damage to the ecosystem. The environmental crises have become perceptible to all because pollution has become a global problem (Usoro, 1998). The value of life and the prospective for sustainable development are being severely constrained by environmental degradation in societies across the earth. The damage to biodiversity and the environmental services and the risk pollution poses to the region's water supplies have become glaring. This is assertion from the Organization for Economic Cooperation and Development (Onosode, 2003).

Environmental problems became prominent in Economics literature around half of the twentieth century. Long before this period, Marshall 1890 had analyzed environmental benefits that accrue to economic identities through general industrial development. The concept of externalities contains the key to the economic analysis of environmental problems. The advantages referred to by Marshall are enjoyed free of charge by businessmen and the outside market. Pigou (1920) aptly pointed out that the concept of externalities is a double-edged sword containing not only benefits as Ricardo has hypothesized but costs as well. He made clear that not only could the production conditions of third parties be influenced outside the market, but that the welfare of private persons could also be seriously affected both in cost and in benefit terms.

According to Kula (1992), the first substantial treatment of externalities was offered by Kapp (1950) who predicted the accomplishment of undesirable cost of growth of the economy on the environment. The social cost which is defined as all direct and indirect burdens imposed on the third parties or general public by the participant in economic activities is the central point in Kapp's analysis. He explicitly mentions all costs emanating from productive processes that are passed on the outsiders by way of water and air which could have harmful effect on health, reduce agricultural yield, accelerate corrosion of materials, endanger aquatic life, flora and fauna, and pollute drinking water.

It is instructive to argue that environmental costs are frequently externalized for lack of clearly defined property rights. This is because most environmental resources share the traits of public goods and some suffer uncontrolled and excessive exploitation for coming under common property right. Insecure land tenure is bound to discourage long term investments; therefore, well-defined property right is a dimension towards enforcing appropriate environmental behavior. These arise essentially because of scarcity of all resources in the economic system (Richard & Krugman, 2004).

Externalities occur when economic unit's activities such as firms or consumers impinge on the consumption or production of another component, and where the benefits of costs that build up components do not usually go into the gain or loss estimation. In other words, these effects are noticed and are left un-priced; hence the bearers are normally uncompensated in the private market environment. If externalities are priced and bearers are compensated, then they are said to be internalized (Collin, 2007). Baumol & Oates, (1988) pointed out that market failure is a very broad issue that occurs in many areas of economics. They favour the approach taken by Buchanan & Stubblebine, (1962) in which externalities are defined not in terms of what they are but in terms of what they do, given the contravention of the optimum allocation of resources conditions in the economy.

Kula (1992) following Hartwick (1977) identified the distinction between private and public externality. Kula explained that a private externality is typically bilateral, or involves relatively few individuals whose agent's action affects the actions of another agent, but where there is no spillover on the other parties. The key characteristic of a private externality is that the agents involved may be required to be fully appropriated by the external effect.

In their study, Thomas *et al.* (2006) noted that public externality arises when a natural resource is used without payment and its use by one agent does not reduce the quantity obtainable to others. The quality of the natural resource may be affected, however, owing to the use-as-you-please principle. Air and water pollution is an example of this kind of externality. It is only of recent in Nigeria that social scientists began to concern themselves with the existence of and distinction between private and public externalities. From the points of view of the authors cited above, there is a need to plough back some of the benefits accruing to these firms and companies to the communities that have been impoverished as a result of destructive operations of the oil majors. The absence of this kind of incentives to the host communities would lead to confrontation between Nigerian government, oil companies and the host communities.

2.6 Modeling Market Failure

In the circular flow model, free markets provide desired goods and services to the market, resolve shortages and surpluses and eliminate inefficiency through the pricing mechanism, all without government's intervention. This is given that demand side and the supply side are not motivated by benevolent goals but rather are driven by their own self-interest. This can be deduced from Adam Smith's "invisible hand," whereby the market outcome emerges as though consumers and firms are guided to make decisions to enhance society's well-being. Recognizing the efficiency and welfare implications of a competitive equilibrium emphasizes what is at stake when persistent pollution, for example, impedes the market process that underlies it (Scott &Thomas, 2007).

Give the circular flow in the context of the material balance model, economic activity generates residuals that can impair natural resources, which is why pollution persists in the absence of third party intervention. The most immediate reaction is that pollution is a market failure that distorts the classical market outcome.

Classical microeconomic theory predicts efficient results given certain assumptions about cost stipulation, pricing, entry barriers and product definition. If any of these assumptions fails to hold, market forces cannot operate freely. Depending on which assumption is violated, the result will be any of a number of inefficient market conditions. Collectively termed market failures, these inefficient market conditions include imperfect competition, imperfect information, public goods and externalities. For instance, if the assumption of freedom of entry in the competitive model is relaxed, some degree of market power will develop. As this occurs, society's welfare declines, and resources are allocated inefficiently (Alan, 2007).

Economic assumption indicates that price is a more essential indication mechanism in the market process. Symmetry price indicates the marginal value that consumers allocate goods, and firm acquire marginal costs in producing the goods. Under ordinary conditions, this theory predicts the realities of the market remarkably well. However, prices fail to capture all the benefits and costs of a market transaction. Under the condition above, market failures occur when a third party is affected by the production or consumption of a commodity. Such a third-party effect is called an externality (Thomas, 2010).

So, the third party generates cost that has an external effect called a negative externality. However, when a third party generates benefit from external effect, this is positive. Common to both is the spillover effect that occurs outside the market transaction. This effect is not captured by the price of the commodity being exchanged. If price does not reflect all the benefits and costs associated with production and consumption, it is unreliable as a signaling mechanism and could cause the market to fail. The consequence is that scarce resources are misallocated. If consumption generates external benefits, the market price undervalues the good, and too little of it is produced. If there is a negative externality, the market price does not replicate the external costs and too much of the commodity is produced (Scott & Thomas, 2007).

Thus, externalities impair the overall quality of life, natural resources, atmosphere, and water supply. The classic case is the negative externality associated with production.

Environmental externalities are those affecting air, water, or land, all of which have public goods characteristics. A wide section of society is affected by externality and if its effects are non-rival and non-excludable, the externality is itself a public good. Technically, if the externality provides benefits to a large component of society, it is public good; if the case is opposite, the externality is a public bad.

Torstein & Annegrete, (2008) maintained that to achieve allocation efficiency, consideration must be given to external costs when finding equilibrium price and quantity. To accomplish this, marginal external cost (MEC) is added to the firm's marginal private costs *(MPC)* to derive the marginal social cost (MSC) *MSC = MPC + MEC.*

The *MSC* is relevant to decisions in production because it appropriates total costs of developing crude oil by private costs of production and the external costs of environmental damage to society. On the demand side, there is a related benefit relationship, called the marginal social benefit (*MSB),* which is the total of the marginal private benefit (*MPB)* and any marginal external benefit (*MEB*). Because it is assumed that there are no positive consumption externalities, the *MEB* is zero; therefore, the *MPB* equals the *MSB* in this case. Once determined, *MSC* must be equal to *MSB* to solve the efficient equilibrium price (P_E) and the quantity (Q_E).

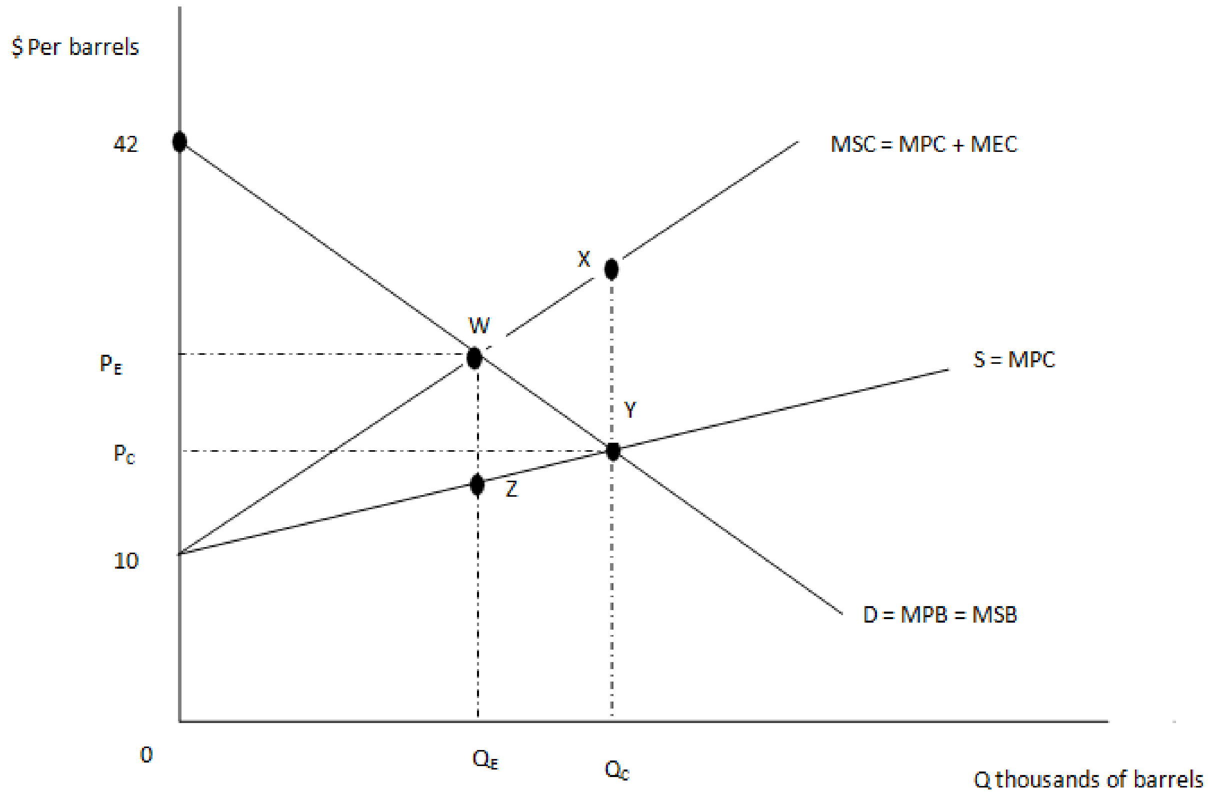


Figure 2.2: Environmental Economic Application Efficient equilibrium
Sources: Adapted from Thomas Callan, 2010.

Efficient equilibrium*:* MSB = MS
MPB + MEB = MPC + MEC
MPB – MPC = MEC (since MEB = 0)
Mπ = MEC

The competitive equilibrium in the presence of a negative externality is characterized by an excessive allocation of resources to production. In this scenario, the competitive price is too low because the *MEC* is not captured by the market transaction. The graph shown above presents MSC curve as the vertical sum of MEC and *MPC* curves. The intersection of *MSC* and *MSB* identifies the efficient equilibrium at P_E and Q_E. In the graph the competitive equilibrium at P_C and Q_C which corresponds to the intersection of *MPC* and *MPB*. It should be noted that at $Q_{C,}$ *MSB* is below *MSC*. This signifies that society is giving up more in scarce resources (environment) to produce crude oil than it gains in benefits from consuming it. To restore the equality of *MSB* = *MSC*, signifying allocated efficiency, output must be decreased which is exactly what is predicted by the theory.

The significant conclusion of the preceding analysis is that efficiency in the market would improve if the outputs are reduced. This adjustment in output would increase society's welfare. To illustrate this, the *MPC*, *MSC* and *MPB* curves are reproduced. This model has been used to consider the separate effects on the firms and on society associated with this output restriction. From the firm's perspective, there is a loss in profit. Notice that as Q reduces the firm loses profit, measured as the excess of *MPB* over *MPC* for each unit of output. Adding all the $M\pi$ values between Q_E and Q_C defines the triangular area *WYZ*, which represents the total loss in profit. However, from society's vantage point, there is a gain equal to the accumulated reduction in MEC associated with the output decline. This reduction in external costs represents the decrease in health and ecological damage. Geometrically, this gain is shown in area *WXYZ*. On net, society gains from the triangular area *WXY* as efficiency is restored. The movement to the efficient output level achieves a welfare gain even if it does not entirely eliminate the externality. Firms are still generating pollution at $Q_{E,}$ than it would be at Q_C.

In summary, if production of good yields a negative externality, inefficient solution will be yielded by the market with too many resources allocated to production. If that externality is somehow accounted for within the market (internalization), society as a whole would gain. Of course, the operative issue is how to account for externalities such that efficiency can be restored.

John (2009) provided a general solution to externalities by internalizing the externality such that the environment experiences an upset, that is, the market players are forced to take up the external cost or benefits. Granting of property rights is one of ways this can be done. In the model, when the firm owns the rights to pollute, the recreational users internalize the externality through their payment offer. Conversely, when the recreational users own the rights to clean the water, the refineries internalize the external cost by paying for the right to pollute. The right gets assigned in practice by the governments which determine as well as enforce limitations on the rights for the good of society.

Pollution as a negative externality is considered to have a damaging effect on environmental public goods and could constitute conditions that impede natural market forces. The root of the dilemma is the absence of property rights. The result is a misallocation of economic resources and a decline in society's welfare. Some third-party mediation, typically a government, is needed to correct the market failure and reach an efficient equilibrium.

Ezra (2011) argued that policy failure is one of the causes of environmental degradation blamed on the government's inability to correct market failure by public sector economists. Regrettably, policy failure results when government actions or policies create disincentives for sustainable environmental resources management. Price distortions, which often affect the environment negatively, include input subsidies, energy subsidies, interest rate ceiling and corporate income tax exemptions. It is useful to appreciate policy failure as having a wide impact on the macro economy in the sense that such failure needs not be found in the environment-related sector before it creates incentives for overexploitation of natural resources.

Darren*et al.,* (2003) pointed out that artificial trade alterations contribute to possibility of reducing welfare for consumers. However, in a system with compound price changes, analytical potential become ambiguous and compounded. At the level of policy formulation, reduction or outright elimination of distortions in prices to reflect more closely private costs will be required to encourage resource conservation, and hence, bring about an end to environmental damage. Policy and market failure are institutional failure which occurs when governmental apparatus, otherwise known as institutions, are either poorly designed, are not well coordinated or do not exist at all.

Georgina (2012) identified institutional failure as a distinct problem of the environment. It cannot be denied that there is no watertight compartment between institutional failure and policy failure. Policy failure (Governmental policy) is sometimes quoted as the root cause of both institutional and market failure as expressed in the argument that government has no serious business in economic management other than to create a level-playing ground for economic agents. If the government is able to track down policy and market related problems, it is likely that the institutional issues would have been taken care of, more so that most important economic institutions exist to alleviate agency problems which can only be recognized through policy and market dislocation. Environmental degradation affects societal welfare even when individuals are better off in the process. Therefore, the challenge for environmental issues is how to eliminate the net loss in social welfare arising from consumption and production of environmental services.

The challenges are more acute when it is realized that a trade-off between environmental management and economic growth seems to exist, particularly for developing economies whose growth and development process seems to rely substantially on natural resources. This tradeoff between growth and environmental quality cannot be denied, and has thus become a matter of how well to search for the right choice for environmental management as an economic and allocation problem.

2.7 Foreign Direct Investment (FDI) and Environmental Issues

The Foreign Direct Investment is significant to the prospect of enhancement of Nigeria's economy profiles as a system of increasing the existing capital for savings, growing the least deficient economy and elevating the values of livelihood. Furthermore, advancement of economic activities helps in the development of skilled manpower and attainment of new technological methods of production. In addition, FDI makes access to global markets easier, improves the effective of use of resource, reduces waste and pollution, facilitates recycling and creates diverse production range (Peter, 2004). Furthermore; there is a long-run positive significance of the marginal impact of inflow of FDI on GDP growth in Nigeria. The tangible impact on the environment may be bigger for the reason that emission is one of the main pollutants generated by economic activities.

Nevertheless, absence of legal provision or weak and poorly enforcement of has been responsible for the laxity in regulating the exploitation of natural resources in spite of increased foreign investment to accelerate sustainable resource use patterns. The capacity of the developing countries to attract FDI is hinged on taking full advantage of the related benefits and reducing the risks involved, though this is contingent on the effectiveness of government's policies and institutional frameworks (Kasim, 2008).

Furthermore, both scale effect and composition effects can be generated by the inflow of Foreign Direct Investment in the short run. Emission and resource depletion caused by large-scale effects of the production bring in greater economic activity by FDI. From another point of view, the composition effect alters the share of dirty goods in the GDP because of a price change promoted over their production. The growth in income may also have a positive effect on a long run on the environment by changing the demand relatively towards goods that are clean.

Joysri (2009) has maintained that reducing pollution emission might cause the fall in the allocated output of pollution-intensive goods. If there is no change in the strength of emission in an industry with a constant scale of the economy, the effect would reduce the total pollution. The scale effect of low income and output seem to be prominent and leads to degradation of the environment due to inflow of FDI. Nigeria has experienced speedy economic development after adopting liberal economic policies during the past few decades. Effective environmental regulations especially industrial pollution has the tendency to enhance the economic advancement of the nation.

2.7.1 Environmental Degradation and Pollution in Nigeria

The expression pollution has various implications under the Nigerian law. Section 41 of the Federal Environmental Protection Agency Act Cap.F10 Laws of the Federation 2002 delimitate ‘pollution’ to signify: “man-made or man-aided alterations of chemical, physical or biological quality of the environment to the degree that is injurious to the environment beyond acceptable limits.” The oil pollution that occurs as a result of, or in the course of the extraction, storage or transportation of petroleum oil as is the discharge of pollutants associated with the environment through extraction of crude oil come under pollution (Jeroen, & Bergh, 2009).

The origin and sources of environmental degradation in Nigeria are found in many of the factors that have been described by some social scientists as ‘’the engine for economic growth’’ Rao, (1952); Bruton, (1955); Lele, (1989); Ojo (1991) and Iniodu (1997). These sources include, among others, deforestation occasioned by increased demand for firewood, strip-mining for coal or minerals, explosive birth rate, excavation for crude oil and wide spread of industrialization. These have led to reduction of the value of ecosystem.

Approximately, reports on spillage from the Nigeria National Petroleum Corporation indicate a geometric rise in incidents of spillage between 1976 and 1996 where a total of 4,835 incidents resulted in the spillage of at least 2,446,322 barrels (102.7 million US gallons), of which an estimated 1,896,930 barrels (79.7 million US gallons; 77 percent) passed to the environment as pollution (Onakuse & Eaman, 2007). The main causes of oil spillage in the Niger Delta include poor maintenance of the machinery and pipelines carrying the oil. The spillage involves dangerous release of hydrocarbons such as benzene and polynuclear aromatic hydrocarbons into the soil and water sources. Spillage on the waterways spillage and vast land pollute not only marine life but crops and the sources of water for household uses. The mangrove forests, when exposed to oil spill, soak up the oil in the soil and then re-release it at each raining period.

According to Oshwofasa, et al. (2012), when spillage occurs, it spreads out onto farmlands and water bodies. The toxic crude oozes into the soil and is taken up by the roots of plants, thus lowering soil fertility and causing poor growth of plants. Oil prospecting and exploitation for years in the Niger Delta has destroyed the ecosystem of the region. This has led to the deterioration of political, economic and social structures in the region. This challenge has made conflict a thriving and big business with serious implication for prospects for developmental. Figure 2.3 below shows the level of occurrence and the volume of oil spillage and the quantity recovered from 1976 to 1996.

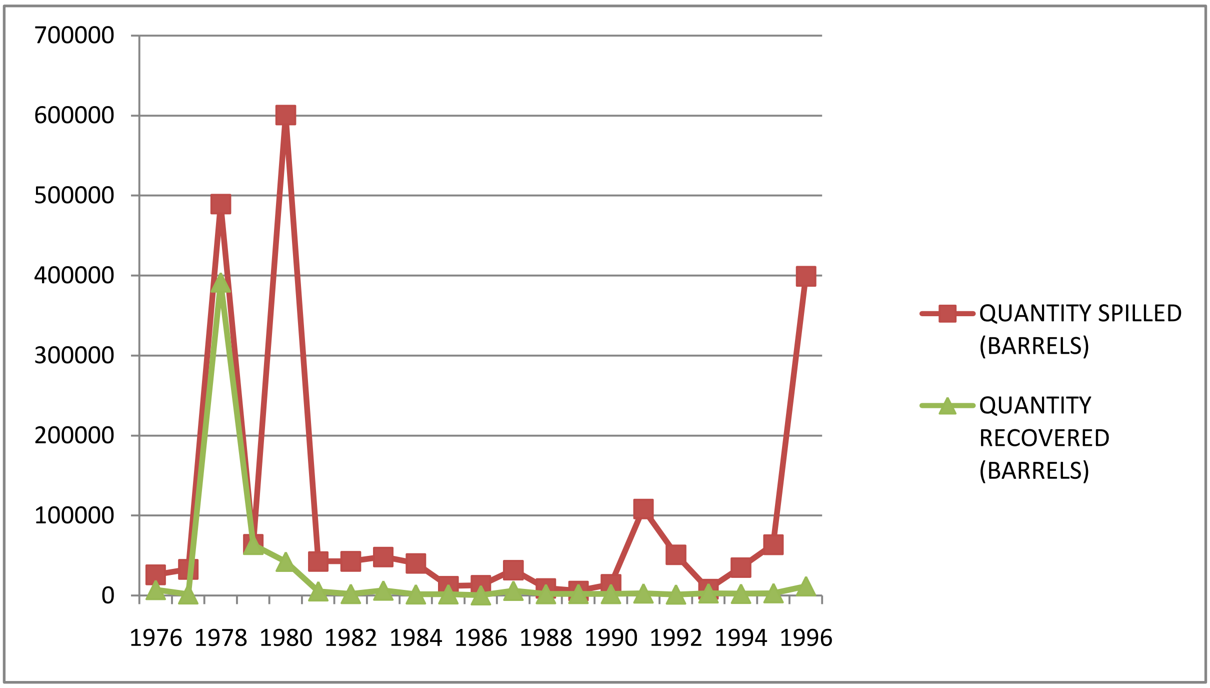


Figure 2.3: Oil Spillage Occurrence

Sources: Department of Petroleum Resources, Nigeria, 1998

The oil spill incidence reported between 2006 and mid 2010 was about 3,000 as witnessed in different localities in the Niger Delta. It is imperative to mention that efficient review of development and cooperation with National Oil Spill Detection and Response Agency (NOSDRA) must increase proportionally with information technique and education awareness emphasized to the community. There is an urgent need to stem these tides so as to alleviate the suffering of the community and to foster economic development of the areas and that of the oil companies.

2.7.2 The Petroleum Industry and Air Pollution

Production of oil has resulted in the release of hydrocarbon and flaring of natural or associated gas, a by-product of the crude oil from reservoirs in which oil and gas are mixed. Large percentages of the gases flared lead to pollution of the area where the oil companies are based. The manifested consequence of gas flares on climate and local ecology as well as on peoples' health and property has made the Niger Delta region one of the most polluted areas in the world.

The oil companies combined flared an average of 76% of the total gas produced in 1970 to 2004. Large quantity of the natural gas extracted in oil wells in the Niger Delta is flared into the environment. Gas flaring expels huge amount of methane which has a high global warming potential. While flaring in the developed countries has been minimized, in Nigeria, flaring has been raised proportionately with oil production (Orubu, 2002).

Orubu did a comparison analysis of concentration of ambient air pollutants in the Niger Delta region and Lagos State and concluded that pollutant concentrations are higher in the Niger Delta region. It has been reported that the methane and carbon dioxide emitted at flare sites contribute to global warming, suggesting that Nigeria's oil fields contribute more to global warming. The major impact of oil production activities on the environment affects negatively the standard of living of the people. The economic effects are widespread and include dislocation of traditional economic activities and associated livelihood pursuits not to mention the danger posed to human health.

Abosede (2010) stated that the pressure on the environment as a result of pollution from oil industry activities leads to the exploitation of marginal farmlands, over-farming and deforestation, all of which result in a new wave of environmental degradation. There are no alternative sources of livelihood for deprived land owners because compensation programmes of oil companies are inappropriate. The people of the communities are well informed of the consequences of oil industry's activities on the Niger Delta environment as shown in table 2.1.

Table 2.1: Community awareness of environmental problems in the Niger Delta

S./No	Environmental Problems Identified	Perceived Effects of Environmental Problems
1	Oil spillage	a) soil infertility b) waters pollution leading to loss of fish population and other aquatic organisms c) contamination of drinking water thus posing a risk to the health of the people d) related social dissension e) harmful consequence on ecosystem
2	Land acquisition	a) decline of cultivable land (b) land degradation (c) as a result of construction of facilities and access roads, floods result due to blockage of natural water courses
3	Gas flaring	(a) pollution of air (b) hammering of protected environment (c) land becoming arid in areas of gas flares (d) in areas near gas flares there is reduction of animal population
4	Environmental Impact Assessment Studies	Communities are generally ignorant about EIA activities. They seem not to be aware of public forum for the discussion of the EIA report.
5	Other environment related problems and general problems of the oil industry (such as poor compensation, rural-urban migration increasing city population, etc	(a) there is pressure on accessible resources (b) high living cost (c) reduction of rural population (d) corrosion of roofing sheets of building (e) Population pressure on the 'oil city'

Source: Orubu et al,.2002,

Similarly, Emoyan, *et al.,* (2008) maintained that the Niger Delta region generates incredible heat as high as 1,600^{o}C thereby resulting in thermal pollution temperatures produced at flare sites. The temperature could be high as 400C at an average distance of 43.8metres from flare sites. He shows that such flares have negative effects on animal life, vegetation growth and ecological equilibrium in the Niger Delta area. In addition, an assessment made by the Intergovernmental Panel on Climate Changes (IPCC) noted that as a result of global warming sea level has risen and thus poses serious global consequences for low lying coastal areas and island state.

2.7.3 Gas Production and Utilization in Nigeria

Gas production in the Nigeria is undertaken by the major oil companies (Shell, Chevron, Agip, Texaco, Mobil, Elf, Ashland and Pan Ocean). Natural gas production has increased enormously from 125.55 million tons (MT) (310 million cubic metres) in 1961 to 14472.11 MT (36,036.6 million cubic meters) in 1998. It further increased to 101,976 million cubic metres in 2002. This increase in oil production means that increase in the volumes of associated gas produced (CEE, 2006 & Okoh, 2001).

Cedigaz's (2002) study provided an approximate world's total flaring volume in 2001 put at 84.87 bcm and indicated that Nigeria accounted for 19.79% of the global quantity. Nigeria's is four times higher than the figure for Algeria recorded as having flared and vented 4 bcm. European flaring is put at 2.54 bcm, or 0.76 % of gross production, US flaring at 2.92 bcm, or 0.43 % of gross production. Topical study accepted by the Bureau of Public Enterprises in Nigeria approximated that every year the country losses between US$500 million and US$2.5 billion to flaring of gas. Figure 2.4 below shows gas flared and utilized in Nigeria for the period of 1970 to 2010.

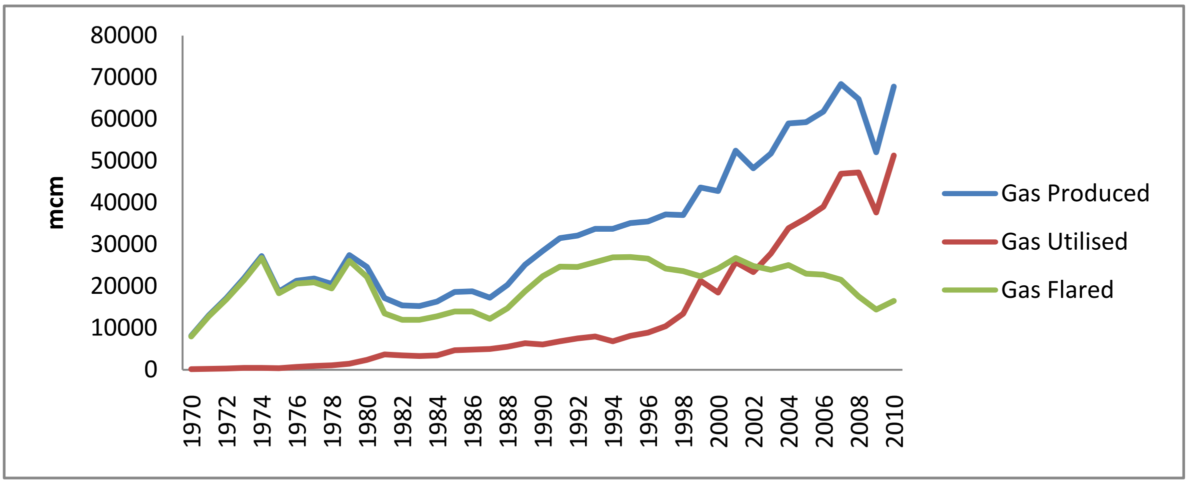


Figure 2.4: Gas Production and Utilization in Nigeria (million cubic meters)
Sources: Central Bank of Nigeria, 2011.

There is uncertainty about the amount of oil and related gas being produced in Nigeria. The current source of information indicated that over 3.5 billion standard cubic feet (scf) of associated gas was produced in 2000, out of which 70 per cent was flared. At the same rate increase in oil production, Nigeria gas flare has increased both proportionally and absolutely with about 2 billion scf a day being flared, equivalent to about 25 per cent of the UK's gas consumption. The biggest flared is from major oil producing companies (SPDC, MOBIL &CHEVRON) with the report estimating flaring to represent an annual economic loss to the country of about US $2.5 billion (Friend of the Earth, 2004).

The Ffederal government of Nigeria had extended the zero flaring deadlines to 2008, placing it back from 2004, the earlier declared date for ending gas flaring. This was done after the major oil companies argued that the previous time limit was not practicable. In May 2000, representatives of the major oil companies targeted the following dates: Chevron Texaco – 2008; Total Final Elf - 2008; Shell - 2008; Agip – 2005, and ExxonMobil, 2004to phase out gas flaring (CEE, 2006). It is instructive to note that ssomeof the oil companies made significant efforts towards meeting the deadline but failed. The efforts made by SPDC, Mobil and Chevron in ending gas flaring can be seen in the reduction of the proportion flared in 2010 as shown in figure 2. 5 below:

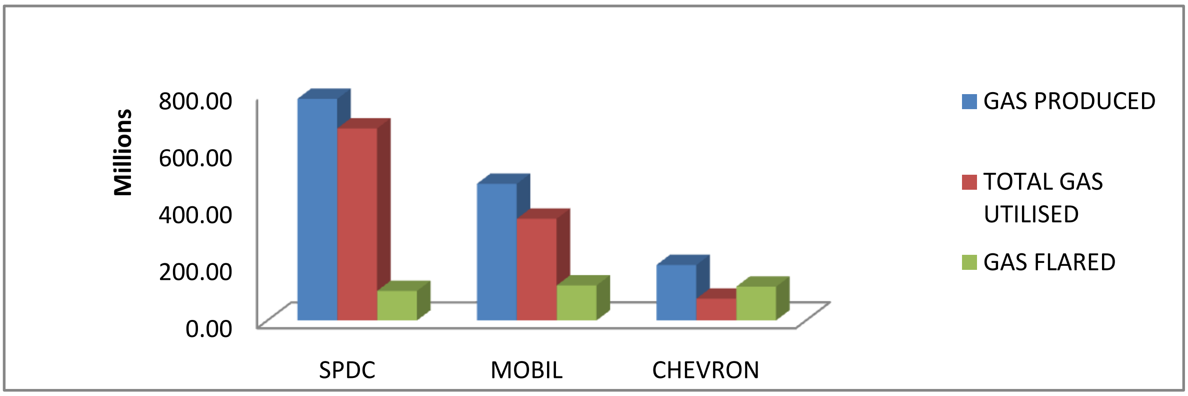


Figure 2. 5: Gas Produced, Utilized and Flared by selected oil Firm
Source: Department of Petroleum Nigeria, 2011

The development of gas utilization projects in Nigeria has increased being the main driver of the government's desire to diversify the economy and create wealth for the country. Moreover, there has been increase in utilization of gas in Nigeria since the 1980s primarily for power generation, petrochemical manufacturing, industrial heating, and fertilizer. But the Liquefied Natural Gas (LNG) project and the Aluminum Smelting Industry are the largest gas users. Nigerian's LNG project had been on the drawing board since the 1960s. It was not until 1990 that the NNPC concluded financial arrangements for the establishment of the project in 1992. The Nigerian Liquefied Natural Gas Company commenced execution of the project in 1993. The shipment of gas from the Bonny Plant to overseas buyers in Europe commenced late in 1999. However, despite this success, the emissions generated from oil refineries and power plants are enormous. Comparatively, the greenhouse gas pollution in USA constituted about 40 percent, most of this generated from the power plant compared with the situation in Nigeria. It was as a result of this that the World Bank suggested a joint private and public global concern to cut gas flaring, while ascertaining other benefits such as energy savings and reduced air pollution. Gas flares release about 390 million tons of carbon dioxide every year, and it was projected that free of global flaring, nations would be able to curtail more CO_2 emissions as shown by all the projects currently under the Kyoto Protocol's Clean Development Mechanism (Lisa -Jackson, 2010).

The social cost of carbon dioxide summarizes the impacts of climate change on all relevant market and non-market sectors, including agriculture, energy production, water availability, human health, coastal communities, biodiversity, and so on. As such, estimates of the social cost of carbon dioxide bring an indispensable purpose of evaluating the gains from the policies that result in lessening of CO_2 emissions (Richard *et al.*, 2007).

Furthermore, the effort social costs of CO_2, both in terms of updating the integrated assessment models to reflect progress in physical impacts and economic damages from environment alteration (Nordhaus, 2010). Similar attention to non-CO_2 greenhouse gases would be of great benefit to policy analysts who are currently working to assess the impacts of regulations that affect more than just CO_2 emissions. To facilitate the adaptation strategies, an adoption of the functional assessment framework approach is necessary. Also international institutions have set up emission reduction targets, developing a carbon stock exchange mechanism and policies that have carbon stock, in order to make investor redirect their investments appropriately. Reassessing investment value provides a strategy for long-term capacity building that will link the knowledge of climate change in action.

Furthermore, efforts to cut gas flaring are producing results if effort and response of international and local pressure are anything to go by. Gas flaring has reduced by about 10 billion cubic meters a year from the mid-1990s. Nigeria, one of the few countries in the world that is working hard to reduce gas flaring still flares about 24 billion cubic meters of gas a year, which is adequate to provide power for many a good number of African countries a year (Safiya, 2008).In spite of her oil wealth, Nigeria has experienced acute energy deficiency. Table 2.2 below summarizes the major cause of environmental diseconomies arising from crude-oil exploitation and its damaging effects.

Table: 2.2: Oil Company's Operations and their Impacts on the Environment

S/No	*Activity/Event*	*Actual and Potential Impact on the Environment*
1	Exploration-including geological surveys and, Geophysical investigation	Ravaging of forest, vegetation and farm land/human settlement. Noise pollution and shuddering from seismic shooting. Disturbances of flora and fauna habitats. Displacement of economic activity and apprehension in the social environment due to disagreements over compensation
2	Drilling	Oil pollution of the sea, beaches or land through the accumulation of toxic materials from drilling equipment, damaging of breeding ground for some marine fisheries. Underground water Pollution (waste pots).
3	**Production/Process** 1) Platforms and Tank farms 2) Gas flaring	Cumulative effect of water pollution from long term of production of high salinity water. Negative effects on marine life of water polluted from salinity waste, used lubricating oil and solid waste. Air pollution from gas and processing evaporation and flaring. Production of heat kills vegetation around the heated area, reduces agricultural productivity and wildlife concentration in the area
4	Refining Petroleum	Pollution of air and water affects human health and ecosystem negatively.
5	Oil spillage	Destruction of farmland, fishery and aquatic resources and mangrove ecosystem. Water pollution creates social tension due to disagreement over compensation.
6	Tanker loading, location (On shore and off shore)	Water pollution from ballast and tank washing. Deck drainage, spillage during loading operation with accompanying effects on the fauna and flora. Disruption of seabed by dredging (i.e. Canalization).
7	Storage Depot	Effluent water and solid waste from chemical cans and drums leading to land pollution. Destruction of farmland for the establishment of storage depots, water pollution from effluent water. Air pollution from gaseous fumes during loading.
8	Transportation	Sea bed disruption by dredging for pipeline installation. Water pollution from sedimentation,

		consequences of leaks from broken pipes caused by metal fatigue, trawlers and dredges or sea floor failures, and sabotage. Devastation of environmentally responsive area e.g. lowland, estuaries, wetlands and sand dune fields. Erosion and flooding of the area affected.
9	Marketing	Pollution of direct environments put on the market outlets. And high hazard potential located near residential buildings.

Source: Orubu *et al.*, 2002.

The consequence of damage to the environment by oil operation has affected both the environment and the economy of the region. These negative implications for the environment has led to serious social tension and resulted in many claims of damages by the Niger Delta communities.

For example, an increase in incidence of certain sickness been reported. A link has also been established between exposure to oil pollution and increase in health problems that were formerly unknown in the Niger Delta region. This will explain why there has been an increase in the incidence of cancer and other respiratory problems. The oil exploration-engendered illness includes respiratory problems, skin ailments such as rash and dermatitis, gastro-intestinal disorders, water borne diseases and nutritional problems associated with poor diet and eye problems (Olusi & Olagunju, 2005).

These problems revolve around the communities' dependence on the natural resources for their livelihood and emotional health emotionally involved round their environment. The people are further exposed to alteration in the environment because social, political and economic isolation. The social, economic and political isolation has further worsened the impact of natural hazards, pollution (air, water and soil), biodiversity loss, deforestation and the negative impacts of industrial actions on the people (Legborsi, 2007).

However, the United Nations Human Development Report on Niger Delta, among several disturbing declarations about the state of the region's environment assessment, has stated that there is a strong feeling in the region that the degree and rate of degradation are pushing the Niger delta towards ecological disaster (UNDP, 2002). This damning finding is strengthened by the results of research on impact assessment of the 1983 Oshika oil spill on the back of the death of floating and submerged aquatic vegetations particularly water lettuce, fish, birds and crabs (Mmom and Chukwu-Okeah, 2011). The oil companies have been blamed not only for their unresponsive attitude to incidence of oil spill and its catastrophic impact on the ecosystem but also because they have done little to prevent a reoccurrence. There is a need for the oil companies and the government to take immediate steps to clean up of the environment in the Niger Delta communities.

2.8 Summary

The chapter relied on different strand of theoretical literature on the concept of valuing the environment and its specification, and the valuation of the resource stock that has been treated like any other input in a neoclassical production technology. This approach provided valuable information to the public on a range of topics relating to management of natural resources. Also, this chapter described the deficiency in the environmental market for environmental services regarded as the most important instance of market failure and called for a solution to the problem of mis-allocation of resources through key economic principle.

It is no longer news that the impact of the oil exploration and exploitation in Nigeria has engaged the attention of many researchers. The environmental costs are regularly externalized for lack of clearly-defined property rights. This is because most environmental resources share the traits of public goods and thus suffer uncontrolled and excessive exploitation on the pretext of being common property right. However, a well-defined property right provides the best approach towards enforcing appropriate environmental behavior. However, it should be borne in mind these problems arise essentially because of scarcity of all resources in the economic system. However, the result of this is misallocation of economic resources and a decline in society's welfare. This necessitated third-party mediation, typically a government, which is needed to correct the market failure and reach an efficient equilibrium. Public sector economists have identified policy failure as the cause of environmental degradation and the government for its inability to correct market failure. Consequently, it is useful to appreciate the fact that policy failure affects macroeconomics in the sense that such failure needs not be found in the environment-related sector before it creates incentives for overexploitation of natural resources. The environmental degradation affects societal welfare even when individuals are better off in the process. The challenge of environmental problems remains how to eliminate the net loss in social welfare arising from consumption and production of environmental services.

Nevertheless, in spite of absence of, or weak, enabling laws which are more often than not poorly enforced, regulating natural resource exploitation, the oil and gas sector has seen an increase in foreign investment. This has accelerated the growth of the economy and led to unsustainable resource use patterns. The developing countries need to increase their capacity to take advantage of FDI and the related benefits and reduce the risks associated with the oil exploration and exploitation, though how effective this is depends on the effectiveness of their policy and institutional frameworks (Alan *et.al*, 2004).

Reducing pollution emission may cause a decrease in the allocated output of pollution-intensive goods. If there is no change in the strength of emission in an industry with a constant scale of the economy, the effect would reduce the total pollution. The scale effect of low income and output seems to be prominent and leads to the frightening conditions of the environment due to inflow of FDI. It is trite that prolonged activities of the oil communities have affected the health and the economic activities of the habitants of the FDI host communities. Worst still, since the source of the food consumed is already polluted; this spells danger to the people's health that is killed after consuming such food. Often, those who suffer loss from these oil production activities are not adequately compensated or not compensated at all.

The air pollutant concentration such as carbon dioxide and methane produced in locations of gas flaring exacerbate global warming. This suggests that oil fields in Nigeria could be worsening global warming than any other country in the world. The effect of these activities on the standards of living of the people in the area can better be imagined. These economic activities and related pursuits have negative impact on the people (Christopher *et al*., 2004).

In reassessing investment valuation, there is a need for a strategy of long-term capacity structure that will link the concept of action on climate change. International institutions need to set up emission reduction targets, undertake carbon stock exchange technique development and course of action that will make carbon stock feasible in order to make investor redirect their investments appropriately. In reaction to local and international demands, Nigeria pledged to end gas flares in 1984, but extended the deadline to 2011 when 1984 failed. Efforts being made to cut down gas flaring are producing results, considering a reduction in gas flared of about 10 billion cubic meters a year from the mid-1990s. But there is still a lot of work to do given that the oil companies still flare considerable quantity of gas a year, in spite of Nigeria's acute energy shortages.

CHAPTER THREE

FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH THEORIES

3.1 Introduction

This chapter is organized around the Foreign Direct Investment (FDI) and economic growth theories and related issues and their relevance in the literature. It is important to emphasize the factors that determine the inflow of FDI into a host country. The impact and the gains of FDI have a spillover effect across sectors of the industry. This chapter reviewed the macroeconomic concepts such as balance of payments, trade and tariffs, product cycle model, and the investment-development cycle which assert that the level of outward and inward direct investment of countries is a function of the improvement in a nation's economy. Section 3.2 reviewed literature on theories of FDI and looks at Foreign Direct Investment policy and economic growth in Nigeria with emphasis on the economic theory guiding the contentious issue of improving growth performance. There is no common consensus amongst empiricists about the relationship between economic growth and the inflow of FDI. Further studies have also proven that the benefits of FDI on growth cannot be general across diverse countries or sectors.

Section 3.3 examines the resource curse theory along in line with relevant literature. Natural resource exploitation, economic development and trade in developing countries were examined to justify the theory of resource curse. Though natural capital is crucial for developing sustainable economy, growing dependence of economics on exploitation of natural resource were found to hinder development and growth in developing countries. Granted that the abundant economic resources in developing countries could act as catalysts for rapid economic growth and development; however, the unsuccessful course of action and feeble foundation, insecurity of contract, lack of well-defined property rights, had led to corruption and low economic performance. Section 3.4 that followed discussed the theory of economic growth and environmental quality and reviewed the linkage between them.

Moreover, economic growth has always been linked to air pollution, municipal waste problems, threats to biodiversity, habitat destruction, resource depletion and the global greenhouse problem. Increasing understanding of these problems raises issues as to whether economic growth is still advantageous. Section 3.5 discussed FDI policy and economic growth in Nigeria considering crude-oil exploitation impact on economic expansion and how this produced wealthier and more dynamic economy the prospect and resources to finance investments in innovative technology to solve environmental problems. The last section 3.6 concluded the chapter.

3.2 Foreign Direct Investment Theories

Foreign Direct Investment is a driving force to trade because it opens the economy to the benefit accruing from private investment which is important determinant of economic growth. Foreign direct investment is a policy initiative often favored by countries for the reason that it yields spillover effects such as improved technology and management.

Relatively, a numbers of theories have sufficiently validated the FDI concepts. The economic theory and empirical studies hold the view that FDI is accomplished in expectation of expected profit. After allowing for risk, it is accepted that investment flows from regions of low projected profit to those of high anticipated profit. Although anticipated profits may give significance of FDI, however, corporate management might put emphasis on a diversity of factors when asked about their investment intention.

These reasons consist of labour cost, market-demand conditions, trade restriction, transportation cost and investment regulations (David, 2003).

Foreign direct investment, controlled by an oversea company or facility usually occurs when: 1) the parent company obtains adequate common stock in a foreign company to assume voting control of 10% equity and above. 2) When the parent company acquires new plants and equipment overseas; 3) the parent company transfers resources overseas to finance growth of its foreign subsidiary; and 4) earning of the parent company's foreign subsidiary is reinvested in plant expansion. Factors that determine and influence FDI inflow in a host country, are income level, target country's market size, market growth rate, inflation rates, interest rate, and current account positions. Other socioeconomic determinants are quality of infrastructure and political stability (Thomas *et al.* 2005; Wijeweera & Mounter, 2008).

De Mello (1997) classification suggested two channels through which FDI may lead to growth in an economy. First, it might promote knowledge transfer both in terms of skill acquisition and promote better alternative management. Second, it can encourage new technology in the production process through capital spillovers. It is in the light of the above that Bengos & Sanchez-Robles (2003) pointed out that FDI is positively correlated with economic growth, but that host countries need economic stability, human capital, and liberalized market in order to benefit from long-term inflow of FDI.

Rasiah (2007) held that other scholars have advanced the role of multinational in technological capability building in developing economies. As differences in technological capabilities between foreign MNCs and local firms show, taxonomies of human resources, research and development are recommendations for seeking FDI beyond the static factors of investment, employment and foreign exchange. In his assessment, Rasiah provided a strong link between purposeful institutional development and catch up in automotive and electronics firms in the East and Southeast Asian nations.

Market imperfection has also been closely tied to FDI. Firms always seek market opportunities before determining to make an investment in a foreign country, a strategy that explains the need to capitalize on certain potentialities not shared by competitors in foreign countries. The advantages of firms are explained by market imperfections for products and factors of production. Perfect competition theory suggests that firms that produce homogeneous products have advantages from the same level of access to factors of production. On the other hand, imperfect competition is revealed in industrial organization theory that establishes a firm's gain. Nevertheless, the theories do not give details why foreign production is conceived as the most desirable means of harnessing the firm's advantage (Ricardo & Isabel, 2007).

3.2.1 International Production Theory

The international production theory argued that the tendency of a firm to originate foreign investment will depend on the detailed desirability of its domicile country's balance with resource proposition and the advantages of locating in another country. Foreign government's dealings may influence the firm's entry conditions. The theory shows that the degree of difference in resources and the return of the firm play a part in influencing a foreign country's investment activities. Ioannis-Dionysio (2010) work examined international production theory under two approaches, the competitive international industry approach and the macroeconomic development approach. The competitive international industry approach asserts that international production is characterized by competition amongst multinationals, which facilitate the process of technological rivalry and development amongst them. If there are more personal contacts through which people in one nation get to know about the products of other nations, these spreads the capacity of technology quickly.

The main global resource passage to less developed countries is FDI. On the whole it is significant because it puts together both physical and intangible assets which are imperative in the international economic system. The FDI can complement domestic investment by facilitating trade and transfer of knowledge and technology which will have positive effect on growth and development (Ibi-Ajayi, 2006). To the neoclassical economists, FDI will influence economic growth by increasing the amount of capital per person. Notwithstanding its salutary effect, Bengos & Sanchez-Robles (2003) argued that even though FDI has positive correlation with economic growth, there is a need for human capital, economic stability and liberalized markets in the host countries in order to have long-term benefit from the inflow of FDI.

Alfaro (2004) hinged the impacts of FDI on growth across sectors on dependence on the increase in the potential of the industry. Further studies have also found that the impact of FDI on growth cannot be generalized across different countries or sectors. There are specific conditions that characterized market which could improve or hamper these benefits in the host country's economic growth. However, regardless of inconsistent views on the relationship between FDI and growth, it is suggested that emerging markets should aggressively pursue FDI (Nwankwo, 2006). The developing countries have been known to attract more inflow of FDI, and this will explain policies targeted towards encouraging FDI charge these countries to do more on trade liberalization. This becomes necessary because the effects of FDI on economic growth depend on the relationship between the FDI and domestic investment (David &Matthew, 2008). Akinlo (2004) held the same opinion when he argued that the productivity of foreign capital is dependent on initial circumstances of host country which may include the introduction of advanced technology and the degree of absorptive capacity, sufficiently high level of human capital in recipient economy and high savings rate and open trade regimes.

Until recently the development of export promotion of domestic industries in many developing countries has been held back due to absence of FDI. The benefit of FDI has been felt in the development of human capital, technology transfer, and access of the economy to international forces in the midst of other motivations that have served to change the former image (Bende-Nabende & Ford, 1998). Caves (1996) outlined the numerous positive effects attributed to FDI among of these are, technology transfers, and productivity gains, introduction of new processes, employee training, managerial skills and international production networks. Moreover, Contessi &Weinberger (2009) argued that FDI brings in technologies and knowledge that are not easily obtainable by domestic investors, and helps boost productivity growth in the economy. In addition, FDI provides easy access to the global market through the foreign investors' expertise and goodwill.

Rasiah (2010) submitted that foreign investment development has contributed to the development of emerging economies by way of technological capabilities and global market sales shares. Furthermore, foreign investments and firms originating from developing economies have added a new face to the understanding of the flows of FDI. In this light, Rasiah identified an increase FDI driven by a range of causes namely: increasing wealth, regional integration and industrialization, reforms in trade and investment policies, and financial liberalization. Furthermore, competition from the international and domestic trade, Research &Development and investment in human capital are promoted by outward trade policy which emphasizes the endogenous growth theory. There is recognition of the two-fold impact of FDI on economic growth, one through capital accumulation that may increase the stock of domestically available physical capital and economic growth of the beneficiary country (De-Mello, 1997).

3.3. Resource Curse Theory

The concern that natural resource abundance is a barrier, rather than a blessing or advantage, to development dates back to the 1950s when Raul Prebisch and Hans Singer proposed that primary commodities tend to be subjected to deterioration in their terms of trade vis-à-vis manufactured goods. The hypothesis, receiving mixed empirical support, subsequently underpinned policies promoting import-substituting industrialization, under which trade barriers were erected with the aim of restricting foreign imports, and encouraging self-sufficiency in production. These policies have come to be seen by many as largely ineffective, and by some as disastrous. In particular, trade closure protects infant industries from market discipline, retards their maturity and becomes the locus for inefficient investment and rent seeking. In the 1980s, Max Corden and Peter Neary introduced another challenge faced by resource-abundant countries that experience what can be called resource booms: the so-called 'Dutch disease'. The idea is that a small open economy, given tradable goods price and with a domestic non-traded goods sector, would experience de-industrialization as a result of the real exchange rate appreciation that accompanies a boom in a traded good sector.

Corden & Neary (1982) explained that productivity boom in the oil sector has the following effect: first, it raises real incomes and consumption, leading to excess demand relative to services, driving up price relative to traded goods, whose price is fixed in world markets. This has a tendency to appreciate the real exchange rate, defined as the relative price of traded to non-traded goods. The appreciated real exchange rate may be a disadvantage to the manufacturing sector, exports from which are now more expensive for foreigners to buy. Secondly, there is a resource movement effect, as labour is drawn out of the manufacturing and service sectors into the oil sector. The two effects, taken together, lead to both indirect and direct de-industrialization causing the manufacturing sector to be unambiguously squeezed.

Natural resource exploitation has been the main attribute of trade and economic progress in many developing countries. The question to ask is, why in spite of the significance of natural capital for sustainable economic development? The emerging economy's reliance on natural resource exploitation comes as an obstacle to growth and development in less developed income economies. It is in line with this that Sachs& Warner (1997) argued that the enormous wealth of natural resources can have remarkable consequences on the politics and economics of producing countries. The dire consequences of this wealth generated are now known as the "resource curse." Resource wealth often leads to lower growth rates in countries with huge endowments of natural resources, such as oil and gas, which are found to do worse than their poorer countries. These countries are also bedeviled by endemic corruption and socio-political instability.

As Neary (1985) noted, that 'Dutch disease' is of course only a 'disease' so far as the manufacturing sector is cared for over and above other sectors, or if the real sector aggravates some existing market failure. Alternatively, if one considers the monetary aspects of such booms, unemployment can be the result where there exists a barrier preventing wages or prices from falling in the presence of a floating exchange rate, under which a boom may be deflationary. The Dutch disease may have bad implications for growth, when there is growth externality to the manufacturing sector. Hence any squeeze experienced by manufacturing also has dynamic implications for learning and productivity in the rest of the economy, a condition that is crucial for growth. However, in some resource-rich countries, such as Australia and Canada, the resource sector itself appears to have been a driver, not an inhibitor, of development.

Feldstein & Horioka (1980) argued that for many small open economies, access to international capital markets is sufficiently limited that at an aggregate level, investment must track savings quite closely. So, when some of a resource windfall is saved, a capital market constrains the small open economy to experience an investment boom. In their comparative study, Karl & Zhongchang **(**2011) argued that an economy dependent on natural resource exports has sluggish growth than resource-scarce economies. Their justification centered on both market failures and institutional challenges that are caused by resource profusion. They illustrated that the correlation between natural resource abundance and growth can be negative in the absence of organized institutions and market failures. An economy can only be determined by an investigation of the correlation between resource abundance and income levels. This reveals whether resources are a curse or a blessing; and reveals whether natural resource exploitation promotes institutions and productive activities which in turn reduce welfare by lowering long-run income levels. The study concluded that increasing economic dependence on natural resource exploitation seems to be a hindrance to growth and development in developing economies (John, 2011).

The frail institution includes like well defined property rights, corruption**,** insecurity of contract, and general social instability has resulted in poor growth. Different hypothesis have explained the poor economic performance of resources abundant countries. The explanation for the poor performance of resource-dependent economies is the resource curse hypothesis. The restrictions on resource-based development in pursuing economic growth will lead to development required to sustain growth in a small open economy. This experience is frequently associated to the Dutch disease effect arising from some exogenous influence such as resource price boom and trade liberalization (Corden & Neary, 1982).

Sachs & Warner (2001) argued that the relative structural significance of tradable manufacturing sectors and the natural resources in an economy are important to its growth performance. The discovery of huge reserves of a valuable natural resource or a boom in commodity prices will cause a growth in primary product exporting and lead to over-valuation of the exchange rate. This will reduce manufacturing and services exports that are more conducive to growth and may also reduce total exports.

Ulrich (2009) examined the special features of some developing countries that expose them to these types of commodity boom with Nigeria, Cameroon, Ecuador, Indonesia, Mexico, Papua-Guinea and Venezuela as examples. He maintained that the resource curse is particular relevant for oil-producing tropical countries. Political economists have cited the reality of policy and institutional failure as the cause of Dutch disease and further economic shock. The failure to control rent-seeking resource users will weaken the political and legal institutions necessary to foster long-run growth.

The basic model of a competitive well-functioning exhaustible resource industry predicts a negative correlation between resource abundance and income growth and a positive correlation between resource abundance and income levels. Therefore, the strategy that can make a distinction between the effects of resource abundance on income levels and income growth is lower per capita income growth but resource rents must raise per capita income levels. Thus, before any conclusion that resources are a blessing, not a curse, the per capita income is expected to be higher all along the equilibrium path (John & Herbert, 2011).Therefore, resource curse is conditional on the level of institutional development of the countries. A Country will suffer negative impact on resources if its institutions lack accountability and do not respect the rule of law, whereas countries with good institutions will attain positive relationship (Mehlum, *et al.,* 2006).

The Dutch Disease models explain that natural resource extraction increases real wages and appreciates the real exchange rate which in turn lowers competitiveness and production in the non-resource exports sector. This will cause a negative impact on natural resources for long-term economic growth (Ivar &Arne, 2009). Similarly, Gylfason (2001) argued that under investments in human capital may result from excessive social confidence created from resource endowments.

Sachs & Warner (2001) argued that social and economic turmoil can result from the sudden exploitation of a natural resource stock and that countries with strong institutions to protect against civil conflict are therefore less likely to be affected by the natural resource curse. In practice, the optimal fiscal response has been problematic, with some resource-rich countries experiencing pro-cyclical fiscal expenditure exacerbating investment and construction booms. Further, some governments have been tempted to borrow against temporarily increased commodity prices, thereby accumulating national debt. Nigerian's case in the mid-1980sis a reference point, when commodity prices fell, the government was faced both reduction in resource revenues and a debt overhang. In sum, temporary commodity booms pose serious challenges to macroeconomic policy.

Some African countries like Botswana has successfully broken away from the resource curse by giving consideration to property rights, providing better health care and education, ensuring political checks and balances and investing in infrastructure. In contrast, other countries such as Sierra Leone and Democratic Republic of Congo with weak and corrupt institutions and high resource extraction have had tottering or dwindling economies.

Private agents can enhance resource rents, through natural resource abundance, windfall commodity price booms and the discoveries of valuable new reserves. But in fragile political and legal institutions, governments are weighed down by the special interest pressures of the rent seekers, thus leading to distorted economic and resources policies that favour the rent seekers and generate problems of corruption and institutional breakdown (Alex & David, 2011). Expansion in natural resources may result in an initial increase in productivity but existence of weak institution will provide encouragement for the rent-seeking interest groups to compete for a greater share of production via increased transfers and, it should be stressed, more transfer means less actual investment in the economy. Importantly, the natural resource curse is not necessary the fate of resource-abundant countries, sound economic policies and good management of the oil windfall can lead to sustained economic growth.

3.4 Theory of Economic Growth and Environmental Quality

There a good number of models linking economic growth to environmental quality by the strength of scale, composition and technique effects. There are abundant of literature linking growth and pollution, starting with works in the early1970s by Solow (1986); Stiglitz (1974) and Maler, (1991). In recent time, there are works investigating the Environmental Kuznet's curve, Stokey (1998), Jones (2002) and Alejanro (2007). The attractiveness and enhancement in the standard of living depend on the interface between economic growth and environmental quality. Economic growth has always been linked to increase in air pollution, municipal waste problems and environmental devastation; it has put pressure on biodiversity, depleted the resources and worsened the problem of the global greenhouse. Increasing understanding of these difficulties raises issues as to whether economic growth is still beneficial.

Furthermore, increase in the exploitation of natural resources through FDI leads to economic expansion that creates dynamic economies which are brought in contact with more highly-developed countries with technological information. In addition, economic progress and growth will attract resources to finance investments in new environment-friendly technologies that will solve environmental problems. However, environmental transformation and economic growth work together because of linkages and feedbacks in environmental quality and economic growth. The environment can both be a waste and a source of resources for the economy because of environmental quality and society may have a preference for a clean environment that has an amenity value or an existence value (Sjak-Smulder & Lucas, 2000).

Therefore, economic growth precipitates environmental degradation. It is important to state that environmental degradation could bring about economic growth when properly managed. As stated earlier, externalities like air, water and noise pollution are the major sources of environmental degradation. If property rights are well defined, people, firms or institutions that cause negative externalities can be made to pay for their actions. Through an environmental regulation such as pollution control laws, which impose large compliance costs can be imposed on industries that contravenes the provisions of the law (Tietenberg, 1996).

Al-Amin, *et al.*,(2011) study had found a correlation between production and consumption of energy and greenhouse emissions. It has been argued that with effective cooperation and goodwill among stakeholders in the oil and gas sector, action towards reducing global warming should be manageable. Al-Amin et al work investigated the situation of environmental sustainability in Malaysia and reassessed the energy policy and alternative energy sources such as the utilization of renewable energy such as oil palm to reduce the economic and environmental burden. They found the gap between greenhouse gas mitigation and sustainable development to b lesser, with focus on changing conventional energy instruments. In this regard, they suggested appropriate environmental regulations and management of the resources can mitigate the adverse consequences of growth on the environment in the long run. Antle (1995) revealed that market economies would generally maintain their environmental capital stock at positive and possibly increasing levels since the elasticity of income and the claim for environmental amenities is high. But the situation is different in developing countries where the income elasticity of demand is low for environmental amenities and high for sustenance.

Theodore (2001) showed this in conformity with the environmental transition hypothesis, which states that at low income levels, economic growth is expected to go in the same direction with environmental degradation. However as income increases the demand for environmental quality and protection tends to increase, that will lead to development path characterized by both environmental quality improvements and economic growth. Since people of the Niger Delta are predominantly low-income earners typical of developing countries, there is the need to adjust hypothesis to check environmental degradation in spite of low level of income. This is because in the latter part of the 1990s, many developing countries experienced a substantial growth slowdown. In year 2000, however, Nigeria had recovered with future prospects of growth rates of between 4-6 percent a year. In addition, growth rates in sub-Saharan Africa, for several decades, have been stagnant for the most part, a departure from the trend in recent years which have at best been upbeat.

With long-run growth rates of this type, what impacts on the environmental quality in these countries can one expects? If all technological factors were to stay the same over this period, environmental impacts and damages would increase along with this economic growth. But these factors are unlikely to remain constant. Economic development brings with it many changes. The most obvious is an increase in per capita incomes, and, as people's incomes rise, so their willingness to sacrifice for improved environmental quality. Developing economies usually experiences a variety of structural changes often in the direction of replacing relatively high-polluting industries with those that pollute less.

3.5 Foreign Direct Investment Policy and Economic Growth in Nigeria

Foreign Direct Investment is the well-known recompense tool of economic development which will explain why countries around the world make tremendous effort to attract it. Africa and Nigeria in particular have made significant efforts in attracting FDI as evidenced by the formation of the New Partnership for Africa's Development (NEPAD) through which Africa has become attractive to foreign investment. The determinants of FDI in Nigeria in the main are market size, natural resource endowment, population, stable macroeconomic policy, available human capital and openness to trade. FDI in Nigeria has contributed positively to economic growth, the effect of FDI on economic growth taken as a whole (Ibi -Ajayi, 2006).

The deteriorating respect of rule of law coupled with political and institutional failures have discouraged FDI and trade flows outside the oil sector. Moreover, the Nigerian Legal and judicial systems have done little to earn the respect of new investors in other sectors of the economy. The fundamental factor that can lead to the country's future prospects of attracting more efficient FDI remains in addressing problems of corruption, inadequate infrastructure and inconsistent regulations. There is a need for policies that are FDI friendly and are in conformity with national laws and international best practices.

The African development can be achieved when there is available capital for investment and economic growth, this will reduce poverty and raise living standards by attracting foreign direct investment which is essential to the future of the continent. Also, FDI leads to sustainable economic development, skills and transfer of new technology methods. In addition, it provides access to international markets, increase product diversity, generate employment, enhance efficiency of resource use, and reduce waste and pollution (UNCTAD, 2007).

After placing considerable restriction on FDI in the past, in 1995 Nigeria opened its economy to foreign investment in almost all the sectors of the economy. In order to liberalize the economy, Nigeria has reformed most of the policies affecting business activities, ranging from the privatization of backbone services to effort being made to combat corruption at all levels. Hence, the current reforms should derive eliminate the remaining bottleneck, and ensure effective implementation of the new regulations (Ibi - Ajayi, 2006).

Moreover, Akinlo (2004) argued that FDI into the oil sector should be integrated into the economy if the country would benefit from increased inflows. A major policy in this direction is the liberalization of the oil sector. This will lead to increased private participation, higher employment with possible multiplier effects on the economy as a whole. For Nigeria to build a robust presence of TNC, it will need to bridge capital, management skills and technology gaps where they are most severe. TNC has helped in developing competence of local companies and the workforce toward world standard. Nigeria has been affected by the inflows of Foreign Direct Investment in the development of the oil sector. In 1970, a year before Nigeria joined the OPEC, FDI was put at a mere $205 millions. By 1975, it had reached $470 million. The inflow of FDI has also responded absolutely to the remarkable economic terms of private sector involvement in the oil and gas that were introduced in 1986 (UNCTAD, 2005).

The decline in Nigerian National Petroleum Corporation’s (NNPC) stake in Shell Nigeria and other oil companies from 80% to 60% arising from the 1989 (Mergers and Acquisition (M&A) showed a $1 billion value of such transaction. Since then, FDI to Nigeria has not decreased below $1 billion yearly. There are indications that non-oil FDI is rising in correlation with the world’s oil price and the inflow of FDI to Nigeria. This is especially the case since the early 2000s since the rise in oil prices has undoubtedly led to sharp increase in FDI (UNCTAD, 2007).

The inflow of FDI in sectors other than oil was directly affected by the various private sector policies adopted since the early 1970. FDI fell in the immediate aftermath of the second indigenization Decree which pushed many TNCs to divest. Among those were Citigroup, IBM and Barclay Bank in 1979. The enactment of National Investment Promotion Act, 1995 virtually opened the economy to Foreign Investors. This was accompanied by the Foreign Exchange Decree, which eased access to foreign exchange for business purposes. However, Nigerian economic growth induced by tranquility in the Niger Delta region, experienced appreciable increases due to renewed confidence in the improved macroeconomic environment. The ongoing reforms in the financial sector and commitment to tackle the challenge of infrastructure inadequacy had been a major leap in the growth of the real sector (CBN 2010).Table 3.1 shows the flow of FDI in selected African countries overtime (1990-2008).

Table 3.1: Foreign Direct Investment Overview for Selected Countries
(Million dollar and as percentage for Gross-Domestic Product)

FDI flow	1990 2000 aveg	2005	2006	2007	2008	1990 2000	2006	2007	2008
Nigeria									
Inward	1477	4978	13956	12454	20279	44.3	116.1	39.6	34.7
Outward	304	200	228	468	299	9.1	0.1	3.0	4.9
Memorandum									
Algeria									
Inward	180	1081	1795	1662	2648	1.5	6.7	5.0	6.8
Outward	6	57	35	295	318	0.1	0.9	0.9	0.8
Angola									
Inward	60.2	6794	9064	9796	15548	29.1	161.3	156.4	176.4
Outward	-	221	194	912	2570	0.0	3.5	14.6	29.2
West Africa									
Inward	2106	7118	16095	15934	25969	21.2	61.3	28.9	31.4
Outward	470	651	547	868	1393	5.6	1.6	3.2	5.2
Africa									
Inward	6890	38222	57058	69170	87647	7.3	27.3	24.5	24.8
Outward	1913	2316	7171	10614	9309	2.2	3.8	4.6	3.6

Source: UNCTAD, World Report, 2009.

From1970to1990, Nigeria accounted for 30% of the inflow of FDI to Africa, this is an outcome of its oil attractiveness to foreign investors. In 2007, oil industry in Nigeria accounted for about 16% of the total FDI in Africa. Furthermore, another factor is the improved FDI performance of other large African countries such as Egypt and South Africa, which are successful in attracting FDI into the various sectors of their economies (Ibi- Ajayi, 2006). In terms of absolute FDI stock, Nigeria remains second to South Africa in the continent with $63 billion and $93 billion respectively. The country’s capital accumulation expanded through the inflow of FDI to Nigeria. During 2001-2007, FDI accounted for more than half of the gross fixed capital formation compared to an average of around 15% in the rest of Africa (Ibi-Ajayi, 2006).

Privatization has boosted FDI in many of the developing countries in the last two decades. Nigeria has implemented two rounds of privatization since 1980s. The first phase of Structural Adjustment Programmed (SAP) was 1986-1993 and the second one was introduced in 1999. Table 3.2 below shows the Foreign Direct Investment stock in selected countries in Africa.

Table 3.2: Foreign Direct Investment Overview for Selected Countries (Million dollars and as percentages of Gross-Domestic Product)

FDI Stocks	1990	1995	2000	2007	2008	1990	2000	2007	2008
Nigeria									
Inward	8539	16256	23786	62791	83069	27.1	51.6	33.7	29.5
Outward	1207	2931	4132	5722	6020	3.8	9.0	3.2	2.9
Memorandum									
Algeria									
Inward	1521	1631	3497	11812	14458	2.5	6.4	8.9	9.1
Outward	183	183	249	1017	1335	0.3	0.5	0.8	0.8
Angola									
Inward	1024	2922	7978	11202	26750	10.0	87.4	21.4	32.1
Outward	1	-	2	1127	3696	-	-	2.2	4.4
West Africa									
Inward	14013	23523	33401	85001	110928	19.1	39.8	31.1	29.3
Outward	1799	561	6627	9736	11125	2.9	8.6	4.0	3.9
Africa									
Inward	60635	89269	154244	424316	510511	12.5	26.2	32.2	31.9
Outward	19826	31501	44155	89139	97958	4.8	8.3	7.7	7.2

Source: World Investment Report 2009.

Nigeria has been playing host to major oil companies. Topping the list of the largest foreign investors in Nigeria are the United States-based oil companies Chevron, Texaco and Exxon-Mobil; the Netherlands with Shell; France with Total and Italy with ENI. While Western Europe and United States remain dominant as sources of FDI, Chinese companies are becoming increasingly involved in the Nigeria oil sector lately. An upsurge in the FDI from South Africa is one significant trend in recent time. The development of oil has made Nigeria the 11th largest producer in the world and the largest in Africa. Foreign investors have been instrumental in this achievement (Mohammed, Ajibola, Omotosho & Oladipupo, 2011).

As a tool of economic development t, most countries in Africa have policies geared towards attracting FDI because of its recognized advantages. FDI is seen as a very significant component in the approach to economic development because of the synergy it provides in technology, capital, marketing and management. In Africa particularly, Nigeria has taken advantage of the New Partnership for Africa's Development (NEPAD) as a major element of promoting foreign investment in Africa.

Not all the elements of FDI have a positive impact even though the overall effect of FDI on economic growth may not be significant. Studies have revealed that more than 60% of the inflow of FDI in Nigeria is made in the extractor (oil) industry. Given her natural resource base and large market size, Nigeria is one of the top three leading African countries that have constantly received FDI in the past decade (Adeolu, 2007). Table 3.3 below shows the bilateral investment treaties in Nigeria in recent time. Nigeria sees FDI as an avenue through which growth-enhancing performances may be infused into the entire economy

Table 3.3: Bilateral investment treaties of Nigeria

Partner	Signed on:	Entry to force:
Algeria	14 January 2002	Partner yet to ratify
Bulgaria	21 December 1990	Partner yet to ratify
China	27 August 2001	Partner yet to ratify
Egypt	20 June 2000	Partner yet to ratify
France	27 February 1990	19 August 1991
Finland	22 June 2005	Nigeria yet to ratify
Germany	28 march 2000	Partner yet to ratify
Jamaica	5 August 2002	Partner not yet ratify
Korea, Rep.	27 March 1998	01 February 1999

Korea, Dem. Peoples' Rep	11 November 1996	Partner yet to ratify
Italy	27 September 200	Partner yet to ratify
Netherlands	02 November 1992	01 February 1994
Romania	18 December 1998	Partner yet to ratify
Serbia and Montenegro	01 June 2002	Partner yet to ratify
Spain	09 July 2002	Partner yet to ratify
South Africa	29 April 2000	Partner yet to ratify
Sweden	18 April 2002	Partner yet to ratify
Switzerland	30 November 2000	Partner yet to ratify
Turkey	08 October 1996	Partner yet to ratify
Uganda	15 January 2003	Partner yet to ratify
United Kingdom	11 December 1990	11 December 1990

Sources: UNCTAD (2005).

The inflows of FDI into the country unlike the pre-1986 era was enhanced by the adoption of the Structural Adjustment Program in 1986 which led to change of policies that characterized restrictive policy measures like the Nigerian Enterprise Promotion Decree (NEPD) and other Indigenization Decrees. This has made Nigeria one of the few countries that have consistently benefited from the FDI inflows to Africa. Nigeria accounts for 70% of sub-regional total FDI to West Africa and 11% of Africa's total. Out of this, Nigeria's oil sector alone accounts for 90% of the FDI (UNCTAD). It is against this backdrop that the study is interested in separating the causal link between FDI and growth on the one hand and environmental impact of FDI on the other hand. It is natural then to ask to what extent increase in the inflow of FDI may have contributed to increased growth rates in the country.

Furthermore, FDI is basically an indicator to measure the inflow of foreign capital from investors. Foreign Direct Investment to Nigeria dropped considerably between 2009 and 2010 by $3.7bn from $6bn in 2009 to $2.3bn respectively. According to UNCTAD, the Global Investment Trends Monitor, based in Geneva, there is an immense fall of 60.4 percent. It implies that it is about time government began to address the problems that discourage foreign investment and other business interests which could have contributed to capital flight to other countries. In addition, the inflow of investment into

Nigeria and the rest of Africa increased substantially in 2008, but declined significantly in 2009. It was observed that in spite of economic reforms by government, identification of perception of risk was primarily responsible for the sharp decline. This is a true manifestation of Nigeria's economic, social, legal and cultural environment which raises several questions for prospective foreign investors. Table 3.4 shows the summary of main FDI policy issues in Nigeria

Table: 3.4: Nigeria: Summary of Main FDI Policy Issues

Policy (Last revised)	Current status	Comment/Recommendation
FDI entry (1995)	***	Open entry for legal basis.
FDI establishment (2006)	**	OSIC recently introduced, CAC incorporation efficient. NIPC registration barriers need administrative reforms.
FDI treatment and protection (1995)	**	BITs closure and negotiation needed, national treatment needs to be formalized.
Taxation (2006 proposed)	**	Deliver on VAT and Zones tax reforms. Consider low flat corporate tax for all and eliminate the pioneer scheme
Labour (2006)	***	Standards are currently good and will improve with adoption of new legislation.
Entry of foreign workers (1990)	*	Both temporary visas and entry of foreign workers regimes badly in the need of reform.
Land (1978)	*	Anachronistic and discretionary land title allocation system is in need of reform
Technology transfer regulation(1998)	*	Old regulation approach to technology transfer, shift in focus needed.
Competition (2006)	**	Competition regime and authority are being introduced, but there is room for improvements.
Sectoral regulations (2005)	**	Major improvements achieved. Reconsider electricity cluster. Address fixed-line and broadband expansion in telecoms.
Rule of law (2006)	***	Sustained anti-corruption drive needs a communication strategy targeted at international business.
Court system (2006)	**	Serious questions of speed and fairness of the system. Improvements underway, including state- level initiatives.
Intellectual property	*	Organization, staffing and enforcement are major problems, a new internet protocol

protection (2006)		framework is being devised – not made available for assessment.
Environment (2003)	***	A modern legal framework but enforcement a problem. Funding and staffing issues need to be addressed.
*Note: The Key is according to report of UNCTAD 1996: *= poorly development; ** =solid development but room for improvement; ***= high standard regulation*		

Source: UNCTAD (1996)

The table above will explain why many foreign firms are relocating to neighboring countries, or closing businesses completely in Nigeria. For example, instability and inconsistency of government policies, poor power supply, shifting legal framework and crippling poverty have considerably reduced the purchasing power of the people. In addition, some of the factors that increase the price of doing business in Nigeria and the cost of production are also steadily on the rise.

In recent time the Federal Government has done little to entice foreign investors back to the country. Neither has the National Assembly fared any better in repealing laws that discourage the inflow of foreign investment. The result is that not only has foreign investment been on a steep decline, institutional and portfolio investments that determine the character and soundness of a country's economy and provide a veritable guide to investors and entrepreneurs on how to minimize credit risks and maximize the net worth of their investment portfolio have remained worryingly low. It is sure that no foreign investor or firm would risk its capital in an economy that is full of uncertainties.

3.6 Reverse and Outward Flow of Foreign Direct Investment

Most economic rationale for granting special incentives for attracting Foreign Direct Investment (FDI) is based on the principle that FDI bridges gaps between rich and the poor nations in addition to generating technological transfers and spillovers. In some literatures, it was revealed that multinational corporations are highly adaptive social agents and therefore the degree to which they can help in improving economic activities through FDI will be heavily influenced by the policy choice of the host country.

Nigeria's vast oil and gas resources have proven a magnet for foreign investors especially in times of rising oil prices. Nigeria has experienced higher inflow of FDI during the past five years, driven by a rising global demand for hydrocarbons. Given the prominence of the oil industry in Nigeria, the main source countries for FDI are the host countries of the major oil MNCs. The leading source country for FDI is the United States through oil majors Chevron, Texaco and ExxonMobil, The Netherlands through Shell, France through Total and Italy through ENI and these companies are the leading investors in Nigeria. South Africa is the fifth largest source country. Apart from oil, other important destinations for foreign investors in Nigeria are the telecommunications, food and beverages and rubber product industries.

The Indian oil company Escarp entered Nigeria in 2007 and the state-controlled ONGC has bought long term oil and gas concessions in the country. Apart from India, the other G-15 country with investments in Nigeria is Brazil which, through Petrobras, has reportedly invested $2.5 billion in oil extraction in the Niger Delta. Malaysia's Petronas has also invested in offshore oil exploration activities in Nigeria. Foreign Direct Investment (FDI) from developing countries has risen sharply over the past two decades as several scholars have noted since the early 1980s (Lall, 1983; Page, 1998; Aykut & Ratha, 2003, and UNCTAD, 2004). The overall empirical evidence in the last few decades indicates that FDI has been growing at a pace far exceeding the volume of international trade. Between 1975 and 1995, the aggregate stock of FDI rose from 4.5% to 9.7% of world's GDP, with sales of foreign affiliates of multinational enterprises substantially exceeding the value of world exports (Barrell and Pain, 1997).

Nigeria is one of the economies with great demand for goods and services, a major reason for the FDI she has attracted over the years. The amount of FDI into Nigeria reached US$2.23 billion in 2003 and it rose to US$5.31 billion in 2004 (a 138 % increase), and the figure rose again to US$9.92 billion (an 87% increase) in 2005. The figure however declined slightly to US$9.44 billion in 2006. The United Nations Conference on Trade and Development, UNCTAD (2007) reported that the flow of FDI to Africa has increased from $9.68 billion to drive growth effectively. Policymakers believe that Foreign Direct Investment (FDI) produces positive effects on host economies. Some of these benefits are in the form of externalities and the adoption of foreign technology. Externalities here can be in the form of licensing agreements, imitation, employee training and the introduction of new processes by the foreign firms (Alfaro, 2006).

The favorable economic environment has made some countries in Nigeria increasingly attractive as destinations for private inflow of capital. Net private capital inflows reached record levels in 2007, led by strong inflow of FDI. However, the bulk of FDI is still focused on mainly extractive industries, particularly the petroleum sector, based on evidence from mergers-and-acquisition related inflows, an important fraction of gross FDI inflows. Over the years, the debate on the role of foreign investments in bringing about economic growth has received the attention of policy makers, researchers and international organizations. This is in view of the increasing wave of globalization and the consequent substantial movement of capital across economies, enabled by improved information technology. The Nigeria's economic Transformation Agenda hinges on active participation of the private sector with an annual projected injection of US$13.0 billion into the economy. However, government had instituted several policies/incentives aimed at creating a sustainable business environment that would enhance the global competitiveness of the economy and make it the preferred investment destination in sub-Saharan Africa

Generally, the performance of Nigeria's external sector improved in 2011 with an estimated overall balance surplus of N47.1 billion (US$0.3 billion) or 0.1 per cent of GDP. However, the current account recorded a reduced surplus equivalent of 3.6 per cent of GDP as the deficit in the services and income accounts (net) overwhelmed oil export receipts and inward transfers. The stock of external reserves as at end-2011 was US$32.6 billion, In terms of the financial account, the economy witnessed increased inflow of capital in the form of direct and portfolio investments, driven largely by the improved investment climate. However, Libya, Nigeria, and Russia also accounted for one-half of all outflow deposits from oil-exporting countries, and in each of these countries outflow deposits accounted for one-half or more of total gross capital outflows. These huge capital outflows are linked mainly to extractive FDI and calls to question the ability of FDI to drive growth effectively in these countries (UNCTAD. 2011).

Neo-classical researchers regard FDI and international capital flows as closing the savings gap in developing countries. Capital is expected to flow from capital-rich to capital-poor countries, as is suggested by developments in the Heckscher-Ohlin approach to trade by Mundell (1957), because capital is scarce in developing countries which should lead to profitable investment opportunities for capital in developing countries. On this view, there should be no outflows from Africa. However, FDI represents control of production as well as a flow of capital, and it is influenced by other factors as well. In the traditional trade approach, trade and FDI might be seen as substitutes, given that other factors affect FDI, such as technology and firm-specific assets, and may also be complements (Markusen, 1995).

African outward FDI (particularly intra-Africa) will grow, but only in the future as incomes in Africa rise on the assumption that their economic structures become similar. International business economists have explained the emergence of TNCs using an eclectic paradigm for FDI, the Ownership-Location-Internalization (OLI) framework. Multinationals need to have some firm specific asset that differentiates them from domestic firms to compensate for the extra costs in terms of local knowledge that a foreign firm must incur to operate in foreign markets (Dunning, 1993).The firm specific asset is called an ownership (O) advantage. Multinationals should also have an internalization (I) advantage to internalize business contacts, and not to outsource. The reason why a multinational invests in one country but not in another depends on the country's location advantage (L). The OLI framework explains FDI on the basis of ownership specific advantages of the firm, internationalization incentives and location advantages

African investors are more likely to invest in order to seek markets or for strategic reasons, and especially the latter is more likely to be out of Africa. Africans are less likely to invest outside Africa for efficiency reasons, because of the relatively low wages in Africa, though there is disparity of natural resources. Africa has an abundance of natural resources which need to take into account policy factors like trade, investment, and privatization as these have changed dramatically within Africa. Aykut and Ratha (2003) also identified the factors behind the rise in South-South flows, and distinguished between pull and push factors but did not deal with the African context with the exception of South Africa. Push factors include: rising wealth in emerging markets, rising cost of labor and non-tradable, broken-up domestic monopolies, new technology and communications, improved information sharing and reduced transaction costs, strategic, desire to procure inputs such as oil, capital account liberalization regarding outward FDI, changes in trade barriers, regional trade agreements, and government policies encouraging outward FDI. Pull factors include: large and growing markets, geographic proximity and ethnic and cultural ties, supply of cheap labor, abundance in raw materials, incentives in host countries, preferential treatment of foreign companies, and export markets through preferential treatment (Markusen, 1995).

Moreover, it is projected that African countries with faster growth rates should receive more African FDI than African countries with slower growth. Changes in policy and laws on inward and outward investment in many African countries have seen changes in investment policy, including bilateral and regional investment treaties, and privatization policy, almost all inching towards a more liberal stance towards FDI. These have affected intra-Africa FDI.

Changes in relative costs of production and level of wages or user costs of capital is higher in Africa, or if they are growing more rapidly than outside Africa, this would lead to more outward African FDI. Changes in strategy to obtain better access to technology and distribution channels or other inputs, would lead to developing country outward FDI for competitiveness reasons (Kumar, 1995). Firm-specific assets, such as technology or management skills, may be emerging in some African firms, increasing their propensity to invest abroad. This is particularly important in Africa because conventional risk rating and country evaluation is less common and less comprehensive for African countries. Only South Africa is regularly rated, with some coverage of

Mauritius and Botswana (African Development Report 2003). There are also general potential influences on African investment which could help explain its direction. The links of complementarities with trade, suggesting that as African trade expands and moves into markets, investment could follow. There is a possibility that some African countries will emerge as particularly active in foreign investment, as some have done in Europe and Asia with the shares of FDI much more concentrated than those of trade suggesting that there are special characteristics that make some countries more likely to be major investors

The total inward capital to Nigeria from other countries (foreign liabilities) amounted to N12,729.69 billion as at end of 2011, representing an increase of 8.97 per cent above the level of N11,681.32 billion in 2010. A breakdown of the 2011 figure by category of capital showed that N9,515.34 billion or 74.75 per cent came in the form of direct investment, while portfolio investment and other capital flows accounted for N1,318.48 billion or 10.36 per cent and N1,895.87 billion or 14.89 per cent, respectively. A further breakdown of total inward capital by originating economy in 2011 showed that N6, 988.08 billion or 54.90 per cent was from the European Union.

Table 3.5: Nigeria’s Foreign Liabilities by Category (N ‘Billion)

	FDI	FPI	OCF	TOTAL
2011	9,515.34	1,318.48	1895.87	12,729.69
% Share	74.75	10.38	14.89	
2010	8,108.99	1,907.69	1,664.64	11,681.32
% Share	69.42	16.33	14.25	
Annual change (%)	17.34	-30.89	13.89	8.97

Source CBN *Journal of Applied Statistics 2011*

This was followed by Africa, which accounted for N2, 013.41 (or 15.82 per cent). Other regions of capital origin were Asia (13.97 per cent), North Atlantic & Caribbean (11.30 per cent), North America (3.99 per cent) and other countries (0.03 per cent). A further breakdown of investments from Africa revealed that investments from East and Central Africa dominated (85.15 per cent) while ECOWAS sub-region accounted for 6.6 per cent.

Table 3.6: Nigeria's Foreign Liabilities by Region of Origin (N .Billion)

Region	2011 1	2010 2	% change btw (1)&(2)	% Share Column (1)	% Share Column (2)
Asia	1778.68	1612.72	10.29	13.97	13.81
European Union	6988.08	7469.34	-6.44	54.90	63.94
North America	507.73	477.33	6.37	3.99	4.09
North Atlantic Caribbean	1438.54	1439.63	-0.08	11.30	12.32
Others	3.29	8.15	-59.59	0.02	0.07
Africa	2013.41	674.14	198.66	15.82	5.77
ECOWA	133.54	122.61	8.92	6.63	18.19
East & Central Africa	1714.33	441.96	287.89	85.15	65.56
South Africa	157.37	107.71	46.10	7.82	15.98
North Africa	8.15	1.86	338.42	0.40	0.28
TOTAL	12729.69	11681.22	8.97		

Source *CBN Journal of Applied Statistics 201*

An analysis of FDI by originating regions revealed, the bulk of investments as at end of 2011 came from the EU (N5, 294.36 billion or 55.64 per cent). The EU was followed by Asia (N1, 636.76 billion or 17.20 per cent), North Atlantic & Caribbean (N1, 431.07 billion or 15.04 per cent), and Africa (N646.67 billion or 6.80 per cent). Other regions from which Nigeria attracted direct investments were North America (N503.18 billion or 5.29 per cent) and others (N3.29 billion or 0.03 per cent). A further breakdown of FDI from Africa showed that the ECOWAS, Southern Africa, East & Central Africa and North Africa sub-regions contributed 57.20, 23.83, 17.71 and 1.26 per cent, respectively.

Table 3.7: Nigeria's Foreign Liabilities by Destination Sector (N Billion)

Sector	2011	2012	%change btw (1) & (2)	%Share Column (1)	%Share Column
Agriculture, Housing and Fishing	6.09	9.51	-35.91	0.05	0.08
Financing, Insurance, Real Estate, And Business	726.27	328.73	120.94	5.71	2.81
Extractive	6285.97	6695.01	-6.11	49.38	57.31
Construction	157.57	127.55	23.53	1.24	1.09
Manufacturing	3794.37	2377.17	55.83	29.10	20.35
Transport, Storage and Communication	1273.39	1531.99	-16.88	10.00	13.11
Wholesale, and Retail Trade, Catering and accommodation	576.02	611.37	-5.78	4.52	5.23
Global Total	12729.69	11681.32	8.97	-	-

Source CBN *Journal of Applied Statistics 2011*

In terms of regional contributions to inward FDI between 2010 and 2011, inflows from EU, Asia, Africa, North America and others rose by 19.64, 26.44, 34.35, 6.47 and 1.00 per cent, respectively. However, the contribution of North Atlantic and Caribbean declined slightly by 0.08 per cent. A breakdown of total FDI to Nigeria by recipient sector showed that the extractive sector received the largest share as at end of2011 with a sum of ₦ 4, 853.76 billion or 51.0 per cent. Enterprises in the oil and gas sub-sector largely accounted for this as the oil and gas sub sector accounted for about 99.0 per cent of total FDI inflows to the sector. About 64.1 per cent of investments into the oil and gas subsector were in the form of equity while the balance of 35.9 per cent came in the form of debt instruments. The extractive sector was followed by manufacturing (₦2, 309.87 billion or 24.3 per cent) and transport, storage & communication (₦1, 164.69 billion or 12.2 per cent). Agriculture, hunting, forestry & fishing got the least investment (₦ 6.09 billion or 0.1 per cent).

Foreign investment requires firms able to negotiate the differences in economic and legal conditions in the foreign country or put differently, with prospective sales or cost saving sufficiently large to justify incurring the costs. Normally, such firms are larger than average. Firms must reach the critical size on the basis of home markets: this is likely to be a constraint in small economies (and most African economies are still very small compared to those of the major world investors), but as the economies grow the number of potential TNCs will increase. The more barriers to investment come down, both direct barriers and differences in company legislation and standards, either within regions or in general, the smaller the required size for a firm to be internationally competitive (Mohammed, Ajibola, Omotosho & Oladipupo, 2011).Cost factors have reduced the relative attractiveness of developing countries, and Africa in particular, as destinations for foreign investment. The importance of information and the relative lack of information about Africa outside Africa both suggest that any increase in investment in Africa may be preferentially treated by African investors. Policy presents fewer barriers but perhaps also reduced incentives.

3.6 Summary

The industrial organization theory establishes firms gain as an unusual kind of competitive advantages changeable at different degrees, and does not give details why foreign production is considered as the most attractive ways to exploit the firm's advantage. Foreign production depends on the specific attractions of its home country compared with the resource implications and advantages of locating in another country. The effects of FDI on economic growth depend on the relationship between the FDI and domestic investment but FDI enhances more growth in the domestic investment. The countries that have accomplished a certain income level will enhance investment and foreign capital inflow that can absorb new technologies and gain from technology diffusion. Foreign Direct Investment is imperative to the future of development of Africa, and it is a means of growing the economic growth and making capital available for investment needed to ease poverty and raise living standards.

African countries are striving hard to attract FDI noted for its advantages as a tool of economic development. Nigeria in particular is seeking FDI and has taken advantage of the establishment of the New Partnership for Africa's Development to attract foreign investments. There are conditions in some developing countries that may make them vulnerable to commodity boom, thus resulting in resources curse which has been found in the oil-producing tropical countries. This is the implication of natural capital dependence for sustainable economic development. Bad policies, weak institutions including lack of a well-defined property right, insecurity of contract, corruption and a broad spectrum of social instability have resulted in relatively poor growth performance in Nigeria.

Foreign Direct Investment into crude-oil exploitation leads to economic expansion that produces more affluent and dynamic economies, and brings about access to more highly developed technological information. This also improves output per unit of natural resources and allows larger volumes of production at lower rates of environmental degradation. Industrial progress has created opportunities of resources to finance investments in new environmentally-well-disposed technologies to solve problems of environmental sustainability.

CHAPTER FOUR

THEORIES OF ENVIRONMENTAL REGULATIONS

4.1 Introduction

The government as an institution is supposed to identify market failures and enact regulatory legislation to correct it at little cost to maximize social welfare. The negative effect of market failure on social welfare is not caused by firms because the level of production output chosen by firms is greater than the welfare-maximizing level. The government, therefore, should regulate the market in order to correct its failure.

It is an indisputable that damage is being done to the environment worldwide through industrial sector activities. Sustainable development can only be achieved through the interdependence of economic growth and environmental quality. This has constrained some governments to view the environment as a value and an essential part of economic growth.

Section 4.2 presents the conventional solutions to environmental problems. The public goods model and the theory of externalities were used to show how pollution occurred as the result of market failures. This failure arises due to the absence of property right. According to the Coase Theorem, assigning property rights would solve the dilemma but only under certain limiting conditions. The principle is that government must act as a third-party mediator in those markets where pollution is a major problem.

Identifying the need for government to correct environmental market failures is important, but equally important is what policy measures are put in place the respond to these failures. In this condition, economic theorists will maintain that the government should set objectives to achieve allocation efficiency, balance social benefits and costs at the margin.

Section 4.3 of this study examined the economic instrument for Environmental Management. It has been pointed out that economic instruments are being embraced in developing countries as a way of increasing environmental quality. The increasing use of economic instruments derives from the recognition that they offer in practical way the best alternative to achieving environmental goals much more flexibly and at lower costs than the traditional command–and-control regulation. Sustainable environmental development is now an integral part of planning in Nigeria. Most of the literatures on environmental policy identify two principal approaches to environmental management. These are Economic or Market-based Instruments and Command-and-Control Strategies (CAC).

Section 4.4 discussed Nigeria environmental policy and its enforcement, and some relevant statutory instruments of environmental policy and their objectives. The foundation of environmental policy in Nigeria is contained in the 1999 Constitution of the Federal Republic of Nigeria. Pursuant to section 20 of the Constitution, the State is authorized to protect and improve the environment and preserve the water, air, land, forest and wildlife. Lastly, section 4.5 presented the conclusion of the chapter.

4.2 Theories of Environmental Regulations

Researchers have maintained that it is the role of government to identify market failures and enact regulatory legislation to correct cost to maximize social welfare (Robert, 2005). Such market failures include externalities, unemployment, inflation and under-provision of public goods. Theories on regulation have shown conflicting viewpoints regarding consumer-protection theory which is made up of regulation that assist the interested public at the cost of regulated firms or the producer-protection hypothesis which favour special interests at the expense of consumers. Consumer-protection theory owes its popularity to the welfare economist Vilfredo Pareto. The carbon-dioxide emission is a negative externality resulting from usage of high carbon-emitting energy in the operational process or production. The aggregate level of greenhouse gases increases through carbon dioxide released through energy sources. This carbon dioxide when released into the atmosphere potentially leads to global warming. This results in the rise in the earth's surface temperature and ocean levels and the melting of the glaciers, and exacerbates the intensity of extreme weather conditions (John & Linda, 2002; Cseres, 2008).

Nevertheless, firms do not take account of this negative effect on social welfare as the level of input chosen by firms is greater than the welfare-maximizing level. In order to correct this "market failure," the need for government to regulate the market becomes important. There was no empirical evidence from the 1950s and 1960 that demonstrates the connection between regulation and reduction of market failure. This led to the development of an alternative theory called the special-interest or capture theory of regulation. Stigler (1971) who propounded this theory argued that incentive-driven politicians pass regulation in exchange for the benefits offered to them by profit-maximizing industries. The theory was broadened by Posner (1975), Becker (1983) and Peltzman (1989) who regarded as germane the influence by non-industry special interest groups. In general, an increase in abnormal returns for an industry such regulation is regarded as a support for the special-interest theory.

Furthermore, the effect of industrial sector activities on the environment varies but these activities have the potential to damage the global environment. Sustainable development can only be achieved through the interdependence between economic growth and environmental quality. This has forced some governments to now regard the environment as an indispensable part of economic growth.

International and local governments have placed priority on the environmental problems. Environmental regulations are compounded by the fact that the government's incapability in most cases has constrained the availability of stringent environmental regulations. Most corporate organizations give little attention to their social responsibilities because their focus has been on furthering the interests of their businesses. Organizations are apprehensive about the social and moral implication of their actions on fundamentals of the environment.

According to McCarthy (1992), sustainable development implies evolving radical new economic policies of and bringing about a change in the habits of individuals. It certainly means abandoning the pursuit of simple self-interest. The Brundtland Report (World Commission on Environment and Development, 1987) commissioned by the United Nations to study the long-term environmental approach, argues that environmental protection and economic development could be made well-suited, but that this would necessitate systematic economic transformation that is being practiced throughout the World (Welford & Stranchan, 2005).

Environmental sustainability objectives have attracted attention in development strategies. Environmental policies resulting from increasing pressures from the population and economic growth have so far been outpaced and are central to the Millennium Development Goals (MDGs) adopted by the United Nations in 2001. It should be noted that the United Nations Environment Program (UNEP) has concluded that persistent barriers to sustainable development remain environmental degradation that is undermining development and threatening developmental progress (UNEP, 2009). The United Nations' regular monitoring of progress towards the MDGs suggests that it will be very difficult to meet many of the environmental targets (Cseres, 2008).

4.3. Conventional Solutions to Environmental Problems

The public goods model and the theory of externalities can be used to show how pollution results from market failures. Failure arises due to the absence of property right. The implication of this is the government must act as a third-party mediator in the markets where the pollution problem arises. Recognizing the need for government to correct environmental market failures is an important step, but there is a need to determine how the government should respond through effective policy formulation. In the opinion of Dani-Rodrik (2005), economic theory is hinged on the assumption that government should set objectives to achieve allocation efficiency, balance social benefits and costs at the margin. However, government is generally not motivated by efficiency, and even when this happens, it is unlikely that the benefits and costs can be determined exactly.

Nonetheless, the efficiency criterion is useful in assessing whatever policy objectives are set relative to their optimal level. Also, cost effectiveness can be used to evaluate how these objectives are implemented, even an objective targeted at something other than its efficient level. Standards remain fundamental to most environmental policies in United State of America and are determined after a lengthy set of procedures involving scientific research and a series of formal reviews. The EPA is charged with the oversight of these tasks and for making a formal recommendation about how these standards are to be defined. The standards are legislated by the Congress and subsequently monitored for compliance and enforcement by the EPA. When environmental principles are defined in the law, it can be specified as technology-based standards, performance-based standards and ambient standards (Scott& Janet 2007).

The economic implications of using standards can be investigated through economic evaluation that centers on standards being used to define efficient environmental objectives at the level that allocate efficiently. That is, the marginal social cost of pollution abatement equals the marginal social benefit. Also, given some biases for environmental objective, the implementation could be conducted in a cost-efficient approach.

John-Bowers (2005) argued that since environmental objectives are defined by standards it is important to determine whether these standards are efficiently allocated. This criterion is met if economic resources are allocated such that the associated benefits and costs to society are equal at the margin. As pollution abates, the society benefits from social gains associated with a cleaner environment such as improvements in health, ecosystems, aesthetics and property. In measuring how these benefits increase relative to increases in abatement, consider marginal social benefit (MSB) of abatement and how it measures the reduction in damages or costs caused by pollution. In theory, adding up all the marginal reductions in environmental external costs across every market where pollution is reduced would give as the MSB.

In demanding for environmental quality from a market perspective, the MSB of abatement in society's demand is equivalent to pollution abatement. As the recreational users were willing to pay the firms for a cleaner river, society is willing to pay for a cleaner environment. On the supply side, there is a need to model the costs to society as polluters reduce their releases of contaminating residues. This relationship is called the Marginal Social Cost (MSC) of abatement. This comprises the aggregate of the marginal costs of every polluter's abatement activities and the marginal costs the government incurs to monitor and enforce those activities.

John–Bowers (2005) argued that a firm's marginal abatement cost and maximize profit in other to meet an environmental standard, the firm will consider all available abatement options and select the method with the least cost. While the firm could reduce production to meet the standard, it has other options such as installing new abatement technology or changing a production process. This, of course, allows for the fact that the polluters choose from a menu of available abatement methods model, what is conventionally called a Marginal Abatement Cost (MAC) function.

The *MAC* measures the change in economic costs associated with the increased pollution abatement (A) using the method with the least cost. Each polluting source likely faces a unique MAC curve. Among the factors affecting the shape and position of the MAC curve are the location, the type of contaminants released, the nature of the production, and the availability of technology. Market-level Marginal Abatement Cost is the aggregate of all the firms' polluters' MACs represented as the market-level MAC (MAC_{mkt}) and defined as the horizontal sum of each polluter's MAC, or $MAC_{mkt} = \Sigma MAC_i$. The horizontal summing ensures that the MAC_{mkt} represents the decision with the least cost because it effectively sets each MAC equal at every abatement level.

In considering the second element of the marginal social cost (MSC) of abatement, the MAC_{mkt} function needs to add the marginal costs incurred by government in enforcing and monitoring the abatement activities. This component is commonly referred to as the Marginal Cost of Enforcement (MCE).At any abatement level (A), the MCE is the vertical distance between MAC_{mkt} and MSC. As the standard of regulations to control pollution becomes more stringent, polluters have a greater tendency to evade the law, bringing about the need for a more sophisticated and more closely monitored and enforcement programs.

In determining the abatement efficient standard, the MSB and MSC altogether determine the efficient level of abatement (A_E), which occurs at the intersection of the two functions. Whether or not the government sets environmental standards to achieve this level depends on various circumstances such as legislative constraints, imperfect information, regional differences and non-uniformity of pollutant.

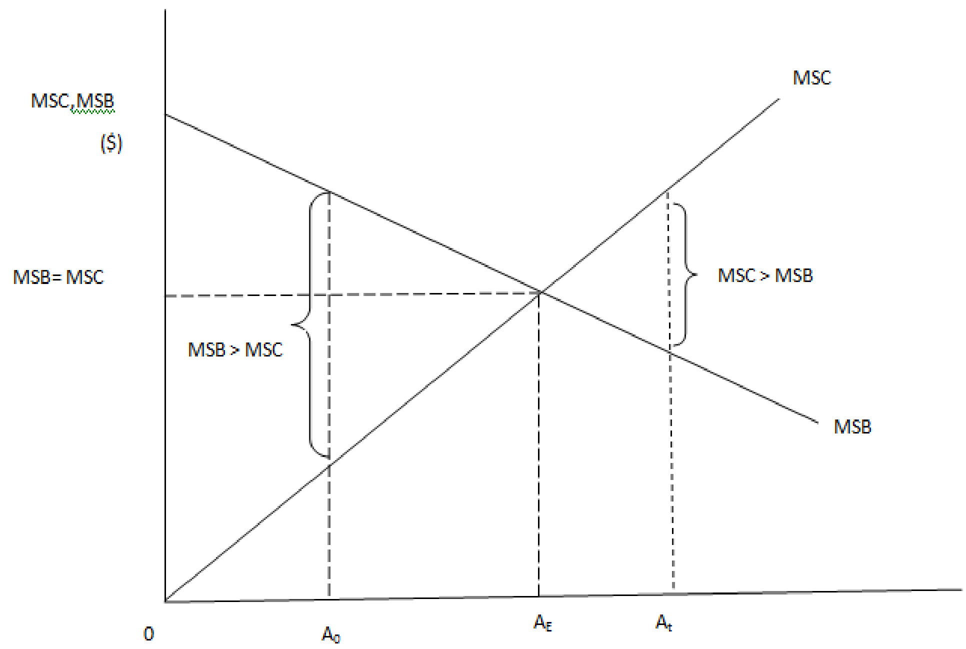


Figure 4.1: Conventional Solutions to Environmental Problems
Source: Adapted from Thomas Callan, 2010.

If the government set the abatement standard at A_o, *MSB* would be higher than *MSC*, meaning that society places a higher value on the gain from reduction in pollution than the resources needed to achieve it. Hence, the A_o standard would be too lenient. On the other hand, if the standard is set at A_1, it would be considered too restrictive. Only at A_E would society accept the legal limit as efficiently allocated. Most governments, including that of the United States, use a number of different policy tools to achieve environmental quality. Roberta's (2002) study gave two broad based categories. The Pollution limits of technology based restrictions can be used to regulate pollution sources through the command-and-control approach. The other approach is the market approach which uses incentive-based policy tools to achieve abatement through market forces.

Command-and-control is the more conventional approach and it dominates environmental policy in most countries. Inflexible regulations and pollution limits, often imposed homogeneously across all polluters have not met with consistent success. Therefore, policymaker should begin to look for alternatives. The developed countries have gradually incorporated market-based solutions into their environmental policy programs. However, the comparative gains of market-based solutions cannot be fully appreciated without assessing the cost effectiveness of the command-and-control approach (Roberta, 2002).

The market approach has been stronger supported by economists because it can achieve a cost-effective solution to environmental problems. This initiative allows polluters to respond according to their own self interest. The theoretical premise of a pollution charges is to internalize the cost of environmental damages by placing a price on the activities that generate pollution. The motivation follows what is known as the polluter pay principle, a position rooted in the belief that the polluter should bear the costs of measures to control maintain an acceptable level of environmental quality (Scott & Janet, 2007).

The product in a competitive market has production that generates a negative environment externality. Because producers base their decisions solely on the Marginal Private Cost (MPC) of production, ignoring the Marginal External Cost (MEC) of the environmental damage, too many resources are allocated to production as shown in figure 4.2 below, where firms produce an output level Q_C, a point at which the marginal social benefit (MSB) of consuming the goods is equal to the Marginal Private Cost

(MPC) of producing it. Implicitly, this assumes that there is no Marginal External Benefit (MEB) in this market so MPB = MSB. Note that the competitive equilibrium output (Q_C) is higher than the efficient level (Q_E), which corresponds to the point where the *MSB* equals the Marginal Social Cost *(*MSC).

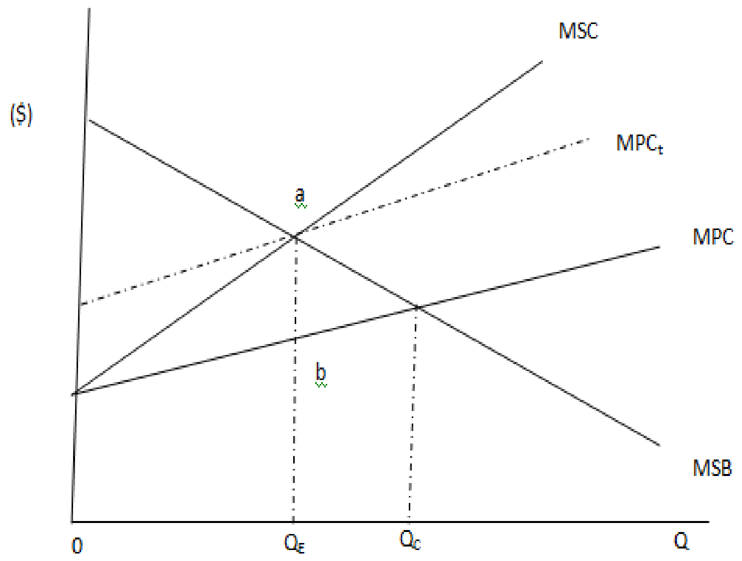


Figure 4.2: Market-Approach Solution to Environmental Problems
Source: Adapted from Thomas Callan, 2010.

Setting the unit tax equal to the MEC at Q_E, shown as distance ab, the MPC curve shifts up to MPC_t. Equilibrium output is then determined by the intersection of MPC_t and MSB, which is the efficient production level, Q_E. The product charges are to induce firms to internalize by taking account of the MEC in their production decisions. One way of doing this is to impose a unit tax on the product generating the pollution equal to the MEC at the efficient output level (Q_E). This type of tax is called a Pigouvian tax, named after English economist A. C. Pigou who propounded formulated the theory.

As illustrated in figure 4.2 above, this policy instrument effectively shifts the MPC curve *ab* to MPC_t, which generates equilibrium at the efficient output level. The Piguovian tax forces firms to lower production to the efficient level. The instrument is difficult to impose in practice because of the difficulty in identifying the monetary value of MEC at Q_E and, hence, the level of the tax. Another problem is that the model implicitly allows for an output reduction to abate pollution which is considered an impractical restriction.

Emission charge specifies the price a firm pays for pollution and it is assumed that once this price mechanism is in place, the polluter can no longer ignore the effect of the damage to the environment. The pollution charge drives the polluter to identify those damages, pay for them and, in so doing, consider them as part of its production cost. Modeling an emission charge that allows polluters to make a decision to minimize cost assumes that the government will sets abatement standard at some satisfactory level. In this case, the polluter must pay a per-unit constant on the difference between its existing abatement level and the cost incurred in respect of abatement. Seeking to satisfy its own self-interest to maximize profit, the polluter makes a decision based on the least cost between paying the tax and abating. The result is that the externality is internalized, using the least amount of resources.

In practice, charge and other levies imposed on the pollution is the most commonly used market-based instrument. Several countries like France, Japan, Australia and Germany use fees or taxes to control noise pollution generated by aircraft. Some countries like Poland, Mexico and France impose effluent charges to protect water resources. Nigeria, for example, fines and charges the oil companies in the Niger Delta for air pollution.

4.4 Economic Instrument for Environmental Management

In examining the OECD experience, this study relied on a wide range of applications and economic instruments. As Jerome (2000) noted a total of 169 economic instruments from 23 OECD countries were used. This indicated that economic instruments are being favoured in developing countries as a way of increasing environmental quality. The increasing use of economic instruments derives from the recognition that they offer a practical way of achieving environmental goals much more flexibly and at lower costs than the traditional command-and-control regulation. The 1992 Rio Declaration on environment and development endorsed the use of economic instruments as an important component of sustainable development. Matthew (2012) observed that Nigeria is a participant and signatory to most of the global conventions and protocols on sustainable environmental development which now form an integral part of planning in Nigeria. The Federal Government of Nigeria signaled its commitment to the environment by establishing a Federal Environmental Protection Agency (FEPA) in 1988 and since then effort has been made to create State Environmental Protection Agencies in all states of the federation. They are to carry out effective management and control of pollution in Nigeria.

There are two principal approaches to environmental management; these are economic or market-based instruments and command-and-control strategies. Market-based instruments are regulations that support activities through market relative information concerning pollution control technique. These policy instruments such as pollution charges or tradable permits regularly serve as market control forces, because considered and implemented, they support the firm or the individual to undertake a pollution control plan collectively convenes the policy goals (Stavins, 2000).

This condition described above depends on markets and price mechanism not only to internalize environmental externalities (O'Connor, 1999), but also attempts to align private cost and social cost to reduce negative environmental externalities. Environmental externalities have become popular because the command-and-control approach has not been cost effective in meeting the challenge of industrial pollution. They aim at changing behavior by offering incentives rather than by imposing standards regulation or seeking specific technical improvements. Economic instruments are underpinned by the basic economic philosophy of the polluter-pays and user-pays principle.

According to Xia (2003), the polluter-pays-principle works on the principle that a firm pays a smaller penalty or receives a financial reward for low level of pollution and the polluter pays a financial penalty for high level of pollution. It means that a user of a resource pays a full social cost of supplying the resource. The broad spectrum of economic instruments following Hanley, *et al.,* (1997) noted that economic instruments can be grouped into three broad categories, namely, price rationing, quantity rationing and liability rules. Price rationing increases the cost of levying a charge, a tax or a subsidy on producer or products. Emission or effluent charges are mainly use as tools of price rationing. Taxes and subsidies work by modifying relative prices in existing markets in order to realign incentives faced by polluters.

Quantity rationing sets the acceptable levels of pollution by allocating marketable permits that provide an incentive to producers with low pollution **cost** and sell their excess permits to producers with high control costs. Market or tradable permits work by creating artificial markets for the right to pollute, where permit prices are established via trading between firms in need of the right to pollute more and one willing to pollute less. In principle both approaches equate marginal abatement cost across all polluters, thereby achieving a given level of industrial pollution at the least cost. These approaches will generate the same equilibrium level of pollution abatement if there were no uncertainty concerning pollution abatement cost compared to the benefit function (Fischer & Pizer 2003).

Non-compliance fees, deposit refund schemes and performance bonds represent approaches and specify schedules for meeting the standards, as well as permit and enforced alternative liability rules. Command-and-control approaches could in theory achieve cost-effective solutions but this would require that different standards are set for each source of pollution. It bears stating that the policy makers should obtain detailed information about the compliance cost of the firm even though such information is not available to the government. Figures 4.1 and 4.2 below show the taxonomy of policy instrument and the economic instrument for environmental protection and natural resource management, respectively.

Economic Instruments for Environmental Protection and Natural Resources Management

Property Right

Ownership right

- Land titles
- Water right
- Mining right

Use rights

- Stewardship
- Licensing
- Concession/ bidding
- Turfs

Market Creation

Tradable emission permits
Tradable catch quotas
Tradable development quota
Tradable water shares
Tradable resources shares
Tradable land permit
Tradable offset credit

Financial Instruments

Financial Subsidies
Soft loans
Grants
Location/relocation incentive
Subsidized interest
Hard currency below
equilibrium
Exchange rate
Revolving funds
Sect oral funds
Ecofunds/ Environmental
funds
Green funds

Fiscal Instruments
Pollution taxes
Effluent taxes
Emission taxes
Input taxes
Product taxes
Export taxes
Export tariffs
Tax differentiation
Royalties and Resources
taxes
Land Use taxes
Investment tax credit
Accelerated depreciation
Subsides

Charges Systems

Pollution Charges
User Charges
Betterment charges
Impact fees
Access fees
Road tolls
Administrative Charges

Bonds And Deposit Refund System
Environmental performance bonds
(e.g. forest management)
Land reclamation bonds
(e.g. mining)
Environmental accidents bonds
(e.g. oil spills)
Deposit refund systems
Deposit refund shares

Liability Systems

Legal liability
Non-compliance charges
Joint and several liabilities
Natural resources damage liability
Liability insurance

Source: UNEP 1995, Economic Instruments for Environmental Management and Sustainable Development. Consultant report prepared by Panayoutou for UNEP Environment and Economic Unit. *Environmental Economic Series* Paper 16. UNEP Environment and Economic Unit Nairobi.

Figure 4.3: Economic Instrument for Environmental Protection and Natural Resources Management

Table 4.1: Taxonomy of Policy Instrument

	Direct Instruments	Indirect Instruments
Market- base Incentive (MBIs)	Effluent charges, tradable permit, deposit refund system	Input/output taxes and subsidies, Subsidies to substitutes and to abatement input
Command and Control (CAC)	Emission regulation (source specific, non-transferable Quotas)	Regulation of equipment, process, input and output
Government production or expenditures	Purification, cleanup, waste disposal, enforcement and agency expenditures	Technological development

Source: Eskeland & Emmanuel, 1991
Note: A direct instrument is addressing the level of damages or emissions directly, whereas indirect instruments work via other variables.

By distinction, market-based instruments provide for cost-effective allocation of the pollution control burden among the sources without requiring the government to have this information. As Madhu (2001) pointed out, economic instruments reduce the cost of specified levels of environmental protection by allocating polluters greater flexibility in how they achieve the required level of pollution. The net cost savings from economic instruments vis-à-vis CAC derive from two sources: lower administrative costs and a shift of the burden of abatement from high-cost to low-cost abate. The cost advantages of economic instruments derive from lower information requirements and monitoring and enforcement costs.

4.5 Nigeria Environmental Policy and its Enforcement

The regulations governing environmental policy in Nigeria is contained in the 1999 Constitution of the Federal Republic of Nigeria pursuant to Section 20 of the Constitution. These provisions give each state of the Federation the function of improving the environment and safeguarding the water, air and land, forest and wildlife in Nigeria. The Environmental Impact Assessment Act of 1992 (EIA Act) provides that the public or private sector of the economy shall not embark on projects or activities without prior consideration of the consequence on the environment. The Federal Government of Nigeria has thus promulgated various laws and regulations to safeguard the Nigerian environment. Table 4.2 below shows the summaries of some Environment Laws in Nigeria as at 2007.

Table: 4.2 Some Relevant Statutory Instruments of Environmental Policy and Their Objectives

S/No	*Statutory Instrument*	*Objective / Remark*
1	Minerals Ordinance (1914) amended 1925, 1950, 1958	To proscribe the pollution of watercourses in the process of mining and prospecting for any mineral, including petroleum.
2	Oil Pipeline Act (1956), amended 1965	Provides for the prevention of pollution of land and water resources as a result of petroleum and production activities.
3	Public Health Act (1958)	Provides legal framework for the preservation and management of public health.
4	Criminal Code (1958)	Provides legal framework for seeking redress from environmental diseconomies, among others.
5	Mineral Oils (Safety) Regulations (1963)	Provide a framework for health, safety and environmental - friendly exploration and production activities.
6	Petroleum Regulations (1967)	Provide a framework for safe petroleum operations, including environmental protection
7	Oil in Navigable Waters Act (1968)	Prohibits discharge of oil into navigable water courses and other areas.
8	Petroleum Act (1969) and Related Regulations	Major legislation on petroleum industry to date. Provides encompassing framework for the regulation of upstream and downstream petroleum activities so as to protect the environment.
9	Land Use Act (1978)	To reform existing land ownership rights through nationalization. Adequate and fair compensation to be paid for loss of surface rights
10	Associated Gas Re-injection Act (1979), amended 1984, 1985.	Provides the statutory basis for the regulation of gas flaring in Nigeria.
11	Harmful and Toxic Wastes (Criminal Provisions) Decree No. 42 (1988)	Makes available legal anchor for redressing the dumping of toxic and hazardous wastes.
12	Federal Environmental Protection Agency (Decree No. 58, 1988), And related legislations.	Makes available a quasi-legal framework for checking environmental crimes, and to set environmental standards for different pollutants

13	Industrial Pollution Abatement Regulations (1991)	To regulate the generation and disposal of industrial waste through the principle of environmental permits.
14	Effluent Limitations Regulations (1991)	Provision of standards for industrial effluent discharge and emissions into the atmosphere.
15	Environmental Impact Assessment Act (1992)	Provides statutory basis for EIAs, as part of project development authorization process.
16	Environmental Guidelines and Standards for the Petroleum Industry (DPR), 1991, 1999.	Most comprehensive framework for environmental policy and management in the petroleum industry.

Source: Department of Petroleum Resources (DPR), 1990.

The Federal Ministry of the Environment (FME) was established in 1999 to manage and enforce environmental laws in Nigeria. Before then existed the Federal Environmental Protection Agency (FEPA), created under the FEPA Act, 1988. When the federal Ministry of the Environment was established in 1999, FEPA was disengaged and its functions taken over by FME. The Federal Ministry of Environment has published several guidelines for the administration of the FEPA and EIA Acts and released procedures for measuring Environmental Impact Assessment (EIA) Reports (Environment Law in Nigeria 2007).

The function of the ministry also includes supervising other regulatory agencies and specific industries and issuing guiding principles to regulate the impact of such industries on the environment such as the Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN) 2002, published by the Department of Petroleum Resources (DPR).The FEPA Act allowed every state and local government in the country to set up its own environmental protection body. States were also allowed to make laws to protect the environment within its jurisdiction. Many states have environmental agencies operating under the state laws, e.g. the Federal Capital Territory has issued the Abuja Environmental Protection Board (Solid Waste Control/Environmental Monitoring) Regulations 2005 (the Abuja Environmental

Protection Board Regulations) which guides solid waste control in Abuja.The legislative structure for environmental policy in the Nigerian Petroleum Industry is shown in Figure 4.4.

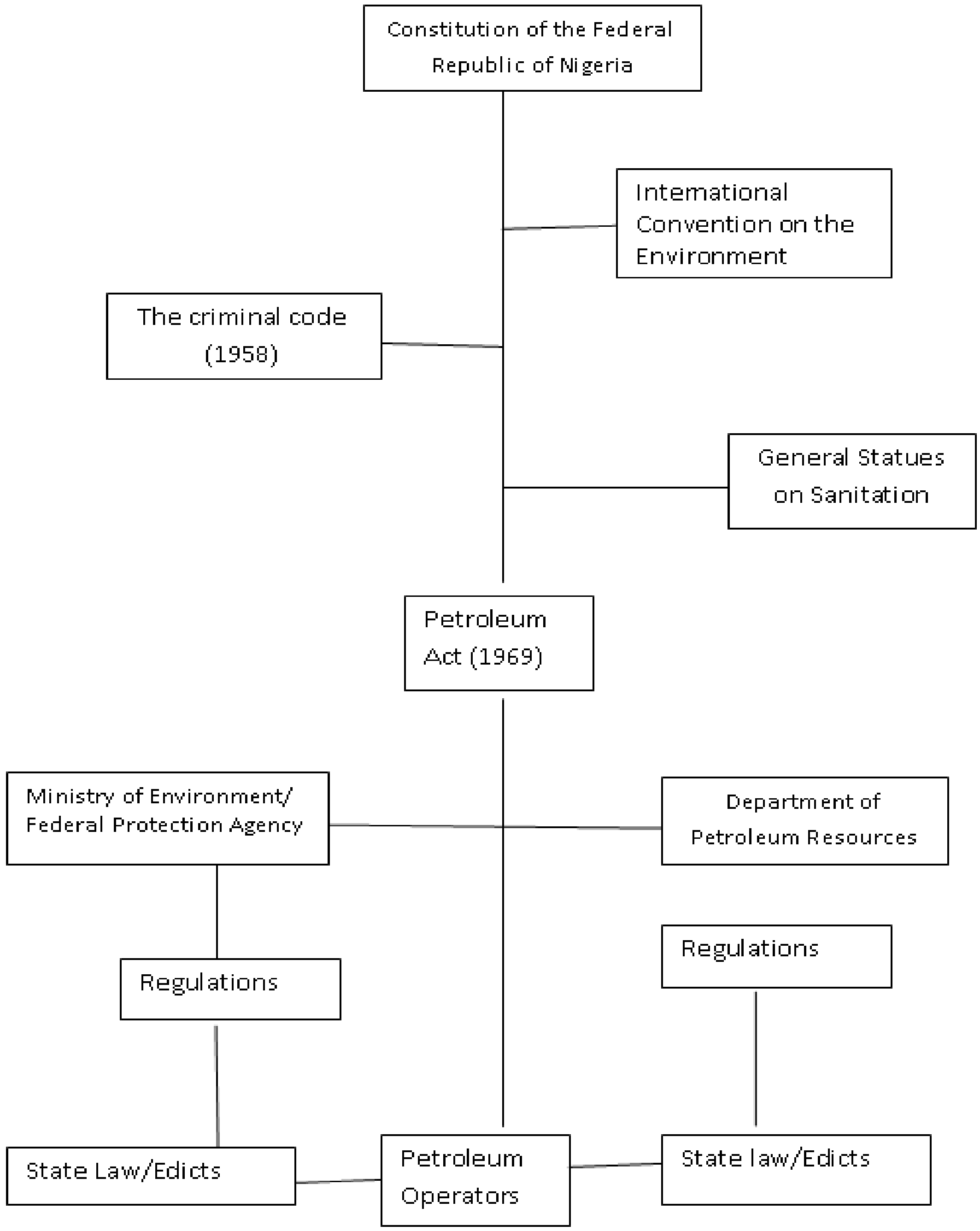


Figure 4.4: Statutory Frameworks for Environmental Policy in the Petroleum Industry Source*: The Federal Environmental Protection Agency (FEPA), 2009.*

Lagos State Environmental Protection Agency (LASEPA) manages and controls the disposal of waste in Lagos State and advises on policies of environmental management. Post-independence environmental protection laws like the Mineral Oil (Safety) Regulations, 1963, Petroleum Regulations, 1967, as well as the Oil in Navigable Waters Act 1968 (among others) are some of the statutory regulations safeguarding environmental protection in the petroleum industry. Environmental policy in the industry did not however become effective until the enactment of the Petroleum Act, 1969 which gives the Minister of Petroleum immense powers to make regulations relating to all aspects of petroleum operations, including protection of the environment.

The Federal Environmental Protection Agency (FEPA) and the Department of Petroleum Resources (DPR) have functioned as environmental watchdog of the petroleum industry. The actions of these agencies are guided within the framework of the National Policy on the Environment (NPE) established in 1989. Deriving its authority from the many statutes and regulations, the Directorate of Petroleum Resources has the power to set up strict environmental standards for the petroleum industry. In 1991, DPR came up with the (EGSPI) Environmental Guidelines and Standards for the Petroleum Industry.

4.6 The Government Policies Developing the Niger Delta Region to Date

The government has implemented various policies and established many existing functional and non-functional agencies to help in the development of the Niger Delta region such as:

- The Niger Delta Development Board (NDDB),
- Niger Delta River Basin Development Authority (NDBDA),
- Oil Mineral Producing Areas Development Commission (OMPADEC).

- Nigeria National Petroleum Company, and more recently,
- Niger Delta Development Commission,
- The federal government has also, over the years, implemented policies aimed at the development of the Niger Delta such as the following:
- The establishment in 2001 of the General Alexander Ogbemudia Special Security Committee on Oil Producing Areas was set up. The committee made five major recommendations as follows:

  - Upward review of the minimum 13 percent derivation to 50 percent.
  - Training of Niger Delta indigenes for employment in oil companies.
  - Provision of infrastructures such as electricity, schools, water, roads,
  - Repeal of the Land Use Act, Petroleum Act, Gas Injection Act and other laws which dispossess oil-producing areas of their land; and
  - The total industrialization of the Niger delta.

The federal government has also initiated or supported some policy options in the Niger Delta. These are:

- The implementation of the 13 percent derivation (excluding offshore) in 2000;
- The establishment of NDDC in 2000;
- The Governor James Ibori Presidential Standing Committee on the Niger Delta in 2004.
- The NNPC Niger Delta Youth Standing Committee in 2004;
- The Major General Mohammed Presidential Committee on Peace and Reconciliation in the Niger Delta 2003/2004; and
- The Niger Delta Peace and Security Strategy (PASS.2007).
- Niger Delta Human Capacity Development for the Youth in 2008.
- Federal Government Amnesty Policy For Niger Delta Militant Groups 2009
- Establishment of Ministry of Niger Delta 2010

The most memorable event was the establishment in 2000 of Niger Delta Development Commission to quicken the pace of the development of the nine oil-producing states. Six years after its existence however, the Commission had been dogged by corruption, mismanagement, nepotism and greed, the same reasons advanced for the apparent inertia of OMPADEC and other similar agencies. What this suggests is that the intervention agency may not have efficiently fulfilled its mandate.

4.7 Summary

Environmental predicaments of the oil-rich communities are in the front burner of the agenda of domestic and international institutions. However, government’s incapability has stymied the enforcement of strict environmental regulations that can check the excesses of the oil multinationals. This has been further worsened by the profit-driven motive of the companies operating in the region who think only in terms of their economic interests. In order to correct all these at little cost, the government needs to be committed to the common welfare of the people and identify market failures and enact regulatory legislation to guard against these. However, because firms do not account for this unconstructive effect on social welfare, the level of production output chosen by firms is greater than the welfare-maximizing level. In order to correct this, government should address market failure. The effects of industrial sector’s activities on the environment vary but it is an indubitable fact that severe damage is being done to the environment in the Niger Delta. Interdependence between environmental quality and economic growth leads to sustainable growth that can only be achieved by making government to view the environment as a valuable and an essential component of economic growth.

Furthermore, in the light of the conventional solutions to environmental problems and the public goods model, the theory of externalities shows how pollution is the result of market failures. Failure arises due to the absence of property right. The need for government to correct environmental market failures therefore becomes imperative, but government should respond to these failures through effective policy. Government should set objectives to achieve allocation efficiency, balance social benefits and costs at the margin. The economic instruments for environmental management and instruments are becoming popular in developing countries as a way of improving the quality of the environment.

Governments all over the world use a number of different policy tools to achieve environmental quality and most of these fall into two broad based categories. The first is the command-and-control approach which uses pollution limits or technology-based restrictions to regulate polluting sources. The other approach is the market approach which uses incentive-based policy tools to achieve abatement through the market forces. This is dependent on the markets and price mechanism to internalize environmental externalities and align private cost and social cost to decrease negative environmental externalities. They have become accepted because the command and control approach has not been cost effective in solving the problem of industrial pollution.

Environmental policies and its enforcement and some relevant statutory mechanism as contained in the 1999 Constitution of the Federal Republic of Nigeria have been targeted at environmental protection. The effort above has been complemented by the states which are authorized to protect and develop their environment and safeguard the water, air and land, forest and wildlife in their jurisdiction in Nigeria. To achieve specified level of environmental protection, there is a need for polluters' superior flexibility.

CHAPTER FIVE

CONCEPTUAL FRAMEWORK

5.1: Introduction - Models Interaction

Environmental economic theory encompasses and differentiates between all three dimensions of economic, social and environmental development. It also provides a more descriptive framework, and uses of concepts of capital and welfare recognized in existing economic and political economy theories of economic growth and development. This has played a major role in economic and environmental economic theories of sustainable development (Massimiliano, 2002).

Capital accumulation is fundamental to economic growth and embraces the three scarce factors of production, capital, labour and land or environmental resources. Capital has the capacity to spur economic growth and labour is considered as human capital. Human capitals are the combination of knowledge, health and skills and contribute to personal productivity. Human capital importance has increased, not because of the new endogenous growth theory, which is technological innovation, one of the key factors linked with accumulation of human capital advancement (Romer, 1990). This is based on modified neo-classical economic model in which the environment is integrated into the economic system. Development is portrayed as an accumulation of human and man-made capital at the expense of a reduction in natural capital. Development is generally deemed sustainable when a balance is struck between these processes of gain and loss so that capital stocks do not decline (Alexander, 2008).

David et al. (2002) noted that environmental resources constitute an essential factor of production needed to produce goods and services. The economic value of natural resources is determined by consumer preferences and the scarce environmental resources, these preferences being stated clearly by the free operation of the private market system. Resource and environment scarcity can be quantified by the market price. In a precise situation, natural resource can always be substituted partially or fully use other natural or manufacturing resources. Moreover the technological progress continually enhances the scarcity of natural resources.

5.2. Structure of the Aggregate Stock Pollution

The environment suffers the shock of industrial activities which more often than not, resulted in operating utility damage or through production function damages. There are often negative effects of environmental pressures cause utility to capture the effects. The utility function is stated as $U = U(C, E)$ by assumption, $Uc > 0$ and $U_E < 0$. The environmental pressures E depends on the rate of fossil-fuel use (R) and on the accumulated stock of pollutant allowed in an environmental medium (A), so $E = E(R, A)$. More prominent rates of crude oil use and higher pollution points enhance environmental pressures, so that $E_R > 0$ and $E_A > 0.U = U(C, E(R, A))$. This explains a situation where damages operate through the utility function and production functions. For instance, greenhouse gas induced climate change might reduce crop yield, emission and overflow of ocean (William, 1991). The production function that incorporates this kind is Q = Q (R, K, E (R, A). Acquiring non-renewable resource involves the extraction and processing costs which depend on the quantity of the resource used. Figure 5.1 below shows the structure of the aggregate stock pollution.

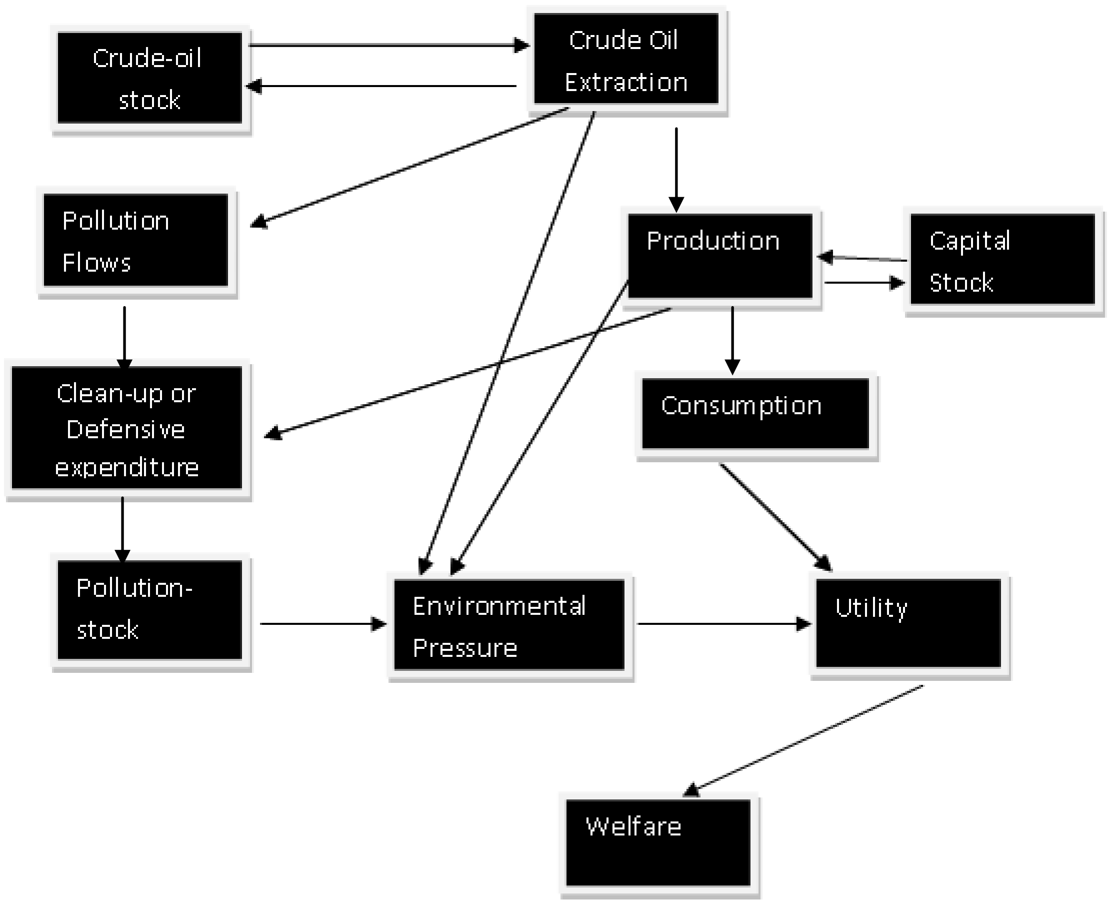


Figure 5.1: The Structure of the Aggregate Stock Pollution
Source: Adapted from, Roger Perman et al., 2003.

The picture above is a simple, cumulative stock pollution model which considers an optimal growth and shows the flow of pollution, linked to extraction and use of a composite non-renewable resource. The model is employed exclusively to find the features of an emission course for the pollutant that will maximize a suitable distinct objective function.

Moreover, suppose the production process utilizes two inputs, capital and non-renewable environmental resources. Acquiring non-renewable resource involves extraction and processing costs. The fixed and the total stocks of the non-renewable resources produce the crude oil. Using crude-oil involves an inter-temporal tradeoff, given that the total stock is fixed and suggests that less of it will be available for future time (Christoph & Andreas, 2002). Therefore, the diverse paths of fossil fuel extraction can affect the welfare of different generations. Production and corresponding usage of crude oil have negative effects and as a cost to welfare by way of increased pollution.

5.3. Optimal Allocation of Natural Resources

In constructing a framework to analyze the natural resources usage for a period of time, there is a need to present the foundation for investigation of non-renewable resource depletion. The theoretical framework gives a basis for developing a simple economic model built around a production function. The natural resources are inputs in the production process establishing the features of a socially optimal pattern of resource. This is used over time in the utilitarian social welfare function (Jeroen & Peter 1991). One of the basic objectives is to establish conditions that must be satisfied for natural resources use to be optimal, thereby maximizing the social welfare function (SWF). The required social welfare function is:

$$W = w\ (U_0, U^1, U_2 \ldots\ldots\ldots\ldots U_T) \qquad 1)$$

Where $U_t,\ t = 0\ldots\ldots\ldots.,\ T,$ is the aggregate utility in period t in social welfare function, social welfare being the weighted sum of the utilities of the relevant individuals.

Individual in this case means an aggregate of persons living at a certain point in time and so refer to the utility in period 0, 1, 2, and so on. The utilitarian function will be in the form,

$$W = \ \ \alpha_0 U_0 + \alpha_1 U_1 + \alpha_2 U2 + \ldots\ldots + \alpha tUT \qquad 2)$$

The utility in each period is a concave function of the level of consumption assumed in that period, so that $U_t\ =\ U_t = U(C_t)$ for all t, with $Uc > 0$ and Uc < 0. It is observed that the utility function is not dependent upon time; so that there is relationship between consumption and utility in all the periods of time. The weights in equation 2 is take as discount factors associated with a social utility discount rate ρ taken to be fixed over time. Rewritten, the social welfare function gives:

$$W = U_0 + \frac{U_1}{1+\rho} + \frac{U_2}{(1+\rho)^2} + ... + \frac{U_T}{(1+\rho)^T} \qquad 3)$$

Supposing that the applicable time horizon is infinite, resulting inthe special case of the utility of social welfare function being:

$$W = \int_{t=0}^{t=\infty} U(C_t)e^{-\rho t}dt \qquad 4)$$

As the equation shows, an optimal solution must be satisfied by two constraints. All the resources stock be extracted and used by time horizon ending. In this regard, Schutze (2004) argued that given a non-renewable resource that is fixed and finite initial stock, it is constrained to be equal to the fixed initial stock by the total use of the resources over time. Denoting the initial stock at (t=0) as S_0 and the rate of extraction and use of the resource at time *t* as $R_{0.}$ The constraint can be written as

$$S_t = S_0 - \int_{\tau=0}^{\tau=1} R_\tau d\tau \qquad 5)$$

Equation 5 is integrated over a period time interval from the period 0 to any later point, introducing another symbol τ , the Greek letter (tau) to denote any point in time in the range over which function is being integrated. Equation 5 states that the remaining stock at time t (S_t) is equal to the magnitude of the initial stock (S_0) less the quantity of the extracted resource over the time interval from zero to t.

This resource stock constraints are obtained by differentiating equation 5 with respect to time, giving

$$\dot{S}_t = -R_t \qquad 6)$$

Where the dot over a variable indicates a time derivative, so that $\dot{S}_t = \frac{ds}{dt}$. Equation 6, is the rate of depletion of the stock, $-\dot{S}_t$, which is equal to the rate of stock of resource extraction, R_t

The second constraint on welfare optimization derives from the accounting identity linking output, consumption and the economy's stock of capital. Output is apportioned between consumption goods and capital good, and so that part of the economy's output which is not consumed results in a capital stock change.

Writing this identity in continuous time gives

$$\dot{K}_t = Q_t - C_t \qquad 7)$$

This specifies how output, Q, is determined and produced through a production function involving two inputs, capital and a non-renewable resource:

$$Q = Q(K_{t,} R_t) \qquad 8)$$

Substituting for Q_t, in equation 7) from the production function in Eq.8, the accounting identity can be written as

$$\dot{K}_t = Q(K_t, R_t) - C_t \qquad 9)$$

Here lies the solution for the socially optimal inter-temporal allocation of the non-renewable resource. The objective is to maximize the economy's social welfare function subject to the non-renewable resource stock flow constraint and income identity. The solution is to internalize the activities and problem arising from extraction of non-renewable resources.

5. 3.1 Polluter's Choice of Care

The effect of strict liability on polluter care can be seen from a simple model of an environmental accident. Let x denote the polluter's expenditure on care or pollution abatement. We assume that the polluter's care can affect either the probability of an accident or the magnitude of the damages that result if an accident occurs. For example, the care used in the construction and operation of an oil tanker can affect both the probability that an oil spill will occur, and the magnitude of a possible spill. Let $p(x)$ denote the probability that an accident will occur and let $D(x)$ denote the damages that the victim will suffer if an accident occurs, where $p'(x) < 0$ and $D'(x) < 0$. At the time that the polluter makes this careful decision, the expected damages are $ED(x) = p(x)D(x)$, the socially efficient choice of $x(x^*)$ then minimizes total social costs $x + ED(x)$, which are the sum of the cost of care and the expected environmental damages. If the sufficient second-order conditions are met, then x^* is defined by the first-other condition

$$1 + ED'(x) = 0 \qquad 10)$$

The polluter, on the other hand, chooses a level of x that minimizes his private costs, which are the sum of the cost of care and the expected liability payment. Let L(D(x) denote the polluter's liability payment, which refers to the damages that the victims suffer as a result of the accident. Expected liability is thus given by $EL'(x) = p(x)L(D(x))$. If the polluter seeks to minimize $x + EL(x)$ the first-order condition for the polluter's choice of care is given below as

$$1 + EL'(x) \qquad\qquad 11)$$

Under a strict liability rule, the polluter is liable for all damages that occur, given that L$(D(x) = D(x)$.Clearly, under such a rule, $EL(x) = ED(x)$, which implies $EL'(x) = ED'(x)$ for all x. Thus, Marginal Private Cost equal Marginal Social Costs suggesting that the polluter is induced to choose the efficient level of care. In other words, the polluter is forced to internalize the expected damages that result given his choice of care. This is the same principle that underlies the use of a Pigouvian tax, under which pollution-generating activities such as emissions of a given pollutant are taxed at a rate equal to the marginal social damages that result from the activity (Amy-Farmer, 2001).

5.4 Interaction between the Concepts

The inflow of Foreign Direct Investment into the oil industry is considered to have direct impact on the exploitation of crude oil and result in increase in the production capacity of the oil companies in the Niger Delta. The increase in the oil exploitation has led to increase in the revenue to the federal government of Nigeria and generated employment in the sector over time. The impact of the inflows of FDI eventually resulted in economic growth in the country. These activities have also had direct impacts on the growth of the sector culminating in increase in the investment into the oil sector, revenue generation to government and employment opportunities for the people (Phamhoang, 2003).

Economic growth can also result to environmental pressure which caused externalities to the environmental system. This is in form of increase in environmental degradation, such as air and water pollution, reduction in the land fertility, increase in the social capital cost and composite assets (Mohan, 1999).Increase in all these factors has impoverished the people in the Niger Delta. To check all these pressures on the environment, government needs to intervene by regulating and protecting the environment for sustainability.

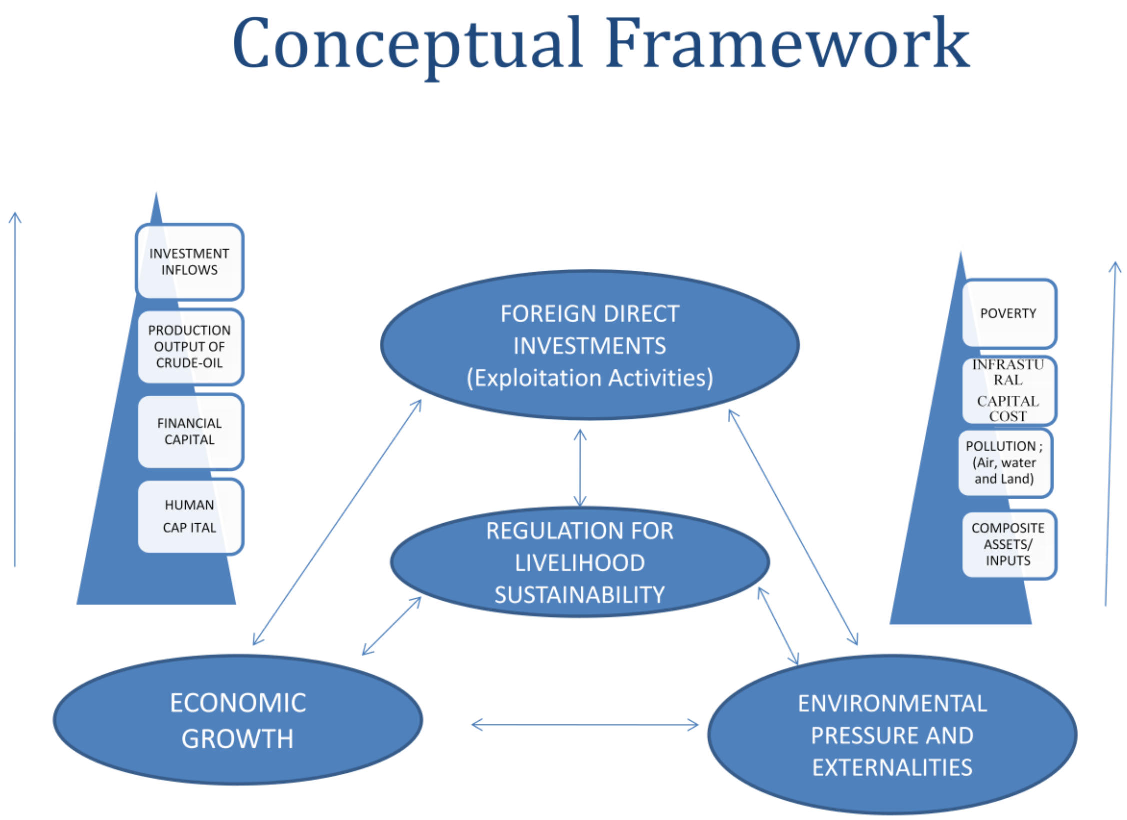


Figure 5.2: Conceptual Framework

The fundamental issue of sustainability has been central to the management of non-renewable resources. Non-renewable resources are such that when exploited, they involuntarily become unavailable to future generations. Exploitation of these resources calls for caution and it should be done in a manner that does not constitute any danger to the environment and the people. Furthermore, these natural wealth once exploited are converted into durable human-made wealth (William, 2006). Consequently, the petroleum resource of many developing countries must be converted to long-term private and public productive capital, if they are to contribute to the long-term economic development of the oil-rich country. Productive capital means not only physical capital (roads, housing, factories, etc.), but also human capital (education, skills, employment,) and institutional capital (an efficient legal system, effective public agencies).

The basis of effective policy in the analysis of the benefits and costs of different courses of action affect economic productivity through impacts on human health, soil fertility, and resource depletion. Moreover, with relatively low incomes and high value given to matters of economic development, it is important to understand the priority placed on the improvement of the environment. Thus, there is a critical need to assess the benefits and costs of alternative environmental policies and regulation for sustainability (Massimiliano, 2002).

5.5. Foreign direct investment

Foreign Direct Investment is more often than not linked to multinational enterprises who are the dominant actors in the world economy. FDI results in the expansion of an enterprise and the corresponding inflow of capital, entrepreneurial skills and technology from its home country to a foreign host country.

Foreign Direct Investment is an investment that acquires the long-term management interest. It has 10% or more of voting stock in a business activity functioning in a country other than that of the investor. According to position of World Bank (1996), such investments take the structure of merger and acquisition, and are essential to the acquisition of existing interest rather than new investment. FDI includes reinvested earnings and loans and similar capital transfer linking parent companies and their affiliates, and could arise from merger and acquisition and new investment (Xueli, 2010).

Countries may possibly be both hosts to FDI projects in their own country and a partaker in investment projects in other countries. A country's inward FDI arrangement is made up of the hosted FDI projects, while outward FDI includes those investment projects owned abroad. In corporate governance, ownership of less than 10% is authenticated as portfolio investment while ownership of at least 10% of the ordinary shares or voting stock is the condition for a direct investment relationship.

However, deliberate expansion of cross border investments, particularly by international corporations and firms, is the most important features of globalization drive. Many countries particularly developing countries now build a centre of interest for FDI as a significant element in their move toward economic development. This is most perhaps because FDI is seen as a combination of capital, management, technology, marketing (Adeolu, 2007).

The monopolistic advantage theory is based on the assumption that the investing firm owns monopolistic advantages that make it possible for it to operate subsidiaries abroad more profitably than local competing firms. These advantages are specific to the firm rather than to its production location. The advantages enjoyed by the firm are not available to other firms on the open market. Hence, direct investment belongs more to the theory of industrial organization than to the theory of international capital movement.

5.6. Economic Growth

Economic growth refers to the overall amount of income generated through an increase in an economy's output and services. This is measured by Gross Domestic Product (GDP) index. Environmentalists have protested that economic growth destroys the environment and depletes stocks of natural resources because it prioritizes the need to generate income over other considerations (Robert, 1991).

Atkinson (2000) argued that growth as a mean of income alone does not guarantee that full range of human needs and aspirations will be satisfied. Economic development can be defined as an improvement in the well-being of society as a whole as reflected in the expanded set of opportunities available to the present generation. It requires not just an increase in mean income but that this income is distributed as equitably as possible among the population to increase the welfare of the society. For Instance, increasing access to food, clean water and housing and improving standard of health and education will increase the living standard of the communities. Economic development therefore leads to greater intra-generational equity, though no particular degree of equity is specified as a target that a country should meet in order to be called developed.

Moreover, rising income levels often characterized as indices of economic growth result not only in the growth of quantity and quality of resources and technology improvement, but also in the structure of social and political situation that is conducive to such transformation. It demands a steady but flexible social and political structure which is capable of compelling and even encouraging rapid structural change (Khaltd & Ponthep, 1997).

Growth is derived from enhanced amounts of inputs with superior efficiency and an increase in output per unit of input. Growth is related to a sustained improvement in a country's per capital output or income along with an expansion in its labor force, consumption, volume of trade and capital. There has been controversy among economists as to whether economic growth increases or decreases income distribution. Kuznets (1973) observed that in the early stages of economic growth relative income inequality increased, stabilized for a time and then declined in the later stages. This is known as the inverted U- shaped hypothesis of income distribution. Economic growth is influenced by two types of factors, economic and non-economic. Its reliant upon natural resources, human resources, technology, capital and enterprise. Moral value, social institution and political conditions are all non-economic factors that affect the advancement of economic growth.

Simon Kuznets in his Nobel Memorial Lecture in 1966 defined economic growth 'as a long-term rise in capacity to supply increasingly diverse economic goods to its population, based on advancing technology and institutional and ideological adjustments that it demands. Nigeria is well endowed with agricultural and mineral resources; however, exploitation and utilization of these resources have, at one time or the other contributed significantly to economic growth with an attendant to consequences to the environment.

5.7 Environmental Externalities

The Adam Smith's fundamental theorem of the invisible hand would fail when resource ownership is defined in such a way that individuals could not take account of the full benefits or costs of their actions. In this situation, the cost and benefit would be treated as incidental or external. The technical term used to describe the situation is externality. Externality take place when the actions of a number of individuals have direct (negative or positive) effects on the welfare or utility of other people, none of whom have direct control over that activity. Put differently, externalities are incidental benefit or costs to others for whom they are not explicitly proposed. Environmental externalities are uncompensated environmental effects of consumption and production that influence consumer utility and enterprise cost outside the market mechanism. Externality is a cost or benefit, not spread through pride, and incurred by a party who did not agree to the action causing the cost or benefit. A benefit in this case is called a positive externality or external benefi**t**, while a cost is called a negative externality or external cost (Werner, 2000).

Herman (1990) argued that in the competitive market, producers and consumers may not bear every single cost or may not acquire all the benefits of the economic activity, and prices do not reflect the full costs or benefits of producing or consuming a product or service. For instance, manufacturing that cause air pollution imposes costs on the whole society. The external costs such as pollution will occur because the goods will be overproduced by a competitive market, as the producer does not take into account the external costs when producing the goods. The advantage of looking at pollution this way is that environmental quality can then be considered as an input to an economic activity on exactly the same basis as the other inputs such as labour, capital, raw materials and quality energy.

Therefore, resource allocation is based on a market mechanism that is based on the consideration of private cost and benefits which would be inefficient when viewed from the perspective of society at large. This represents an obvious case of market failure because if the market is left alone, it will lack a mechanism to account for external costs and/or benefits (Venables, 2007).Whenever there are external benefits, such as education and public safety too little of the good would be produced by private markets as producers and buyers do not take into account the external benefits to others. The overall cost and benefit to society is distinctly regarded as the sum of the economic benefits and costs for all parties concerned. Pollution is a symbol of an external cost because damages connected with it are borne by the society as a whole and are not reproduced in market transactions.

5.8 Environmental Regulations

Environmental externalities can lead to misallocation of resources if not corrected. In particular, from a societal viewpoint many resources like capital, labour, and raw materials will be committed to the production of goods and services. This might lead to lack of resources for preserving or protecting the environment. This is generally recognized as the microeconomic effect of environmental externalities. One way of correcting this is to internalize the effects by imposing a penalty on those who are directly responsible for the polluting the environment (Grehard, 2006).

Environmental laws may be implicitly concerned with the prevention of present and future externalities and conservation of common property from individual exhaustion. The laws are generally expected to protect and preserve both the natural environment and human health. The benefits of preservation and economic exploitation of resources are generally balanced by resource conservation and management laws (Lawrence, 1998).Furthermore, an environmental regulatory mechanism is the basic instrument for ordaining environmental policy in the industrialized world. Maintaining the quality of the environment has been seen as public goods that the state must protect by preventing private agents from damaging it. Direct regulation requires the imposition of standards practice or bans regarding emissions and discharges product or procedure through licensing monitoring. Legislation forms the basis for this structure of control, and compliance is generally obligatory with sanctions for non-compliance. Prevention of pollution is the best way to protect the environment and when this fails and pollution occurs, the companies should be committed to cleanup which is better than doing nothing (Anthony, 2004).

The impact of these economic activities on the environment and human health has been alarming. This call for stringent regulation and supporting tools to make the environment sustainable. Regulatory design and compliance strategies guarantee efficiency when general and facility-specific requirements encourage a maximum level of natural compliance and, in the absence of enforcement, if driven by fundamental motivation. Spontaneous compliance stems from social norms or from social and economic benefits of compliance. If intrinsic motivation is insufficient, as it is often the case, then regulatory monitoring and sanctions external pressure are necessary in order to ensure compliance.

5.9 Livelihood Sustainable

Sustainable development is a concession between two opposing aims, the pursuit of environmental conservation and the pursuit of economic growth and development. From the perspective of developed countries, sustainable development is primarily about conserving the environment. Developing countries view it as a means of continued pursuit of the objective of reducing poverty and accomplishing the status of modern society. To the environmentalists, the gap between conservation and economic growth should be bridged. Sustainable development attempts to overcome two fundamental conflicts. The first of these is striking a balance between sustaining healthy environment and attaining economic growth considered necessary for development. The second is the bridging the gap between the quality of life in the developing countries and developed countries (Jim-Butcher, 2006).

There must be multilevel development interactions promoting people-centered concept of sustainability frameworks. Livelihood approaches bring about sensitivity of the broad range of livelihood strategies adopted by people to ameliorate poverty. It identifies the connections of the livelihood of individuals, household and communities with the bigger socioeconomic, cultural and political macro levels. Livelihood approaches help to bring together a responsiveness of sustainable livelihood with focus on development intervention. Put differently, these approaches impede poverty and reduce obstacles to method and policies designed for poverty reduction programme and projects (Ashley & Carney, 1999).

The first step toward sustainable livelihoods was made by the Brundtland Commission on Environment and Development, and the 1992 United Nations Conference on Environment and Development developed the blueprint aimed at accomplishing sustainable livelihoods as an unrestrained goal for eradication of poverty. Jim (2006) projected the following amalgamated definition of a sustainable rural livelihood, which is applied most commonly at the household level. Livelihood that is sustainable embraces the potential assets and actions essential for a means of living, which can cope with and make progress from stress and shocks, upholds or enhances its capability and assets, and endows with sustainable livelihood opportunities for the next generation.

According to World Commission on Environment and Development (WCED), far from necessitating the end of economic growth, that recognizes attributes of sustainable development. The problems of poverty and underdevelopment can be solved when there is a new era of growth in which developing countries play a large role and reap large benefits. Growth must be revitalized in developing countries through the synergy of economic growth, poverty alleviation and improved quality of the environmental. In the assessment of some environmentalists, there is a limit to the destructive impact of pollution that the environment can tolerate, otherwise the growth so much desired will be counterproductive and result in inevitable damage to the environment, thereby making it impossible to sustainable development (Munasinghe, 1993).

The economic goal of increasing output and growth is being pursued by the developing countries. Thus, the traditional approach to development was strongly associated with economic growth and it has important social dimensions as well. There are large numbers of poor people in the developing countries who are alienated from the benefit that trickle-down; hence, the efforts being made to improve income distribution. This has called for a paradigm shift in development towards equitable growth, where the social objective of poverty alleviation is acknowledged to be as important as economic efficiency. However, environmental protection is a major objective of sustainable development, evidenced by environmental degradation which is a major barrier to development. Moreover, sustainable development is a process of improving the range of opportunities that will enable people and communities to accomplish their desire and full potential over a sustained period of time while maintaining the resilience of economic, social and environmental system. In other words, sustainable livelihood requires increase in adaptive capacity and opportunities for improvement of economic, social and ecological system of the communities.

5.10 Summary

The major key to economic growth is capital accumulation that can be acquired from foreign investment. The capital accumulation constitutes the three scarce factors of production, the capital, labour and land or environmental resources. Human capital and financial capital, which are the main factors leading to economic growth are provided by foreign direct investment. The environment is integrated into the economic system development portrayed as an accumulation of human and man-made capital at the expense of a reduction in natural capital. Development is generally deemed sustainable when a balance is struck between these processes of gain and loss, so that capital stocks do not decline. The economic value of natural resources is determined by consumer preferences and the scarcity of environmental resources is best acknowledged evidently by the free operation of the private market system. The market price quantifies the resource and environment scarcity. Given this situation, natural resource can always be substituted partially or fully by use of other natural or manufactured resources and technological progress that continually enhances the scarcity of natural resources.

The environment generally suffers the effect of damage arising from operating utility function and damages operating through the production function. In consideration of an optimal growth, the model shows the externalities flow linked to extraction and usage of a composite non-renewable resource. The theoretical framework gives a basis for developing a simple economic model built around a production function. The natural resources are inputs in the production process and establish the features of a socially optimal pattern of resource by adopting regulation for sustainable livelihood. In this framework, one of basic objectives is to establish conditions that must be satisfied for natural resources to be optimal, in the sense that the allocation maximizes a social welfare function.

CHAPTER SIX

FOREIGN DIRECT INVESTMENT AND ENVIRONMENTAL EXTERNALITIES

6.1 Introduction

In this section, we discussed foreign direct investment and social responsibility as regards to objective one of the thesis. In views of good corporate governance, it embraces, facilitates and enriches the growth and development of individual and groups; right to sustainable livelihood; individual and group social and economic right. It also entailed the performance and compliance with professional standard, rules and regulations, the rule of law, legal and constitutional frameworks, national and international conventions, standards and expectations in relations with the environment, host communities and citizens. Good corporate responsibility further seeks to institute and further corporate responsibility to the legal, regulatory and ethical frameworks, the economy, environment, stakeholder and society.

In section 6.3 of the chapter, examines the features of a social optimal model of resource use over time in the approach of social welfare function and established analyzes of the polluter’s choice of care and polluter’s choice of output. In section 6.4 discussed the methodology of the first proposition in the study. Selection of communities’ areas where the research was conducted was based on the high level of oil production activities by the oil companies. The communities where surveyed was carried out was purposive chosen. We examine the descriptive analysis of the population in the study area which consisted of 4,500 households, and we obtained the sample size of 354 heads of household. The questionnaire was targeted on the household's head in the two communities Burutu and Ogulagha in Niger Delta. These are the study area where oil companies are mostly present.

6.2 Foreign Direct Investment (Oil Companies) and Social responsibility

There is global standard meaning of Corporate Social Responsibility (CSR), and a good number often cited definitions have a common composition; meeting legal requirements and more encompassing expectations of stakeholders in order to throw into a better social order through actions in the workplace, marketplace and local community and through partnerships and advocacy of public policy (Jeremy Baskin, 2006).

The company responsibility is to put in and maintain the obligation to work with employees, their families, and the local community in order to advance their quality of life, in ways that are good for business and development of the society (Jorgensen *et al.*, 2003). Ikelegbe, (2005), noted that good corporate governance embraces, facilitates and enriches the growth and development of individual and groups right to sustainable livelihood. The high-quality corporate governance covers individual and group social and economic right, observance and compliance with professional standard, rules and regulations, national and international conventions, standards and expectations in relations with the environment, host communities and citizens. However, corporate responsibility is defined as how companies response to the economic, social and impact of the environment on their operations and help to meet sustainable development goals. Specifically, corporate responsibility is an intended measure that business can acquire, and further fulfilling competitive benefit and the welfare of the broader society.

Eweje, (2006) noted that companies also faced with growing demands in order to lessen their environmental impacts. Regard to this, managerial responses to such pressures can be classified into two general categories: some firms have chosen to ignore such pressures, while others have a sense of responsibility for its environmental impacts and consequently that have adopted a true environmental commitment. Companies are increasingly aware of the fact that a positive environmental performance can provide them important competitive advantages.

In the area of CSR, it is imperative to state that with the exclusion of a few studies notably Eweje, (2006), and Ite, (2004), the bulk of the literature on corporate social responsibility performance in the Niger Delta conclude that oil corporations have failed to deliver on their promises, either through inefficiently or projects that have had no direct bearing with the needs of the people. Furthermore, some of these communities are lacking in development projects and other social amenities. The oil companies require clarification on the environmental sensitivity of their operations and how affect the future position and actions of stakeholders. The multinational companies have not only invested in capital investment, also in human capital and providing communities people with the tools to drive their own economic development.

The social responsibility involves two major players: business and society. According to Jeremy (2006) social responsibility has three main facts: legal (complying with the law); setting and abiding by moral and ethical standards; and philanthropic giving. The role of the oil companies may be extensive in LDCs and transitional economies where free market regulating mechanisms are not yet fully formed or effectively. Oil companies have a unique opportunity in attending to social responsibility issues, as in the Niger Delta, especially where potential host countries lack the legal framework, societal infrastructure and experience of a market economy (Gabriel, 2007).

Azmah and Kari (2008), observed that enhancing cooperative movement among the communities people, an organization operates and managed based on values and principles, first introduced by the Rochdale pioneers in Malaysia, with the purpose of the value of self-responsibility, equality, equity, solidarity and democracy; would have been a tool to achieve quick social and economic change. This idea would have helped the development of the Niger Delta region in Nigeria. In all, even though the long term effects of the pollution are yet to be computed and documented, the fact that huge sum of money was paid out for the damages caused by the incident of pollution is an indication of its extent and magnitude (Nwankwo, *et al.,* 1998). With the less severity of environmental laws in Nigeria however has informed in the indifferent attitude of the oil major operative to environmental protection and conservation. Moreover, the Nigerian Petroleum Act, 1969 requires oil companies to conduct their operations in an approach consistent with good oilfield practice and a proper and workmanlike manner to prevent environmental pollution (Aghalino, 2009).

The cost and benefit analysis, assess the desirability of efforts to control pollution. Pollution control certainly confers many benefits but it also has costs. Do the benefits justify the costs? That was a question the US congress wanted answered; in session 812 of the Clean Air Act Amendment 1990. It required the US environmental protection Agency (EPA) to evaluate the benefit and costs of the US air pollution control policy over the 1970-1990 periods.

In responding to this congressional mandate, the EPA set out to quantify and monetized the benefit and cost of achieving the emissions reductions required by US policy. Benefit quantified by this study included reduced death rates; and lower incidences of chronic bronchitis respiratory diseases and heart disease as the benefit of better visibility, reduced structural damages, and improved agricultural productivity (David & Lester, 2003).Therefore of the above and for Nigeria case the assessment needs to be carried out periodically and often to meet the day to day challenges of the people and environment. Though there are national laws, regulations and international agreements, most of them are more than thirty years old which need to be reviewed and strictly implemented and enforced. For instance: Petroleum (Drilling and Production) Regulation 1969. Mineral Oil (safety) Regulation 1963, International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, and 1971 African convention on the Conservation of Nature and Natural Resources.

Compliment with the above views, introduction of environmental taxes would help to change the behavior of firms and consumers in an environmentally friendly direction. Environmental taxes intend to correct the negative externalities to the extent that marginal social abatement benefits are equal to marginal social environmental costs. Several environmental taxes have been in use in the Scandinavian countries, the Netherlands and Germany. The environmental taxes can trigger innovation and production efficiency gains that may lead advantages to all the stakeholders.

6.3. Theoretical Framework: Polluter's Choice of Output

The efficient activity or output choices occur when a firm pays the total expected cost, including total environmental damages, associated with that activity. Under a Pigouvian tax, total expected payments from the polluter equal total expected damages only if the damage function is linear. Under the strict liability total expected payments from the polluter equal total expected damages even if the damage function is non-linear (Jordan, *et al.,* 2008). Unlike a Pigouvian tax, strict liability creates an efficient activity level or output incentives for the polluter, regardless of the form of *D(x)*.

In extending the simple model of care Let q be the output or activity level of the injurer and assume that both the care level (x) and damages (*D*) are defined per unit of output. Let B(q) be the benefits from the production of q and let *c(x)* be the unit production costs, which assumed to increase with the firm's investment in care, that it, c'(x) > 0.

Given the efficient level of care (x^*), the social efficient choice of $q(q^*)$ maximizes the net benefits from the activity, which are the gross benefits minus total costs, including both the production costs and the expected damages. Thus, q^* solves

$$Max\ B(q) - [c(x^*) + p(x^*)D(x^*)]q. \qquad 12)$$

The associated first-order condition is

$$B'(q) - [c(x^*) + p(x^*)D(x^*)] = 0 \qquad 13)$$

Given q^*, the polluter should engage in the activity, if and only if the net benefits- given the efficient choices of g and x are non- negative, that is, if only if

$$B(q^*) - [c(x^*) + p(x^*)D(x^*)]q^* \geq 0. \qquad 14)$$

The above conditions characterize the efficient decisions, that is the decisions that maximize net social benefit in making his actual decisions, the polluter seeks to maximize net private benefits, $B(q) - [c(x) + p(x)L(D(x))]q$. the corresponding first-order condition is

$$B'(q - [c(x) + p(x)L(D(x))] = 0 \qquad 15)$$

The polluter will choose to engage in the activity (or enter the industry) if and only if his net profits from doing so are non-negative. This assumes that there are no externalities that result from the activity other than the possible environmental damages, so that private and social benefits from the activity are equal.

$$B(q) - [c(x) + p(x)\ L(D(x))]q \geq 0 \qquad 16)$$

Comparing (15) with (13) and (16) with (14) implies that the care and output choices, as well as the decision about whether or not to engage in the activity at all, will be efficient if $L(D(x)) = D(x)$, that is, if the polluter's liability payment is equal to the total damages that the result from the accident. Since under a strict liability rule polluter pay the full amount of damages for all x, this rule will induce an efficient choice of activity level, as well as an efficient entry or decision. Since polluters bear the full social costs of all of their action, those choices will be efficient.

6.4 Research Methodology framework

6.4.1 Sample Research Design.

The study adopted the social cognitive theory and related theories in foreign direct investment and environment economics in explaining the factors contributing to the welfare of the people and their environment. The first objective of the study is to examine the Foreign Direct Investment into crude oil exploitation and its impact on the environment in Niger Delta oil producing communities.

Tabachinick & Fidell (2007) argued that, survey research is suitable in the investigative assessment of psychological constructs where data can be used to review and explain the populations' understudy of an issue. Therefore, a sample of respondents from a population was selected and a standardized questionnaire was administered. Furthermore, the structural equation modeling is adopted in this study. The structural equation modeling was used to investigate and predicting the causal attribution that explain the relationships under investigation.

In this part of the study, the selection of communities where the research was conducted was based on where there is a high level of oil production activities of the oil companies. This was purposefully selected communities and the survey applied a semi-structured questionnaires guide to give a high-quality measurement of the differences between various oil exploration impacts on the environment, environmental stress, well-being of households and communities as whole. The quantitative methods use careful and systematic methods to gather high-quality data which are empirical representations of the concepts. The questionnaire employed by extracting information and collecting data from residents of the communities in the Niger delta region. The questionnaire is therefore designed to generate data about the level of awareness of the people as regards air pollution, oil spillages and land degradation as an environmental problem. It also contained the extent of stress from environmental problem in the communities, environmental impact on the people and communities, general awareness of environmental consequences and the perception of the people on operation of oil companies in the communities.

The research work was carried out in two local government areas of the Delta states from where the sample was drawn. The two communities are *Burutu and Ogulagha*, These are communities where oil companies' activities are prominent. The total population of the household in the two communities is four thousand, five hundred (4500). The target respondents are the heads of the household. The questionnaire consists of structured and semi-structure statements. Some of the questions are continuous in nature, while others are in scales of five and ten Likert scale questions.

Sample size for the study was determinant of an adequate sample size as a crucial decision that a researcher should make on his discretion. Based on this notion, the researcher considered suggestions from various researchers to provide guidance for determining the sample size. But statistical plays a role in sample selection in determining the sample size needed to be representative of a given population. In this study a formula for determining sample size in Krejcie & Morgan (1970) shall be used:

$$S = \frac{X^2 NP(1-P)}{d^2 (N-1) + X^2 P(1-P)} \qquad 17)$$

S = required sample size.

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size.

P = the population proportion (assumed to be .50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (.05).

Furthermore, setting an appropriate confidence level can be used to determine any sample sizes. The most often used level of confidence is 95% considering the danger of Type I error when making a critical decision. Thus, a significant level of .05 levels or 95% confidence level sets for this research study (Krejcie, & Morgan, 1970).

The sample of 354 households head was used and questionnaire targeted the household head. The case study is in Niger Delta using two communities where there is present of oil companies' activities. The communities are Burutu and Ogulagha**.** As stated earlier 354 questionnaires were administered; however, 338 copies were found to have complete responses among the copies that were returned. In other words, approximately more 95 percent of the questionnaires were successfully completed. This is considered to be adequate for the analysis. The relatively high response obtained could be attributed to the direct involvement of the researcher in the administration of the questionnaires.

The questionnaire was divided into six sections: i) the demography of the respondent ii) examine the environmental impacts of the oil companies on the community; iii) to examine the general awareness of environmental consequences, iv) examine the impact of crude oil exploitation on the people and community well-being, v) also investigate the extent of stress from environment in the communities, and finally examine the perception of the people on operation of oil companies in the communities. To sum up these reasons on the first objective of the study, is to examine the foreign direct investment into crude oil exploitation and its impact on the people and environment in Niger Delta oil producing communities.

6.4.2 Model Specification

The responses from the questionnaires were coded and then analyzed using SPSS 19 and further analysis on structural equation modeling was performed using Analysis of Moment Structure V6 (Amos Software). For the analysis of structural equation modeling (SEM), Kline, (1998) stated that a sample size that passes 200 cases may possibly be considered adequate. However, this study adopts several predictors. The ratio of items measuring each construct and the sample size is influential to analysis using the structural equation modeling technique.

The variables used are: Perception of the people on operation of oil companies in the communities (Oil_FDI), Impact on environmental (Envr_Imp), Impact of crude oil exploitation on peoples' well-being (Wlb_Imp), Extent of stress from Environmental problem in the communities (Stress) and General Awareness of Environmental Consequences (GAC). The questionnaire is in the appendix. The theories that guide in the construction of questionnaire is depict in table 6.1 below.

Table 6.1: The research measures in the main questionnaire

Theoretical concept	Construct/ Measure	Numbers of Items	Scale
Foreign Direct Investment Theory	*Oil_FDI*	5 items	5 -Point Scale
Environmental Quality Theory	*Envr_imp,*	15(parcels to 5 items)	10 -Point Scale
Developmental Theory	*Wlb_Imp*	15 (parcels to 4 items)	5 -Point Scale
Environment and Behavior,	*Stress*	4 items	5 -Point Scale
Environmental Theory,	*GAC*	10 items	5 -Point Scale

Sources by the author based on research measures in the main questionnaire

The *s*tructural equation modeling (SEM) possesses the appropriate analytical power for the model integration in research because it can simultaneously analyze and influence several variables on other variables in the entire scheme of the model. Also, implicit assumptions of unidirectional constructs are made explicit and the result that theoretical meaningful models can be derived and compared with the existing models (Kline, et al. 2001). Hence, following multiple regression analyses conducted to detect the primary relationships among variables, SEM analyses were computed in the confirmatory mode to study the function of variables in predicting behavioral intentions. The path diagram of hypothetical 1model is illustrated in the figure below that show the relationship between the variables.

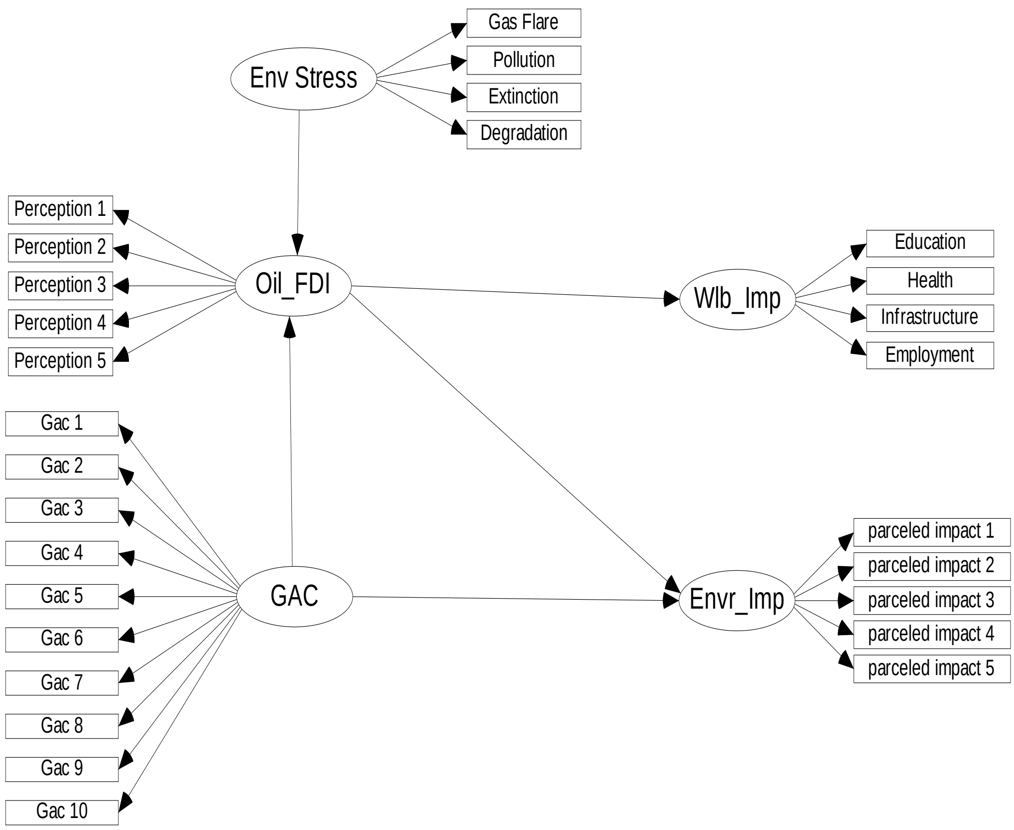


Figure 6.1: Path Diagram of Hypothetical 1Model

Note:

Env Stress, the	represents Extent of stress from Environmental problem in communities
Oil_FDI,	represents Perception of the people on operation of oil companies in the communities
Envr_Imp,	represents Impact on environmental
GAC,	represents General Awareness of Environmental Consequences
Wlb_Imp,	represents Impact of crude oil exploitation on peoples' well-being

6.4.3 Descriptive statistics and Reliability test

The sample of 354 heads of households from Burutu and Ogulagha of Niger Delta region participated in the study. The table 6.2 below shows the basic demography and socioeconomic status of the respondent.

Table 6.2: The Basic Demography and Socio-economic Status of the Respondent

Titles	Frequencies	Percentages
Sex		
Male	219	61.9
Female	118	33.3
The respondent Age groups		
Middle age	67	18.9
Old age	210	59.3
Elderly	77	21,8
Resident status of the respondent		
Indigene	298	84.2
Settler	56	15.8
Marital status		
Married	285	80.5
Widow/widower	53	15.0
Separated	6	1.7
The educational qualification obtained		
primary leaving certificate	272	76.8
secondary / Diploma	46	13.0
Degree / Higher Diploma	36	10.2
Employment in the Oil companies		
Employee	48	13.6
Non-employee	306	86.4
Occupation of Household Head		
Farmer	221	62.4
Trader	97	27.4
Civil servant	20	5.6
Others	16	4.6

Sources by the author based on research result in the main questionnaire of Demography and Socio-economic Status of the Respondent.

For the reliability test: The average summated mean scores and all the constructs under study representing standard deviations are presented in table 6.3

Table 6.3: The Reliability Alpha Value and Descriptive Statistics of the Constructs

	Means	Standard deviation	Alpha value
Oil_FDI	3.67	0.58	0.72
Env_ Stress	2.18	0.27	0.67
Envr_Imp	3.24	0.65	0.74
GAC,	2.16	0.97	0.78
Wlb_Imp	3.34	1.14	0.82

Sources by the author based on research result for the Reliability Alpha Value and Descriptive Statistics of the Constructs

Note:

Oil_FDI Extent of stress from Environmental problem in the communities answerable with a 5-point scale range from 1= strongly disagree to 5 = strongly agree

Env_ Stress: Perception of the people on operation of oil companies in the communities accountable on a 5-point scale ranging from 1= strongly disagree to 5 = strongly agree

Envr_Imp: Impact on environmentally accountable on a 5-point scale ranging from 1= strongly disagree to 5 = strongly agree

GAC : General Awareness of Environmental Consequences accountable on a 5-point scale range from 1= strongly disagree to 5 = strongly agree

Wlb_Imp: Impact of crude oil exploitation on peoples' well-being answerable on a 5- point scale ranging from 1= strongly disagree to 5 = strongly agree

N: Sample Size under study (N=354)

The possible range of the average mean score of Env_ Stress, Oil_FDI, Envr_Imp, GAC and Wlb_Imp is between 1 and 5

Under investigation expressed a positive oil foreign affect environmental degradation and poverty in the host communities. Out of a maximum score of 5, the Oil_FDI and Env_ Stress, mean scores of the respondents were 3.67 and 2.18 respectively. The GAC and Wlb_Imp are above the average means score was reported for the peoples' well-being. Along a 5- point scale, the means Wlb_Imp score was 3.34. To further assess the reliability of the collected data, the Cronbach's alpha reliability test was performed on the foregoing constructs. The test rendered alpha values between 0.67 and 0.82. These computed figures well exceeded the threshold of 0.70 for exploratory research.

6.5. Reason of using Structural Equation Model

Structural equation models encompass two mechanisms, a measurement model and a structural model. The measurement model relates observed responses or ‘indicators’ to latent variables and sometimes to observed covariates. The structural model then specifies relations among latent variables and regressions of latent variables on observed variables. Research in social and behavioral science including research in business and management have two basic problems, First problem relates to how to measure variables and the second relates to complex causal relationships among these variables (Joreskog & Sorbom, 1996). Efforts toward overcoming first problem can be traced back to Francis Galton (1822-1911). His concept of common source among variables initiated the development of factor analysis (Hagglund, 2001). Charles Spearman (1863-1945) continued the work of Galton and his concept of one factor model brought him to become 'the father of factor analysis'. Spearman's one factor model was expanded to multiple factor model and second order factor by Louis Leon Thurstone (1887-1955). Karl Joreskog made a great achievement and breakthrough in estimation and factor analysis. Among his contributions and the most important are Maximum Likelihood (ML) estimates, confirmatory Factor Analysis (CFA) and structural models. Relative to other estimation methods, the ML estimator advocates for its flexibility.

While the solution of the first problem was derived from psychometric/socio-metric factor analysis, the solution of the second problem had been derived from econometric simultaneous equation modeling (Kaplan, 1996; Joreskog & Sorbom, 1996). Kaplan (1996) argued that much of the development work in this field such important ideas as identification were articulated in the field of econometrics. Moreover, many of current issues such as sample selection and SEM with censored variables derives from econometrics as well. The genius of the Joreskog, (1971), Keesling, (1972) Wiley, (1973) framework or JKW model was the recognition that the 'statistical' foundations of econometric modeling could be combined with the 'statistical' foundations of factor analysis (Kaplan, 1996). This JKW model was the starting point of the development Lineal Structural Relationship model, which later on known as Structural Equation Modeling.

6.5.1 Structural Equation Model (SEM).

Basically, Structural Model or Latent variable Model, depicted causal relationships among latent variables and was derived from econometric simultaneous equation modeling. While in econometric, these equations consisted of measured/observed variables, in structural model they consisted of latent variables (which could not be measured directly).

Measurement model: This model showed indicators or measured/observed variables as the effects or reflections of latent variables. The basic concept of this model was Confirmatory Factor Analysis (CFA), which was derived from factor analysis in psychometric and socio-metric. Both parts of the model were the answers to a stated problem in social, environmental and behavioral sciences. The structural model solved the first problem regarding complex causal relationships and the measurement model solved the problem regarding relationships between a latent variable with its indicators-observed variable (Kline & Klammer, 2001).

The popularity of SEM was also driven by the fact that it has several advantages, compare to other popular tool for research namely multiple regressions. According- to Hair *et al.*, (1988) SEM had the capability of estimating multiple interrelated dependence relationships, while multiple regression could only estimate one dependence relationship. Gujarati, (1995) showed that the use of latent variables in multiple regression produced measurement errors which influenced estimation of parameters regarding biased-unbiased as well as the size of the variance. He stated that the measurement error problem could be solved by SEM through the equations in measurement model. Kline & Klammer, (2001) added advantages of SEM over multiple regressions by citing that SEM had capability of handling reciprocal or non-recursive relationship.

6.5.2 Framework and Concept of Structural Equation Modeling

Wiley, (1973) developed path analysis to illustrate direct and indirect effects of variables, where some variables are viewed as causes of other variables which are viewed as the effects. Path Diagram can illustrate and specify SEM more clearly compares to mathematical model and it can easily transform a model to the syntax of AMOS software.

Conceptually, SEM comprises of two variable latent variable and observed/measured variable. Latent variable is a key variable in research and an abstract concept such as motivation, satisfaction, stress, perception etc. This variable cannot be measured directly but through their indicators or observed variables. There are two types of latent variable, the first is exogenous latent variable, with mathematical notation ξ ('ksi'), and the second is endogenous latent variable η ('eta'). The observed variable is a variable which can be empirically observed or measured and is often called by other name indicator.

In a survey research using questionnaires, each question represents one observed variable. Related to latent variables, there are also two types of observed variables. The x observed variable is an indicator of ξ, and they observed variable is an indicator of η.

Path diagram's notation of latent variable is circled or ellipse and observed variable is rectangular in shape (Setyo, 2010).

The two models in SEM concept are structural model and measurement model. The structural model depicts causal relationships among latent variables. Each causal relationship is a linear regression equation between two latent variables and several causal relationships build a simultaneous equation of latent variables. Each causal relationship, generally, represents a research hypothesis (Steiger, 2007).

Mathematical notation of the causal relationship coefficient (similar to regression coefficient) between ξ and η (in the direction from ξ to η) is y and between two η is β. By default ξs can freely 'co-vary, among each other and covariance matrix of ξ has mathematical notation Φ (‘phi’). The path diagram notation of a causal relationship is an arrow, where the direction of the arrow also represents the direction of causal relationships. To represent covariance or correlation between two variables or errors in path diagrams, a double headed curve arrow is used.

Measurement model shows the relationships between a latent variable and one or more observed variable. Similar to factor analysis, these relationships are reflective, where observed variables are reflections of their latent variable. Parameter or coefficient of each relationship represents a factor loading and has mathematical notation λ ('lambda'), and λ_x, is for relationship between ξ and x, then λ_y is for relationship between η and y. Path diagram of the measurement model consists of arrows from a latent variable to its observed variables (Kline & Klammer, 2001).

The other component of SEM is two errors. i.e. structural error and measurement error in an equation, independent variables cannot perfectly predict a dependent variable; therefore a structural error is needed to be added to the equation. Mathematical notation of structural error is ζ ('zeta'). Even though structural errors can correlate or covary between one and another, by default these structural errors are not correlated. The covariance matrix of ζ is Ψ ('psi') and it is a diagonal matrix by default. The observed variables cannot perfectly measure their latent variable. To model these imperfect measurements, a measurement error is added to each equation in measurement model. Mathematical notation of measurement error for observed variable x is δ ('delta) and for y is ε ('epsilon'). Similar to ζ, the covariance matrix of δ is Φ_{δ} ('theta-delta') and for ε is Φ_{ε} ('theta-epsilon') and both matrices are diagonal by default (Byrne, 1998).

The general mathematical model of SEM can be written in form of this mathematical model below, we can indicate matrices: B, Γ, Λ_y and Λ_x ; in a way the parameters will be estimated.

Structural Model: $\eta = \mathrm{B}\eta + \Gamma\xi + \zeta$

Measurement Model:

For y: $y = \Lambda_y \eta + \varepsilon$

For x: $x = \Lambda_x \xi + \delta$

With assumptions:

I ζ uncorrelated with ξ
2 ε uncorrelated with η
3. δ uncorrelated with ξ
4. ζ, ε and δ mutually uncorrelated
5. 1-B is non-singular, endogenous variables

The modeling methodology adopted in this study is centered on the structural equations modeling framework that can be used to determine and model relationships among several dependent (endogenous) variables simultaneously. A typical Structural Equation

Model may be written as:

$$Y = BY + \Gamma X + \varepsilon \quad 18)$$

Where: Y is a column vector of endogenous variables,

B is a matrix of parameters associated with right-hand-side endogenous variables,

X is a column vector of exogenous variables,

Γ is a matrix of parameters associated with exogenous variables, and

ε is a column vector of error terms associated with the endogenous variables.

Structural equation systems are estimated by covariance-based structural analysis, also called method of moments. In this methodology, the difference between the sample covariances and the covariances predicted by the model is minimized. The fundamental hypothesis for the covariance's-based estimation procedures is that the covariance matrix of the observed variables is a function of a set of parameters *X* (Bollen, 1993).

6.6. Estimation and Results

6.6.1Confirmatory Factor Analysis (CFA) - Model Fit and Construct Validity for individual Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis of the individual construct is used to test the construct validity of the instrument. Specifically to test the convergent validity, it also entails the assessment of model fit for each instrument. An instrument is believed to have satisfied convergent validity only when the values of the instrument's individual factor loadings and the Average Variance Extracted (AVE) satisfy some benchmarks. According to Fornel & Larcker (1981) AVE greater than 0.5 shows high convergent validity, in defining the threshold for factor loading, Hair *et. al*., (2003) posits that loadings of greater than or equal to 0.5 are high enough to justify the existence of convergence validity.

$AVE = \frac{\sum \lambda^2}{n}$, Where λ^2 denotes squared individual factor loadings.

6.6.2 Model Fit and Construct Validity Assessment of Perception of Well-being Impact of Oil FDI Instrument.

This instrument originally comprises eighteen items. However, upon justifying the existence of one underlying dimension in the construct, the items were parceled into four indicators. All factor loadings are greater than 0.5. The instrument's AVE is computed to assess construct validity.

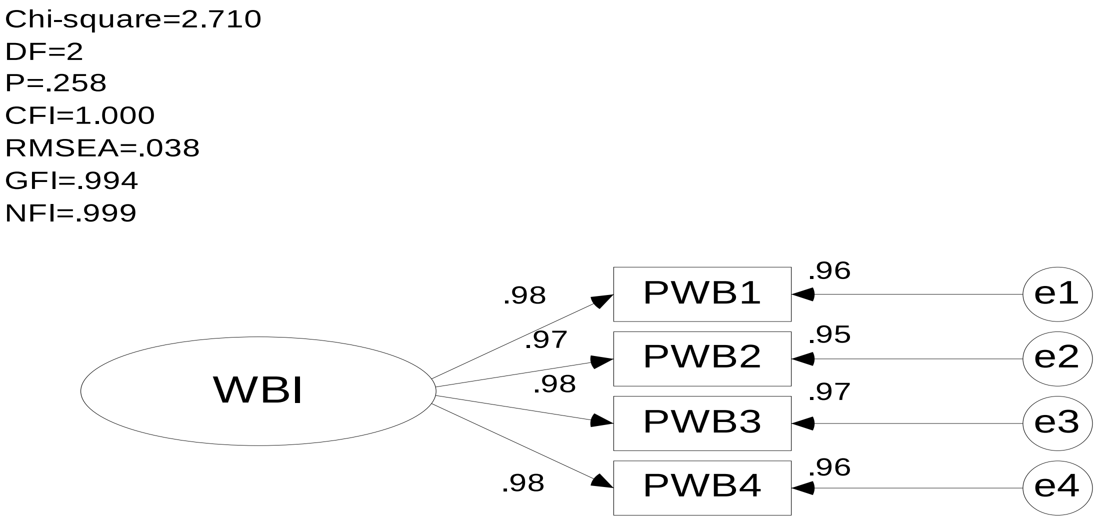


Figure 6.2: CFA for Well-being Impact

$$AVE = \frac{\sum \lambda^2}{n} = \frac{0.96 + 0.95 + 0.97 + 0.96}{4}$$

$$AVE = 0.96$$

This instrument has high convergent validity because the factor loadings for each indicator > 0.5 and the AVE (0.96) > 0.50

Besides, an assessment based on construct validity based on AVE, model fit is also important to evidence the existence of construct validity. Generally, three to four fit indices are used. The indices generated along with the output including the p-value, RAMSEA, GFI and NFI, all meet the expected range to give explanation for the existence of construct validity.

6.6.3 Model Fit and Construct Validity Assessment of Perception of Impact of Oil producing company Instrument.

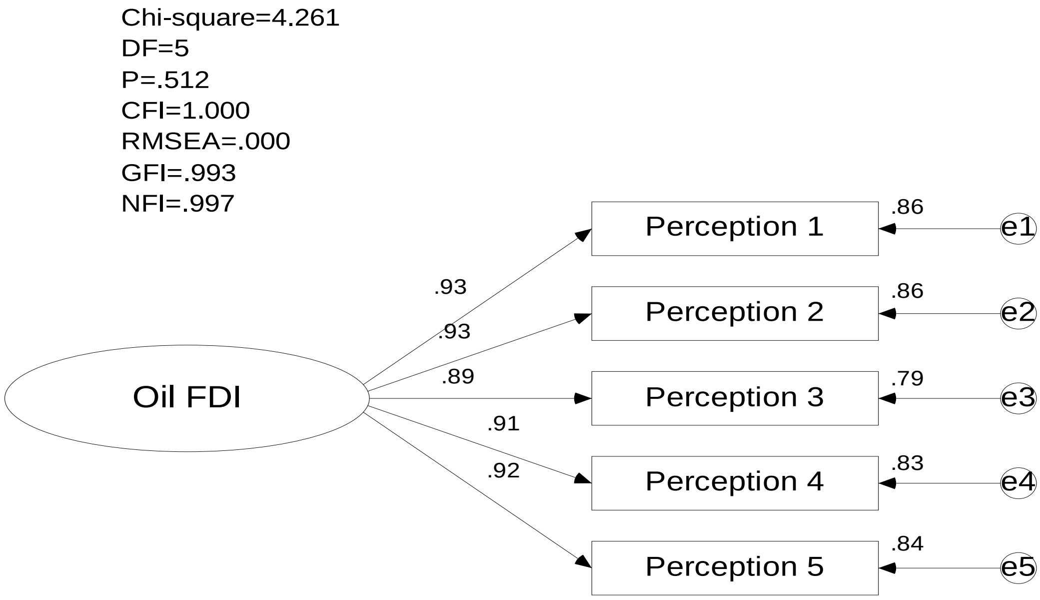


Figure 6.3: Impact of FDI

This instrument's individual factor loadings are greater than 0.5.

$$AVE = \frac{\sum \lambda^2}{n} = \frac{0.86 + 0.86 + 0.79 + 0.83 + 84}{5}$$

$$AVE = 0.84$$

This instrument has high convergent validity because the factor loadings for each indicator > 0.5 and the AVE (0.84) > 0.50. Besides the AVE and factors loading, the model fit indices generated along with the output including the p-value, RAMSEA, GFI and NFI, all meet the expected range to validate the existence of construct validity.

6.6.4 Model Fit and Construct Validity Assessment for Perception of Environmental Stress.

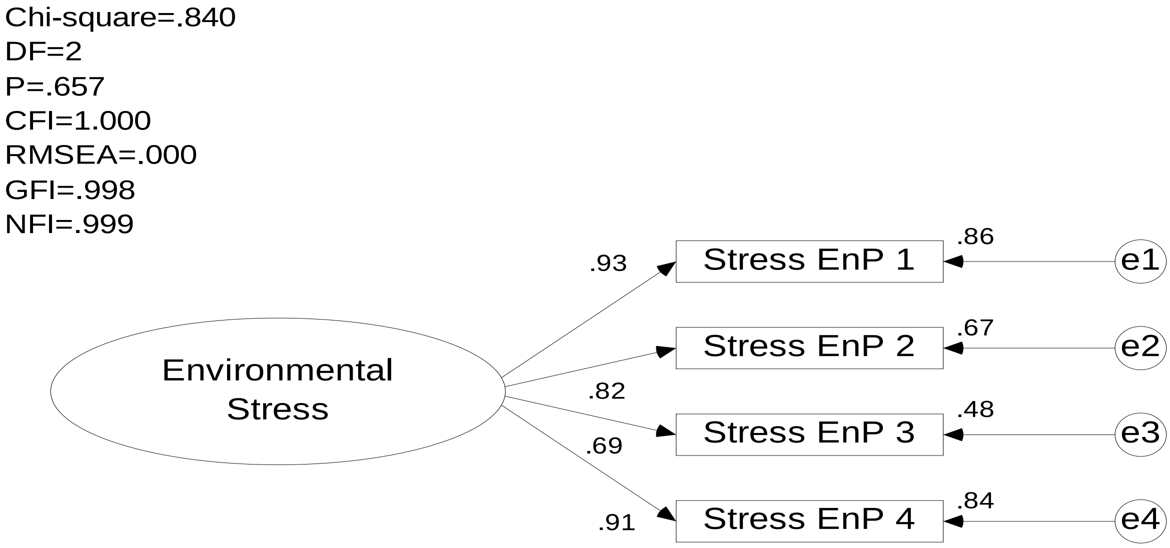


Figure 6.4: Environmental Stress

Individual factor loadings are greater than 0.5.

$$AVE = \frac{\sum \lambda^2}{n} = \frac{0.86 + 0.67 + 0.48 + 0.84}{4}$$

$$AVE = 0.71$$

This instrument has high convergent validity because the factor loadings for each indicator > 0.5 and the AVE (0.71) > 0.50. Besides the AVE and factors loading, the model fit indices generated along with the output including the p-value, RAMSEA, GFI and NFI, all meet the expected range to justify the existence of construct validity.

6.6.5 Model Fit and Construct Validity Assessment for Oil FDI Environmental Impact Instrument.

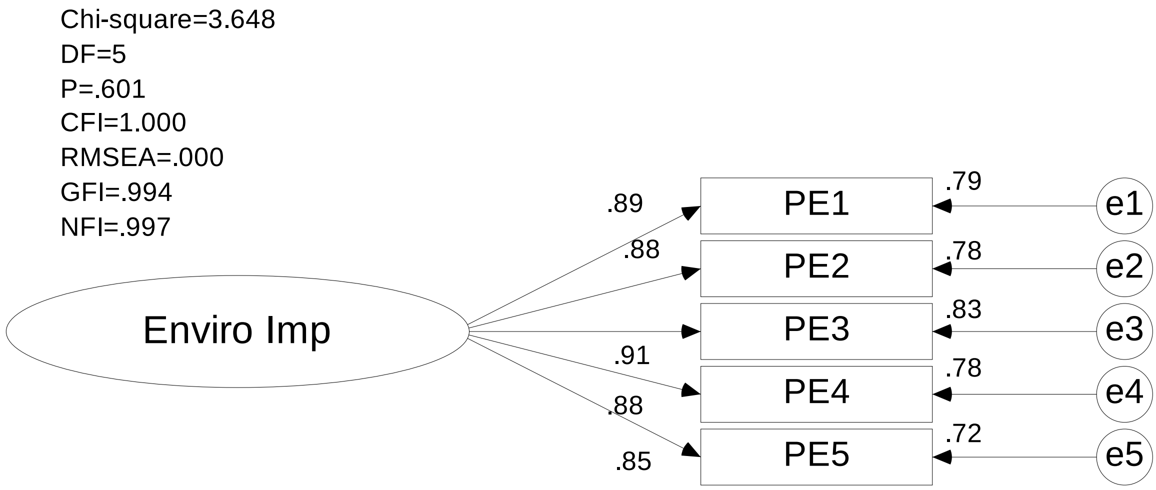


Figure 6.5: Environmental Impact

Individual factor loadings are greater than 0.5.

$$AVE = \frac{\sum \lambda^2}{n} = \frac{0.79 + 0.78 + 0.83 + 0.78 + 0.72}{5}$$

$$AVE = 0.78$$

This instrument has high convergent validity because the factor loadings for each indicator > 0.5 and the AVE (0.78) > 0.50. Besides the AVE and factors loading, the model fit indices generated along with the output including the p-value, RAMSEA, GFI and NFI, all meet the expected range to give good reason for the existence of construct validity

6.6.6 Model Fit and Construct Validity Assessment for Perception of Environmental Risk (GAC) Instrument.

General Awareness of environmental consequence (GAC) measured the environmental value. This is been used to evaluate perceived environmental risk from environmental degradation.

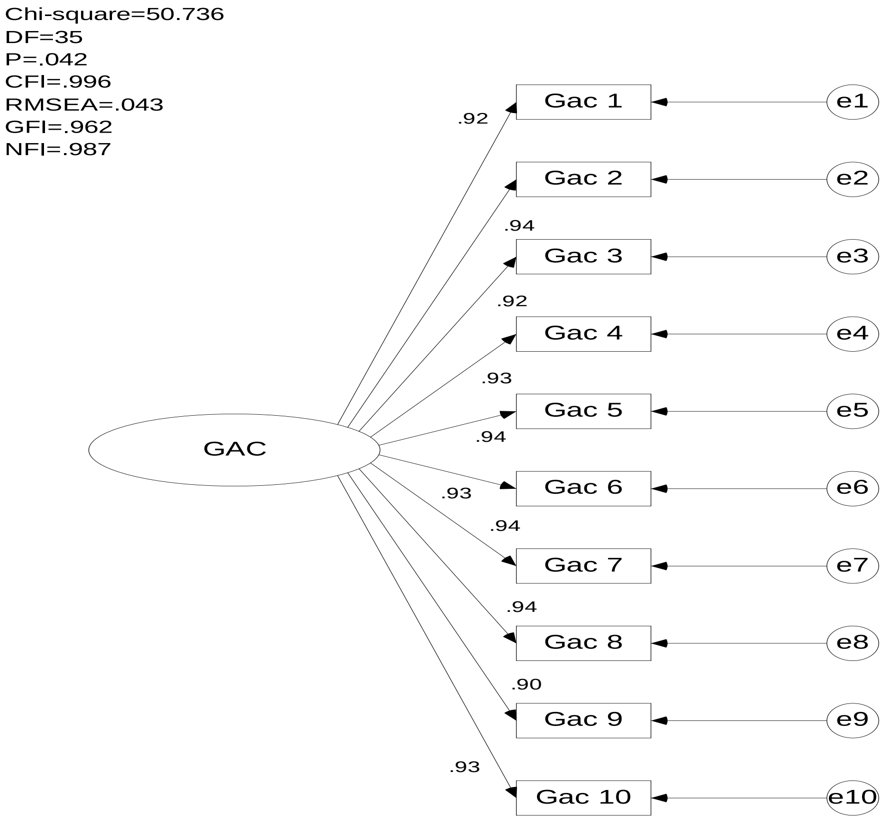


Figure 6.6: Environmental Consequences (Risk)

Individual factor loadings are greater than 0.5.

$$AVE = \frac{\sum \lambda^2}{n}$$

$$= \frac{0.92 + 0.94 + 0.92 + 0.93 + 0.94 + 0.93 + 0.94 + 0.94 + 0.90 + 0.93}{10}$$

$$AVE = 0.93$$

This instrument has high convergent validity because the factor loadings for each indicator > 0.5 and the AVE (0.93) > 0.50. Besides the AVE and factors loading, the model fit indices generated along with the output including the p-value, RAMSEA, GFI and NFI, all meet the expected range to justify the existence of construct validity.

6.7 Measurement Model

In measurement model, constructs are collectively assessed for the establishment of **discriminant validity** and **model fit**. This is besides examinations of diagnostics such as multivariate **normality**. Discriminant validity between any two latent constructs is established when the values of their individual AVE are greater that the squared correlation between them(AVE > R^2).

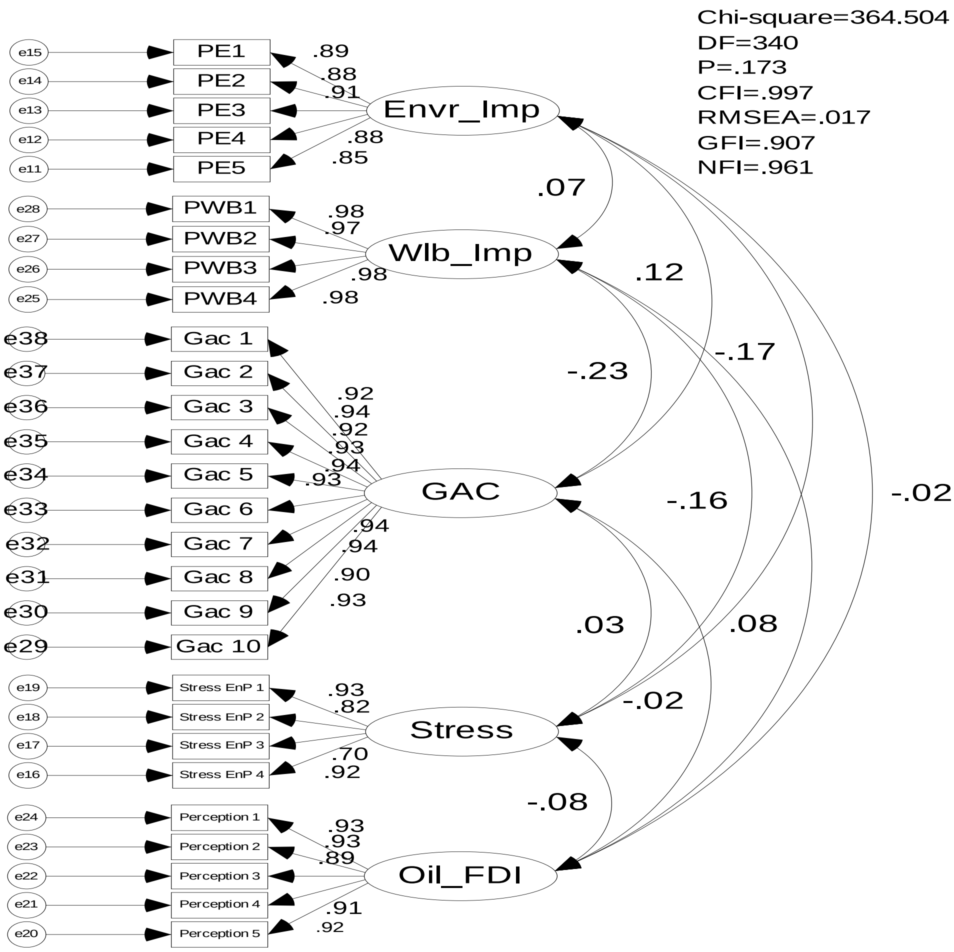


Figure 6.7: Correlations among Latent Constructs (variables)

The results of correlation among latent constructs variables in figure 6.7 is depicted in the table 6.4 for more clarity.

Table 6.4: Correlations among Latent Constructs (variables)

	Envr_lmp	Wlb_Imp	GAC	Stress	Oil_FDI
Envr_lmp	1				
Wlb_Imp	.07	1			
GAC	.12	-.23	1		
Stress	-.17	-.16	.03	1	
Oil_FDI	-.02	.08	-.02	-.16	1

: Sources by the author based on research results on correlations among Latent Constructs- *Extracted from Figure 6.7*

The correlation coefficient among latent variables in the measurement model, as indicated in the table 6.5 below, is low, this implies that multi co-linearity problem is not inherent. Besides it depicts that each of these variables distinctly represents separate constructs. The low correlation across latent constructs also explains why the AVE for each of the constructs is greater than the square correlation coefficients. Hence, the fulfillment of discriminant validity arises from the low correlation across latent constructs.

Table 6.5: Assessment of the Validity of Measurement Model

		AVE	R^2	Discriminant Validity
1	Env_Imp	0.78		Yes
	Wlb_Imp	0.96	0.069	
2	Env_Imp	0.78		Yes
	GAC	0.93	0.121	
3	Env_Imp	0.78		Yes
	Stress	0.71	-0.166	
4	Env_Imp	0.78		Yes
	Oil_FDI	0.84	-0.019	
				Yes
5	Wlb_Imp	0.96		
	GAC	0.93	-0.228	
6	Wib_Imp	0.96		Yes
	Stress	0.71	-0.158	
7	Wlb_Imp	0.96		Yes
	OIL_FDI	0.84	0.076	
8	Stress	0.71		Yes
	GAC	0.93	0.032	
9	OIL_FDI	0.84		Yes
	GAC	0.93	-0.020	
10	OIL_FDI	0.84		Yes
	Stress	0.71	-0.081	

Sources by the author based on research results on Assessment of the Validity of Measurement Model

Discriminant validity between any two latent constructs is established when the values of their individual AVE is greater that the squared correlation between them (AVE>R^2).

6.7.1 The Measurement Model Fit

All the model fit indices generated along with the output including the p-value, CFI, RAMSEA, GFI and NFI, meet their expected range to justify the validity of the measurement model.

Table 6.6: Established Criteria for Fit Indices

Fit Indices	Authors	Recommended Values	Values from Current Model
P-Value	Barrett 2007,Kline 1998	>0.05	0.173
Chi Square/DF	Hair et al., 1998, Wijanto 2008	<3.0	1.07
GFI	Yuan, K. H. (2005) and Steiger, J. H. (2007	>0.90	0.907
CFI	Bentler (1990)	>0.90	0.997
RMSEA	Byrne (1998) and Hu and Bentler (1999)	<0.05 or <0.08	0.017
NFI	Bentler and Bonnet (1987)	>0.90	0.961

Sources by the author based on research results on Established Criteria for Fit Indices

It is thus clear from the table above, that the measurement model fits the observed data.

6.7.2 Assessment of Items' Normality

Another important element in the evaluation of the measurement model is to examine the fulfillment of normality assumption. A data set is considered normal if the values of skewness fall within the range of +2 to -2 while kurtosis values do not exceed the range of +7 to -7 (Tabachinick & Fidell 2007). Given the above threshold for justifying the normality of data, it could be said that all observed data for items considered under this study are normal (See Appendix B). The normality of data deduces from the survey was examined and skewness and kurtosis values and their individual items were explored. There was no serious skewness or kurtosis that required transformation of data. All the data have absolute values of the original skewness less than 0.7 for theoretical variables.

Also, absolute values of the original kurtosis were less than 0.6 for theoretical variables (Kline, 1998).

6.7.3 The Basic Structural Model

The construct measures establish the structural relationships among the constructs and translate them to form suitable SEM analysis. The path diagram is used for the estimation of relationships. It is used to examine the foreign direct Investment into crude oil exploitation and the impact on the environment and people of Niger Delta oil producing communities. This leads to a hypothetical theory that the effect of foreign Direct Investment into crude oil exploitation in the Niger Delta will affect the environment and communities negatively. This implied that the foreign direct investment into crude oil (Oil_FDI) would lead to negative impact on the environment (Envr_lmp) and well-being of the people in the communities (Wib_Imp). The proposition can be expressed in figures 6.8 below. The structural model shown in the path diagram below can now be estimated and assessed to determine whether the structural relationships are consistent with theoretical expectations.

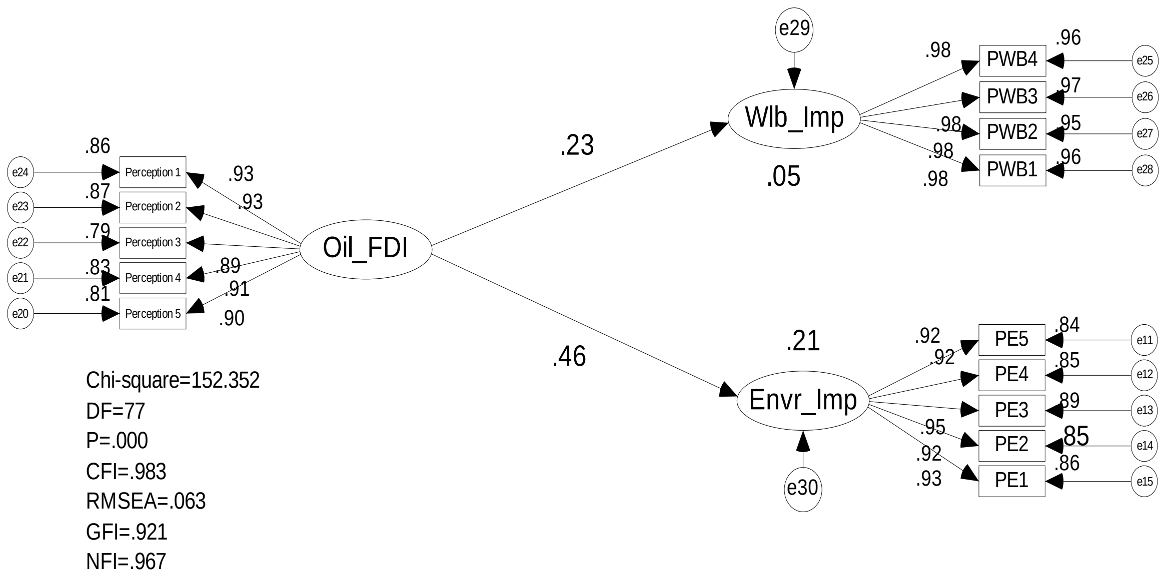


Figure 6.8: The Basic Structural Model Path Diagram

The result above in the path diagram shows the overall fit statistics. The overall model χ^2 is 152.352 with 77 degrees of freedom. The ρ- value associated with this result is 0.000. The ρ- value is significant using a type 1error rate of .05. The rule of thumb suggests that we rely on at least one absolute fit index and one incremental fit index, in addition to the χ^2 results. The value for Root Mean Square Error of Approximation (RMSEA), an absolute fit index, is 0.063. This value is below the 0.08 guideline. The Goodness of Fit Index (GFI) is 0.921 which reflect good model fit for this model. Another absolute fit statistic is Normed χ^2, which is 1.97. The measure is the chi-square value divided by the degree of freedom (152.352 / 77 = 1.97).Hence, Kline (1998) suggests that χ^2/ d.f. The ratio must be equal to 3 or less as a reasonably desirable alternative indicator of model fit. From the structural model, χ^2/ d.f. yields 1.97 which is less than 3 as suggested by Kline (1998). Thus, the Normed χ^2 suggests an acceptable fit for the model.

In the incremental fit indices, the comparative fit index (CFI) is the most widely used index. In our result CFI has a value of 0.99, which exceeds the CFI guidelines of greater than 0.90 percent. Studies have shown that a value greater than0.90 is needed in order to ensure that mis-specified model is not accepted (Hu & Bentler, 1999). The other incremental fit indices also exceed suggested cutoff values. Normed fit index (NFI) is 0.967 which reflect good model fit. The result showed reasonably overall model fit and the hypothesis of the relationships were generally supported by the results.

The constructs of Oil_FDI had an impact on the environment (Envr_Imp) and well-being of the people in the communities (Wlb_Imp) by 0.46 and 0.23 respectively. The R^2 for the impact on the environment and well-being is 0.21 and 0.05 respectively. The Comparative Fit Index (CFI) = 0.983 indicates acceptable fit of the model. All the latent variables and their indicators are positive and significant. However, since the path coefficients are standardized values, a higher value for environmental impact (0.46) relative to that of well-being (0.23), implied that the communities perceived more destruction of their environment than the direct influence on their well-being from oil_FDI. This conforms to realities in these communities as most of them had always lamented that oil exploration by multinational corporations had impacted adversely on crop land and fish farming. The consequence had manifested in social crimes such as the kidnapping of foreign oil company workers. But since there are other theoretically advocates determinants of environmental behaviour, the above basic model is extended based on literature.

6.7.4 The Extended Structural Model

The extended structural model is introduced as evidence that the communities' perception about the operation of oil producing companies (the proxy for Oil_ FDI) affects both the environment and the well-being of the community according to communities' resident perception. However, environmental risk as well as environmental stress impact on environmental behaviour was introduced in the basic model to form extended model. The General Awareness of Consequence (GAC), as measure of environmental risk and environmental stress measure the extent of stress from environmental problem in the communities. The basic model is extended to further examine the impact of the Oil-FDI. Consistent with the basic model, the Oil-FDI impacted more on the environment than the well-being of the people in community.

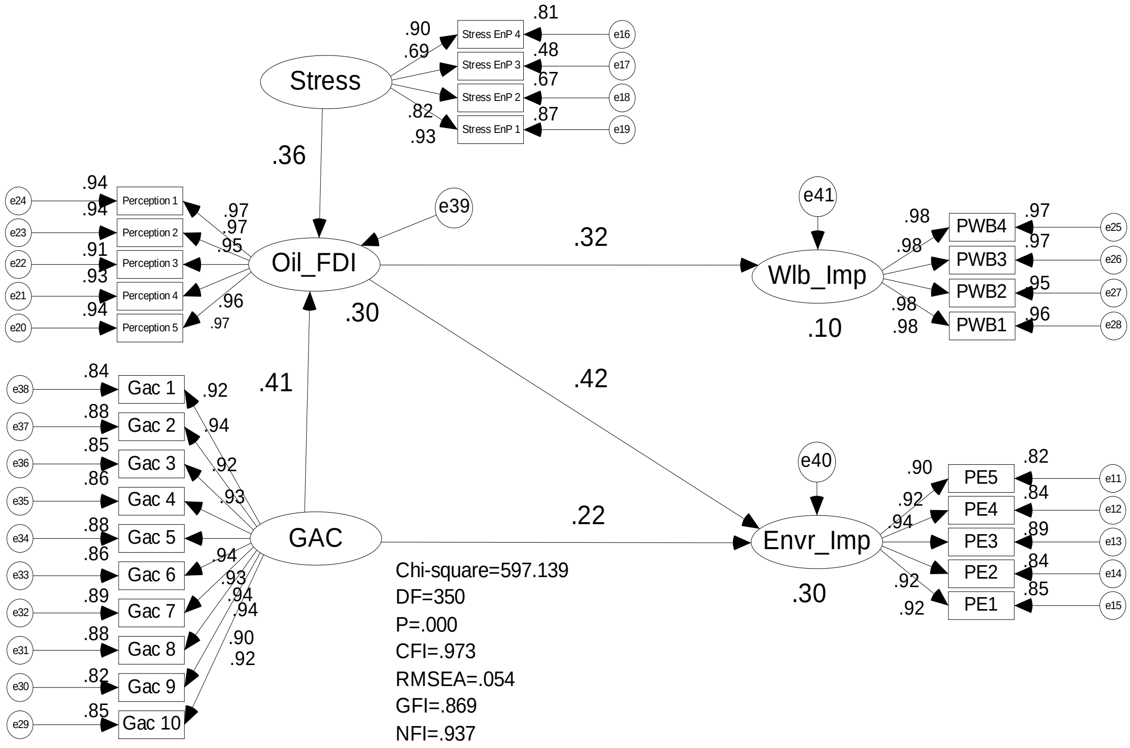


Figure 6.9: The Extended Structural Model Path Diagram

Table: 6.7. The Extended Structural Model

VARIABLES			β =ESTIMATE	R^2
STRESS	→	OIL_FDI	0.36***	0.30
GAC	→	OIL_FDI	0.41***	0.30
OIL_FDI	→	WLB_ IMP	0.32***	0.10
OIL_FDI	→	ENV_IMP	0.42***	0.30
GAC	→	ENV_IMP	0.22***	0.30

***1% level of significance.
Note: The parameter Estimates reported in the above are standardized value
Sources by the author based on research results on The Extended Structural Model

However, unlike the basic model, the squared correlation coefficient has improved. All fit indices meet established thresholds to ascertain that the model fits the sample. The results above in the path diagram extended model χ^2 are 597.139 with 350 degrees of freedom. The ρ- value associated with this result is 0.000. The ρ- value is significant using a type 1error rate of .05. Thus, the χ^2 goodness of fit statistic does not indicate that the observed covariance matrix matches the estimated covariance matrix within sampling variance.

The value of Root Mean Square Error of Approximation (RMSEA), an absolute fit index, is 0.54. This value is below the 0.07 a stringent upper limit guideline (Steiger, 2007). The RMSEA let us know how well the model, with unknown but optimally chosen parameter estimates would fit the population covariance matrix (Byrne, 1998). It has been regarded as one of the most informative fit indices. Also, Goodness of fit index (GFI) is 0.869 which reflect good model fit for a model of the sample. Another absolute fit statistic is normed χ^2, which is 1.71. This measure is the chi-square value divided by the degree of freedom (597.139/ 350 = 1.71). Hence, Kline (1998) suggests that χ^2/ d.f. The ratio must be equal to 3 or less as a reasonably desirable alternative indicator of model fit. From the structural model, χ^2/ d.f. ratio yields 1.71 which is less than 2 as suggested by Tabachnick &Fideli, 2007. This further clarifies that the model has a good fit.

In the incremental fit indices, the Comparative Fit Index (CFI) is the most widely used index. In the result CFI has a value of 0.973, which exceeds the CFI guidelines of greater than 0.90. The other incremental fit indices also exceed suggested cutoff values. Normed Fit Index (NFI) is 0.937 which reflect good model fit. The result showed reasonably good overall model fit and the hypothesis in the relationships were generally supported.

The constructs estimate coefficient of Oil_FDI impact on the environment (Envr_Imp) and well-being of the people in the communities (Wlb_Imp) by 0.42 and 0.32 respectively. The perception of people in the communities that environmental stress causes by foreign direct investment into oil (Oil_FDI) estimate coefficient is 0.036. While the General Awareness of Environmental Consequences (GAC) caused by an increase in foreign direct investment into oil exploitation (OIL_FDI) estimate coefficient is 0.41. The direct effect path estimate coefficient of GAC from environmental impact is 0.22. They all achieved significant at 1%, the latent variables and their indicators are positive and significant. However, since the path coefficients are standardized values, a higher value for environmental impact relative to that of well-being, implied that the communities perceived more destruction of their environment than the direct influence on their well-being from oil_FDI.

6. 8.Discussion and Conclusion

The model consists of structural equations which accommodate multiple dependent variables simultaneously. It is found to offer statistically valid indications and plausible interpretation suggesting that the model is suitable for interaction and enhance the decision on the environment, consequences of production in oil sector in the host communities. Oil companies have an exclusive prospect in concentrate on social responsibility issues, especially where potential host countries lack the societal infrastructure. The model shows that communities' perceptions about the operation of oil companies as well as, environmental consequences and risk perception collectively determine environmental impact perception. The direct environmental impact leads to social strain that caused increased in resource scarcity that lead to greater conflict, with the community people being the most likely victims. The crisis in the Niger Delta is believed to have been triggered by environmental stress.

This finding has important implication in the face of rising social crises in Nigerian oil-rich regions. To reduce communities' aggressiveness towards those oil companies, there should be measures to abate adverse effects to both the environmental degradation and community well-being. It reveals that the environment appears to be worsening at a faster rate than well-being. This shows that the marginal environmental cost of addition exploitation will rise over time. The people have lost control of some of their traditional natural resources. Most of the natural resources have been locally unsustainable and has occurred in a manner and scales that often bypasses the poor.

Moreover, since both environment stress and risk perception affect Oil_FDI, the members of those communities need to be educated on potential risk to avoid the expectation of exaggerated impacts. More so, oil companies' social responsibility could be strengthened further to reduce communities' perceived stress from their operation. There is an accumulation of toxic materials from drilling activities; oil pollution of the sea, beaches and land. The exploration of crude oil leads to the degradation of land, vegetation and farm land/human settlement. Furthermore, noise pollution and vibration from seismic shooting and pollution of underground water are some of the stress from the activities of oil companies. This caused adverse health effect on humans being and dislocation of economic activity with tension in the social environment due to compensation disagreements.

In this perspective, degradation of the environment and natural resource, pollution and loss of biodiversity are detrimental for the reason that they increase vulnerability, undermine health system, and reduce resilience of the communities. It is useful to think about livelihood sustainability in stipulation of the normal functioning and longevity of a nested hierarchy of ecological and socioeconomic system. From this perspective ecological and socioeconomic system should acquire so as to maintain a level of biodiversity that will ensure the resilience of the ecosystems that human consumption and production depend.

Furthermore, the exploitation of crude oil should be done with the degree of environmental and economic efficiency with the ideal of Pareto optimality, which encourages measures that will advance the welfare of at least one individual without worsening the situation of someone else. The Pareto optimality benchmark will ensure efficient allocation of resources in production, and efficient consumption choice that maximize utility. Furthermore, it will increase an adaptive capacity and opportunities for improvement of economic, social and economic systems (Gunderson & Holling 2001).

The practice of environmental accounting may be considered for the companies to be environmentally friendly and socially responsive. By introducing accounting practices which incorporate environmental expense benefits and always measuring the environmental impacts of the firm's activities. In addition, integrating the financial and ecological consequences of the firms' activities is necessary. The environmental challenge caused by exploitation of resources, including oil spillage, air pollution-through flaring of gas and oil pipe and storage leakages and land degradation. These lead to health hazards and lack of alternative to unsustainable patterns of living and economic necessity often forces farmers to use resources in a ways that guarantee short term survival but reduce the future productivity of environmental assets

The Niger Delta Environmental Survey (NDES, 1997) points some of the reasons for the high occurrence of spills as lack of regular inspection and maintenance and very old age of the pipelines. The Corrosion of equipment also accounts for a high part of oil spills in the Niger Delta, which has a wide-ranging network of pipelines, between the fields and various small networks of flow lines that carry oil from wellheads to flow stations, allowing many opportunities for leakages. These pipelines were laid about 50years ago according to the then prevailing standards and estimated to have a life span of about fifteen years after it will vulnerable to corrosion. Unfortunate management practices are causes of oil installations leading to oil leaks and spills.

The growing of crude oil exploitation has become a double edged sword, the oil companies and government are enjoying prosperity in term of huge earning but the well-being of the people and the environment of the host communities are greatly deteriorated due to the quality of air, water, and land resources. The ecological damage is going on virtually unchecked. This is perceived as an obstacle to economic advancement that can frustrate industrial development. The environmental damage has become so severe that people economic advancement is being diminished. By the lack of clean water, reduced productivity associated with pollution induced health problems, and other damages that limit productivity activities of the people in the Niger delta region.

The direct environmental impact has led to social deformations and greater conflict caused by increased resource scarcity. The Niger Delta is believed to have been triggered by environmental stress and they are at risk because of sensitivity and vulnerability to ocean flooding, erosion and loss of freshwater, fishing and tourism. Mitigation is necessary by encouraging faster technological progress in cleaning up the oil spill and stop gas flaring. Plan to improve environmental conditions are likely to be more successful when they work in cycle with community networks, ascertaining that program design is consistent with both local and national objectives. The efforts with grassroots can be more cost effective because they generally involved the use of low-cost alternatives and provide jobs to local populations. Institutions facilitating cooperative management of common property resources can be encouraged.

Appropriate institutional changes must be made in regard to tapping and using national resources. In this regard, due recognition must be accorded the fact that the institutional mechanism cannot succeed without a proper system of incentives and disincentives made especially to address the needs of the local population from whose environment resources are tapped. A feeling of insecurity by local citizen engendered by the battered environment is certain to breed incessant agitation for private or local resource control.

Principally those in the areas where these resources are tapped, naturally have expectations about welfares actions that will mitigate their suffering by ensuring a better life for their family.

CHAPTER SEVEN

ECONOMIC GROWTH AND TRADE LIBERALIZATION

7.1 Introduction

The theories of economic growth and trade liberalization take successive from the classical school of thought of neo-classical theory. It developed a model where comparative advantages not only arise due to international divergences in labour productivity, but also owing to differences in resource endowments of the countries. The Heckscher-Ohlin model (H-O) forms upon the similar fundamental assumptions as the Ricardian model of foreign trade arises due to differences in comparative costs amongst countries. The H-O model diverges from the Ricardian model with respect to Ricardo's assumption of labour as the only factor of production, and the perception of labour as an immobile factor. Therefore, in the normal and effective approach to macroeconomic stability and trade liberalization there are fundamental components of a good economic operation. There would be efficient in the private markets that generate robust economic growth when the government deals with the issues of allocating resources (Ingrid, 2007).

Furthermore we examine the determination of the aggregate production model, in section 7.3. The foreign direct investment appeal and trade liberalization policy have been the fundamental preoccupation of Nigeria government, since 1986 by adopting of structural adjustment policy. The study proposition is to investigate the impacts of foreign direct investment and trade openness on economic growth in Nigeria within the theoretical framework of neoclassical Cobb-Douglass production function. The session 7.5, conclude the chapter.

7.2. Economic Growth and Trade Liberalization Theories

The magnitude of the trade as an outlet for surplus production and as a means of expanding the market thereby enhancing the division of labour and the level of productivity was emphasized by Adam Smith, (1723-90) in his renowned book, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776). The theory that improves trade, wellbeing and growth, has an extensive and renowned lineage dating back to Smith. Following Smith, David Ricardo (1772-1823) attains the theory of comparative advantage and give detail in his Principles of Political Economy and Taxation(1817) on the assumptions of perfect competition and the full employment of resources, countries can obtain welfare gains by focus in the production of those goods with the lowest opportunity cost and trading the surplus of production over domestic demand. Therefore, Eli Heckscher and Bertil Ohlin 1920s, both neoclassical economists built a model where comparative advantages not only take place due to international differences in labour productivity, but also due to differences in countries' resource endowments (Krugman, 1987).

The Heckscher-Ohlin model put up upon the same basic postulation as the Ricardian model that foreign trade commences due to differences in comparative costs amongst countries. The H-O model diverges from the Ricardian model with reference to Ricardo's assumption of labour as the only factor of production, and as an immobile factor. Land is included as a second factor of production to reveal resource endowments. There is variation in the comparative prices of the factors of production and different proportions in which the factors are applied to determine comparative advantage. There divergence in relative prices is determined by the relative scarcity of resources, therefore the relative price of a good produced with a scarce resource is more expensive than goods that are produced with an abundant resource (Ingrid, 2007).

The work of Paul Krugman presented the new trade theory which emphasizes the dynamic effects of economies which involving an economy can obtain long-term growth effects due to increasing returns (Krugman, 1987). Some theories have proposed an open access exploitation hypothesis, trade liberalization for a developing economy. In neoclassical model, trade openness and liberalization generate gains in terms of resourceful static resource allocation.

Alfaro, et al. (2004) argues that a country's constructive economic adjustment requires measures will minimize government intervention in the domestic economy, liberalize trade and getting prices right. The private markets would allocate wealth resourcefully and generate strong economic growth when the intervention of government is reduced. Trade openness and liberalization could influence the strength and composition of output and welfare, but is not able to pick up the pace of the economy's long-run growth path. Moreover, the presage size of static gains from trade is usually very small. Empirical data do affirm the small impact of trade openness upon aggregate income (Richard & Krugman, 2004). In this regard, many works of new trade and growth models have made known that the incidence of imperfect competition and external economies technological spillovers, countries' trade performance and competitiveness is much less reliant on factor endowments and static comparative advantages. On the contrary, it is established on dynamic gains, intangible capital, technology transfer, complex trade and industrial strategies at the level of firms and nations (Dong-Hyeon & Shu-Chin, 2009).

The relationship between international trade and growth bring into being at the macroeconomic level on the demand side of an open economy, given that export demand could stand for a significant foundation for countries' economic growth. In view of the fact that most developing countries have joined the World Trade Organization

(WTO) and aimed at opening their economies, however, the outcome has not been systematically positive for export performance sometimes remains unsatisfactory and these countries steadily follow contrasted development paths. This gives emphasis that there is no systematic gain in growth related with the obligatory of the multilateral rules in international trade (Fosu & Magnus, 2006).

Many researchers presented the relationship between FDI and economic growth. The fundamental position on FDI and economic growth can be generally classified into two. First, FDI is well thoughtfully to have unswerving impact on trade through which the growth progression is assured (Markussen, & Vernables, 1998). Second, FDI is implicit to enhanced domestic capital in a way that stimulating the production of domestic investments (Borenstein, *et al.*, 1998; Driffield, 1999). These two arguments are in conformity with endogenous growth theories (Romer, 1990) and cross country models of industrialization in which the quantity and quality of factors of production and alteration of the production progression are component in developing a competitive advantage. FDI has empirically been found to stimulate economic growth by an integer of researchers (Borenstein *et al.*, 1998; Glass & Saggi, 1998; Jerome & Ogunkola, 2004).

David *et al.,* (2007) argued that developing countries with progressive liberal trade policies have upward ratios of trade and inward investment to national income, and with higher growth rates. Fosu & Magnus (2006) examine the long-run impact of foreign direct investment and trade on economic growth in Ghana between 1970 and 2002. Using an augmented aggregate production function growth model and employing the bounds testing approach to cointegration, they found cointegration relationships between growth and its determinants in the aggregate production function model, however trade was found to have a significant positive impact on growth.

Furthermore, the rate of economic growth can be speed up capital from external country and can act as a catalytic agent in making it possible to exploit mostly developing country domestic resources. Foreign investment inflow can at best be complementary to domestic savings. In developing economies, the literature has shown that foreign investment unaccompanied cannot create any stable basis for a higher standard of living in the future. Rasiah, (2002) argued that China's expansion in global trade and investment flows is not a new experience, since compromise with the United States in 1970s. He also noted that, if greater assimilation improves between Southeast Asia and China complementary and structural interdependence give confidence and stronger industrial relations frameworks, it could encourage an inclination fall in unemployment and bring improvements in labor standards.

Interestingly, in literature it was noted that there was a positive correlation between growth and the share of foreign investment in the GDP and a positive relationship connecting the latter share and the openness (share of external trade in GDP). Hence, it comes into view that openness do not straightforwardly enhance growth, but encourages investment, the latter being the essential engine of growth. This affects the environmental quality that would encourage sustainable economic growth.

7. 3. Research Methodology framework

This study will employ the cointegration and error correction models through this model, not only is the stationary of the variables tested, but also their long run relationship and the validity of the short run relationship were estimated. The theory of cointegration which was developed by Engle and Granger is important for reasons that go beyond its use as a diagnostic for linear regression. In many cases economic theory tells us that two variables should be cointegrated and a test for cointegration is then a test of the theory. If the variable is cointegrated, the cointegration regression can be used to analyze the effect of the explanatory variables on the dependent variable in the long run. Though the error correction model not only can the short run effect of the explanatory variables on the dependent variable be analyzed but also the speed adjustment of the depend variable toward its long equilibrium (Syafri, 2008).

7.3.1 **The Co integration and Error Correction Model Method**

The use of the cointegration and error correction models involve some procedures. The first is to test the unit root of each variable which is used in the study. The second is testing the cointegration regression. If there is any evidence that the variables considered in the test are co- integrated, the cointegration regression will be used for an analysis. Based on the residual of cointegration regression, the error correction model can be constructed.

7.3.2 The Unit Root Test

By regress an equation, the stationary property of each variable must be tested first. This is important because a regression using non-stationary series could lead to spurious results if the variables used in the regression are not co-integrated. Therefore, the testing of the unit root has become essential before conducting any regression analysis (Oh, 1992). For the variable at the level, the unit root test can be tested using the Dickey Fuller and Augment Dickey Fuller Test as follows (Gujarati, 1995).

$$\Delta Y = b_0 + cY_{t-1} + u_t \text{ ------------------------------------19)}$$

$$\Delta Y_t = b_0 + b_1 t + cY_{t-1} + u_t \text{ --------------------------------20)}$$

Where: $\Delta Y_t = Y_t - Y_{t-1}$

Y_t = the observed variable at period; T = time trend variable

The equation (19) is a DF test which includes a constant only. Some variables in the level show a time trend, such as Gross Domestic Product and FDI data. The equation (20) is a DF test which includes a time trend variable. In both equations, the null hypotheses are H_0 :c = 0 against H_1: c < 0. If the t statistic of coefficient c computed from equation (19) and (20) is greater than the critical of DF test (in this study based on MacKinnon critical Value) the null hypothesis is rejected. The rejection means that the data is stationary at any level.

The unit root test of the equations (19) and (20) are valid only under the assumption that the error term in the test regressions are uncorrelated. This assumption is very often untenable, because the regression functions for the test regressions do not depend on any economic variables. It means that the tests for the unit roots are performed in a univariate (single) time series. There are no other economic variables used expect Y_t in the root test of the equation (19) and (20). This makes it very likely that the error terms will display serial correlation.

Therefore, the unit root tests are (asymptotically) valid in the presence of serial correlation (Davison & MacKinnon, 1993). The unit root tests that are valid in the presence of a serial correlation of unknown forms are the modified version of the Dickey Fuller test, when the lagged change in the equation (19) and (20) are included. This modified version is usually called the Augmented Dickey Fuller (ADF) test. The ADF tests which include only a constant and a trend can be expressed as follows (Gujarati, 1995).

$$\Delta Y_t = b_0 + cY_{t-1} + d_i \sum_{i-1}^{k} \Delta Y_{t-i} + u_t \quad \text{-------------------------21)}$$

$$\Delta Y_t = b_0 + b_1 t + cY_{t-1} + d_i \sum_{i-1}^{k} \Delta Y_{t-1} + u_t \quad \text{-------------------------- 22)}$$

Where: k = number of time lags.

The null hypothesis in equation (21) and (22) are still H_0: c = 0, against the alternative hypothesis H_1: c < 0. If the t statistic of the coefficient c is greater than critical value of the ADF test, the null hypothesis is rejected, and it is concluded that the data is stationary in the level.

The inclusion of the lagged changes is projected to clean up any serial correlation in ΔY_t. The idea is to include enough lagged changes so that the error in the equations (21) and (22) are serially independent (Gujarati, (1995:720). But, the more lags we include in equations (21) and (22), the more initial observations we lose. If we include too many lags, the small sample power of test generally suffers. But if we include too few lags, the size of the test will be incorrect. Often the lag length test is determined by the frequency of the data (as well as the sample size). For the annual data, one or two lags usually suffice. For the monthly data, we might include twelve lags. But there are no hard rules to follow (Wooldridge, 2000).

If the error term follows the Moving Average (MA) process, the ADF test might have a problem. In this case, moving the average component of error terms could be modeled only by an infinite-order AR process, so it would seem that an infinite number of lagged changes have to be added. Said, & Dickey (1984)), quoted by Davidson &MacKinnon, (1993), showed that one can use the ADF test even when there is a moving average component in error term provided one lets the number of lagged changes (ΔY_t) that are included to tend to infinity at an appropriate rate, which turns out to be a rate not faster than $T^{1/3}$, where T is a sample size. One acts as if the error term follows an AR(k) process and allows k to grow at a rate not faster than $T^{1/3}$.In other determine the number of lagged changes (k) to be include in ADF test, one can use this rule namely $T^{i/3}$. This rule had been used by Insukindro (1992) to determine the number of lagged changes in the ADF test in his research.

Another way to determine the optimal lag use for conducting the ADF test is based on minimizing optimal criteria (the Akaike's information Criteria (AIC). The number of lagged changes (k) is chosen based on the minimum value of AIC. These criteria have been used by researchers such as Masih &Masih (1998) and Weliwita & Ekanaya (1998).

The same procedure of the ADF test can be applied to the data in the first be expressed respectively as follows (Wooldridge, 2000:581):

$$\Delta^2 Y_t = b_0 + c\Delta Y_{t-1} + d_i \sum_{i-1}^{k} \Delta^2 Y_{t-1} + u_t \quad \text{----------------------23)}$$

$$\Delta^2 Y_t = b_0 + c\Delta Y_{t-1} + b_i t + d_i \sum_{i-1}^{k} \Delta^2 Y_{t-1} + u_t \quad \text{---------------- 24)}$$

Where: $\Delta^2 Y_t = \Delta Y_t - \Delta Y_{t-1.}$

Even though in series data in the first difference it is unusual to have a linear trend (Wooldridge, 2000), many researchers always use both the ADF tests above to ensure that the possible trend in the different series of data has been considered.

In conducting the ADF test, the critical value reported by E views is valid only for the unit root test of the data series, and will be invalid if the series is based on the estimated value (Quantitative Micro Software, 1997). The critical value of the unit root test for this data will be based on the critical values in Davison, and MacKinnon.

7.3.3 The Phillip-Perron Test

The second way to obtain the unit root test statistics that are valid despite the occurrence of a serial correlation of unknown form is to use the non-parametric unit root test of Phillip and Perron (Davison, & MacKinnon 1993). The test regression for the Pillips-Perron (PP) test is the AR(1) process. The Phillips-Perron test with and without trend can be expressed as follows:

$$\Delta Y_t = b_0 + cY_{t-11} + u_t \text{ ----------------------------25)}$$

$$\Delta Y_t = b_0 + b_1(t - T/2) + cY_{t-1} + u_t \text{ ------------------- 26)}$$

Where t is time trend and T is sample size. In each case, the H_0*: c = 0* against H_1: c < 0. If the Phillips-Perron test statistics is greater than the MacKinnon critical value, the null hypothesis is rejected. The rejection of the null hypothesis means that the variable is stationary. On the contrary, if we fail to reject the null hypothesis, it means that the variable is non-stationary.

In practice, making a choice of the more appropriate test (between the ADF and PP tests) can be difficult for the true data generated process is never known. A safe choice is to use both typed of unit root test. If they reinforce each other, we can have confidence in the results (Ender, 1995). Therefore, both the ADF and PP tests are used. In the ADF test the optimum lag length using the Akaike's information criterion number of lags of the first difference term in the ADF test.

7.3.4 Cointegration Test

The cointegration test is needed to find out whether two or more variable are integrated together. A test of cointegration can be consideration of as a pre-test to avoid a spurious regression situation and also can be considered as testing for equilibrium of long – term relationship of the economic variables implied by the theory. If two or more variables are cointegrated, the regression results may not be spurious and then the usual t and F test are valid (Gujarati, 1995:725). The cointegration test is necessary part of the formulation and estimation of the dynamic model, especially the ECM (Error Correction Model). In particular, the Granger Representation Theorem establishes that the ECM can only be valid if it includes a set satisfies the cointegration test (Wooldridge, 2000).

Some of the most widely used tests of cointegration have been the Cointegration Regression Durbin-Watson test (CRDW), the Dickey Fuller test (DF) and Augmented Dickey-Fuller test (ADF). Besides these tests, cointegration test can be carried out using the Johansen test. All of the test will be considered when the cointegration is tested in this study. CRDW Test. The rationale for using this test statistic rests on the work of Sargant & Bhargawa (1983) who imply that the CRDW statistics has a probability limit of zero under the null hypothesis of non cointegration. It is therefore rejected for large calculated values of the CRDW statistic (Holden, & Perman, 1994).

For two variables in which $Y_t$is a dependent variable and X_1 is an independent variable, the first step in this test is to estimate the following cointegration regression:

$$Y_t = \alpha + \beta X_t + u_t \text{ ------------------------27)}$$

Durbin Watson for this is given by

$$DW = \frac{\sum(\hat{u}_t - \hat{u}_{t-1})^2}{\sum \hat{u}_t^{\,2}} \text{ ----------------------------------28)}$$

Where: $\hat{u}$ denotes the OLS residual from the co-integrating regression of the equation (31). The DW statistic is compared with the critical value of DW at a certain significant level. If the DW statistic is greater than the critical value of DW, the hypothesis which says that there is no cointegration is rejected. It means that X_t and Y_t are co-integrated (Gujarati, 1995)**.**

7.3.5 Engle-Granger Model (DF and ADF tests)

Engle &Granger (1987) proposed a two-step procedure in determining the cointegration of the variable in the model is non-stationary. It is the unit root test for the variables. The second step is in the presence of the unit root in the residuals of the level regression estimated, using the non-stationary. It is the unit root test for the variables. The second step is in the presence of the unit root in the residuals of the level regressions estimated, using the non-stationary variables. If the residuals do not have a unit root, then the non-stationary variable are co-integrated (Ye, 1987).

From the estimate of the long-run equilibrium relationship such as the regression equation (27), we get the estimated residual of this regression ($\hat{u}$)

$$\hat{u}_t = Y_t - \alpha - \beta X_t \quad \text{-------------------------------------- 29)}$$

By the analogy of the Dickey-Fuller tests for a unit root, a test can be based on the regression:

$$\hat{u}_t = a\hat{u}_{t-1} + u_t \quad \text{--------------------------------------30)}$$

A convenient reformulation of the equation (29) is obtained by subtracting $\hat{u}_{t-1}$ from both sides to give:

$$\hat{u}_t - \hat{u}_{t-1} = a\hat{u}_{t-1} - \hat{u}_{t-1} + u_t \quad \text{-----------------------------------31)}$$

$$\Delta\hat{u}_t = (a-1)\hat{u}_{t-1} + u_t \quad \text{-------------------------------------32)}$$

$$\Delta\hat{u}_t = p\hat{u}_{t-1} + u_t \quad \text{--------------------------------------33)}$$

Where: p = (a-1). The cointegration test of equation (33) is called the Engle-Granger test or EG test or DF test. Since the serial correlation is very often a problem, it is more common to augment the regression (33) by the k lagged value of $\Delta \hat{u}_t$ to ensure that the estimated u_t is free from serial correlation, in which case, the maintained regression becomes (Ender, 1995).

$$\Delta\hat{u}_t = \mathrm{P}\hat{u}_{t-1} + b_i \sum_{i=1}^{k} \Delta\hat{u}_{t-1} + \varepsilon \quad \text{----------------------34)}$$

Where: k is the pre-selected order of lags for the residuals. The equation (33) is often called an Augmented Engle-Granger test or AEG test or ADF test (Davidson &MacKinnon, 1993). The DF and ADF test statistic for the coefficient p is compared with the critical value of DF and ADF. If the DF and ADF tests statistic of the coefficient p is greater than the critical value of DF and ADF, the hypothesis null which states that there is no cointegration between variables X_t and Y_t is rejected. For the DF and ADF test, the critical value of DF and ADF tests are based on the Davidson and MacKinnon critical value for cointegration.

Engle and Granger introduce experimental evidence in order to produce the critical values for the various tests they consider and to evaluate the power of those procedures.

The critical value for the Dickey-fuller statistics for unit roots in the residuals from the cointegrating regression differs from those for the unit root in the variables. Engle and Granger conclude that the Augmented Dickey Fuller and CRDW tests achieve best in terms of power but the critical for CRDW are not sufficiently constant across the various experiments for the tests to be practicable. Thus they conclude that the Augmented Dickey Fuller test is the preferred one (Holden & Perman, 1994).

The Engle and Granger approach is easy to be enforced; it also does have various crucial defects. First, Engle and Granger approach relies on a two step estimator. The first step is to generate an error series u_t and the second step uses these generated errors to estimate a regression of the forms such as the equations (33) and (34). Thus, the coefficient p in equations is obtained by estimating a regression using the residuals from another regression.

Hence, any error introduced in step 1 is carried into step 2. Second, the Engle-Granger approach may not be valid for samples because it is derived from large sample properties. Third, for a case of three or more variables, the Engle-Granger approach is not valid. For three or more variables, there may be more than one cointegrating vectors. The Engle-Granger approach has no systematic procedure for the separate estimation of the multiple cointegration vectors (Ender, 1995).

7.3.6 The Johansen Test

The Johansen test of cointegration is based on the multivariate maximum likelihood estimation (MLE) procedure. To carry out the Johansen test, we first formulate the VAR as:

$$Y_t = \Pi_1 Y_{t-1} + \Pi_2 Y_{t-2} + ... + \Pi_k Y_{t-k} + u_k \quad \text{----------------------------35)}$$

(t = 1…………, T))

Where Π_k is an n x n matrix, and Y_t is a column vector of m endogenous variables. The stochastic term $u_1 \ldots\ldots u_T$ are drawn from an m-dimensional identically, independently and normally distributed covariance matrix A (Johansen, 1988). Since most economic time series are non-stationary, the VAR model such as (34) is generally estimated in their first-difference forms.

The equation (35) can be rewritten in the first difference form as (Weliwita, 1998)

$$\Delta Y_t = \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + ... + \Gamma_{k-1} \Delta Y_{t-k-1} + \Pi Y_{t-k} + u_t \quad \text{---------------36)}$$

Where

$$\Gamma i = -1 + \Pi_1 + \Pi_2 + ... + \Pi i \qquad \text{I = 1…., k-1) ------------ 37)}$$

And

$$\Pi = 1 - \Pi - ...., \Pi_k \quad \text{-------------------------------------- -----38)}$$

Equation (36) screen from a standard first-difference version of a VAR model only by the presence of Π_{t-k}. It is this term that contains information about the long-run equilibrium relationship between the variable in Y_t. If the rank of the Π Matrix r is 0 < r < m Then there are two matrices α and β each with dimension m x r such that $\alpha\beta' = \Pi..r$ represents the number of cointegrating relationships among the variables in Y_t. The matrix β contains the elements of r cointegrating vectors and has the property that the elements of β' Y_t are stationary. A is the matrix of the error correction parameters that measure the speed of adjustment in ΔY_t.

The maximum likelihood estimation of the full set of possible cointegrating vectors β could be obtained by calculating a set of Eigen value obtained by computing the basic correlation between ΔY_t and $Y_{t-k,}$ correcting for all intervening lags. The Eigen values can be used to construct a likelihood ratio (LR) test statistic that is often called a trace statistic ($_{trace}$). The LR test statistic or trace test statistic is expressed as (Ender, 1995):

$$\lambda_{trace} = -T \sum_{i=r+1}^{m} In(1-\lambda) \text{ -------------------------39)}$$

Where λ_I is the estimated values of eigenvalues obtain from the estimates the null hypothesis in the trace test statistic states that the number of distinct cointegrating vectors is less than or equal to r against the general alternative.

Besides the trace test statics there is also the maximum eigenvalue test (λ max) which is more powerful than the trace test. The maximum eigenvalue test is calculated as follows:

$$\lambda_{max} = -T \text{ In } (1-\lambda_{rt1}) \text{ -------------------------40)}$$

The null hypothesis in this test is that number of cointegrating vectors is r against the alternative of r + 1.

7.3.7 Cointegration and Error Correction Models

The cointegration regression is achieved after the variables considered in the regression have passed from the unit root and cointegration tests. The equation of the cointegration regression is similar to the equation (27). For this purpose, this equation is presented again as equation (41):

$$Y_t = \alpha + \beta X_t + u_t \text{ ---41)}$$

Based on the residual of cointegration regression at equation (40), the error correction model can be constructed as follows (Gujarati, 1995:725):

$$\Delta Y_t = b_0 + b_1 \Delta X_t + b_2 \hat{u}_{t-1} + \varepsilon_t \quad \text{--42)}$$

Where $\hat{u}_{t-1}$ is the one-period lagged value of the residual from the regression equation (41) and acts as an error correction term (ECT).

The principle behind the error correction model is that there often exists a long-run equilibrium relationship between two economic variables. In the short run, however, there may be disequilibrium. With the error correction mechanism, a proportion of the disequilibrium in one period is corrected in the next period. The error correction process is thus a means to reconcile the short run and long run behaviour (Ramanathan, 1995). The error correction model of the equation (42) considers only the outcome of the change of explanatory variables of this period of the change of dependent variable in the same period. A variable may influence other variable instantly.

A government policy, such as investment policy, can be said to be effective if it can influence a target variable instantly. Increase in inflow of investment in the oil sector will automatically raise the production output of crude oil, capital, and human capital. In this case, the error correction model of the equation (42) is a suitable model.

Sometime a variable influence other variables with time lags. Investments might respond to the change in growth rate with a time lag. Labour and capital will respond to the investment at time lag. The error correction model of the equation (42) cannot capture this phenomenon. If the effects of the current and time lags are considered into the equation (41), we can obtain the specification of a general error correction model (Baghestani & Noer, 1993)

$$\Delta Y_t = a_0 + \sum_{i=1}^{m} c_i \Delta Y_{t-1} + \sum_{j=0}^{n} d_j \Delta X_{t-j} + b_2 \hat{u}_{t-1} + \varepsilon_t \text{ -----------------------43)}$$

Where i begin at one and j begins at zero in order for the series to be related within a structural ECM. The problem of using several lags of the same variables is that some of the estimated coefficients might not be statistically significant, possibly because of the multicollinearity. In order to overcome this problem, researchers usually eliminate the insignificant variables such as done by Engle, &Granger (1987).

7.3.8 Error Correction Model and Granger Causality Test

Granger & Newbold, (1988), pointed out that if a pair of series is cointegrated, and then there must be causation at least in one direction. The error correction models can be used for the Granger causality test. The error correction models which were used for the Granger Causality test are as follows:

$$\Delta Y_t = a_0 + \sum_{i=1}^{m} c_i \Delta Y_{t-i} + \sum_{j=0}^{n} d_j \Delta X_{t-j} + b_2 \hat{u}_{t-1} + \varepsilon_{1t} \text{ --------------------44)}$$

$$\Delta X_t = \alpha_0 + \sum_{i=1}^{p} \lambda_i \Delta X_{t-i} + \sum_{j=0}^{q} \delta_j \Delta Y_{t-j} + \beta_2 \hat{u}_{t-1} + \varepsilon_{2t} \text{ -----------------45)}$$

The causality tests in this model involve not only testing the joint significance of coefficients of the causal variable, but also testing the significance of the coefficients of the error correction term b_2 and β_2 (Mahdvi & Kholdy, 1994). The Granger causality test for the coefficient of the error correction term ($\hat{u}_{t-1}$) is tested using the t- test. If b_2 is statistically significant, it means that the error correction term Granger causes ΔY_t. For the explanatory variables other than $\hat{u}_{t-1}$, the Granger causality test uses the likelihood ratio (LR) tests as follows (Gujarati, 1995):

$$LR = -2(I_r - I_U) \quad \text{---------------------46)}$$

Where I_r and I_u are the maximized values of the log likelihood function of the restricted and unrestricted regression, respectively. Consider the null hypothesis that ΔX_{t-j} does not Granger cause ΔY_t. This could be tested by the hypothesis that all of the lags of ΔX_{t-j} are zero. If the value of LR in this test is greater than the critical value of the chi-square, the null hypothesis is rejected. It means that ΔX_{t-j} Granger cause ΔY_t .

7.4 Determination of Aggregate Production Model

Foreign direct investment and trade liberalization policy was the integral preoccupations of Nigeria government, since the adoption of structural adjustment policy in 1986. Studies have attempted to examine the determinants structure and potentials of foreign direct investment in Nigeria (Odozi, 1995; Anyanwu, 2006). Others have focused on the magnitude direction and prospects of foreign direct investment in Nigeria (Ayanwale, 2001; Jerome, & Ogunkola, 2004). Despite rigorous empirical exercises, the evidence as it relates to the determinants and impact of foreign direct investment on economic growth in Nigeria remain ambiguous.

This study intends to contribute by chanting its way differently. It aims at investigating and evaluating the impacts of foreign direct investment and trade openness on economic growth in Nigeria within the theoretical framework of neoclassical Cobb-Douglass production function. Subsequent to the theoretical proposition investigate in the theoretical framework, for the successful examination of the relative impact of crude oil on the Nigeria economy, with regard to the work of Milbourne, Otto & Voss (2003), which is based on the studies by Mankiw, Romer, & Weil, (1992). The production function, which has been broadly employed in the investigation of foreign direct investment and trade impact on growth, assumes unconventional input such as foreign direct investment and trade openness along the conventional inputs of labour and capital in the model. There is an attempt to determine the impact of foreign direct investment in crude-oil production, and trade openness ultimately on economic growth in Nigeria.

This part of the thesis shall make use of the aggregate production function (APF) framework. The production function has been broadly used in the analysis of FDI and trade impact on growth. The approach employed in this study follows that of Fosu &Magnus, (2006).

The aggregate production function is determined as follows:

$$GDP_t = A_t K_t^{\alpha} L_t^{\beta} \quad \text{-----------------------------------}47)$$

Equation 47: GDP represents the aggregate production of the economy at a time t; $A_{t,}$ K_t and L_t also denote the Total Factor Productivity (TFP), capital stock and labour stock at time t respectively. Subsequent to the Bhagwati's hypothesis it is implied that, foreign direct investment, trade openness and other factors that are exogenously influenced and entire determine the behavior of TFP (Edwards, 1990). Therefore TFP is specified as:

$$A_t = f\ [FDI_t^{ø}, TR_t^{\delta}, C_t] \quad \text{--}48)$$

Equation (48) can be expressed as

$$A_t = FDI_t^{ø}\ TR_t^{\delta}\ C_t \quad \text{---------------------------}49)$$

Substituting equation (48) into (47) therefore give

$$GDP_t = C_t K_t^{\alpha} L_t^{\beta} FDI_t^{ø}\ TR_t^{\delta} \quad \text{---------------------------------}50)$$

To estimate Eq. (50), we take the natural logs of both sides which leads to eq.(51);

$$gdp_t = C_t + \alpha k_t + \beta l_t + øfdi_t + \delta tr_t + \mu \quad \text{---------------------51)}$$

$f_{FDI} \geq 0$, $f_l \geq 0$, and $f_{tr} \geq 0$

C_t represent a constant parameter, μ denote the error term and gdp_t,l_t , fdi_t, and tr_t , remain as earlier defined. The represents the relationship among α, β, ø, and δ as coefficients of the parameters of FDI_t , l_t and tr_t correspondingly. All coefficients are anticipated to be positive.

Equation 56 above is on the premise that all the variables are stationary. However, each of them will be tested to ascertain if it is stationary or not. If any of them is not stationary, it will be differenced to achieve stationarity. After all the variables have been made stationary, if any of the independent variables is found to be integrated in the same order with the dependent variable (GDP), a co-integration test will be conducted between the dependent variable and such independent variable(s) using Johansen Co-integration Test and unit root test (Augmented Dickey-Fuller test and Phillips-Perron test). If the problem of co-integration is established in the model, an error correction mechanism (ecm) will be introduced in the model and thus equation 50 will translate to equation 52 below:

$$gdp_t = C_t + \alpha FDI_t + \beta l_t + \delta tr_t + \lambda ecm_{(t-1)} + \mu \quad \text{-------------------------------52)}$$

Where λ = coefficient of $ecm_{(t-1)}$

In estimating the relationships amongst the variables of interest, this study shall employ the distributed lag (DL) model approach stipulated by Pesaran, *et al.,* (2001). Conversely, the regression model would be kept as simple as possible when following Occam's razor Principle of parsimony. The principle states that if we can explain the behavior of Y "significantly" with two or three explanatory variables and if our theory is not strong enough to suggest what other variables might be, why introduce more variables (Gujarati, 1995).

7.5. Evaluation Procedure of Hypothesis II

The proposition stated that: Foreign direct investments in oil and trade openness have no significant effect on economic growth. This hypothesis is represented below:

H_O:$\alpha = \beta = ø = \delta = 0$ against the alternative,

H_1 :$\alpha \neq \beta \neq ø \neq \delta \neq 0$

Most macroeconomic variables are affected by seasonal variation. This in turn affects the predictive power of any model built with such variable. Therefore, to ensure all variables in this model are void of seasonal variation, stationary test was carried out using unit root test at 1% level of significant. The choice of 1% level of significant is based on the need to reduce seasonal variation to barest minimal. If any of the variables is not stationary at its level (i.e. Zero) integration, it shall be differences till it achieved stationarity. Thus, all variables shall be used at their levels of stationarity (Risikat, 2010).

7.5.1: Data and Sources

In examine the relationship between foreign direct investment, trade openness and economic growth in Nigeria, this study employed Nigerian annual time series from 1981- 2010. The variables are output (GDP); Foreign Direct Investment in the oil sector (FDI); Trade Openness (TR); Labour Stock (L); measure in term of labour force and capital stock (K) which is also measured by gross capital formation respectively. The data are sourced from Central Bank of Nigeria Statistical Bulletin (2008), Federal

Ministry Statistics and World Development Indicator (WDI).The variables are expressed in their per capita values and stated in real forms.

7.6: Evaluation, Finding and Discussion of the result of Hypothesis II

The time series properties of each of the variable used will be determined by performing the stationary tests. This is necessary because it has been pointed out in the econometric literature that the use of one or more non-stationary series in a regression equation could generate an estimate that is biased. Thus, it has been noticed that the occurrence of significant co-movement among a number of economic time series data could undermine the policy lessons that could be deduced from economic modeling construct (Engle & Granger, 1987). Against this background, time series characteristic of the variable employed in this study would be determined within the framework of one of the techniques that have been extensively used in empirical econometric research in recent times.

To increase numerical accuracy, all variables were transformed into log form. As specified in the methodology section, stationary tests were conducted using Augmented Dickey Fuller (ADF) unit root test at 1% level of significant. The summary of the tests is presented in table 7.2 below.

Table 7.1: Augmented Dickey Fuller (ADL) Unit Root Test: 1981-2010

VARIABLE	Critical Value1%	ADF Test Statistic	*ORDER OF INTEGRATION*
Log(FDI)	-3.69	-4.28**	*I(1)*
Log(GDP)	-3.69	-3.69**	*I(1)*
Log(K)	-3.69	-3.87**	*I(1)*
Log(L)	-3.68	-4.40**	*I(0)*
Log(TR)	-3.69	-4.04**	*I(1)*

***significant at 5 %;*

Sources by the author based on Augmented Dickey Fuller (ADL) Unit Root Test

The results show that apart from labor (L), none of the variables are stationary in level. The rest of the variables became stationary after taking first difference. Following the above result, we tested if there is cointegrating or long-run relation between the dependent - variable Gross Domestic Product (GDP) and independent variables FDI, capital (k), and trade Liberalization (Tr). This was examined using Johansen Co-integration Test as shown in table 7.3 below.

7.6.1: Johansen Co-integration test for model II

The cointegrating regression has so far considered only the long-run property of the model, and does not deal with the short-run dynamics explicitly. Clearly, a good time series modeling should report mutually short-run dynamics and the long-run equilibrium simultaneously. The two tests statistics (Trace Test and Maximum Eigenvalue) procedures are sequential. First, the null of zero cointegration vector against at most one. If rejected, the null of one against at most 2 and so on. Thus, the Johansen Juselius results indicate that there is only one co-integrating equation. Specifically, the Trace Test and the Maximum Eigenvalue both confirm one co-integrating equation. Sample: 1981-2010, included observations: 27; Series: LGDP LFDI LK LL LTR; Lags interval: 1 to 1; Test assumption: Linear deterministic trend in the data.

Table 7.2: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 CriticalValue	Prob.**
None *	0.902	96.46	69.81	0.00
At most 1	0.491	35.95	47.85	0.39
At most 2	0.401	18.35	29.79	0.53
At most 3	0.168	5.031	15.49	0.80
At most 4	0.008	0.230	3.841	0.63

Trace test indicates 1 cointegrating equations at the 0.05 level
Sources by the author based on Unrestricted Cointegration Rank Test (Trace)

Table 7.3: Unrestricted Cointegration Rank Test (Maximum Eigenvalue

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.902	60.50	33.87	0.00
At most 1	0.491	17.59	27.58	0.52
At most 2	0.401	13.32	21.13	0.42
At most 3	0.168	4.800	14.26	0.76
At most 4	0.008	0.230	3.841	0.6310

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
Sources by the author based on Unrestricted Cointegration Rank Test Maximum Eigenvalue

The results suggest there is a long-run relationship between growth (GDP) and the explanatory or independent variables.

Table 7.4: Normalized cointegrating coefficients (standard error in parentheses)

LGDP	LFDI	LK	LL	LTR
1.000000	-0.616737	-1.141503	0.768558	-0.702331
	(0.06317)	(0.15131)	(0.13460)	(0.12993)

Sources by the author based on Normalized cointegrating coefficients

The dynamic ordinary least squares (DOLS) allow us to model dynamic relationship between gross domestic products and the explanatory or independent variables. This method is reasonable because most economic relationships are dynamic in nature. The coefficient of the error correction term is negative and statistically significant at one percent. This means that error correction term correct the disequilibrium of the system.

The speed at which it is correcting this disequilibrium is 15.4 percent annually. In order word, the speed of adjustment of the disequilibrium is 15.4 percent. The statistical significance of the error correction term gives validity that gross domestic products and the other explanatory or independent variables have a long-run relationship. Since all variables are likely dynamic in nature, it will be appropriate to use dynamic model. Virtually all the independent variables have time lags to impact gross domestic product (GDP). Thus, this static model is not appropriate for this research. Hence, a dynamic model was estimated as discussed below.

Table 7.5: Dynamic Model Regression, (Error Correction Model)
D (GDP, 2)

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	0.385	0.199	1.935	0.0076
D(LFDI(-3))	0.005**	0.044	2.132	0.0429
D(LK(-1))	0.001	0.045	1.026	0.1097
LL(-1)	0.198***	0.098	3.023	0.0015
LL(-2)	-0.220***	0.103	-2.124	0.0024
D(LTR(-2))	-0.090**	0.054	-1.662	0.0211
ECM(-1)	-0.154	0.057	2.675	0.0344
R^2	0.571			
Adjusted R^2	0.362			
F-statistic	1.774			
Durbin-Watson stat	2.146			

***Significant at 5% level; ***Significant at 1% level, Sample (adjusted): 1982- 2010*
Included Observation:28 after adjusting endpoints
Sources by the author based on result of Dynamic Model Regression

Foreign direct investments in oil and trade liberalization have no significant effect on economic growth performance. Ho: $\beta_i = 0$; Let level of significant (α) = 5% = 0.05/2 = 0.025. Decision Rule: Reject Ho if $/t_{cal}/ > /t_{tab}/$; accept if otherwise. From the statistical table, $t_{tab} = t_{26}^{(0.025)} = 2.056$, The test is presented in table 7.6 below:

Table 7.5: t-statistic Test

Variable	t-value	t-tab	Conclusion
D(FDI(-3))	2.178109	2.056	S
D(K(-1))	1.400092	2.056	NS
L(-1)	3.916395	2.056	S
L(-2)	-3.875808	2.056	S
D(TR(-2))	-2.360387	2.056	S

Where: S = Statistical significant
NS = Not Statistical significant
Sources by the author based on result - t-statistic Test

7.7. Discussion of the Results

From the above table, it is observed both FDI, labor and trade liberation (Tr) were found to have significant impact on economic growth (GDP); while capital (k) is not statistically significant. Thus, since foreign direct investment in oil, and trade liberation (Tr) were found to be statistically significant vis-à-vis their impacts on GDP, we reject the second null hypotheses and conclude that foreign direct investments in oil and trade liberation (Tr) have a significant effect on economic growth performance. The implications of these findings are discussed below.

It is imperative to observe that FDI was used in its lag 3. This was to establish the dynamic nature of FDI. The result shows that FDI at its lag 3 is positively associated with GDP. It could be because such investment needed some time lag to translate to any significant impact. Thus, after foreign investment in oil is allowed three year lag time, it demonstrated a positive significant impact on economic growth (GDP). For instance, the result indicates a percentage increase in foreign direct investment in oil at lag 3 will increase Nigeria GDP by approximately by 2 percent. The intensity of impact could be because oil and gas sector of Nigeria is principally managed by foreign investors. The UNCTAD World Investment Report in 2007shows that FDI inflow to West Africa countries established that FDI necessitates time lag for its effect to become evident, a dynamic nature of FDI. The result is supported by these following researchers Stephen (2005); Arnold (2012) and Awolusi, (2012).

Although the Nigerian economy has a high propensity of return on capital, the regression result shows the impact of such investment in GDP, though positive is statistically insignificant. In other words, Nigeria needs a lot more investment to impact the GDP. As stated earlier, labor was used in its lags 1 and 2; and both were found to be significant. At lag 1, labor was found to be positively related to GDP. For instance, the result shows that a percentage increase in labor at lag 1 will lead to about a percent increase in GDP. In other words, large population, especially in terms of labor force is a major determinant of GDP in Nigeria. On the other hand, to pay unproductive members of the labor force from current productivity would be counterproductive. It is good to note that labor at lag 2 shows significant negative impact on GDP. Nigerian economy could be described as a consuming economy rather than producing economy. This could explain why the country depends so much on imported product – even import major part of its refined petroleum products as well as agricultural products. As a result, trade liberation seems to be affecting the economy adversely. For instance, the regression result shows that trade liberation has negative significant impact on GDP. The result reveals that a percentage increase in trade liberation at lag 2 will lead approximately 9 percent decrease in GDP. This stresses the need for Nigeria to review its foreign trade policy; sector-segmented trade liberation may be preferred to total liberation.

7.8. Conclusion

It is observed both FDI, labor and trade liberation (Tr) were found to have significant impact on economic growth (GDP); while capital (k) is not statistically significant. Thus, since foreign direct investment in oil, and trade liberation (Tr) was found to be statistically significant vis-à-vis their impacts on GDP, we reject second null hypotheses and conclude that foreign direct investments in oil and trade liberation (Tr) have a significant effect on economic growth. It is imperative to observe that FDI was used in its lag 3 which was found to be positively significant. This explains the dynamic nature of FDI. Foreign investment in oil needs some time lag to transform to any significant impact. Therefore, government policies that grow investors’ confidence in the long run would attract more FDI in the oil sector of Nigeria.

Although the Nigerian economy has a high propensity of return on capital, the domestic investment is yet to significantly impact GDP. In other words, Nigeria needs more domestic investment. As stated earlier, labor was used in its lags 1 and 2; and both were found to be significant. At lag 1, labor was found to be positively related to GDP. On the other hand, to pay unproductive members of the labor force (like labor lag 2) from current productivity would be counterproductive. Improving the quality of labor in Nigeria is exceedingly recommended. The country depends so much on foreign product, still import major part of its refined petroleum products as well as agricultural products. As a result, trade liberation seems to be affecting the economy negatively. Nigeria needs to review its foreign trade policy to favour sectoral trade liberation instead of total liberation of the economy.

CHAPTER EIGHT

COMPLIANCE TO ENVIRONMENTAL REGULATION

8.1 Introduction

The government environmental regulation is to reduce the adverse effect of oil companies on the environment and the people of Niger Delta. It is examined in this section and the section looks at the compliance to environmental regulations. When there is pollution, government intervention would be justified in an attempt to reduce negative environmental externalities. In addition, environmental effect can be classified as externalities because there are cases where the costs and benefits are not fully a sign of actual market transactions. Nigeria has been experiencing distress for five decades because of the consequences of environmental externalities arisen from oil exploitation. The environmental damage has not been taken seriously until recently.

The approaches for meeting environmental targets have generally resulted in cost savings and could be designed to improve economic efficiency. Section 8.2 discussed the methodology and model specification for the third proposition. The balances of economic benefits and costs, designing an economic approach that more strongly links firm behaviour to actual economic damages are the chosen targets. This model examines the government policies on the environment in the light of oil exploration. One of the major protective measures taken by the Nigeria government was the imposition of fine on gas flaring. Furthermore, section 8.3 evaluates proposition three of the study. The section 8.4 concludes the chapter.

8.2 Compliance on Environmental Regulations

When the market fails as it is in the case of pollution, government intervention would be justified (Coase, 1960, Browining, 1989, and Frank, 2002). A great deal of the controversy has centered on the relative effectiveness of taxation and regulation. The attempt to reduce environmental pollution resulting from the emission of pollutants has acknowledged considerable awareness in the development of an efficient pollution tax for pollution control (Baurmol & Oates 1988; Hanley *et. al.*, 1997).

Pigou, (1920) pioneered the economic analysis of environmental effects of production activities which adopts market economy and perfect competition framework to create the divergence between private and social benefit when externalities occurs. Furthermore, environmental effect can be classified as externalities since there are cases where the costs and benefits are not entirely a sign of potential or actual market transactions. They occur because of incomplete or missing market trends that are associated with market failure (Pearce, 1992).

Studies have shown that government's failure could also cause environmental externalities. This is because failure of government may possibly be perceptible in the accomplishment of unsuitable policies, unaware of the effect of the policies, and incomplete information (Iyona, 2000). Furthermore, the main environmental problems lead to flaring of gas, spillage of oil and ecological problem; there have been lots of incidents of oil spillage which takes place often in the region. This had extended to environmental degradation that caused friction between the multinational oil companies, the state and the indigene of the communities where they are operating.

The degree of development in the society and the capability of the industry, determine the capability of the industry to bear the mitigation cost. Also, the environmental regulations could depend on the efficiency cost of mitigation. The industries that are resource-intensive like, iron and steel, chemical and crude oil, non-ferrous metals, non-metallic minerals, has high potential that cause large negative externalities. This leads to high compliance costs, which results to high investment in both cleaner production processes and equipment to restrict pollution (Sanford, 2002).

The cost of mitigation of pollution and ineffective in rendering it will be raised by ambitious laws. A firm's level of compliance is biased in many ways positive inducements in the progression of pollution reduction, such as tax break investment subsidy, lowered per unit costs may possibly bring about greater compliance. Market-based instruments have established to be effective more than Command and Control method in the abatement of pollution.

Becker, (1968) in his Nobel lecture; economic analysis of crime noted that fines are handled as costs of doing business, and it is inexplicit that polluters reduce the sum of anticipated compliance costs and expected penalties. The efficient of environmental law and regulations may improved either by raising the penalty and increasing monitoring actions to raise the probability of being caught or by changing legal rules to increase the probability of conviction. However, the environmental legislation could be passed when a country has attained a reasonably high standard of living. The relevant institutions for improving the environment are installed, enforced compliance and the environment quality improves.

Furthermore, the emphasis has lay in by Environmental Kuznets Curve (EKC). The EKC design the correlation between environmental indicators and per capita income of countries. The EKC hypothesis suggests that the pollutant levels per capita rise as per capita income rises; then the relationship reverses after some threshold level of income. Studies examining the EKC hypothesis in developing countries have, however, found mixed results (Keren & Omprakash, 2003). It is of interest to know whether Nigeria had reached the stage of EKC hypothesis adjustment.

Morris (2002) argues that the societies which demonstrate a gross contravention of the law, shows poor compliance with environmental law. Increase in income above a distinct level, need to be worried about other aspects of life, like clean environment, equality, access to good public facilities and pollution increases. To attained high compliance lies on growth and development that is placed above a certain level of income. Failure in governance may possibly be adjusted by setting up correct institutional agreements, rules, and incentives for economic behavior. Morris concludes that better and equal distribution of income could make governance efficient, effective and functional.

In additional, to advance compliance is to treat pollution control as an economic issue. With this, if emissions go beyond the given standard, a fee will be charged on the amount exceeded in the form of a pollution levy. In this case, no levy will be paid by the firm whose waste concentrations are equal to, or below the appropriate standards (Dasgupta, *et al.*, 1998). The effective levy rate increase sharply with discharge volume. Cost-minimizing and budget-constrained firms may possibly motivate to reduce pollution to the degree where the expected levy rate is equal to the marginal cost of abatement. Raising the levy would raise the probability of compliance.

8.3 The Abatement of Gas Flaring and Environmental issues in Nigeria

Gas flaring is broadly discouraged and condemned by the international community as it contributes greatly to climate change. In an effort to encourage better use of natural gas and minimize adverse environmental impact of its flaring, government imposed fine on flares and has periodically adjusted it upwards. The government has, however, not sufficiently followed through with its decision to have more industries convert to the use of natural gas as a way of increasing demand for the product and making flaring less desirable (Ukpang, 1998).

Thus, the neglect of Nigerian natural gas was due to institutional and policy lapses. The joint venture (JV) comprises' primary preference was to extract crude oil and make their profit. Consequently the gas associated with crude oil was seen as a nuisance and had to be flared. The Nigerian government enacted a law (Associated Gas Re-injection Act, 1979) which allowed some considerations for specific immunities or the payment of a fee of US $0.003 (0.3 cents) per million cubic feet with effect from 1984, which raised in 1988 to US $0.07 per million cubic feet, and in January 2008 to US $3.50 for every 1000 standard cubic feet of gas flared. The fine weighed insufficient and not an impediment for companies that get it more comfortable to pay fines than foreclosing the flaring (Ojinnake, 1998).

Friends of the Earth, (2004) state that several other reasons that have been put forward for continuing to flare, could be categorized into economic, commercial and technological issues. On the other hand, Evoh, (2002) emphasized that the entire issues of gas flaring in Nigeria boil down to one question; who manages natural resources exploitation in Nigeria, the government or multinational corporations? It is quite astonishing that gas flaring has continued in the country despite the fact that flaring has been in generally illegal since 1984 pursuant to section 3 of the Associated Gas Re-injection Act, 1979.

Iwayemi & Adenikinju (2001) applied the computable general equilibrium (CGE) model framework to evaluate Energy-Environment-Economy linkage in Nigeria. They observe that the share of petroleum products in energy consumption declined from 74.6 percent in 1970 to 46.5 percent in 1992 and further to 37.7 per cent in 1999. On the other hand, the share of natural gas increased from about 5 per cent to 29.3 per cent in 1992 and to 53.2 per cent gas flaring between 1995 and 1997. Ojinnaka, (1998) describes flaring gas as enormous loss of revenue that could have been realized. However, he notes that some percentage of gas sold in the domestic market to industries like cement, brewery, glass and aluminum as complement to the use of diesel and fuel oil to operate private generators. As liquefied natural gas, there is high demand for gas in the international petroleum market. Therefore, investors are showing more interest in gas production in Nigeria because of its high economic potential and higher efficiency when compared with other fuels.

Iwayemi, Adenikinju, & Adetunji (2010) estimate petroleum products demand dynamics in Nigeria based on a multivariate cointegration approach, they investigated whether there is a long-run relationship between petroleum product demand and its primary determinants, price and income. The estimated short and long-run price and income elasticities confirm that energy consumption respond positively to changes in GDP and negatively to changes in energy price. Accordingly energy prices and income are the main factors influencing the demand for energy in Nigeria. The responsiveness of petroleum products demand to price changes suggests that taxes are likely to achieve government goals for energy conservation or environmental improvement, and they might be revenue raising efficient. Ndiomu, (2000) argue that against the massive economic loss natural gas should and can play some vital roles in the Nigerian economy. These roles include stimulant for industrial development, foreign exchange earner, improved capacity utilization of Nigeria industries, and provision of employment opportunities.

Furthermore, domestic gas consumption is expanding as a result of the ongoing power sector reforms while gas export which was non-existent prior to 1999, has received a strong boost. Comprehensive and integrated gas utilization Master plan/programmers' have been embarked upon, in which LNG and IPP developments are being given priority. The expected increased export earnings from LNG, coupled with adequate domestic power supply from IPPs, strongly support and broaden economic expansion and urbanization, increase the income generating capacity of Nigerians and lift the general wellbeing. It will further reinforce Government's efforts towards integrating the Host communities into the mainstream of national development and growth. As a result of various projects established, total gas utilized in the country increased from 197 million scf/d in 1999 to about 573 mmscf/d in 2004. Substantial demand growth is expected in this decade. Consequently, domestic demand for natural gas increase to about 1700mmscf/d by 2010. Investment opportunities therefore abound in the domestic gas market.

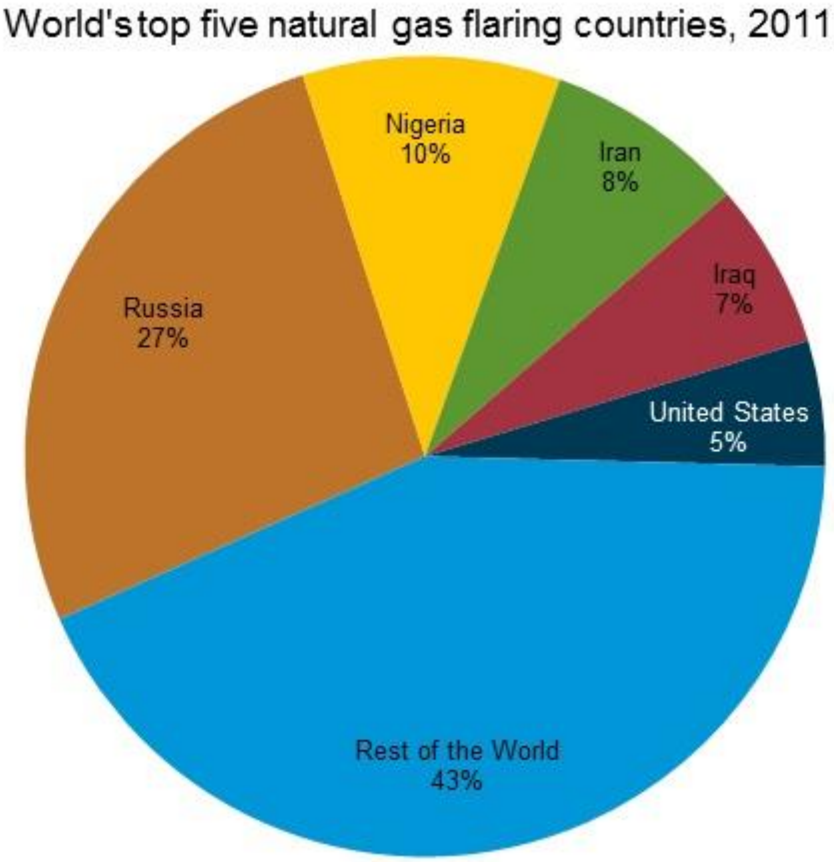
Nigeria is the largest oil producer in Africa and was the world's fourth leading exporter of LNG in 2012. Despite the relatively large volumes it produces, Nigeria's oil production is hampered by instability and supply disruptions, while the natural gas sector is restricted by the lack of infrastructure to monetize gas that is currently flared. Nigeria is the largest oil producer in Africa, holds the largest natural gas reserves on the continent, and was the world's fourth leading exporter of liquefied natural gas (LNG) in 2012. However, aging infrastructure and poor maintenance have also resulted in oil spills. Also, natural gas flaring, the burning of associated natural gas that is produced with oil, has contributed to environmental pollution. Protest from local groups over environmental damages from oil spills and gas flaring have exacerbated tensions between some local communities and international oil companies. The industry has been blamed for pollution that has damaged air, soil, and water, leading to losses in arable land and decreases in fish stocks.

The Petroleum Industry Bill (PIB), which was initially proposed in 2008, is expected to change the organizational structure and fiscal terms governing the oil and natural gas sectors, if it becomes law. IOCs are concerned that proposed changes to fiscal terms may make some projects commercially unviable, particularly deepwater projects that involve greater capital spending. The Petroleum Industry Bill (PIB), which was initially proposed in 2008, is expected to change the organizational structure and fiscal terms governing the oil and natural gas sectors, if it becomes law. IOCs are concerned that proposed changes to fiscal terms may make some projects commercially unviable, particularly deepwater projects that involve greater capital spending. Some of the most contentious areas of the PIB are the potential renegotiation of contracts with IOCs, changes in tax and royalty structures, deregulation of the downstream sector, restructuring of NNPC, a concentration of oversight authority in the Minister of Petroleum Resources, and a mandatory contribution by IOCs of 10% of monthly net profits to the Petroleum Host Communities Fund.

The latest draft of the PIB was submitted to the National Assembly by the Ministry of Petroleum Resources in July 2012. The delay in passing the PIB has resulted in less investment in new projects as there has not been a licensing round since 2007, mainly because of regulatory uncertainty. The regulatory uncertainty has also slowed the development of natural gas projects as the PIB is expected to introduce new fiscal terms to govern the natural gas sector. There are several planned upstream deepwater projects that are expected to increase Nigerian oil production in the medium term, but the development of these projects depends largely on the passing of the PIB and the fiscal/regulatory terms it provides the oil industry.

According to PFC Energy, deepwater exploration activity in Nigeria has declined since 2007 because of regulatory uncertainty, increasingly unfavorable operating conditions, and the delay of the PIB. As a result, while it typically took about 9 years for projects to come online after discovery, the new projects in Nigeria are expected to take closer to 15 years, according to PFC Energy. Recent drafts of the PIB have also prompted questions about the commercial viability of deepwater projects under the proposed changes to fiscal terms. Deepwater projects have typically included better fiscal terms than onshore/shallow water projects, but the PIB, if passed into law, is expected to increase the government's share of production revenue, particularly during periods of high oil prices, according to PFC Energy. Currently, deepwater projects in Nigeria have an average full-cycle breakeven of $44 per barrel, which ranks

In 2012, Nigeria exported between 2.2 million to 2.3 million bbl/d of crude oil and condensate, according to an analysis of data from EuroStat and FACTS Global Energy. The United States has been the largest importer of Nigerian crude oil for at least the past decade. In 2012, the United States imported 406,000 bbl/d of crude oil from Nigeria, accounting for 18% of Nigeria's total exports. India (12%), Brazil (8%), Spain (8%), and the Netherlands (7%) made up the remaining top five largest recipients of Nigerian oil. By far, the largest regional importer of Nigerian oil was Europe, importing 44% of the total in 2012. For the past decade, the United States imported 9% to 11% of its crude oil from Nigeria. However, this share fell to an average of 5% in 2012 and 4% from January to August 2013. As a result, Nigeria has fallen from being the fifth largest foreign oil supplier to the United States in 2011 to eighth in 2013. Nigeria had an estimated 182 trillion cubic feet (Tcf) of proven natural gas reserves as of January 2013. Despite holding a global top-10 position for proven natural gas reserves, Nigeria produced about 1.2 Tcf of dry natural gas in 2012, ranking it as the world's 25th largest dry natural gas producer. The majority of the natural gas reserves are located in the Niger Delta. The natural gas industry is also affected by the same security and regulatory issues that affect the oil industry.



Source: National Oceanic and Atmospheric Administration (NOAA)

Nigeria established a Gas Master Plan in 2008 that aimed to reduce gas flaring and monetize gas resources for greater domestic use and to export regionally and internationally. Draft proposals of the PIB also include these goals. There are a number of recently developed and upcoming natural gas projects that are focused on monetizing natural gas that is flared. Nigeria flares the second largest amount of natural gas in the world, following Russia. Natural gas flared in Nigeria accounts for 10% of the total amount flared globally. Gas flaring in Nigeria has decreased in recent years, from 575 Bcf in 2007 to 515 Bcf in 2011. There are a number of recently developed natural gas projects that are focused on monetizing natural gas that is flared.

Moreover, some of Nigeria's oil fields lack the infrastructure to capture the natural gas produced with oil, known as associated gas, much of it is flared (burned off). According to the National Oceanic and Atmospheric Administration (NOAA), Nigeria flared slightly more than 515 Bcf of natural gas in 2011 - or more than 21% of gross natural gas production in 2011. Natural gas flared in Nigeria accounts for 10% of the total amount flared globally. The company recently reported that it was able to reduce the amount of gas it flared in 2012 because of improved security in some Niger Delta areas and stable co-funding from partners that allowed Shell to install new gas-gathering facilities and repair existing facilities damaged during the militant crisis of 2006 to 2009. Shell also plans to develop the Forcado Yokri Integrated Project and the Southern Swamp Associated Gas Gathering Project to reduce gas flaring.

Furthermore, other recently developed or upcoming gas projects include: the Escravos Gas-to-Liquids plant, Brass LNG, Escravos gas plant development, Sonam field development, Onshore Asset Gas Management project, Assa-North/Ohaji South development, Gbaran-Ubie, the Idu project, and the Tuomo gas field. The Nigerian government has been working to end gas flaring for several years, but the deadline to implement the policies and fine oil companies has been repeatedly postponed, with the most recent deadline being December 2012. In 2008, the Nigerian government developed a Gas Master Plan that promoted investment in pipeline infrastructure and new gas-fired power plants to help reduce gas flaring and provide much-needed electricity generation. However, progress is still limited as security risks in the Niger Delta have made it difficult for IOCs to construct infrastructure that would support gas monetization.

A Chevron-operated Escravos GTL project is currently underway. Chevron (75%) and NNPC (25%) are jointly developing the $9.5 billion facility. Sasol Chevron, a joint venture between South Africa's Sasol and Chevron, provided technical expertise to design and develop the GTL plant. The project is expected to be operational within a year. The project will convert 325 MMcf/d of natural gas into 33,000 bbl/d of liquids, principally synthetic diesel to supply clean-burning, low-sulfur diesel fuel for cars and trucks, according to Chevron.

Nigeria exported 19.8 MMtpa (950 Bcf) of LNG in 2012, accounting for more than 8% of globally traded LNG and making Nigeria the world's fourth largest LNG exporter. Japan is the largest importer of Nigerian LNG, receiving 24% of the total in 2012. The United States did not import any natural gas from Nigeria in 2012 for the first time in more than 10 years. Because some of Nigeria's oil fields lack the infrastructure to capture the natural gas produced with oil, known as associated gas, much of it is flared

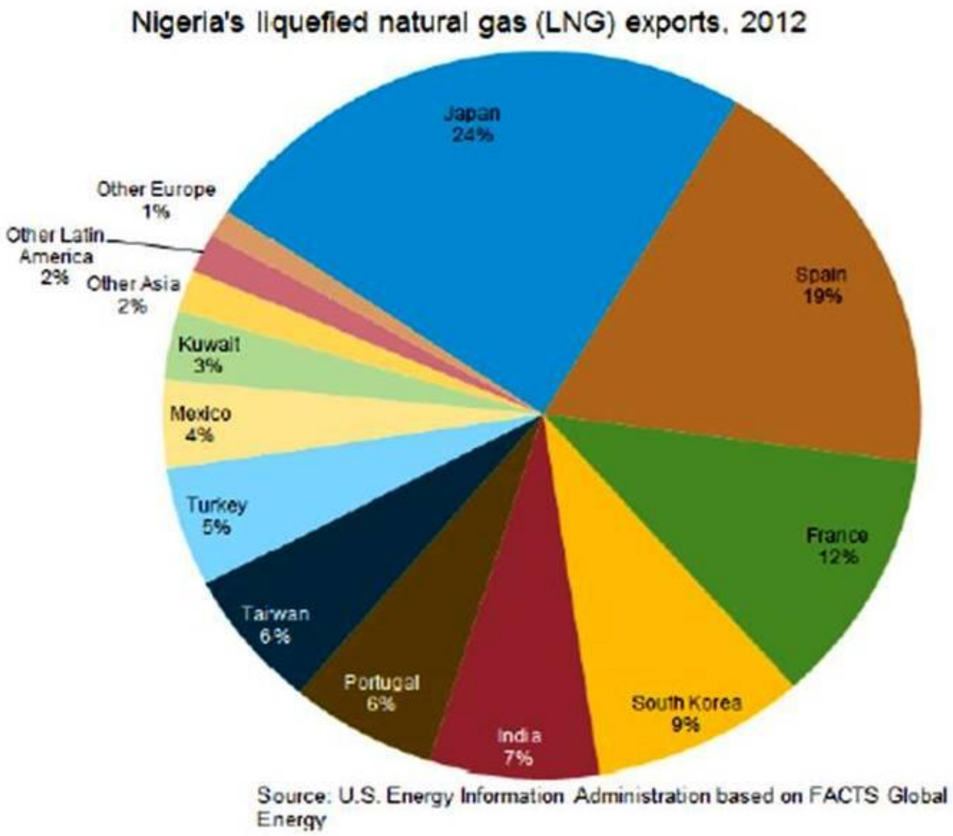


Figure 8.2: Nigeria’s Liquefied Natural Gas Export, 2012

According to the National Oceanic and Atmospheric Administration (NOAA), Nigeria flared slightly more than 515 Bcf of natural gas in 2011 or more than 21% of gross natural gas production in 2011. Natural gas flared in Nigeria accounts for 10% of the total amount flared globally. The amount of gas flared in Nigeria has decreased in recent years, from 575 Bcf in 2007 to 515 Bcf in 2011. According to Shell, one of the largest gas producers in the country, the impediments to decreasing gas flaring has been the security situation in Niger Delta and the lack of partner funding that has slowed progress on projects to capture associated gas.

The company recently reported that it was able to reduce the amount of gas it flared in 2012 because of improved security in some Niger Delta areas and stable co-funding from partners that allowed Shell to install new gas-gathering facilities and repair existing facilities damaged during the militant crisis of 2006 to 2009. Shell also plans to develop the Forcado Yokri Integrated Project and the Southern Swamp Associated Gas Gathering Project to reduce gas flaring. Other recently developed or upcoming gas projects include: the Escravos Gas-to-Liquids plant, Brass LNG, Escravos gas plant development, Sonam field development, Onshore Asset Gas Management project, Assa-North/Ohaji South development, Gbaran-Ubie, the Idu project, and the Tuomo gas field.

Nigeria's LNG exports to Europe have decreased significantly. In 2010, Europe imported around 67% of total Nigerian LNG exports, but in 2012, that share dropped to 43%. Nigeria has increased its LNG exports to Asia, namely Japan, following the Fukushima nuclear incident in March 2011. In 2012, Japan imported 4.8 MMtpa (229 Bcf) of LNG, seven times that of the 0.63 MMtpa (30 Bcf) imported in 2010, according to FACTS Global Energy. For the first time since 1999, the United States did not import LNG from Nigeria in 2012, mostly as a result of growing U.S. domestic production.

The Nigeria NLNG facility on Bonny Island is Nigeria's only operating LNG plant. NLNG partners include NNPC (49%), Shell (25.6%), Total (15%), and Eni (10.4%). NLNG currently has six liquefaction trains and a production capacity of 22 MMtpa (1,056 Bcf/y) of LNG and 4 MMtpa (80,000 bbl/d) of liquefied petroleum gas. A seventh train is under construction to increase the facility's LNG capacity to more than 30 MMtpa (1,440 Bcf/y). Planned: Brass LNG facility Brass LNG Limited, a consortium made up of NNPC (49%), Total (17%), ConocoPhillips (17%), and Eni (17%), is developing the Brass LNG Liquefaction Complex. The LNG facility is expected to have two liquefaction trains with a total capacity of 10 MMtpa (480 Bcf/y) and a loading terminal (BP Statistical Review of World Energy, 2013).

Nigeria exports a small amount of its natural gas via the West African Gas Pipeline (WAGP). The pipeline is operated by the West African Gas Pipeline Company Limited (WAPCo), which is owned by Chevron West African Gas Pipeline Limited (36.7%), NNPC (25%), Shell Overseas Holdings Limited (18%), Takoradi Power Company Limited (16.3%), Societe Togolaise de Gaz (2%), and Societe BenGaz S.A. (2%). The 420-mile pipeline carries natural gas from Nigeria's Escravos region to Togo, Benin, and Ghana, in which it's mostly used for power generation. WAGP links into the existing Escravos-Lagos pipeline and moves offshore at an average water depth of 35 meters. According to Chevron, the pipeline has the nameplate capacity to export 170 MMcf/d of natural gas, although its actual throughput is lower.

Furthermore, Nigeria and Algeria have proposed plans to construct the Trans-Saharan Gas Pipeline (TSGP). The 2,500-mile pipeline would carry natural gas from oil fields in Nigeria's Delta region to Algeria's BeniSaf export terminal on the Mediterranean Sea and is designed to supply gas to Europe. In 2009, NNPC signed a memorandum of understanding (MoU) with Sonatrach, the Algerian national oil company, to proceed with plans to develop the pipeline. Several national and international companies have shown interest in the project, including Total and Gazprom. Security concerns along the entire pipeline route, increasing costs, and ongoing regulatory and political uncertainty in Nigeria have continued to delay this project. Moreover, as an energy resource, the gas industry in Nigeria is a highly strategic commodity not only because of its export capacity but for its domestic capability, especially as a key contributor to electricity generation, as well as for the sustainable growth of other segments of the local market such as cement, steel, fertilizer, methanol, aluminums and the entire industrial sector as a whole.

8.5 Methodology Model Specification

Economists have suggested that regulating environmental pollution with economic instruments can lead to significant cost savings compared with command and control approaches. The market-based approaches of meeting environmental targets have generally resulted in cost savings and economic efficiency could be achieved through this approach. In addition efficient can be achieved through careful balances of economic benefits and costs, and designing an economic approach that more closely links firm behaviour to actual economic damages (Jerome & Ogunkola, 2004).

The study employed econometric analysis, to determine if the imposition of fines on flared gas has affected the level of flaring by oil companies in Niger Delta This study will employ the Nigeria annual data from 1970- 2008. The variables are Volume of Gas flared (Gf); the volume of carbon-dioxide (CO_2); gross domestic products (GDP) and Trade liberalization (TL). The data used are sourced from Central Bank of Nigeria Statistical Bulletin (2009) and World Development Indicator (WDI, 2009). All the variables are expressed in their per capital values and in real form.

In examining, the government policies on the environment in the light of oil exploration. One of the major protective measures taken by the Nigeria government was the imposition of fine on gas flaring. To examine the effect of this policy, the under-stated null hypothesis shall be evaluated.

Mathematically, this is captured below:

$$CO_{2\,t} = (GfF) \quad \text{--------------------------------------53)}$$

Where: Gf = Flared gas

$$GfF = \prec^{1: post-fine-era}_{0: Otherwise}$$

From the reviewed literature, it was observed that fine on flared gas was introduced in 1984 in pursuant to section 3 of the Associated Gas Rejection Act, 1979 (Climate Justice, 2005). Gross domestic product (GDP) will be included in the function since the volume of CO_2 is also a function of the level of production of GDP. In addition, the effect of trade liberalization (TL) on curbing gas flaring shall be examined as well as the effect of the volume of CO_2 released into the atmosphere. Thus, equation (55) translates to:

$$CO_2 = (GfF, GDP, TL, Gf) \quad \text{-----------------------------54)}$$

The econometric equation is as specified thus:

$$\ln CO_2 = \beta_o + \beta_1 GfF + \beta_2 \ln GDP + \beta_3 TL + \beta_4 f + \mu_t \quad \text{---55)}$$

Where: Gf = Gas flare

Gf F= Gas flare fines

GDP = Gross Domestic Product

TL = Trade Liberalization

CO_2 = Carbon Dioxide

Thus, trade liberalization (TL) will be captured using dummy as stated below:

$$TL = \begin{cases} 0 = 1970 - 1985 \\ 1 = 1986 - 2007 \end{cases}$$

GfF and TL were not logged because as dummy variables, they contain zeros which cannot be logged. The tests that will employ in this study are the student R^2, t-test, t-probability, F-test, and Likelihood ratio test. While the t-test (probability) shows how the individual explanatory variable, F-test and Likelihood ratio test evaluates the overall significance of the explanatory variables taken together. R^2 captures the goodness of fit of the model (Robert and Daniel, 1998).

8.6: Finding and Discussion

Table 8.1: The result of the analysis of model III

Dependent Variable: LC02

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.435	3.032	-0.143	0.88
LGDP	1.081***	0.206	5.231	0.00
TL	0.795	0.484	1.642	0.10
LGF	0.135	0.311	0.434	0.66
GFF	-1.258 ***	0.471	2.668	0.01
R^2	0.769			
Adjusted R^2	0.741			
F-statistic	27.59			
Durbin-Watson stat	2.221			

**** Significant at 1 per cent level, Method: Least Squares, Sample: 1970 2008*
Included observations: 39

Sources by the author based on result of the result of the analysis of model III

The coefficient of gross domestic products (GDP) is statistically significant which suggest that gross domestic products increase C02 emission in Nigeria. As expected, gas fine on flared gas (GFF) coefficient is statistically significant with negative sign. This result suggests that gas flaring fine reduce C02 emission in Nigeria.

Table 8.2: Economic Expected Signs

Variable	Expected Sign	Estimates Sign	Remark
GDP	$-B_2$	$-B_2$	Conform
L(GF)	$+B_3$	$+B_3$	Conform
TL	-B4	+B3	Not Conform
GFF	-B2	+B2	Not Conform

Sources by the author based on result of Economic Expected Signs

As expected, fines on flared gas (GFF) shows a negative sign. This implies that imposition of fines on flared gas in Nigeria has the potential to reduce the volume flared. On the other hand, quantity of crude oil produced has a positive relationship with gross domestic product and quantity of gas flared. This shows that increase in quantity GDP leads to increase in volume of CO_2. Trade liberalization was initiated to enhance efficiency in the oil and gas sector as a way of also reducing gas flaring. However, contrary to that expectation, the estimated sign shows that trade liberalization have rather continued to lead to increase in $CO_{2.}$

The result shows that the co-efficient of multiple determinations (R^2) of the model is: R^2 = 0.769 with adjusted R-square as 0.741. This implies that approximately 74 per cent of the variation in the dependent variable (CO_2) is explained by the independent variables in the model. The F-statistic test is applied to ascertain the overall significance of all the independent variables in the model. That is, to determine if the estimates of the parameters are simultaneously significant or not. Thus, the null hypothesis is as stated below:Ho: $\beta_1 = \beta_2 \ldots = \beta_4 = 0$. Let $\alpha = 0.05$.Reject Ho if $F_{cal} > F_{tab}$; accept if otherwise. Alternatively, reject Ho if F-probability is less significantly lower (i.e., less than α)

(Gujarat, 1995). Since the F_{cal} (27.59) > F_{tab} (2.61), we reject our H_o and conclude that the estimates of the parameters are simultaneously significant. This is further confirmed by the F-probability (0.0000) which is significantly low.

The third proposition is to determine if the imposition of fines on flared gas has affected the level of flaring by oil companies. In other word, if the government regulations do not reduce the adverse effect of oil companies on the environment and people of the Niger delta.

Ho: $\beta_i = 0$. Let level of significant (α) = 5% = 0.05/2 = 0.025. Decision Rule: Reject Ho if $/t_{cal}/ > /t_{tab}/$; accept if otherwise. From the statistical table, $t_{tab} = t_{35}^{(0.025)} = 2.021$

Table 8.3: t-statistic Test

Variable	t-value	t-tab	Conclusion
LGDP	5.231	2.021	S
L TL	1.642	2.021	NS
LGF	0.434	2.021	NS
LGFF	2.668	2.021	S

Where: S = Statistical significant
NS = Not Statistical significant

Sources by the author based on result of t-statistic Test

From the above table, it is observed that gross domestic production and gas flaring fine have significant impact on the volume of gas flared of CO_2. This implies that, as oil companies increase the oil produced of gross domestic product, they also increase the volume of CO_2 emission. The result also shows that the volume of gas Flare fine is negative associated with volume of CO_2 emission. This could represent government capability to stop gas flaring in Nigeria as the result shows that units increase in gas flare fine, increase the propensity of the oil companies' to flared CO_2 by approximately 1.256 units.

In addition, the result reveals that although the imposition of fines on gas flaring is negatively associated to volume of flared CO_2. Their impacts since 1984 of introduction seem not to be significant in ending gas flaring. In other words, even though the government can use fine on flared gas as an effective tool towards ending flaring, its implementation has not led to any major decrease in flared of CO_2. Also, the result reveals the intention of imposition of fines on gas flaring; its impact since 1984 seemed not to be significant in ending flared CO_2.

8.7: Conclusion

The proposition three stated that the imposition of fines on flared gas has not affected the level of flaring by oil companies. In other words, government regulations do not reduce the adverse effect of oil companies on the environment and people of the Niger delta. The result of the study reveals that though the imposition of fines on gas flaring is negatively associated volume of flared gas, its impact since 1984 is seen not to be significant in ending gas flaring.

As expected, fines on flared gas (GFF) shows a negative sign. This implies that imposition of fines on flared gas in Nigeria has the potential to reduce the volume flared; however the quantity of GDP has a positive relationship with quantity of volume of carbon dioxide. This shows that increase in quantity of GDP leads to increase in volume of CO_2. Trade Openness was initiated to enhance efficiency in the oil and gas sector as a way of also reducing gas flaring. Then contrary to that expectation, the estimated sign shows that Trade Openness has rather continued to lead to increase in flaring. Increases in the volume of CO_2 released into the atmosphere suppose to invoke government to insist on ending gas flaring. But the result shows that the government seems to exhibit a form of nonchalant attitude which has rather allowed the flaring to remain on the increase.

The study has established the root causes of the environmental degradation as market failure, policy failure and, to some extent institutional failure. Environment management boils down to work on all these problems. The environmental problem can be a side effect of resource allocation, managing environmental problems of natural resource depletion and pollution. Economical informed instruments are analytically easier to apply than strict regulations in the form of command and control system, particularly for developing economies where enforcement and monitoring abilities are suspected.

Economic instruments score high from an economic point of view in tackling environmental problems. The fact is that no economic instrument can work without effective regulation and institutions to implement such regulation, be it at national or international level. Since, economic instrument rely on strong market intervention, there is a need to embark on research that will produce an insight into what the optimum tax levels should be, bearing in mind the likely economic and environmental impact of such tax. Since economic instrument will succeed if administrative capacity is available in the area of implementation, particularly with respect to revenue collection and monitoring. There is a need to consciously build a formidable administrative capacity ahead of the introduction of economic instruments.

The policies and actions that underpinned the development process have contributed to the emergence of suboptimal utilization of environmental resources of which the most notable is crude oil, water, forest and land. There are multiple of problems relating to resources depletion and degradation, such as tropical deforestation, oil spillage, air pollution, desertification, soil erosion, acidic rain. These problems call into question the relevance of current environmental practices. While the command-and-control (CAC) approach to environmental management based on enforcement via fines and other transactions on legally mandated standard has predominated in Nigeria. There is a need to make greater use of economic instruments especially simple instruments as a complement or substitute to other policy instrument that will take into account the national socioeconomic condition of the country. Certain conditions are required before economic instruments can be used effectively to promote environmental protection, such as adequate information base and administration capacity, a strong legal structure, competitive markets and political stability.

CHAPTER NINE

THE CONCLUSION AND POLICY IMPLICATION

9.1 Introduction

The operations and exploitation of the natural resources was expected to be so effectively and responsibly managed in such ways that positive externalities were generated for the local economics, production, public and trade and industrial development of the region and the country in general. The oil and gas industry is successfully developed in Nigeria, largely due to the efforts of Shell-BP and other major oil companies in Nigeria using physical capital and management expertise of the leading industrial nations. Oil production is associated mainly with multinational oil companies with the technical in-depth knowledge, technologies and organizational practices (Frank, et al., 2002).

The central objective of the research is to examine Foreign Direct Investment into crude oil exploitation and its impact on the economic growth and the environment: Case Study of Niger Delta Oil producing Communities. The first specific objective is to examine FDI into crude oil exploitation and its impact on the environment and people of Niger Delta oil producing communities. Furthermore, the second specific objective is to investigate the impacts of FDI and trade Openness in the oil sector on economic growth. While the third specific objective of the study is to determine if the imposition of fines on flared gas affected the level of flaring by oil companies. The first proposition examines the impacts of the FDI activities on the environment and the people of oil producing communities. The structural equation modeling was used to analysis the first proposition. The second proposition uses co-integration analysis, while the third proposition uses least square regression.

9.2 Majors Finding of the Study

Empirical studies have shown that the impact of foreign direct investment in the environment and the well-being of the people in the Niger Delta communities are well established in the estimation. Structural equation modeling was chosen for the study because it identifies fundamental interaction among the hypothesized constructs, rather than simple associations. It is a rigorous approach to determining the systematic and statistical significance of the covariance connecting each construct and outcome in the path diagram. In the following analysis these problems are reduced by specifying a structural equation model (SEM) with three latent variables (factors) defined as Perception of the people on operation of oil companies in the communities (Oil_FDI), Environmental impact (Envr_imp), Impact of crude oil exploitation on a person's well-being (Wlb_Imp), Extent of stress from Environmental risk in the communities (Stress) and General Awareness of Environmental Consequences (GAC). It is further assumed that there are some fundamental paths between these three factors and that they are influenced by some economic indicators. Furthermore, SEM allows combination of many structural relationships into one model, giving a possibility of including all the above mentioned causal mechanisms.

In the evaluation of the measurement model is to examine the fulfillment of normality assumption. A data set is considered normal if the values of skewness fall within the range of +2 to -2 while kurtosis values do not exceed the range of +7 to -7 .Given the above threshold for justifying the normality of data, could be said that all observed data s and kurtosis values and their individual items were explored. There was no serious skewness or kurtosis that required transformation of data.

A path diagram of the basic structural model in figure 6.8 shows the impact of foreign direct investment in the oil sector on the environment and the people of the Niger Delta.

Results and fit indices demonstrated that the model for the total sample was a good fit. The path in the diagram are significant, the root mean square error of approximation RMSEA = 0.063, shows that the model is acceptable with a ρ- value for the test of Closeness of Fit of 0.000 and CFI =0.983 all which indicated an acceptable fit. The χ^2 value is 152.352, with degree of freedom of 77 (ρ>0.05). The chi-square/degree of freedom ratio, therefore, $\chi 2$ = 1.9 which is less than the suggested maximum of 3.0. On the other hand, the estimated chi - square is significant (p = 0.000), suggesting that the model's covariance structure is significantly different from the observed covariance matrix. This is expected because χ^2 due to its sensitivity to sample size most especially when the sample size is up to or more than 200 (Hoe, 2008).

The construct of Oil_FDI had an impact on the environment (Envr_Imp) and well-being of the communities (Wlb_Imp) by ($\beta = 0.46,\ \rho < .001$) and ($\beta = 0.23,\ \rho < .001$) respectively. The R^2 impact on the environment and well-being is R^2 = 0.21 and R^2 =0.05 respectively. The comparative fit index (CFI) = 0.983 indicates acceptable fit of the model. All the latent variables and their indicators are positive and significant. However, since the path coefficients are standardized values, a higher value for environmental impact (0.46) relative to that of well-being (0.23), implies that the communities perceives more destruction of their environment than the direct influence on their well-being from Oil_FDI. This conforms to realities in these communities as most of them had always lamented that oil exploration by multinational corporations had impacted adversely on crop land and fish farming. The consequence had manifested in social crimes such as the kidnapping of foreign oil company workers. But since there are other theoretically advocated determinants of environmental behavior, the above basic model is extended based on literature.

The basic model is therefore extended as evident of path diagram in extended structure equation modeling in the figure 6.9 in chapter six above. The communities' perception about the operation of oil producing companies (the proxy for Oil_FDI) affects both the environment and the well-being of the communities. However, environmental risk as well as environmental stress impact on environmental behavior is introduced to the basic model. Using the General Awareness of Environmental Consequence (GAC) measurement as a measure of environmental risk (Stern & Guagnano, 1995) and environmental stress (Homburg& Stolberg, 2006), this measurement is brought in to the basic model to form extended modeling estimation that will further examine the impact of Oil_FDI. Consistent with the basic model, the Oil_FDI impact is more on the environment than the well-being of the community ($\beta = 0.32$, $\rho < .001$) and with of $R^2 = 0.10$, unlike the basic model, the squared correlation coefficient has improved. All fit indices meet established thresholds to ascertain that the model fits the data. Except for the P-value which is less than 0.05 however, as said earlier, the measure is sensitive to large sample. Hence, Kline (1998) suggests that χ^2/ d.f. A ratio of 3.0 or less as a reasonably desirable alternative indicator of model fit when such problem is encountered.

From the structural model, χ^2/ d.f. ratio yields 1.7 which is less than 3.0, this further clarifies that the model has a good fit. The model shows that communities' perceptions on the operation of oil companies as well as, environmental risk perception ($\beta = 0.41$, $\rho < .001$) collective determine environmental impact perception ($\beta = 0.42$, $\rho < .001$). Of the two variables, however, Oil_FDI had the stronger influence. Besides, environmental risk- GAC ($\beta = 0.41, \rho < .001$) and environmental stress ($\beta = 0.36$, $\rho < .001$) determine communities' perceptions about the operation of oil companies, with the former having a stronger impact.

These findings have important implication in the face of rising social crises in Nigerian oil-rich regions. To reduce communities' aggressiveness towards these companies, there should be measures to abate adverse effects to both the environment and well-being of the host communities. Moreover, since both environment stress and risk perception (GAC) affect oil-FDI, the members of those communities need to be educated on potential risk to avoid the expectation of exaggerated impacts. More so, corporate social responsibility could be strengthened further to reduce communities' perceived stress from the operation of oil companies (Oil-FDI).The oil companies failed in their corporate social responsibilities going by the assertion of the respondents and literature that the oil corporation has failed to deliver on their promises through the inefficient handling of the project. The results ascertain that the people are security threat to the oil companies, because unemployment and socio- economic inequality are of high prevalence in the host communities.

Furthermore, respondents claimed that oil companies operating in the community do not pay compensation to those whose properties are affected by their operations. Toxic waste is released to the environment (sea, land and fresh water) are poisonous to man and animal lives and resulted in high cost of health and reduced productivity of the people in the communities. Other negative externalities that result from the activities of the oil firms, include, carbon dioxide and other emissions hydrocarbon vapors, and industrial waste. There are of opinions that the oil companies operating in the communities do not observed the basic environmental law. The respondents affirm that they are aware that the operations of the oil companies in the communities always lead to oil spillage and gas flaring. Their activities have significant negative impact on the health of the residents of the host communities.

The influence of large companies responsible for carbon pollution became more apparent. Nigeria has an unresolved policy position with regard to environmental degradation, well-being and climate change, because it is economically dependent on fossil fuels, with large export and internal per capita income associate with crude-oil, but also very vulnerable to poverty. The analysis presented here reveals that Nigeria position on environmental and well-being of the people are gradually moved from being somewhat proactive to positively react.

From the second proposition, it is observed that both FDI, labor and trade liberation (Tr) were found to have significant impact on economic growth (GDP); while capital (k) is not statistically significant. Thus, since foreign direct investment in oil, and trade liberation (Tr) was found to be statistically significant vis-à-vis their impacts on GDP, we reject the second null hypotheses and conclude that foreign direct investments in oil and trade liberation (Tr) have a significant effect on economic growth performance. The implications of these findings discussed in turn below.

It is important to observe that FDI in its lag 3 was to ascertain the dynamic nature of FDI. The result shows that FDI at its lag 3 is positively associated with GDP. It could be because, such investment needed to be allowed some time lag to translate to any significant impact. Thus, after the foreign investment in oil is allowed a three-year lag time, it showed a positive significant impact on economic growth (GDP). For instance, the result shows that a percentage increase in foreign direct investment in oil at lag 3 will increase Nigeria GDP by approximately 2 percent. The level of impact could be because foreign investors manage the oil and gas sector in Nigeria.

Although the Nigerian economy has a high propensity of return on capital, the regression result shows that the impact of such investment on GDP, though positive but it is statistically insignificant. In other words, Nigeria needs a lot more domestic investment to influence its GDP. We use labor in its lags 1 and 2; and both are significant. At lag 1, labor has a positive relation to GDP. For instance, the result shows that a percentage increase in labor at lag 1 will lead to about a percent increase in GDP. In other words, large population, especially in terms of labor force is a major determinant of GDP in Nigeria. On the other hand, to pay unproductive members of the labor force from current productivity would be counterproductive. The labor at lag 2 shows significant negative impact on GDP.

Nigeria has natural resources based mono-economy rather than diversified producing economy. This could explain why the country depends so much on imported product, yet import major part of its refined petroleum products as well as agricultural products. As a result, trade liberation seems to be affecting the economy adversely. For instance, the regression result shows that trade liberation has negative significant impact on GDP. The result reveals that a percentage increases in trade liberation at lag 2 will lead approximately 8 percent decrease in GDP. This stresses the need for Nigeria to review its foreign trade policy in favour of sector-segmented trade liberation which may be preferred to total liberation.

The third proposition results reveal the extent the imposition of fines on flared gas has affected the level of flaring by oil companies. The gross domestic production and gas flaring fine have significant impact on the volume of gas flared of CO_2. This implies that, as oil companies increase the oil produced of gross domestic product, they also increase the volume of CO_2 emission. The result also shows that the volume of gas Flare fine is negative associated with volume of CO_2 emission. This could represent government capability to stop gas flaring in Nigeria as the result shows that units increase in gas flare fine, increase the propensity of the oil companies' to flared CO_2 by approximately 1.256 units.

In addition, the result reveals that although the imposition of fines on gas flaring is negatively associated to volume of flared CO_2. Their impacts since 1984 of introduction seem not to be significant in ending gas flaring. In other words, even though the government can use fine on flared gas as an effective tool towards ending flaring, its implementation has not led to any major decrease in flared of CO_2. Also, the result reveals the intention of imposition of fines on gas flaring; its impact since 1984 seemed not to be significant in ending flared CO_2. It shows that the government seems to demonstrate a form of laid-back attitude which has rather permitted the flaring of $CO_2$to remain on the increase.

The results showed the extent governmental regulation via tax/fine reduces the adverse effect of oil companies on the environment and people of the Niger Delta. The results indicated that, the imposition of a fine has no significant impact on the level of flared gas even though it shows a potential to reduce flare. The total volume of associated gas produced through crude-oil production has remained the significant determinant of the level of flares, as the result shows that a unit increase in crude oil production will increase flare by about 0.21 units. The result is equally revealing that the trade liberalization policy of the federal government has not led to any structural change in the level of flares. Therefore, accept the third null proposition and affirm that the imposition of fines on flared gas and the introduction of trade liberalization have not significantly affected the level of flares.

In summary, the main proposition that FDI into crude oil exploitation and its impact on the economic growth and the environment has been established in all chapters of the thesis. However proposition one, the effect of FDI into crude oil exploitation in the Niger Delta will affect the environment and communities negatively are also deep-rooted in chapters two and six. While the proposition two that FDI in oil and trade liberalization has no significant effect on economic growth performance is confirmed in chapters three and seven. Furthermore, proposition three is to determine if the imposition of fines on flared gas has affected the level of flaring by oil companies is established in chapters four and eight.

9.3: Policy Implication

The results of this study provide both practical and theoretical contribution to the understanding of the oil FDI and the impact on the environment and the well-being of the people of oil producing communities. Specifically the results indicated that oil FDI activities will affect the environment more than the well being of the people. The consequences of effect on the environment will result to well-being problem. The environmental consciousness and improvement might lead to increases in the standard of living and sustainable livelihood development. The strong emotional attachment to environmental issues like gas flaring, oil spillage and land degradation can properly translate to the people well-being. Although, the activities of government to speed up economic development of the country has also led to accelerated consumption of natural resources and the degradation of the ecological environment.

The environmental diseconomies arising from oil industry activities in the Niger Delta region has caused the value of life and prospective for sustainable development to be incapacitated and off balance. The problem of biodiversity and the environmental services like water supplies to human being are under pressure. The oil companies have expressed a commitment to sound environmental practice in the host communities' area in which they operate. The oil companies' commitment and practices are not matched by actions. Moreover, the practices displayed are implicit to be the worst anywhere in the world by hurting the environment and livelihoods.

The oil companies' huge profits from exploitation of oil without adequate care of their host communities are inimical to the environment. Moreover, the natural resources are used in a manner that appears wasteful and exclude preference for development in the future. Nevertheless, consciousness level of the environmental predicament has grown tremendously among the people in recent years. Oil production has led to flaring of gas and oil spillage thereby degraded the ecosystem, devastates farmland and aquatic life, as well as vegetation of the Niger delta region. This deteriorates the economic, social and political structure in the region. Several communities and settlements were affected by the gas explosion and destruction of aquatic lives. This has affected the environment and the health of those living in the region. And this classified Niger Delta region to be one of the most polluted areas in the world and the pressure on land as a result of oil industry activity also lead to the exploitation of marginal farmland, over-farming and deforestation which resulted in environmental degradation.

Protection of the environment has turn out to be a main purpose of livelihood sustainable development and indication had build up to show that environmental degradation was a major barrier to development. Generally, sustainable development may be expressed as a practice of improving the range of opportunities that will facilitate individual and communities to achieve their aspirations and full potential over a sustained period of time, while maintaining the resilience of economic, social and environmental systems (Munasinghe, 1993). Therefore, the livelihood and sustainability of development requires increases both in adaptive capacity and opportunities for improvement of economic, social and ecological system. Improving adaptive capacity will increase resilience and sustainability to expanding the set of opportunities for improvement that will give rise to development.

I believe that the key factors for success mitigation of environment problem are the comprehensive planning; support from local government; management and funding of the project in the local communities and support of the local community; and the legal status of the local communities need to be entrenched. These factors are also expected to be important in the restoration of the Niger Delta region for nature conservation and community amenity value for growth and development.

Oil Company’s operations are not commonly restricted but rather strengthen and there are economic effects on the people inflicted by environmental consequences. The social cost derived from FDI activities are direct and indirect burdens imposed on the general public caused government huge expenditure. All the costs emanating from productive processes are passed on the people by way of air and water pollution which harms health, reduces agricultural yield, and endangers aquatic life forms. The failure of GDP translating to economic development has increased poverty and invariably the rate of environmental degradation. They have not invested much in the socioeconomic, infrastructure and physical development of the host communities. They have not made much investment and initiative in terms of stimulating production, employment, income and improved livelihood of the host communities. The government has overlook exploitation by the oil companies without regard to the people that depend on these lands and resources for their livelihoods and ways of life.

However, economic development can be said to be sustainable indefinitely only if development is modified to take into account its ultimate dependence on the natural environment. The Nigerian ecosystem has been degraded not only by deforestation but also by oil spills, gas flaring and sundry activities deriving from oil production, as experienced in the Niger delta. The farmers and fishermen in the region depend essentially upon their land and water resources for their sustenance; destruction by oil spillage often spells doom to the well-being of the people.

The Environmental challenge cause by exploitation of resources, including health hazards created by land degradation, air pollution through flaring of gas andoil spillage. This leads to lack of alternatives to unsustainable patterns of living and economic necessity often forces community people to use resources in a ways that guarantee short term survival but reduce the future productivity of environmental assets.

The focus now is developing agriculture and industry as well as an increase in infrastructure facilities in the oil region. Introduce economic management strategy that will pursue direct investment expansion through policies and programs that serve as an incentive to encourage the development and participation of local investors. The foreign direct investment needs to finance the development project and programs, including the provision of infrastructure and social amenities that promote economic activities and enhance the quality of life and physical environment.

The second proposition of the study, investigates the relationship between foreign direct investment in the oil sector and economic growth and the results reveal that FDI, labor and trade liberation (Tr) have significant impact on economic growth (GDP); while capital (k) is not statistically significant. Thus, since foreign direct investment in oil, and trade liberation (Tr) is statistically significant with regard to their impacts on GDP, we reject the second null hypotheses and conclude that foreign direct investments in oil and trade liberation (Tr) have a significant effect on economic growth performance. We use FDI in its lag 3 and find FDI has significant positive relation with growth. This explains the dynamic nature of FDI. Foreign investment in oil needs some time lag to translate to any significant impact. Therefore, government policies that grow investors’ confidence in the long run would attract more FDI in the oil sector of Nigeria.

Although the Nigerian economy has tendency to earn high returns on capital, the domestic investment is yet to influence GDP. In other words, Nigeria needs a lot more domestic investment. Furthermore, we use labor in its lags 1 and 2 and both are significant. At lag 1, labor has a positive relationship with GDP. On the other hand, to pay unproductive members of the labor force from current productivity would be counterproductive. Improving the quality of labor in Nigeria is highly recommendable. Nigerian economy is a consuming economy rather than producing economy. This could explain why the country depends so much on imported product, still import major part of its refined petroleum products as well as agricultural products. As a result, trade liberation seems to be affecting the economy adversely. This emphasizes the need for policy makers to review its foreign trade policy; sector-segmented trade liberation may be preferred to total liberation.

The determinants of FDI are infrastructure development market size and stable macroeconomic policy. Country makes best efforts to attract foreign direct investment because of its renowned reward as a tool of economic development. FDI could be growth attractive by promoting knowledge transfers both in terms of labor training and skill accomplishment. It also promotes the realization of new technology in the production process through capital spillover.

Despite the contribution of crude oil to economic activities and government revenue in Nigeria, the developmental impact of crude oil endowment such as income effects, welfare effects and other socioeconomic impacts remain an illusion. This is because economic growth has not been sustainable, even though the country is abundantly blessed with crude oil and other natural resources; it continues to showcase incredible poverty, accumulated debts and other economic and social problems that retard the growth of Nigeria economy.

FDI is an index to measure the inflow of capital from foreign investors. It is avenues through which growth enhancing performance may be infuse to the entire economy. In recent times, Foreign Direct Investment inflow to Nigeria dropped 60.4% between 2009 and 2010. This occurred despite economic reforms by government. It is identified that uncertainty and risk are the primary reasons for the sharp decline. National income can be enhanced by diversifying the export base of the economy from oil to non-oil. Besides, efforts should be made to refine all the derivative of oil, while manufacturing activities should be promoted since primary product exports reportedly suffers a secular deterioration in term of trade. The rapid growth experience of the newly industrializing countries has shown the importance of successful manufacturing to economic growth and development. This suggested that no more than when the productive base of the economy is diversified and adequate inter-sectoral linkages are established that employment and income effect of oil exploitation can be maximized. Thus, it will reduce the level of import dependency and instability in government revenues and precipitates fiscal and current account deficit.

Nigeria is a partaker and signatory to most of the global conventions and protocols on the environment. Government of Nigeria has indicated its obligation to the environment by establishing a Federal Environmental Protection Agency (FEPA) in 1988 and State Environmental Protection Agencies in all states of the federation. They are to carry out efficient management and control of the environment. Since market and government failures led to excessive use of environmental resources, which consequently resulted in degradation with negative economic, social, health and ecological effects. The government should negotiate, bargain, and integrate with stakeholders in the oil producing region so that the problems of negative externalities can be solved. Aligned with this backdrop the government has to minimize the negative effects of the activities of the firms by internalizing social costs either by regulation, payments of subsidies, charges, fees or fine. The use of market-based or economic instruments should be encouraged and government should ensure that product prices take account of the real scarcity of non-renewable resources as well as the social cost of producing and consuming the products. The change in turnover of natural resources, both on the input side, which involve the depletion of non-renewable stocks, and on the output side, which involves the creation of waste products has been more than drastic due to the combined effects of population and economic growth.

The foreign direct investment in oil has been operating without restraints in relation to the environment since there is no serious concern about the environmental effect of their operations by the Nigerian state. The oil companies ignored existing environmental regulations and laws; and capitalized on their weakness and ineffective enforcement and implementation. The companies have also been associated with serious operational abuses and failures that impacted the environment quite negatively. It is apparent that production activities in the oil and gas industry in the Niger Delta have environmental magnitude, if not properly handled will constitute repression to the Niger Delta environment. The threats include soil degradation, air and water pollution, loss of biological diversity, climate change, and destruction of the ozone layer and management of water waste. For the purpose of environmental protection the oil producing companies must submit environmental impact studies on proposed construction projects to local communities, local government and the federal Ministry of Environment. There is the need to promote a culture of awareness of environmental issues among the people of the Niger Delta.

It ought to be noted that the use of economic instruments such as taxes to control externalities, has implication for either price or output. The extent to which price and output levels of firms are affected depends on the magnitude of tax as well as the elasticity of demand for the products. In case of oil firms, the elasticity of demand for crude oil is perfectly elastic, then the amount of tax imposed on gas flared or oil spills will be borne entirely by the oil firm. This implies that as the amount of tax increases, costs also increase; the output, revenue and profit fall. This problem will gear up the oil firms to accelerate action on controlling externalities that make them bear the extra cost of production. This analysis is applicable to oil firms in Nigeria and other countries under OPEC organization which are price taker.

Every effort should be made to minimize human suffering associated with oil and gas pollution of the environment. Section 20 of the 1999 Constitution stated that “The state shall protect and improve the environment and safeguard the water, air and land, forest and wildlife in Nigeria” The people in the Niger delta need to be aware of the documents related to the Rio Earth Summit for their benefit and for future generations. And they should participate and contribute to the great global debate on the environmental issues.

9.3.2 Implications for Development and Behavioral Stakeholders

The relationship of the oil Corporation in Nigeria to impacts on the natural and social environments of the Niger Delta communities and the emergence of political resistance and significant conflict between oil companies and host communities concluded that, distrust and antipathy towards oil companies remained entrenched in Niger delta. I explore in more detail issues raised by economic globalization for the practice of corporate social responsibility and stakeholder management, and contrast these concepts with an alternative approach to sustainable development. The oil companies in Nigeria may require an alternative approach to sustainable development if they wish to merit the full confidence of host communities.

There is an increase in incidence of certain sickness that was formerly unknown in the Niger Delta region which is due to oil spillage and air pollution. It was detailed that there is relationship linking vulnerable to oil pollution and increase in health problems. The communities' people in Niger Delta for the past thirty years had experienced increases in the incidence of cancer and other respiratory problems caused by oil pollution in the region. The oil exploration engendered illness includes respiratory problems, skin ailments such as rash and dermatitis, gastro-intestinal disorders, water borne diseases and nutritional problems associated with poor diet and eye problems (Olusi & Olagunju, 2005).

The survival of the communities depends on the continued existence of the natural resources, as their livelihood and health emotionally revolve around their environment. They have fewer alternatives about where to relocate. The people tolerate the natural hazards, pollution (air, water and soil), biodiversity loss and the exhaustion of forests, and the negative impacts of industrial actions occasioned by the activities of the oil companies. However, the United Nations Human Development Report on Niger Delta, among several disturbing declarations about the state of the region's environment, asserts that there is a strong feeling in the region that the degree and rate of degradation are pushing the Niger Delta towards ecological disaster (UNDP, 2002). This is strengthened by the results of research on impact assessment of the 1983 Oshika and Ogoni 1985 oil spills (Mmom and Chukwu-Okeah, 2011). There is a need for quick intervention by the oil companies with the support of government for the immediate clean up of the environment in the Niger Delta communities.

Multinational oil companies have long had a reputation of not doing enough for their host communities in developing countries. The role of oil companies in community development initiatives in the Nigeria oil industry, the study assessed the usefulness of its supported community development projects as a means of demonstrating corporate social responsibility. The findings suggest that expectations for community development projects are greater in developing countries. Sustainable development and poverty are pervasive problems in the Niger Delta, mainly due to lack of significant Nigerian government commitment to the development of the region. The oil companies have contributed in various ways to local community development in the area. Based on a critical analysis of the changes in its strategies and policies, the oil company’s previous approaches to community development in the Niger Delta encouraged unsustainable development and a culture of dependency. It is necessary that the recently launched sustainable community development strategy has the potential to succeed where others failed, if it is implemented within a tri-sector partnership framework involving companies, the Nigerian government and civil society. The oil companies need to meet legal requirements and more encompassing expectations of stakeholders in order to throw into a better social order through actions in the workplace, marketplace and local community and through partnerships and advocacy of public policy (Jeremy& Baskin, 2006).

9.3.3 Implications for Economic and Social Freedom

Nigeria’s Gas and oil capital are the central point of growth in the economy and fiscal situation in the countries. Also, crude-oil and natural gas exploration are associated with social and political conflict; mismanagement of revenue and the resource curse syndrome. These had largely eroded the significant gains from higher but volatile export revenue. In the last two decades, scientists offered several alternative approaches to defining and measuring quality of life: social indicators such as health and levels of crime, subjective well-being measures (assessing people's evaluative reactions to their lives and societies), and economic indices (Diener & Fujita 1995). Nevertheless, the set of laws is weak or poorly enforce in governing natural resource exploitation, subsequently increased in openness of foreign investment to accelerate economy leads to unsustainable resource use patterns. The developing countries' capacity to be focus in FDI will take full advantage of the related benefits and reduce the risks depends on the effectiveness of their policy and institutional frameworks (Alan *et.al*, 2004).

The value of life and the prospective for sustainable development is being restrained by environmental degradation in societies across the earth. The suffering of biodiversity; and the environmental services and water supplies to human beings are now stressful. This is assertion from the Organization for Economic Cooperation and Development (Onosode, 2003). Reducing pollution emission may cause the decrease in the allocate output of pollution-intensive goods. If there is no change in the strength of emission in an industry with a constant scale of the economy, the effect would reduce the total pollution. The scale effect of low income and output seem to be prominent and leads to the frightening conditions of the environment due to inflow of FDI. The health and the economic activities of the habitants of the FDI host communities are badly affected. They contact various diseases that sometimes lead to death by consuming polluted food and water. Often, those who suffer loss from these oil production activities are not adequately compensated or not compensated at all.

There is often disparaging environmental transformation emanating from the business and industrialization particularly in crude-oil; oil spill and gas flares which have destroyed the natural resource base, crucial to sustaining independent indigenous livelihood. In most parts of Delta states up till now very fertile lands are no longer productive. The peasants have lost the fertility of their lands to oil exploration. The resultant alienations of the people from their homeland and local base have intensified ineffective and inequitable land use practices. In fact, various attempts by the local people to avenge this economic disarticulation perpetrated by the State and oil companies have led to frequent loss of valuable lives and property. These are some negative consequences that have resulted to socioeconomic shock and harsh ecological dilapidation and the disruption of the community living. Consequently the region's natural resources are diminishing and they are not being replaced by human and physical capital. With a growing population, the per capita resource based in the region is going down. The sustainable economic growth in terms of increases in the per capita availability of resources does not exist.

Furthermore, investment valuation needs strategy of long-term capacity structure that will link the concept of economic and social freedom; and action on climate change. International institution needs to set up emission reduction targets, carbon stock exchange technique development and course of action that will make carbon stock feasible in order to make investor redirect their investments appropriately. Private agents can enhance resource rents, through natural resource abundance, windfall commodity price booms and the discoveries of valuable new reserves. But in fragile political and legal institutions, governments are weighed down by the special interest pressures of the rent seeker, thus leading to distorted economic and resources policies that favour the rent seekers and generate problems of corruption and institutional breakdown (Alex & David, 2011).

Expansion in natural resources may result in an initial increase in productivity and existences of weak institution will provide encouragement for the rent-seeking interest groups to compete for a greater share of production via increased transfers and more transfer means less actual investment in the economy. The natural resource curse is not necessary the fate of resource abundant countries, sound economic policies and good management of windfall gain can lead to sustained economic growth.

9.3.4 Implication Policies for Natural Resources and Environment

Consequently, it is useful to appreciate the fact that policy failure has a wide impact on the macroeconomic in the sense that such failure needs not be found in the environmental related sector before it creates incentives for over-exploitation of natural resources. The challenge for environmental issues is how to eliminate the net loss in social welfare arising from consumption and production of environmental services. The impact of the oil industry activities on the environment in Nigeria has acknowledged the attention of the researcher. The environmental benefits considered economic identities through wide-ranging industrial development that the concept of externalities contains as the key to the economic analysis of environmental problems. The environmental costs are regularly externalized for lack of clearly defined property rights. This is because most environmental resources share the traits of public goods and some suffer uncontrolled and excessive exploitation for coming under common property right. However, well-defined property right is a dimension towards enforcing appropriate environmental behavior. These problems arise essentially because of scarcity of all resources in the economic system.

The evaluation of the environment suggests that the welfare of the future generation should not be less than the welfare of the current generation (Elif - Akbostanc *et al.*, 2009). He argued that the stock of renewable resource should be maintained and the economy should save over and above the depreciation rate of both man-made and natural capital resources. The serious degradation and pollution of the Nigeria ecosystem suggest the need for valuing the environment and pursue the policies that would help to ameliorate the current adverse environmental condition to survive. The increasing use of economic instruments derives from the recognition that they offer in practical way to achieving environmental goals much more flexibly and at lower costs than the traditional command–and-control regulation. Environmentally sustainable development is now an integral part of planning in Nigeria. However, the concepts observe conditions that impede natural market forces and the root of the dilemma is the absence of property rights. Its result is a misallocation of economic resources and a decline in society's welfare. The third-party mediation typically a government is needed to correct the market failure and reach an efficient equilibrium. Policy failure is the major factor that engenders degradation of environmental, public sector economics ascribes to the government, the role of correcting market failure

There needs to gradually incorporated market-based solutions into their environmental policy programs. The market approach is stronger proponents by economists because it can achieve a cost-effective solution to environmental problems. This initiative allows polluters to respond according to their own self-interest. The external costs of environmental damage could use market instruments to aim the decision making of firms and consumers. The theoretical premise of a pollution charge is to internalize the cost of environmental damages by pricing the pollution generating activities.

It is instructive to argue that environmental costs are frequently externalized for lack of clearly defined property rights. This is because most environmental resources share the traits of public goods and some suffer uncontrolled and excessive exploitation for coming under common property right. Insecure land tenure is bound to discourage long term investments, therefore is biased in technology choice in favor of short-run output maximization over sustainable economic system. Therefore, well-defined property right is a dimension towards enforcing appropriate environmental behavior. These problems arise essentially because of scarcity of all resources in the economic system.

Furthermore increase in the exploitation of natural resources through FDI always leads to economic expansion that creates dynamic economies which achieve contact with more highly developed levels of technological information. In addition, economic progress and growth forged the expectation and resources to finance investments in new environmental friendly technologies that will solve environmental problems.

However, environmental transformation and economic growth work together because of linkages and feedbacks in environmental quality and economic growth. The environment is a sink for wastes and sources of resources for the economy, because of environmental quality. Society may have a preference for a clean environment that has an amenity value or an existence value. Therefore, environmental degradation could bring about economic growth when properly managed. If property rights are well defined, people, firms or institutions that cause negative externalities can be made to pay for their actions.

9.4: Theoretical implications

This study has reviewed the major theories and literature on foreign direct investment, growth, environmental and development to explore the dynamics of the environmental and growth phenomenon nexuses as it relates to its consequences of externalities and livelihoods sustainability. Environmental degradation and poverty nexus particularly in economical, environmental and ecological isolated regions must be investigated from several theoretical perspectives balanced by theoretical approach. It underscores the fact that ecological, environmental, geographical and economic factors must be weighed in order to obtain a comprehensive understanding environmental degradation and externalities factors. These issues have been highlighted in other studies such as; O’Connor,1991;Daly, 1992; Williamson, 1993; Ayres & Nair, 1984; Jeroen & Peter 1991; Ponthep, 1997; Munasinghe, 1993; Ashley & Carney, 1999 Amy-Farmer, 2001;; Massimiliano, 2002;Roger Perman, 2003; Phamhoang, 2003; Atkinson, 2000; Werner, 2000; Jim-Butcher, 2006 Venables, 2007; Xueli, 2010.

Although a variety of environmental problems are modeled from economic perspective that include a review of market theory and price determination in an environmental context, and the market failure of pollution using both a public goods model and externality theory. These require the allocation efficiency such that resources are appropriate in a way the additional benefits to society are equal to the added costs incurred. It is therefore important for policy makers to incorporate some form of environmental accounting into their decision.

The issue of inter-generational costs and benefits involvement has often been overshadowed by a focus on the relative efficiency of various tools and the concern about optimal policy use of crude-oil resources. One of the importances of outcome of this study is that the distributional impact of FDI and potential control policy lead to intergenerational welfare and sharing risk impasse.

The potential importance of natural resources for the livelihood of the households has long been recognized but seldom quantified and analyses. The study shows that the income from oil exploitation affects poverty and inequality. The importance of income from natural resource extraction should be used for alleviation of poverty and income inequalities in the resource-rich Niger Delta communities. Natural resource extraction is an important source of income for many rural households which the oil companies are depriving them of through their activities that resulted to environmental degradation.

The analysis in this study contributes to the empirical literature on environmental abatement progress, policy progress as well as managerial implications. The outcome of this study also signifies the contribution of the study towards a new shift in analyzing improvement environment in developing countries. The study also shows important links between foreign direct investments, economic growth, environmental capacity, linkages and performance. In totality significant contribution is needed if one undertakes a study especially when it involves intense and complex research work. Apart from contributing in forming a new conceptual framework using existing theoretical arguments in this contribution for the policy implications and recommendation for future studies was also established.

9. 5: General Contribution of the Study

Factors militating against the effective and efficient use of oil wealth for growth and development of the Nigeria economy, include high import dependency, mismanagement and corruption, lack of diversification of the export base of the economy, defective economic policy, low level of human capital development and in relative to the population, and debt burden. All these factors have been shown in literature to account for the poor economic and social conditions of living in Nigeria.

The pollution abatement, based on enforcement through fine and other penalties on legally mandated environmental standards is generally widespread. There needs to make greater use of economic instruments based on economic principle of efficiency. The study found out that to be effective, the system must be designed to levy fines at a level that makes compliance less expensive than paying fines at very least cost for the most oil companies.

There are conditions to be met for effective abates industrial pollution in Nigeria; the conditions include an adequate information base and administrative capacity; a strong legal structure and competitive market structure. The environmental information network, set up under the Nigeria environmental management project will also vastly improve information flow. The data collected from the survey in Niger delta was presented in 2nd conference international conference organized by Centre for environmental and Niger Delta Studies

Deliberate efforts to boost consumer demand for gas needed to complement the reinjection and utilization drive by producing companies. Environmental quality is becoming a scarce and highly valued resource, which should therefore command a price. The study therefore suggest that this price should be paid by its consumers in proportion to the amount consumed, as a pollution tax/fine, set at a level which will bring the optimum point of each consumer's private interest in the same position as the social optimum point where the social marginal costs and prices are equal.

Therefore, there is an urgent need for the government to provide an environment that is conducive for investment in the gas industry as this will lead to additional income to both the people and government of Nigeria. The passage and signing into law of the proposed Petroleum Industry Bill (PIB) could as well be the answer to the puzzle obstructing the development of Nigerian gas industry as it will enhance investors' confidence in the industry.

Furthermore, gas flaring should stop without delay since its prolongation is not only humanly and environmentally harmful, but also amount to a huge source of revenue loss to the government and people of Nigeria. Therefore, the study suggests that endorsement for the new oil field development and exploration ought to be conditionally of providing facilities for the utilization of associated gas. Efficient legal obligations must be made obligatory to necessitate associated gas to be used at the Bonny LNG plant and in the West African Gas Pipeline before any non-associated gas is used. The government should continue to promote private investment and ownership in major gas facilities.

The diversification of the economy and the promotion of manufacturing activities in particular are also necessitated by the need to ensure adequate and regular inflow of foreign exchange so as to strengthen the economy. This also requires that macroeconomic policies that are sound, credible and stable, also maintaining the stability of political environment. Borenzstein, *et al.*, (1998) conclude that FDI is an imperative medium for transfer of technology, contributing comparatively more to growth than domestic investment. The higher efficiency of FDI applies only where the host country has a minimum threshold stock of human capital; which this study greatly supported. Also the business concern and priorities of investors must be respected in policymaking, since they are ultimately profit-seekers and not philanthropists.

Regarding the relationship between FDI and growth, it is generally found that inflows of FDI encourage more rapid economic growth. FDI has been considered as a resource that has transmission mechanisms and it serves as a device for dealing with the poverty reduction and human development objectives of host countries. Furthermore, the impact of FDI is determined by government policies in host countries to promote and influence the nature of that investment.

9.6: Recommendation and Future Research Directions

The present research has brought forth a number of recommendations for further research about the role of Foreign Direct Investment into crude oil exploitation and its impact on the economic growth and the environment. The previous research (Richard, et al., 2003; Michael & Mark, 2005; Clive & Arild, 2006; John, 2008; McFadden, 1978; Solow, 1997; Adams B. Jaffe et al. 2000; Omene, 1995; Onosode, G. 2003; Orubu O. 2004,; Richard, 2006; Thomas Berger ,2006; Ikelegbe 2005; Dahlsrud, A 2006; Jorgensen, et al., 2003; Eweje G. 2006; Maya, et al., 2010; Gabriel Eweje 2007; Aghalino, 2009; David & Lester 2003) found that, the strategy of achieving economic development must include valuation of the environment that leads to economic growth, poverty alleviation and sound natural environmental management. Valuing the environment suggest welfare of future generation should not be less than the welfare of the current generation. Furthermore, the stock of renewable resource should be maintained and the economy should save over and above the depreciation rate of both man-made and natural capital resources.

Furthermore, Policy adaptation can help make the livelihood assets of the poor more resilient to environmental stresses while providing other development benefit. For example inventorying and tracking ecological resources of the poor, addressing environmental deprivations including vulnerability to ecological pressure in poverty assessments and programs. Also, implementing early warning systems to anticipate environmental emergencies and to prevent disasters by preserving funds for the development effort, restoring and expanding natural ecosystem barrier to extreme events such as flooding and water shortages; constructing infrastructure to serve the poor. It is a necessity to establish micro insurance schemes for farmers, empowerment of the people and their organization by giving information about the environmental pressure they face to government agencies. They must entrust that the poor will get a fair share of government services; sharing economic growth more equitably and demanding more government transparency and accountability and maintaining the environmental stress.

There is a need for government to ensure sustainable fiscal policy management, and, low inflation rate. Also, enhance competitive market condition that offers the best prospects for speedy economic growth through domestic investment. Also, pursue strategies to enhance effective competition between transnational corporations in the oil industry and indigenous companies. This should be complemented by enforcing the social responsibilities of both the foreign and indigenous companies to their communities.

Policies should promote equity in income distribution so that the income generated from crude oil exploitation will trickle down to the people. It has been noted that high living standard are usually associated with nation that are well accomplished with natural resources and have succeeded in making effective and efficient use of them. But Nigeria's experience has shown that resource endowment can determine the level of economic activities and income generation capacity of an economy, but not the standard of living. The country should adopt measures that would provide a reasonable degree of protection of its ecological human environment from pollution, whether it emanate from the oil industry or other sources. Pricing regime is more beneficial in rendering companies with an incentive to find and produce gas should be adopted by Nigerian government. If gas is able to contend on price with alternative energy forms in the market, the full potential and value of Nigerian gas reserves will be realized. However, consumer subsidy for gas should be considered to keep the product affordable.

This study offers additional understanding of the impact of foreign direct investment into exploitation of crude oil and impact on growth and environment. However, the limitations of the study of this research also warrant some attention. Consequently, the finding also signifies the need for more research to further enlighten the role of foreign direct investment on growth, environment and the standard of living in Niger Delta. This can supplement the research as well to provide more robust conclusions with regard to growth in foreign and domestic investment in building economic capacity, social infrastructure and abating the environmental degradation. Although the study has argued for the merits of the framework used in term of in-depth understanding of the phenomenon in the study. The limitations exist due to the complexity of the issues and incapability of any individual research to provide a holistic framework of analysis. To undertake survey in volatile and dangerous terrain proves to be another limitation in form of time consuming and financially difficult. Hence, this study only uses a more coherent approach that follows the environmental economic study, whereby the analysis is more linear and static in nature. This may serve as one of the limitations that limit the study from revealing any crucial information with regard to scientific and industrial capability enhancement of oil companies to combat the environmental degradation. The study is also limited to specific sector and region in the country, thus limiting the generalization of the finding. This study only measures the direct and indirect impact of oil companies on the communities using household heads as the main respondent; there is need for broad based measurement that will include the oil companies' process performances.

There is a need for research that prearranged measures which influence government in establishing long term investment goals and achieving them by using directive. Although, the primary justification of growth is that, it is the path to greater material abundance and higher living standards desired by the vast majority of people. In contrast other school of thought says growth resulted in pollution, global warming, ozone depletion and other environmental problems. The more rapid our growth and the higher standard of living, the more waste the environment must absorb. There is a need to balance the growth in oil industries with the environmental consequences in a macro level that will yield alternative policies of dealing with environmental degradation.

This also necessitates a study in respect of maintaining a transparent and nondiscriminatory regulation of the environment. In addition, this will help in determine the prerequisite for structural adjustment of the economy and mapped out combination of macroeconomic policies that encourage long term investment. The most formidable problem, which needs to be solved in this type of study, is the lack of statistical data and information with regard to the available physical resources.

The most obvious area of research is probably a government pricing policy, including subsidies of oil product which can aggravate resource shortages or encourage unsustainable methods of production and distribution. Often programmes that were ostensibly designed to reduce hardships for the very poor have little impact on poverty and have worsened existing inequalities; therefore there is a need for study in these identified areas. Another area of study that needed in the Niger Delta is a sustainable partnership framework which explicitly recognizes the role that communities can play in the resolution of environmental related problems. The community development initiatives investment is vital for the establishment of cordial relationship between multinational oil companies and the host communities.

Therefore, the present research needs to be replicated with different samples and methodology of valuation of the environment on cross-country analysis of the rich resource and scare resource nations with sound economic position. For future research, there is a need for inferring the optimal penalty to discourage gas flaring, and oil spillage to be based on scientific inquiry. This presupposes a detailed and focused research to determine the compliance cost to producing firms such that the penalty for environmental degradation will yield to government revenue that will be equal at least to the compliance cost of producing firm.

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APPENDIX A:

Procedure of Estimating Structural Equation Model

There is basic direction different between statistics in general and SEM. Usually, procedure in statistic focuses on individual observation. In multiple regressions, estimation of regression coefficients can be obtained by minimizing sum of square different between predicted and measured dependent variable for each observation or case. In this case, residual analysis shows difference between fitted and measured value for each observation or case in the sample.

Procedure of SEM orientates toward covariance instead of individual observation. Parameters estimation of the model can be obtained by minimizing difference between predicted covariance of model and sample covariance. This minimized difference is called by residual. Mathematically, this orientation can be written as $\sum = \sum(\Theta)$ + residual, where: $\sum$ is covariance matrix data of population and $\sum(\Theta)$ is model implied covariance matrix. In order to obtain good fit between data and model, residual must be minimized toward 0. This discussion leads to the definition of fundamental statistical hypotheses of SEM procedure as: H_0: $\sum = \sum(\Theta)$. Procedure of SEM is looking for the acceptance or non rejection of H_o.

Procedure of SEM consists of stages as follows:

A. Model specification: This stage relates to specification of initial structural equation model in mathematical notation or in path diagram. This model it formulated based on theory or previous researches.

B. Identification: This stage relates to analyzing identification of simultaneous equation of the model. Under-identified model (negative degree of freedom) must be avoided and SEM will work on just and over-identified model (zero or positive degree of freedom).

C. Estimation: This stage relates to estimation of the model in order to obtain parameters' values using available estimation methods such as maximum likelihood, robust maximum likelihood and weighted least square. Estimation procedure use iterations to minimize a function of $S-\sum(\Theta)$, where: S is covariance matrix of sample data and $\sum(\Theta)$ is model implied covariance matrix. (Loehlin, 1992).

D. Testing of fit: This stage relates to testing of the model fit on observed data. This stage consists of 3 sub-stages (Hair et.al, 1998; Wijanto, 2008):

Testing of overall model fit: The objective of this sub-stage is to evaluate overall goodness of fit (GOF) between data and model. SEM does not have best statistical test to explain 'power' of model prediction, instead, researchers have developed several GOF measures or Goodness of Fit Indices (GOFI) which can be used in combination with each others. This condition explains why testing of overall model cannot be severed from controversy and debates (Bollen and Long, 2003).

i) Analyzing measurement model: The objective of this sub-stage is getting valid and reliable measurement models or constructs. Validity relates to whether an observed variable is really measuring or reflecting a latent variable. Validation test can be done by testing standardized factor loading of observed variable on its latent variable.

ii) Reliability: This relates to consistency of a measurement. High reliability represents high consistency of observed variables in measuring a corresponding latent variable or constructs. Reliability of a measurement model can be tested through testing of its construct reliability and its variance extracted.

iii) Analyzing structural model: The objective of this sub-'stage is checking whether estimated coefficients of structural model are significant. By specifying significant level (usually $\alpha = 0.05$), each structural coefficient in the model can be tested whether its probability less or equal the significant level. If probability of a structural coefficient ≤ significant level, then this structural coefficient is significant, otherwise it is not significant. Significant structural coefficient reflects that related research hypothesis is true.

APPENDIX B:

SURVEY QUESTIONNAIRE

QUESTIONNAIRE

Serial No:

SECTION A:

Instruction: please tick (√) where appropriate and fill in the blank space where necessary

1. Sex: Male ☐ Female ☐

2 Respondent statuses in the community: Indigene of the Community ☐

Residents of the Community ☐

3 Age between 30-40 ☐ 41-50 years ☐

51-60 years ☐ 61 yrs and above ☐

4 Marital Statu: Married ☐ Single ☐

Widow/Widower ☐ Divorced/Separated ☐

5 Education Qualification:

Primary School ☐ SSCE /Diploma ☐

BSC/HND ☐ MSc/PhD ☐

Uneducated ☐

6 .Employment in Oil Company in the community?

Yes ☐ No ☐ .

7. If yes what is your status within the company?

Top Management ☐ Middle Management ☐

Clerical officer ☐ Casual worker ☐

Contract staff ☐ Contractors to the Oil company ☐

8. Nature of your work

Full Time ☐ Part time ☐

9. What are your average monthly income

i. Below ₦20,000 ☐ ii. Between ₦21,000 to ₦60,000

iii. Between #61,000 to #100,000 ☐ iv.Between #101,000 to #150, 000 ☐

v Above # 151,000 ☐

Please specify

SECTION B: ENVIRONMENTAL IMPACT

(Please rate the extent to which you agree with the following statements)

(False) (True)1 2

3 4 5 6 7 8 9 10

1	The living condition of the indigenes has improve due to operation of oil companies in the community										
2	Operation of the oil companies resulting into oil spillage has positive effects the health of the residents of the community.										
3	Spillage from the activities of the oil companies has not helped the occupation of the community										
4	Leakages from oil companies pipeline does not contaminate streams and rivers in the community										
5	It is easy to access portable water in the community despite oil spillage incidences										
6	The number of oil companies operating in this community is directly linked to the level of air pollution										

7	The reaction of the community to air pollution brings violence, breaking laws and orders in the community										
8	The air pollution resulted to loss of revenue to the resident of the community										
9	This air pollution has effect on the income generating activities of the residents of the community										
10	The air pollution from these companies has negative effect on the health of the residents of the community										
11	Does oil exploitation result into land degradation in the community										
12	The land degradation in the community affected the fertility of soil in the community										
13	Has oil exploitation resulted to land pollution your community										
14	The number of oil companies operating in this community is directly linked to the level of land degradation										
15	The land degradation has affected income of people the community										

SECTION C: GAC -- GENERAL AWARENESS OF ENVIRONMENTAL CONSEEQUENCES

Strongly Disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly agree 5

No	Questions					
1	While some local plants and animals may have been harmed by environmental degradation, over whole Earth there has been little effect					
2	Environmental protection benefits everyone					
3	Environmental damage generated here harms people all over the world					
4	Environmental protection is beneficial to my health					
5	Environmental threats to public health have been exaggerated					
6	Over the next decade, thousands of species of plants and animals will become extinct					
7	Environmental protection will help people have a better quality of life					
8	Environmental protection provides me with better opportunities for recreation					

9	Environmental protection will provide a better world for me and my children					
10	Environmental threats to public health have been exaggerated					

SECTION D: IMPACT OF CRUDE OIL EXPLIOTATION ON PEOPLE AND COMMUNITY WELLBEING

Strongly Disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly agree 5

No	Questions					
1	Adult education is an essential part of the program introduced by oil companies for reducing poverty in the community					
2	The companies operating in the community organize skill acquisition training for the young people.					
3	The oil companies provides scholarship scheme for the youth who are willing to further their education in the community					
4	The oil companies provide accessible health facilities to the people in the community					
5	The activities of the oil companies in the community has positive impact on the health of the residents					
6	Environmental protection is beneficial to my health					
7	Oil companies provide the community with public infrastructure, this increase the household income					
8	The infrastructural Development by oil company increase employment opportunities					
9	The majority of oil companies are foreign companies this reduces the employment opportunities in the communities					
10	The level of youth unemployment in this community is high					
11	The operation of the oil companies in this community has created employment for the youth.					
12	The main occupation of the indigenes of the community is agriculture					
13	There is negative impacts of oil company activities on agriculture activities in the community					
14	The farmers are being displaced because of the activities of the companies					
15	The fishing activities of the farmer has increase due to the activities of the oil companies					

HEALTH RELATED ISSUES.

1. Please tick the most common illness prevailing in this community for the past 3 years (*Rank them from 1 to 5 as most common*)

	Water Borne Diseases		Air Borne Diseases
A	Diahorea	I	Chicken pox
B	Malaria	J	Influenza
C	Dysentery	K	Tuberculosis
D	Bilharzias	L	Smallpox
E	Typhoid	M	Lung cancer
G	Skin disease	N	Meningitis
H	Cholera	O	Cancer

2. Sources of these illnesses are;

a. Polluted water ☐ b. Polluted Air ☐ c. Land degradation ☐

d. Gas flaring ☐ e. Lack of Health facilities ☐

3. Where is the health care facility located?

Located in the community ☐ Share with other community ☐

4. What types of health care is available in the community

a. sickbay ☐ b. Health centre ☐ c. Public Hospital ☐

d. Private Hospital ☐ c. Company sponsor hospital ☐

5. How far are these health care facilities from your community?

Less than a kilometer ☐ between 2 to 5 kilometer ☐ Above 6 kilometer ☐

6. These health care facilities are sponsored by;

a. Government only ☐ b. Companies operating in the community ☐

c. Community ☐ d. Joint ventures ☐ e. I Don't Know ☐

7. What is the nature of this health care delivery system in the community?

A. Free of charge ☐ b. Partially commercialized ☐

c. Fully commercialized ☐ d. Joint ventures ☐ e. I Don't Know ☐

INCOME RELATED ISSUES:

1. How many persons are earning income in your household?

a.	Male		b.	Female		c.	Not applicable

2. What is your monthly average income?

Please Specify ---

1. Do you have any outstanding debts?

Yes______ No----

3. Do you pay any form of Tax to government?

Yes ☐ No ☐

SECTION E: EXTENT OF STRESS FROM ENVIRONMENTAL PROBLEM IN THE COMMUNITIES

Please indicate the extent of stress you experience due to the following factors. Using a scale from 1 (not stressed at all) to 4 (intensely stressed), please indicate the extent of stress you experience due to the following factors:

1. Gas flare

1	2	3	4
Not Stressed at all	Slightly Stressed	Strongly Stressed	Intensely Stressed

2. Pollution of the oceans and rivers

1	2	3	4
Not Stressed at all	Slightly Stressed	Strongly Stressed	Intensely Stressed

3. Extinction of species

1	2	3	4
Not Stressed at all	Slightly Stressed	Strongly Stressed	Intensely Stressed

4. Land degradation

1	2	3	4
Not Stressed at all	Slightly Stressed	Strongly Stressed	Intensely Stressed

SECTION F: PERCEPTION OF THE PEOPLE ON OPERATION OF OIL COMPAINIES IN THE COMMUNITIES

Strongly Disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly agree 5

No	Questions					
1	The Environmental threats oil companies to public health have been exaggerated					
2	Leaders of this community are getting favor and gratification from the oil companies operating in this community.					
3	The operation of the oil companies in the community created slum and crime					
4	The oil companies compensate people in the community as a result of damage done to them and their property					
5	The oil companies operate in your community observe basic environmental safety laws					

APPENDIX C:

Assessment of Items' Normality

Variable	Skew	Kurtosis
Gac1	0.906	-0.787
Gac2	0.854	-0.607
Gac3	0.86	-0.57
Gac4	0.875	-0.62
Gac5	0.84	-0.677
Gac6	0.894	-0.761
Gac7	0.875	-0.753
Gac8	0.864	-0.83
Gac9	0.848	-0.611
Gac10	0.915	-0.681
PWB1	-0.253	-1.797
PWB2	-0.203	-1.752
PWB3	-0.222	-1.841
PWB4	-0.213	-1.809
Perception1	0.809	-0.866
Perception2	0.894	-0.803
Perception3	0.794	-0.732
Perception4	0.825	-0.886
Perception5	0.785	-0.739
StressEnP1	-0.99	-0.193
StressEnP2	-0.785	-0.276
StressEnP3	-0.268	-0.801
StressEnP4	-1.082	-0.128
PE1	0.185	-1.371
PE2	0.201	-1.313
PE3	0.247	-1.181
PE4	0.039	-1.364
PE5	0.148	-1.041

The Extended structural Model

Assessment of normality (Group number 1)

Variable	min	max	skew	c.r.	kurtosis	c.r.
Gac1	1.000	5.000	.906	5.777	-.787	-2.510
Gac2	1.000	5.000	.854	5.448	-.607	934
Gac3	1.000	5.000	.860	5.484	-.570	-1.818
Gac4	1.000	5.000	.875	5.580	-.620	-1.976
Gac5	1.000	5.000	.840	5.355	-.677	-2.160
Gac6	1.000	5.000	.894	5.703	-.761	-2.427
Gac7	1.000	5.000	.875	5.577	-.753	-2.399
Gac8	1.000	5.000	.864	5.509	-.830	-2.647
Gac9	1.000	5.000	.848	5.410	-.611	-1.949

Gac10	1.000	5.000	.915	5.834	-.681	-2.171
PWB1	4.000	20.000	-.253	-1.616	-1.797	-5.730
PWB2	3.000	5.000	-.203	-1.294	-1.752	-5.585
PWB3	6.000	30.000	-.222	-1.414	-1.841	-5.870
PWB4	4.000	20.000	-.213	-1.361	-1.809	-5.769
Perception1	1.000	5.000	.809	5.158	-.866	-2.763
Perception2	1.000	5.000	.894	5.703	-.803	-2.561
Perception3	1.000	5.000	.794	5.062	-.732	-2.333
Perception4	1.000	5.000	.825	5.264	-.886	-2.824
Perception5	1.000	5.000	.785	5.007	-.739	-2.355
StressEnP1	1.000	4.000	-.990	-6.313	-.193	-.616
StressEnP2	1.000	4.000	-.785	-5.003	-.276	-.879
StressEnP3	1.000	4.000	-.268	-1.707	-.801	-2.556
StressEnP4	1.000	4.000	-1.082	-6.901	-.128	-.409
PE1	3.000	26.000	.185	1.180	-1.371	-4.372
PE2	0	35.000	.201	281	-1.313	-4.187
PE3	3.000	28.000	.247	1.576	-1.181	-3.765
PE4	2.000	26.000	.039	46	-1.364	-4.348
PE5	.000	9.000	.148	.941	-1.041	-3.320
Multivariate					63.709	12.140

Variances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Stress			.752	.085	8.890	***	par_24
GAC			1.607	.169	9.487	***	par_25
e39			3.214	.316	10.169	***	par_26
e40			14.796	1.634	9.057	***	par_27
e41			33.733	3.177	10.618	***	par_28
e11			4.723	.508	9.306	***	par_29
e12			9.855	1.104	8.930	***	par_30
e13			5.870	.733	8.008	***	par_31
e14			13.681	1.533	8.923	***	par_32
e15			8.865	1.008	8.791	***	par_33
e16			.182	.025	7.182	***	par_34
e17			.385	037	10.274	***	par_35
e18			.297	.032	9.265	***	par_36
e19			.125	.024	5.277	***	par_37
e20			.292	.034	8.567	***	par_38
e21			.370	.041	8.944	***	par_39
e22			.390	.041	9.489	***	par_40
e23			.310	.037	8.349	***	par_41

e24			.309	.036	8.558	***	par_42
e25			1.336	.168	7.955	***	par_43
e26			2.480	.329	7.536	***	par_44
e27			.928	.105	8.836	***	par_45
e28			1.327	.162	8.212	***	par_46
e29			.291	.029	10.060	***	par_47
e30			.322	.031	10.233	***	par_48
e31			.275	.028	9.784	***	par_49
e32			.227	.024	9.618	***	_50
e33			.299	.030	9.956	***	par_51
e34			.220	.023	9.712	***	par_52
e35			.268	.027	9.971	***	par_53
e36			.264	.026	10.057	***	par_54
e37			.201	.021	9.686	***	par_55
e38			.359	.036	10.116	***	par_56

Squared Multiple Correlations: (Group number 1 - Default model)

			Estimate
Oil_FDI			.303
Wlb_Imp			.100
Envr_Imp			.301
Gac1			.838
Gac2			.884
Gac3			.847
Gac4			.858
Gac5			.882
Gac6			.859
Gac7			.889
Gac8			.876
Gac9			.819
Gac10			.847
PWB1			.963
PWB2			.953
PWB3			.970
PWB4			.966
Perception1			.941
Perception2			.945
Perception3			.909
Perception4			.930

Perception5			.940
StressEnP1			.869
StressEnP2			.675
StressEnP3			.479
StressEnP4			.805
PE1			.853
PE2			.845
PE3			.886
PE4			.844
PE5			.818

Model Fit SummaryCMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	66	597.139	350	.000	1.706
Saturated model	406	.000	0		
Independence model	28	9430.781	378	.000	24.949

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	4.636	.869	.848	.749
Saturated model	.000	1.000		
Independence model	6.577	.193	.133	.180

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.937	.932	.973	.971	.973
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.926	.867	.901
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	247.139	183.452	318.699
Saturated model	.000	.000	.000
Independence model	9052.781	8739.719	9372.208

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2.457	1.017	.755	1.312
Saturated model	.000	.000	.000	.000
Independence model	38.810	37.254	35.966	38.569

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.054	.046	.061	.189
Independence model	.314	.308	.319	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	709.139	724.316	904.980	960.980
Saturated model	812.000	922.037	2231.850	2637.850
Independence model	9486.781	9494.370	9584.701	9612.701

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.918	2.656	3.213	2.981
Saturated model	3.342	3.342	3.342	3.794
Independence model	39.040	37.752	40.355	39.071

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	161	169

Independence model	11	12

WELLBEING IMPACT

WIb_IMP

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
PWB	<---	Parceled WBI	.979
PWB2	<---	Parceled WBI	.973
PWB3	<---	Parceled WBI	.983
PWB4	<---	Parceled WBI	.981

Variances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Parceled WBI			30.491	2.886	10.564	***	par_4
e1			1.329	.162	8.211	***	par_5
e2			.927	.105	8.829	***	par_6
e3			2.478	.329	7.526	***	par_7
e4			1.338	.168	7.961	***	par_8

Squared Multiple Correlations: (Group number 1 - Default model)

			Estimate
PWB4			.961
PWB3			.966
PWB2			.948
PWB1			.958

Matrices (Group number 1 - Default model)Factor Score Weights (Group number 1 - Default model)

	PWB4	PWB3	PWB2	PWB1
Parceled WBI	.250	.196	.256	.241

Total Effects (Group number 1 - Default model)

	Parceled WBI
PWB4	1.046
PWB3	1.520
PWB2	.741

PWB1	1.000

Standardized Total Effects (Group number 1 - Default model)

	Parceled WBI
PWB4	.981
PWB3	.983
PWB2	.973
PWB1	.979

Direct Effects (Group number 1 - Default model)

	Parceled WBI
PWB4	1.046
PWB3	1.520
PWB2	.741
PWB1	1.000

Standardized Direct Effects (Group number 1 - Default model)

	Parceled WBI
PWB4	.981
PWB3	.983
PWB2	.973
PWB1	.979

Indirect Effects (Group number 1 - Default model)

	Parceled WBI
PWB4	.000
PWB3	.000
PWB2	.000
PWB1	.000

Standardized Indirect Effects (Group number 1 - Default model)

	Parceled WBI
PWB4	.000
PWB3	.000
PWB2	.000
PWB1	.000

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	8	2.710	2	.258	1.355
Saturated model	10	.000	0		
Independence model	4	1996.206	6	.000	332.701

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.048	.994	.972	.199
Saturated model	.000	1.000		
Independence model	27.864	.266	-.223	.160

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.999	.996	1.000	.999	1.000
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.333	.333	.333
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	.710	.000	9.384
Saturated model	.000	.000	.000
Independence model	1990.206	1846.960	2140.796

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.011	.003	.000	.039
Saturated model	.000	.000	.000	.000
Independence model	8.215	8.190	7.601	8.810

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.038	.000	.139	.449
Independence model	1.168	1.126	1.212	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	18.710	19.047	46.688	54.688
Saturated model	20.000	20.420	54.972	64.972
Independence model	2004.206	2004.374	2018.195	2022.195

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.077	.074	.113	.078
Saturated model	.082	.082	.082	.084
Independence model	8.248	7.658	8.867	8.248

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	538	826
Independence model	2	3

Perception on Oil_ FDI

Assessment of normality (Group number 1)

Variable	min	max	skew	c.r.	kurtosis	c.r.
Perception5	1.000	5.000	.785	5.007	-.739	-2.355
Perception4	1.000	5.000	.825	5.264	-.886	-2.824
Perception3	1.000	5.000	.794	5.062	-.732	-2.333
Perception2	1.000	5.000	.894	5.703	-.803	-2.561
Perception1	1.000	5.000	.809	5.158	-.866	-2.763
Multivariate					26.143	24.404

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Perception1	<---	Perception on_Oil FDI	.925

Perception2	<---	Perception on_Oil FDI	.928
Perception3	<---	Perception on_Oil FDI	.888
Perception4	<---	Perception on_Oil FDI	.912
Perception5	<---	Perception on_Oil FDI	.916

Variances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Perception onOil_ FDI			1.808	.191	9.461	***	par_5
e1			.305	.036	8.436	***	par_6
e2			.313	.038	8.295	***	par_7
e3			.386	.041	9.417	***	par_8
e4			.369	.042	8.862	***	par_9
e5			.291	.033	8.769	***	par_10

Squared Multiple Correlations: (Group number 1 - Default model)

			Estimate
Perception5			.838
Perception4			.832
Perception3			.788
Perception2			.862
Perception1			.856

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	10	4.261	5	.512	.852
Saturated model	15	.000	0		
Independence model	5	1408.317	10	.000	140.832

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.012	.993	.979	.331
Saturated model	.000	1.000		
Independence model	1.392	.264	-.104	.176

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.997	.994	1.001	1.001	1.000
Saturated model	1.000		1.000		1.000

Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.500	.498	.500
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	.000	.000	8.214
Saturated model	.000	.000	.000
Independence model	1398.317	1278.725	1525.279

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.018	.000	.000	.034
Saturated model	.000	.000	.000	.000
Independence model	5.796	5.754	5.262	6.277

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.000	.000	.082	.777
Independence model	.759	.725	.792	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	24.261	24.768	59.233	69.233
Saturated model	30.000	30.759	82.458	97.458
Independence model	1418.317	1418.570	1435.803	1440.803

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.100	.103	.137	.102
Saturated model	.123	.123	.123	.127
Independence model	5.837	5.345	6.359	5.838

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	632	861
Independence model	4	5

Perceived Environmental Stress

Standardized Regression Weights: (Group number 1 - Default model)

	Estimate
StressEnP1 <--- Percieved Environmental_Stress	.930
StressEnP2 <--- Percieved Environmental_Stress	.820
StressEnP3 <--- Percieved Environmental_Stress	.694
StressEnP4 <--- Percieved Environmental_Stress	.914

Variances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Percieved Environmental_Stress			.825	.088	9.357	***	par_4
e1			.130	.023	5.535	***	par_5
e2			.299	.032	9.368	***	par_6
e3			.383	.037	10.298	***	par_7
e4			.165	.026	6.432	***	par_8

Squared Multiple Correlations: (Group number 1 - Default model)

			Estimate
StressEnP4			.836
StressEnP3			.481
StressEnP2			.672
StressEnP1			.864

Matrices (Group number 1 - Default model)

Factor Score Weights (Group number 1 - Default model)

	StressEnP4	StressEnP3	StressEnP2	StressEnP1
Percieved Environmental_Stress	.327	.092	.154	.412

Total Effects (Group number 1 - Default model)

	Percieved Environmental_Stress
StressEnP4	1.011
StressEnP3	.657
StressEnP2	.863
StressEnP1	1.000

Standardized Total Effects (Group number 1 - Default model)

	Percieved Environmental_Stress
StressEnP4	.914
StressEnP3	.694
StressEnP2	.820
StressEnP1	.930

Direct Effects (Group number 1 - Default model)

	Percieved Environmental_Stress
StressEnP4	1.011
StressEnP3	.657
StressEnP2	.863
StressEnP1	1.000

Standardized Direct Effects (Group number 1 - Default model)

	Percieved Environmental_Stress
StressEnP4	.914
StressEnP3	.694
StressEnP2	.820
StressEnP1	.930

Indirect Effects (Group number 1 - Default model)

	Percieved Environmental_Stress
StressEnP4	.000
StressEnP3	.000
StressEnP2	.000
StressEnP1	.000

Standardized Indirect Effects (Group number 1 - Default model)

	Percieved Environmental_Stress
StressEnP4	.000
StressEnP3	.000

StressEnP2	.000
StressEnP1	.000

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	8	.840	2	.657	.420
Saturated model	0	.000	0		
Independence model	4	690.855	6	.000	115.143

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.005	.998	.992	.200
Saturated model	.000	1.000		
Independence model	.504	.399	-.002	.239

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.999	.996	1.002	1.005	1.000
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.333	.333	.333
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	.000	.000	4.716
Saturated model	.000	.000	.000
Independence model	684.855	602.235	774.872

FMIN

Model	FMIN	F0	LO 90	HI 90

Default model	.003	.000	.000	.019
Saturated model	.000	.000	.000	.000
Independence model	2.843	2.818	2.478	3.189

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.000	.000	.099	.790
Independence model	.685	.643	.729	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	16.840	17.177	44.818	52.818
Saturated model	20.000	20.420	54.972	64.972
Independence model	698.855	699.023	712.844	716.844

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.069	.074	.093	.071
Saturated model	.082	.082	.082	.084
Independence model	2.876	2.536	3.246	2.877

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	1733	2664
Independence model	5	6

PARCELED ENVIRO IMP

Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
PE1	<---	Parceled Enviro Imp	1.000				

PE2	<---	Parceled Enviro Imp	1.207	.060	19.957	***	par_1
PE3	<---	Parceled Enviro Imp	.944	.044	21.507	***	par_2
PE4	<---	Parceled Enviro Imp	1.023	.051	19.962	***	par_3
PE5	<---	Parceled Enviro Imp	.613	.033	18.423	***	par_4

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
PE1	<---	Parceled Enviro Imp	.887
PE2	<---	Parceled Enviro Imp	.881
PE3	<---	Parceled Enviro Imp	.911
PE4	<---	Parceled Enviro Imp	.881
PE5	<---	Parceled Enviro Imp	.849

Variances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Parceled Enviro Imp			32.528	3.719	8.747	***	par_5
e1			8.844	1.014	8.718	***	par_6
e2			13.601	1.538	8.844	***	par_7
e			5.905	.744	7.940	***	par_8
e4			9.765	1.104	8.842	***	par_9
e5			4.748	.504	9.425	***	par_10

Squared Multiple Correlations: (Group number 1 - Default model)

			Estimate
PE5			.720
PE4			.777
PE3			.831
PE2			.777
PE1			.786

Matrices (Group number 1 - Default model)

Factor Score Weights (Group number 1 - Default model)

	PE5	PE4	PE3	PE2	PE1
Parceled Enviro Imp	.220	.178	.272	.151	.192

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	10	3.648	5	.601	.730
Saturated model	15	.000	0		
Independence model	5	1131.504	10	.000	113.150

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.266	.994	.981	.331
Saturated model	.000	1.000		
Independence model	24.895	.292	-.062	.195

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.997	.994	1.001	1.002	1.000
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.500	.498	.500
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	.000	.000	6.956
Saturated model	.000	.000	.000
Independence model	1121.504	1014.738	1235.647

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.015	.000	.000	.029
Saturated model	.000	.000	.000	.000
Independence model	4.656	4.615	4.176	5.085

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.000	.000	.076	.833
Independence model	.679	.646	.713	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	23.648	24.154	58.620	68.620
Saturated model	30.000	30.759	82.458	97.458
Independence model	1141.504	1141.757	1158.989	1163.989

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.097	.103	.132	.099
Saturated model	.123	.123	.123	.127
Independence model	4.698	4.258	5.167	4.699

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	738	1005
Independence model	4	5

GAC (ENVIRONMENTAL CONSEQUENCES RISK)

Assessment of normality (Group number 1)

Variable	min	max	skew	c.r.	kurtosis	c.r.
Gac10	1.000	5.000	.915	5.834	-.681	-2.171
Gac9	1.000	5.000	.848	5.410	-.611	-1.949
Gac8	1.000	5.000	.864	5.509	-.830	-2.647
Gac7	1.000	5.000	.875	5.577	-.753	-2.399
Gac6	1.000	5.000	.894	5.703	-.761	-2.427
Gac5	1.000	5.000	.840	5.355	-.677	-2.160
Gac4	1.000	5.000	.875	5.580	-.620	-1.976
Gac3	1.000	5.000	.860	5.484	-.570	-1.818
Gac2	1.000	5.000	.854	5.448	-.607	-1.934
Gac1	1.000	5.000	.906	5.777	-.787	-2.510
Multivariate					33.801	17.041

Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Gac1	<---	GAC	1.000				
Gac2	<---	GAC	.908	.033	27.133	***	par_1
Gac3	<---	GAC	884	.035	25.242	***	par_2
Gac4	<---	GAC	.930	.036	25.801	***	par_3
Gac5	<---	GAC	.940	.035	27.049	***	par_4
Gac6	<---	GAC	.989	.038	25.852	***	par_5
Gac7	<---	GAC	.988	.036	27.423	***	par_6
Gac8	<---	GAC	1.023	.038	26.713	***	par_7
Gac9	<---	GAC	.883	.037	23.964	***	par_8
Gac10	<---	GAC	.978	.037	26.086	***	par_9

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Gac1	<---	GAC	.916
Gac2	<---	GAC	.940
Gac3	<---	GAC	.920
Gac4	<---	GAC	.926
Gac5	<---	GAC	.939
Gac6	<---	GAC	.927
Gac7	<---	GAC	.943

Gac8	<---	GAC	.936
Gac9	<---	GAC	.904
Gac10	<---	GAC	.929

Variances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
GAC			1.865	.200	9.342	***	par_10
e1			.359	.035	10.123	***	par_11
e2			.202	.021	9.698	***	par_12
e3			.265	.026	10.069	***	par_13
e4			.267	.027	9.975	***	par_14
e5			.220	.023	9.719	***	par_15
e6			.300	.030	9.966	***	par_16
e7			.226	.024	9.625	***	par_17
e8			.276	.028	9.795	***	par_18
e9			.324	.032	10.245	***	par_19
e10			.281	.028	9.923	***	par_20

Matrices (Group number 1 - Default model)

Factor Score Weights (Group number 1 - Default model)

	Gac10	Gac9	Gac8	Gac7	Gac6	Gac5	Gac4	Gac3	Gac2	Gac1
GAC	.100	.078	.107	.125	.095	.123	.100	.096	.129	.080

Total Effects (Group number 1 - Default model)

	GAC
Gac10	.978
Gac9	.883
Gac8	1.023
Gac7	.988
Gac6	.989
Gac5	.940
Gac4	.930
Gac3	.884
Gac2	.908
Gac1	1.000

Standardized Total Effects (Group number 1 - Default model)

	GAC
Gac10	.929

Gac9	.904
Gac8	.936
Gac7	.943
Gac6	.927
Gac5	.939
Gac4	.926
Gac3	.920
Gac2	.940
Gac1	.916

Direct Effects (Group number 1 - Default model)

	GAC
Gac10	.978
Gac9	.883
Gac8	1.023
Gac7	.988
Gac6	.989
Gac5	.940
Gac4	.930
Gac3	.884
Gac2	.908
Gac1	1.000

Standardized Direct Effects (Group number 1 - Default model)

	GAC
Gac10	.929
Gac9	.904
Gac8	.936
Gac7	.943
Gac6	.927
Gac5	.939
Gac4	.926
Gac3	.920
Gac2	.940
Gac1	.916

Indirect Effects (Group number 1 - Default model)

	GAC
Gac10	.000

Gac9	.000
Gac8	.000
Gac7	.000
Gac6	.000
Gac5	.000
Gac4	.000
Gac3	.000
Gac2	.000
Gac1	.000

Standardized Indirect Effects (Group number 1 - Default model)

	GAC
Gac10	.000
Gac9	.000
Gac8	.000
Gac7	.000
Gac6	.000
Gac5	.000
Gac4	.000
Gac3	.000
Gac2	.000
Gac1	.000

Model Fit SummaryCMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	20	50.736	35	.042	1.450
Saturated model	55	.000	0		
independence model	10	3869.581	45	.000	85.991

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.016	.962	.940	.612
Saturated model	.000	1.000		
Independence model	1.533	.130	-.063	.107

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.987	.983	.996	.995	.996
Saturated model	1.000		1.000		1.000

Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.778	.768	.775
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	15.736	.659	38.797
Saturated model	.000	.000	.000
Independence model	3824.581	3624.098	4032.337

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.209	.065	.003	.160
Saturated model	.000	.000	.000	.000
Independence model	15.924	15.739	14.914	16.594

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.043	.009	.068	.651
Independence model	.591	.576	.607	.000

AIC

Model		BCC	BIC	CAIC
Default model	90.736	92.633	160.679	180.679
Saturated model	110.000	115.216	302.344	357.344
Independence model	3889.581	3890.529	3924.553	3934.553

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.373	.311	.468	.381
Saturated model	.453	.453	.453	.474
Independence model	16.007	15.181	16.861	16.010

HOELTER

	HOELTER	HOELTER

	.05	.01
	239	275
	4	5

BASIC STRUCTURAL MODEL

Variances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Oil_FDI			1.305	.143	9.102	***	par_12
e29			33.977	3.205	10.600	***	par_13
e30			19.475	2.117	9.198	***	par_14
e11			4.774	.520	9.175	***	par_15
e12			9.912	1.107	8.955	***	par_16
e13			5.816	.728	7.988	***	par_17
e14			13.601	1.525	8.916	***	par_18
e15			9.002	1.018	8.846	***	par_19
e20			.310	.034	9.165	***	par_20
e21			.371	.042	8.828	***	par_21
e22			.389	.041	9.395	***	par_22
e23			.306	.037	8.158	***	par_23
e24			.305	.036	8.380	***	par_24
e25			1.336	.168	7.950	***	par_25
e26			2.481	.329	7.535	***	par_26
e27			.928	.105	8.836	***	par_27
e28			1.327	.162	8.211	***	par_28

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	28	152.352	77	.000	1.979
Saturated model	05	.000	0		
Independence model	14	4588.687	91	.000	50.425

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	8.827	.921	.893	.676

Saturated model	.000	1.000		
Independence model	12.808	.272	.160	.235

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.967	.961	.983	.980	.983
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.846	.818	.832
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	75.352	44.082	114.410
Saturated model	.000	.000	.000
Independence model	4497.687	4279.479	4723.136

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.627	.310	.181	.471
Saturated model	.000	.000	.000	.000
Independence model	18.883	18.509	17.611	19.437

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.063	.049	.078	.068
Independence model	.451	.440	.462	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	208.352	212.036	306.272	334.272

Saturated model	210.000	223.816	577.203	682.203
Independence model	4616.687	4618.529	4665.647	4679.647

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.857	.729	1.018	.873
Saturated model	.864	.864	.864	.921
Independence model	18.999	18.101	19.926	19.006

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	158	174
Independence model	7	7

EXTENDED STRUCTURAL MODEL

Assessment of normality (Group number 1)

Variable	min	max	skew	c.r.	kurtosis	c.r.
Gac1	1.000	5.000	.906	5.777	-.787	-2.510
Gac2	1.000	5.000	.854	5.448	-.607	-1.934
Gac3	1.000	5.000	.860	5.484	-.570	-1.818
Gac4	1.000	5.000	.875	5.580	-.620	-1.976
Gac5	1.000	5.000	.840	5.355	-.677	-2.160
Gac6	1.000	5.000	.894	5.703	-.761	-2.427
Gac7	1.000	5.000	.875	5.577	-.753	-2.399
Gac8	1.000	5.000	.864	5.509	-.830	-2.647
Gac9	1.000	5.000	.848	5.410	-.611	-1.949
Gac10	1.000	5.000	.915	5.834	-.681	-2.171
PWB1	4.000	20.000	-.253	-1.616	-1.797	-5.730
PWB2	3.000	15.000	-.203	-1.294	-1.752	-5.585
PWB3	6.000	30.000	-.222	-1.414	-1.841	-5.870
PWB4	4.000	20.000	-.213	-1.361	-1.809	-5.769
Perception1	1.000	5.000	.809	5.158	-.866	-2.763
Perception2	1.000	5.000	.894	5.703	-.803	-2.561

Perception3	1.000	5.000	.794	5.062	-.732	-2.333
Perception4	1.000	5.000	.825	5.264	-.886	-2.824
Perception5	1.000	5.000	.785	5.007	-.739	-2.355
StressEnP1	1.000	4.000	-.990	-6.313	-.193	-.616
StressEnP2	1.000	4.000	-.785	-5.003	-.276	-.879
StressEnP3	1.000	4.000	-.268	-1.707	-.801	-2.556
StressEnP4	1.000	4.000	-1.082	-6.901	-.128	-.409
PE1	3.000	26.000	.185	1.180	-1.371	-4.372
PE2	4.000	35.000	.201	1.281	-1.313	-4.187
PE3	3.000	28.000	.247	1.576	-1.181	-3.765
PE4	2.000	26.000	.039	.246	364	-4.348
PE5	.000	19.000	.148	.941	-1.041	-3.320
Multivariate					63.709	12.140

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Oil_FDI	<---	Stress	.900				
Oil_FDI	<---	GAC	.700				
Wlb_Imp	<---	Oil_FDI	.900				
Envr_Imp	<---	Oil_FDI	.900				
Envr_Imp	<---	GAC	.800				
PE5	<---	Envr_Imp	1.000				
PE4	<---	Envr_Imp	1.590	.065	24.410	***	par_1
PE3	<---	Envr_Imp	1.469	.056	26.307	***	par_2
PE2	<---	Envr_Imp	1.876	.077	24.429	***	par_3
PE1	<---	Envr_Imp	1.556	.063	24.761	***	par_4
StressEnP4	<---	Stress	1.000				
StressEnP3	<---	Stress	.686	.053	12.962	***	par_5
StressEnP2	<---	Stress	.905	.052	17.408	***	par_6
StressEnP1	<---	Stress	1.050	.048	22.043	***	par_7
Perception5	<---	Oil_FDI	1.000				
Perception4	<---	Oil_FDI	1.037	.025	41.902	***	par_8
Perception3	<---	Oil_FDI	.917	.024	38.423	***	par_9
Perception2	<---	Oil_FDI	1.073	.024	44.644	***	par_10
Perception1	<---	Oil_FDI	1.029	.024	43.775	***	par_11
PWB4	<---	Wlb_Imp	1.000				
PWB3	<---	Wlb_Imp	1.452	.024	59.610	***	par_12
PWB2	<---	Wlb_Imp	.708	.013	53.030	***	par_13
PWB1	<---	Wlb_Imp	.955	.017	56.633	***	par_14
Gac10	<---	GAC	1.000				

Gac9	<---	GAC	952	39	24.640	***	par_15
Gac8	<---	GAC	1.102	.040	27.594	***	par_16
Gac7	<---	GAC	1.064	.038	28.349	***	par_17
Gac6	<---	GAC	1.066	.040	26.650	***	par_18
Gac5	<---	GAC	1.013	.036	27.936	***	par_19
Gac4	<---	GAC	1.002	.038	26.561	***	par_20
Gac3	<---	GAC	.952	.037	25.998	***	par_21
Gac2	<---	GAC	.979	.035	28.057	***	par_22
Gac1	<---	GAC	1.077	.042	25.578	***	par_23

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	56	597.139	350	.000	1.706
Saturated model	406	.000	0		
Independence model	28	9430.781	378	.000	24.949

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	4.636	.869	.848	.749
Saturated model	.000	1.000		
Independence model	6.577	.193	.133	.180

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.937	.932	.973	.971	73
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.926	.867	.901
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	247.139	183.452	318.699

Saturated model	.000	.000	.000
Independence model	9052.781	8739.719	9372.208

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2.457	1.017	.755	1.312
model	.000	.000	.000	.000
Independence model	38.810	37.254	35.966	38.569

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.054	.046	.061	.189
Independence model	.314	.308	.319	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	709.139	724.316	980	960.980
Saturated model	812.000	922.037	2231.850	2637.850
Independence model	9486.781	9494.370	9584.701	9612.701

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.918	2.656	3.213	2.981
Saturated model	3.342	3.342	3.342	3.794
Independence model	39.040	37.752	40.355	39.071

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	161	169
Independence model	11	12

APPENDIX D:

B. Econometric Test

The key assumptions of Least Squares is that no autocorrelation between the disturbances. Thus, the null hypothesis states that there is no autocorrelation. That is: Ho: Cov (μ_i, μ_j /x_i, x_j) = 0; Where x_i, and x_j are any two independent variables. If Dw> d_u, there is no evidence of positive first-order serial correlation. But if d_l<Dw< d_u: there is inconclusive evidence regarding presence or absence of positive first-order. Where: d_l and d_u are lower and upper limits of Durbin-Watson. From the model (II): Dw = 2.01426, N = 26, K^1 = 6; thus, d_l = 0.897, d_u = 1.992; Conclusion**:** Since the Dw (2.01426) of the model is greater than d_u (1.992), we conclude there no evidence of positive first-order serial correlation. This implies the estimates are reasonably stable, efficient and unbiased.

I. The Coefficient of Determination (R^2)

The result shows that the co-efficient of determination (R^2) of the model is: R^2 = 0.511162 with adjusted R-square as 0.356792. This implies approximately 51 per cent of variation in dependent variable (GDP) is explained by the independent variables in the model. This could be explained by the fact that the role of government and monetary policies among others were not captured in the model. The variables used in this model are limited to the code variables in relations to the set objective and in line with parsimonious theory. The co-efficient of determination (R^2) of the model is shown graphically below as the fitted trend is seen following closely the actual trend of GDP:

Figure 7.1: Fitted Trend

II. F-Statistic Test

F-statistic test is applied to ascertain the overall significance of all the independent variables in the model. That is, to determine if the estimates of the parameters are simultaneously significant or not. Thus, the null hypothesis is as stated below: Ho: $\beta_1 = \beta_2 \ldots = \beta_6 = 0$, Let $\alpha = 0.05$. From the statistical table: $F_{tab} = 2.47$; From the regression result, $F_{cal} = F(6, 18) = 3.969462$, and F – probability = 0.021050. Decision Rule: Reject H_o if $F_{cal} > F_{tab}$; accept if otherwise. Alternatively, reject Ho if F-probability is less significantly low (i.e., less than α) (Gujarati, D. N., 1995). Conclusion: Since the F_{cal} (3.969462) $> F_{tab}$ (2.47), we reject our H_o and conclude that the estimates of the parameters are simultaneously significant. This is further confirmed by the F-probability (0.021050) which is significantly low.

JJ RESULTS (ALL VARIABLES TRANSFORMED INTO LOG)

JJ RESULTS (Variables in absolute Values)

Date: 04/10/14 Time: 18:10
Sample (adjusted): 1982 2007
Included observations: 26 after adjustments
Trend assumption: Linear deterministic trend
Series: LGDP LFDI LK LL LTR
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.902436	96.46522	69.81889	0.0001
At most 1	0.491811	35.95674	47.85613	0.3985
At most 2	0.401026	18.35732	29.79707	0.5398
At most 3	0.168599	5.031354	15.49471	0.8055
At most 4	0.008832	0.230642	3.841466	0.6310

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.902436	60.50848	33.87687	0.0000
At most 1	0.491811	17.59943	27.58434	0.5288
At most 2	0.401026	13.32596	21.13162	0.4227
At most 3	0.168599	4.800713	14.26460	0.7668
At most 4	0.008832	0.230642	3.841466	0.6310

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LGDP	LFDI	LK	LL	LTR
-1.889323	1.165216	2.156669	-1.452055	1.326931
0.380899	0.751006	-2.749417	1.504339	-0.879614
-1.221539	-0.438841	-1.869028	2.524769	2.806796
-0.294545	-0.751762	0.323980	0.218805	-0.506562
-3.605878	0.271339	2.789665	1.297250	-0.748924

Unrestricted Adjustment Coefficients (alpha):

D(LGDP)	-0.016301	-0.013628	-0.054452	0.002097	0.015337
D(LFDI)	-0.182624	-0.383883	0.021872	0.241065	-0.034236
D(LK)	-0.729759	-0.132180	0.014985	-0.027641	-0.014247
D(LL)	0.110383	-0.124395	-0.138646	-0.052326	-0.008509
D(LTR)	-0.116109	0.297734	-0.160201	0.072395	0.008180

1 Cointegrating Equation(s): Log likelihood -51.23980

Normalized cointegrating coefficients (standard error in parentheses)

LGDP	LFDI	LK	LL	LTR
1.000000	-0.616737	-1.141503	0.768558	-0.702331
	(0.06317)	(0.15131)	(0.13460)	(0.12993)

Adjustment coefficients (standard error in parentheses)

D(LGDP)	0.030799
	(0.08046)
D(LFDI)	0.345037
	(0.38325)
D(LK)	1.378751
	(0.15088)
D(LL)	-0.208550
	(0.14055)
D(LTR)	0.219368
	(0.23113)

2 Cointegrating Equation(s): Log likelihood -42.44009

Normalized cointegrating coefficients (standard error in parentheses)

LGDP	LFDI	LK	LL	LTR
1.000000	0.000000	-2.589401	1.526466	-1.085225
		(0.56421)	(0.46536)	(0.48198)
0.000000	1.000000	-2.347674	1.228898	-0.620838
		(0.89747)	(0.74024)	(0.76668)

Adjustment coefficients (standard error in parentheses)

D(LGDP)	0.025608	-0.029230
	(0.08186)	(0.05888)
D(LFDI)	0.198816	-0.501095
	(0.35220)	(0.25332)
D(LK)	1.328403	-0.949595
	(0.14239)	(0.10241)
D(LL)	-0.255932	0.035199

	(0.13241)	(0.09524)
D(LTR)	0.332774	0.088308
	(0.19561)	(0.14070)

3 Cointegrating Equation(s): Log likelihood -35.77711

Normalized cointegrating coefficients (standard error in parentheses)

LGDP	LFDI	LK	LL	LTR
1.000000	0.000000	0.000000	-0.578724	-1.601496
			(0.11503)	(0.37084)
0.000000	1.000000	0.000000	-0.679767	-1.088914
			(0.15770)	(0.50839)
0.000000	0.000000	1.000000	-0.813002	-0.199379
			(0.06119)	(0.19728)

Adjustment coefficients (standard error in parentheses)

D(LGDP)	0.092123	-0.005334	0.104086
	(0.09263)	(0.05903)	(0.16086)
D(LFDI)	0.172099	-0.510693	0.620715
	(0.41682)	(0.26561)	(0.72388)
D(LK)	1.310098	-0.956171	-1.238437
	(0.16840)	(0.10731)	(0.29245)
D(LL)	-0.086571	0.096043	0.839207
	(0.13895)	(0.08855)	(0.24131)
D(LTR)	0.528466	0.158611	-0.769585
	(0.21587)	(0.13756)	(0.37490)

4 Cointegrating Equation(s): Log likelihood -33.37675

Normalized cointegrating coefficients (standard error in parentheses)

LGDP	LFDI	LK	LL	LTR
1.000000	0.000000	0.000000	0.000000	3.429153
				(2.89699)
0.000000	1.000000	0.000000	0.000000	4.820064
				(3.37448)
0.000000	0.000000	1.000000	0.000000	6.867772
				(4.13648)
0.000000	0.000000	0.000000	1.000000	8.692656
				(5.08243)

Adjustment coefficients (standard error in parentheses)

D(LGDP)	0.091506	-0.006910	0.104765	-0.133851
	(0.09339)	(0.06644)	(0.16139)	(0.13336)
D(LFDI)	0.101094	-0.691917	0.698815	-0.204342
	(0.40055)	(0.28498)	(0.69221)	(0.57197)
D(LK)	1.318240	-0.935392	-1.247392	0.892592
	(0.16916)	(0.12035)	(0.29234)	(0.24156)
D(LL)	-0.071158	0.135379	0.822255	-0.708913
	(0.13736)	(0.09772)	(0.23737)	(0.19614)
D(LTR)	0.507142	0.104187	-0.746130	0.227860
	(0.21428)	(0.15245)	(0.37031)	(0.30599)

DESCRIPTIVE STATISTICS

	LGDP	LFDI	LK	LL	LTR
Mean	13.59459	10.12632	11.64117	9.106761	-1.080370
Median	13.57817	9.586500	11.33682	9.112705	-1.016041
Maximum	16.96314	13.11885	20.09155	14.87056	1.266851
Minimum	10.81240	7.593827	8.643561	6.482343	-2.046586
Std. Dev.	2.092087	1.841981	2.854443	2.191458	0.638910
Skewness	0.026257	0.172618	1.687912	0.632343	1.447187
Kurtosis	1.566974	1.386697	5.944023	2.654338	7.722909
Jarque-Bera	2.399042	3.175591	23.40736	2.005399	35.79714
Probability	0.301339	0.204376	0.000008	0.366888	0.000000
Sum	380.6486	283.5369	325.9529	254.9893	-30.25036
Sum Sq. Dev.	118.1744	91.60810	219.9919	129.6671	11.02156
Observations	28	28	28	28	28

Dlgdp c D(lfdi(-3)) D(K(-1)) L(-1) L(-2) D(TR(-2))

Dependent Variable: DLGDP
Method: Least Squares
Date: 04/10/14 Time: 19:46
Sample (adjusted): 1983 2007
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.385624	0.199199	1.935877	0.0687
D(LFDI(-2))	-0.005945	0.044916	-0.132360	0.8962
D(LK(-1))	0.001186	0.045527	0.026062	0.9795
LL(-2)	0.198500	0.098101	2.023422	0.0581
LL(-3)	-0.220613	0.103838	-2.124589	0.0477
D(LTR(-2))	-0.090709	0.054556	-1.662669	0.1137
ECM(-1)	-0.154171	0.097621	1.579280	0.1317

R-squared	0.571616	Mean dependent var	0.244433
Adjusted R-squared	0.362155	S.D. dependent var	0.195941
S.E. of regression	0.179352	Akaike info criterion	-0.367437
Sum squared resid	0.579009	Schwarz criterion	-0.026152
Log likelihood	11.59296	Hannan-Quinn criter.	-0.272779
F-statistic	1.774151	Durbin-Watson stat	2.146117
Prob(F-statistic)	0.161305		

C02 AS DEPENDENT VARIABLE

Dependent Variable: LC02
Method: Least Squares
Date: 04/11/14 Time: 16:57
Sample: 1970 2007
Included observations: 38

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.435456	3.032904	-0.143577	0.8867
LGDP	1.081639	0.206758	5.231419	0.0000
TL	0.795688	0.484333	1.642853	0.1099
LGF	0.135064	0.311129	0.434111	0.6670
GFF	1.258163	0.471486	2.668505	0.0117

R-squared	0.769835	Mean dependent var	8.582382
Adjusted R-squared	0.741936	S.D. dependent var	1.213427
S.E. of regression	0.616421	Akaike info criterion	1.992306
Sum squared resid	12.53917	Schwarz criterion	2.207778
Log likelihood	-32.85382	Hannan-Quinn criter.	2.068969
F-statistic	27.59383	Durbin-Watson stat	0.821777
Prob(F-statistic)	0.000000		

Dependent Variable: LC02
Method: Least Squares
Date: 04/11/14 Time: 16:57
Sample: 1970 2007
Included observations: 38

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.435456	3.032904	-0.143577	0.8867
LGDP	1.081639	0.206758	5.231419	0.0000
TL	0.795688	0.484333	1.642853	0.1099
LGF	0.135064	0.311129	0.434111	0.6670
GFF	1.258163	0.471486	2.668505	0.0117

R-squared	0.769835	Mean dependent var	8.582382
Adjusted R-squared	0.741936	S.D. dependent var	1.213427
S.E. of regression	0.616421	Akaike info criterion	1.992306
Sum squared resid	12.53917	Schwarz criterion	2.207778
Log likelihood	-32.85382	Hannan-Quinn criter.	2.068969
F-statistic	27.59383	Durbin-Watson stat	0.821777
Prob(F-statistic)	0.000000		