Appraisal of Ganaja Port Expansion Project

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ABSTRACT

Ports are vital for the health and well being of any nation's economy and are the main transport method for international trade. They also handle several million international passenger journeys annually. This industry is also a major employer of labour. Ports constitute an important economic activity in coastal regions. Ports are also important for the support of economic activities in the hinterland since they act as a crucial connection between sea and land transport. Nigeria is a developing coastal country, with a land area of 910,770 km^2 and coastline of approximately 853km facing the Atlantic Ocean. The government of Nigeria has embarked on vigorous infrastructural developments, and to this end, has opted for the improvement its port facilities.

This study is on the evaluation the feasibility of a Port expansion investment in Lokoja, Kogi state of Nigeria. The expansion is designed to increase the cargo handling capacity, increase efficiency and provide a fresh milk terminal, among others. Using the data from the project and other secondary data obtained from government and other sources, this study appraised the financial feasibility of the Ganaja Port expansion project, by analysing the 'with' and 'without' project cases, to derive the 'incremental' project.

In order to identify those variables that will have the greatest impact on project outcome, a sensitivity analysis was carried out, and the results from those were made dynamic by a Monte Carlo risk simulation so as to measure its riskiness. The results from the financial analysis shows a sufficiently positive Incremental NPV, and sensitivity analysis indicated that Inflation rate, annual cargo tonnage, and operating

costs are the critical variables that could significantly affect the project outcome. The results of the risk analysis shows that even though the above variables have significant effect, they will not yield a loss as there is 100% certainty of a positive incremental NPV.

This study indicates that it is a financially viable improvement endeavour and without risk of a negative outcome. The study therefore recommends the execution of the expansion project.

Keywords: Water port expansion, risk analysis, incremental net present value, financial analysis, investment appraisal.

ÖZ

Limanlar her ülkenin sağlığı ve ekonomisi için hayati önem arz etmektedirler. Ayrıca limanlar yıllık olarak birkaç milyon uluslararası yolculuğa olanak sağlamaktadırlar. Limancılık sektörü işgücünün önemli bir işvereni konumundadır. Limanlar kıyı bölgelerinde önemli bir ekonomik faaliyet oluşturmaktadır.

Bu çalışma Nijerya'nın Kogi eyaletinde Lokoja limanında genişleme yatırım projesinin fizibilite çalışmasıdır. Genişleme yük kapasitesini artırmak verimliliği yükseltmek ve taze süt terminali oluşturmak için tasarlanmıştır. Projede veriler ve ikincil veriler kullanılarak projeli ve projesiz durumlarda liman genişletilmesinin finansal fizibilitesinin ölçülmesi amaçlanmıştır. Proje sonucu üzerinde büyük etkiye sahip olacak değişkenleri belirlemek amacıyla bir duyarlılık testi yapılmış risk ölçümü için de Monte Carlo risk simülasyonu dinamiği kullanılmıştır. Finansal analizin sonuçları yeterli oranda pozitif olarak artış gösteren net mevcut değer bulunduğuna dikkati çekmiş duyarlılık testi sonucunda da enflasyon oranı, yıllık kargo tonajı ve yönetim maliyetlerinin proje çıktısını anlamlı şekilde etkileyen değişkenler olduğu oratya çıkmıştır. Risk analizi sonuçları anlamlı bir şekilde değişkenlerin etkisine işaret etse de net mevcut değer üzerinde yüzde 100 kesinlikte bir etki söz konusu değildir.

Bu çalışma finansal açıdan yaşayabilir iyileştirmenin negatif çıktı riski olmaksızın mümkün olduğunu göstermektedir. Çalışma bu nedenle genişleme projesinin eğitilmesini önermektedir.

Anahtar Kelimeler: Su limanı genişleme, Risk analizi, Artış NPV, Finansal analiz

To my beloved parents,
darling wife and our
unborn child.

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LIST OF ABBREVIATIONS

FGN	Federal Government of Nigeria
GDP	Gross Domestic Product
EDF	European Development Fund
NPA	Nigerian Ports Authority
NGN	Nigerian Naira
IRR	Internal Rate of Return
NPV	Net Present Value
EU	European Union
PBP	Pay Back Period
USD	United States Dollars
STDEV	Standard Deviation

Chapter 1

INTRODUCTION

1.1 Background

Ports are vital for the health and well-being of any nation's economy and are the main transport method for international trade. Ports are not just places where goods pass through each year; they also handle several million international passenger journeys annually. This industry is also a major employer of labour. Ports constitute an important economic activity in coastal regions (Davies, 1973).

The volumes of international trade are constantly on the rise and the bulk of the cargo that is being hauled around the globe is being moved via sea transportation. In recent days, ports have become even more important than they were in the distant past simply because they now play a more vital role that is of high relevance to an economy (Polonia et. al, 2007).

Nigeria is a developing coastal country, with a total area of 923,770 km^2. The West African nation lies between longitudes 3 degrees and 14 degrees and latitudes 4 degrees and 14 degrees, and it shares the northern border with the Republics of Niger and Chad, the Western border by the Republic of Benin, the East borders by the Republic of Cameroon, running through to the South where its territory terminates into the Atlantic Ocean. Nigeria has a land area of 910,770 km^2 and coastline of approximately 853km facing the Atlantic Ocean (Dublin et al, 1999).

Nigerian hydrology is dominated by two great river systems, the Niger-Benue and the Chad systems. All of Nigeria's flowing waters ultimately find their way down the lower Niger to the sea, or the Lake Chad basin to the North, with the exception of few rivers that flows directly into the sea (Kuruk, P., 2004).

Nigeria has enjoyed a steady polity in recent years, and has recently attained the position of Africa's largest economy, taking over from South Africa with the rebasing of its economy. Over the years, the country has attracted tremendous foreign business interests, and is poised to rank thirteenth among the world's biggest economies by 2050. With an anticipated Gross Domestic Product (GDP) of about $4 trillion by 2050 and a yearly normal true GDP development rate of around 6-8%, and additionally an energetic and developing working populace (Durojaiye, 2013).

The government of Nigeria has embarked on vigorous infrastructural developments, and to this end, stakeholders have made a case for the improvement its port facilities. They argue that such improvements will increase the cargo handling capacity, and position the ports to effectively meet the expected growth of import and export activities in the near future. Ganaja Port is located near the coastal community settlement of Abocho. Proponents who have made the case for its expansion have highlighted its significance as the pathway to many of its nation's landlocked states and the surrounding agrarian communities and farm settlements, in their quest to increase export, and meet their growing demand, they have specifically canvassed for the inclusion of a fresh milk terminal, as this has risen to become a major import good in recent years. These stakeholders are confident that the expansion of Ganaja Port will yield immense financial and economic benefits (Kuruk, P., 2004).

The government of Nigeria is a beneficiary of the European Development Fund (EDF) as established by the European Union (EU) as the main financial instrument for supporting the states of Africa-Caribbean-Pacific (ACP) with priority areas that includes Transport and Infrastructure (EDF, 2014). The EDF has provided a grant to the tune of 70% of the expansion cost and government provides 30% (Adapted from 'The Makar Project'; Jenkins and Shukla, 1996).

1.2 Aim of Study

The objective of this study is to appraise the proposed expansion of Ganaja port, by way of assessing the Port in terms of 'with' and 'without' the project expansion. This incremental assessment will indicate if an 'incremental' investment is worthwhile, or if the Port is better off without the expansion. Financial analysis will be conducted to ascertain the viability of the project in terms of returns to owners (NPA) which is transmitted to Federal Government accounts.

Monte Carlo risk simulation will be run to determine the effects of the risky variables (obtained from sensitivity analysis) on the possible riskiness of outcomes of the project. This risk analysis will highlight the variables with the greatest impact on the outcome of the project, and will lead to suggested mechanisms of mitigating and managing them.

This work will serve as a valuable guide to policy makers and investors alike in port investment.

1.3 Method used in the study

1.3.1 Sources of Data

The data from the project used for this thesis is obtained from the project owners, as derived from their pre-feasibility studies, and other macro-economic data were collected from several sources on the web, publications and governmental information sources. As is the case for most project data with projections and forecasts, some assumptions were utilized in this study. In this case, educated guesses were made, building from the data of similar projects.

At the stage of research and literature review, several lecture notes, books, publications, and articles in the area of Investment Appraisal were utilized.

1.3.2 Study Approach

This study will be made by means of an integrated financial, sensitivity and risk analysis. The data acquired will be developed into a spreadsheet model, from where deductions and analysis will be made. Using financial analysis, this work will show the financial viability of the project by deriving the NPV of the incremental project.

The critical variables from the project will be put through a sensitivity test to determine their effect on project outcome, this will enable the study to identify the risky variables of the project which will then be fed into the probability distributions of a Monte Carlo simulation to show the various risk level scenarios, and how they can affect the project outcome.

1.4 Structure of the Thesis

After introducing the study case and describing the method used in the study on this chapter, the work proceeds by reviewing literature relevant to the study in chapter 2. The review is meant to highlight previous works in port appraisals.

Chapter 3 will explore a vivid description of the project. These entail costs, projected revenues, and other data used. Also in the chapter, a more concise breakdown of the methodologies used in the financial and risk analysis is given. Chapter 4 conveys the results of the deterministic case of the financial analysis, revealing the NPV (incremental) accruing to owners due to expansion of the Port. In Chapter 5, the findings from the risk analysis will be shown, detailing the critical variables of the project, and how they affect the project outcome. The recommendations and conclusions from the study will be given in chapter 6.

Chapter 2

IMPORTANCE OF WATER PORTS IN ECONOMIC DEVELOPMENT

A water/sea port in short is an area located on a coast or shore, consisting of one or more harbors where ships can dock, to transfer people or cargo to or from land, or effect maintenance and repair. Ports have also got warehouses and storage facilities where inbound or outbound goods are kept until dispatch. There are several types of ports; Inland ports, sea port, warm-water port, dry port, fishing port, etc. An Inland port is one on a navigable water-body such as river, lake or canal with exterior access to a sea or ocean, thereby allowing a ship to sail from the ocean towards the inland port to load or unload its cargo.

The trade transactions that are being carried out at ports and by the instrumentality of seaway transportation is certainly one of the critical elements that is directly reflected on the macro-economy of a country thereby asserting significant relevance to the factors affecting the economic development of that country. Certainly, ports constitute a part of the basic fabric of the entire transport sector, which is critical to, and are often associated with the expanding global trade and economy. It can be categorically said that ports serve as means of integrating various nations into the economic sphere of the globe. In fact, certain unique characteristics of ports have confers great importance on them. Foremost of all is that they serve as important linkage of the hinterland areas to points overseas. Secondly, sea conveyance is by far the most affordable means of transporting goods when evaluated in terms of the fuel

it consumes and the cost of initial outlay. In comparison to other means of transportation for instance, rail transport takes about double the rate of energy consumed, and for road transportation, it is about ten times that of sea conveyance. In couple of decades past, there has been a growing awareness in the world about environmental impacts, and because of its lower consumption of fuel, waterway transport is certainly friendlier environmentally than any other means. In recent times, those countries that enjoy the highest portion of global trade consistently have both profound waterway linkages while maintaining significant fleets of ships. The production sector of the hinterlands and logistic access to them are critical variables to their economic growth. The modern ports are multi-functional areas that are not limited only to docking facilities; they also serve as housing for shipyards where repair and maintenance is undertaken, and construction of ships, while still having offices for insurance companies and customs (Berköz and Tekba, 1999).

A higher throughput of goods and passengers' year-on-year necessitates more infrastructures and other provisions. Such provisions will bring varying levels of benefit (financial and economic) and cost (financial and economic) to the local and national economy and to the environment. Furthermore, Ports play important roles in the support of economic activities in the hinterland since they act as a crucial connection between sea and land transport. Today a great majority of global haulage is being undertaken by sea transportation. If considering the measure of haul tonnage carried, waterway transport is certainly the least expensive and often the most effective system of transport when put side by side with other means of transport (Güller, 2002).

2.1 History of Ports in the world

All through history, the sea has been a link between nations, thereby making ports the connecting bridges between a wide array of peoples and their cultures. It is pertinent to note here that what historians consider as a port goes beyond the sites of harbors of modern times (Braudel 1976). The concept known today as the early modern port has its origins from the medieval urban tradition. Back then, the title of a "port" was the nomenclature of towns whose main activity was trade and exchange, and their location was by the shores of a major water body. The Port towns were major hub for socio economic advancements of that era, and they had certain distinctive features like open markets, warehouses, ship yards and dockyards. Ports were identified by the specific socio-economic classes that they accommodated. Often times, these ports actively attracted a huge concentration of merchants, their, book-keepers, even shopkeepers, bankers, professional shipbuilders and expatriates (Antunes and Cátia, 2010).

These ports in the past served as important urban constituents in the map of the world. Port cities were the most successful by the virtue of the exchanges in a wide array of economic and socio-cultural relations that represented their essence in any defined area. Even though the most significant ports during the renaissance era and even the 16th century were mostly mono-functional, they attained prominence and popularity due to effective participation and expansion of the nation state abroad. As a result, the ports of the late 16th, even 17th and 18th centuries became major gateways for human population and occupation, their products and their ideas that were continuously being exchanged all over the globe. The significance of gateways of global trade like London and Amsterdam can be easily ascribed to their ability to

play the role of a regional center while still serving a trans-continental one, and that conferred on such places, the exceptional capacity to succeed as focal points within the hinterland and regional networks, along with being the inter-state and inter-continental linkages. In those times, these great cities were the driving force behind a popular movement in the axis of trade from the Mediterranean to the Atlantic, by which certain parts of Europe evolved with a new pedigree in social context, and also political, cultural, economic along with religious spheres of development which differs from those prevailing in southern Europe, thereby emanating into a stratification that is apparent till date (Antunes and Cátia, 2010).

In mid-2013, archaeologists stumbled upon what is thought to be the world's oldest water port. They discovered the harbor, on the red sea coast, which is believed to date back 4,500 years, to the days of the Pharaoh Khufu (Cheops) in the fourth dynasty. The team believes it was once of one of the most important commercial ports of ancient day Egypt, and appears to have been used for the export of copper and other minerals from the Sinai Peninsula. The port is located at Wadi el-Jarf area, south Suez, Egypt. Egyptian authorities said the archaeologists found a variety of several docks, as well as an interesting collection of carved stones, serving as anchors. The discovery was made by a team from the French Institute for Archaeological Studies. It is thought to be 1,000 years older than any other port structure in the world (Amanda Williams, *Daily Mail* 2013).

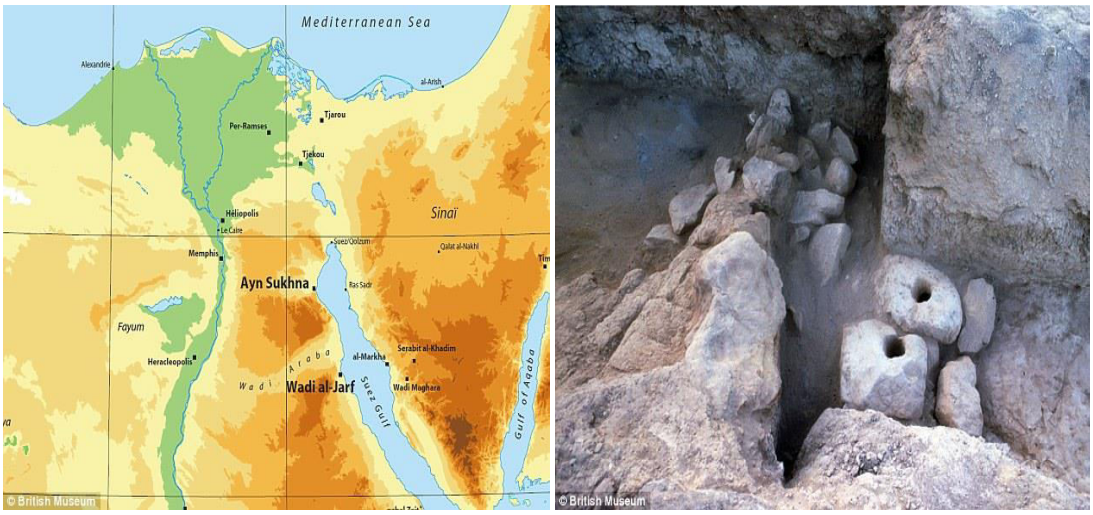

Figure 2.1: World's oldest Port. Source; Daily mail, UK

Today, there are more than five thousand (5,319) major ports in the world. The continent of America has the highest number (1,705), followed by Europe (1,524) and Asia (1068). Africa comes fifth (313), after South America (402), while Australia is last with about (307) major ports (Fleetmon, 2014).

2.2 History of Ports in the Nigeria

It was in the 19th century that Port development and operations began in Nigeria. This was pioneered by the construction of the east and west moles of the Lagos breakwater and dredging activities. The development was necessitated by growth in sea borne trade that characterized slave trade, agriculture and the explorations around the African coasts. Following the discovery and exploration of coal in the southeastern state of Enugu, the port of Port Harcourt was conceptualized and eventually opened for operations in 1913. The port also served for the evacuation of the agricultural produce of the region by the colonial masters. Today, it is the major port serving the oil-rich Niger delta states (NPA, 2014).

The Ports Act of 1954 paved way for the establishment of Nigerian Ports Authority as a continuous public corporation to establish a coherent policy framework for the

development of the nation's ports. This was later followed by the promulgation of the Nigerian Ports Authority Decree No. 38 of 1999, making the NPA the agency in charge of facilitating Nigeria's sea-borne trade. In 2006, during the Federal Government's privatization drive, the terminals of Nigeria's ports were concession to private operators.

Today, Nigeria has more than 25 Ports; six (6) major sea ports, and a host of other specialized, inland and river ports. These Ports cater for over 45% of the total maritime trade in the entire West African sub-region (NPA, 2014).

Figure 2.2: S.S. Akoko; first mail-steamer to berth in Lagos, Nigeria (Feb.1.1914)

2.3 Appraisal of Ports

Most often than not, Port investments are made by the government sector. This is done either via an entirely public agency, or some sort of joint entity with a portion conceded to private sector participant(s). Due to this nature, the benefits from such investment is not considered only in monetary returns as in the case of a purely private investment, but rather other benefits it would yield; tangible, intangible,

direct and indirect. These could be in terms of reduced turn-around time, and cost savings. On the cost side, the bulk of investment lies in construction and maintenance. The issue on what benefits should be included is a political decision (Güler, 2002).

In the development of a port, a government might be inclined to measure benefits in terms of maximizing real national income, improving trade, employment generation, and opening up certain regional areas to development, or simply stimulating growth in the economy. Fundamentally, a port serves as a gateway for a country's international trade. They play the integral role of conveying agricultural and industrial products to the world market (UNCTAD, 1977).

It is pertinent to note however, that the costs and benefits in a Port investment project are also borne by other parties beyond the port authorities. Since the principal aim for such a project is usually to increase net social gains, it must therefore take into account the net gains from all participants and users of the facility.

Development of a port facility is an investment either in the expansion or in repair of an already existing facility, or an outright construction of a new one. The development must yield an increased intensity in the port use, and enhance shipment process. Even though most port development ventures involve construction of physical structures and systems, it could encompass other areas such as laws and re-organization too.

In the financial appraisal of ports which only accounts for its commercial viability, present value (discounted at financial rates) of the costs are weighed against the

accruing benefits, both in monetary terms. For the economic appraisal however, other costs other than construction and maintenance (such as foreign exchange, opportunity cost of funds and labour, etc.) are reflected. So also, the benefits in present value terms (discounted at social rates of discount) are inclusive of others (positive externalities) beyond the financial returns.

Investments in ports most often than not, is a government endeavour. To this end, the objective is not simply to maximize profit within a time frame as in the case of a private enterprise, but to maximize net social benefit. Hence, the benefit/cost method is best used in evaluating such investments like seaports and airports. The benefits arising from a port project –be it an expansion of an existing port, or the construction of a new one, are not circumscribed within the Port or among its direct participants. Such benefits such as reduction in waiting time, increasing productivity, or overall stimulation of economic activities around the Port facility, are spread between direct users of the port and the indirect users (consumers, producers). In order to better capture this range of benefits, the benefit/cost method should be used (Güler, 2002).

According to (Collier and Ledbetter, 1988), Benefit/Cost methodology is simply the measure of;

$$B/C = \frac{\text{Net Savings or Benefit to all users}}{\text{Net capital cost + net operating and maintenance cost}}$$

As already insinuated, this method is most useful for an economic appraisal since the benefits in that case are not all in financial terms, and not only to direct users. The NPV is for a corporate entity, what a B/C ratio is to a national or state entity. Other

investment evaluation criteria include payback period, average rate of return and internal rate of return, although these are not suitable for such huge investment as a Port due to their shortcomings.

In the analysis of the risk in a Port project, the greatest concern is for the reliability and degree of accuracy for the projected traffic and cargo tonnage forecasts. There are many factors which could affect the associated certainty of these forecasts. However, it is the element of uncertainty that gives rise to the need for an in-depth risk analysis. It is not appropriate to merely adjust for risk premium in this context; the more useful approach is to take these uncertainty elements directly into account to see how much influence they hold on the possible project outcome. In view of the unavoidable range of uncertainty in each of the risky variables, it is best to examine the effect on the investment outcome on a one-by-one case; a Sensitivity analysis. The above will shed light on those variables that are critical and then serve as a basis for determining the project's risk management efforts (UNCTAD, 1977).

In the appraisal of Ports and indeed all similarly huge capital intensive projects, an integrated financial, economic and risk analysis is necessary so as to serve as a basis for investment decision and policy making.

Chapter 3

PROJECT DATA AND METHODOLOGY

3.1 Project Description

Ganaja Port was identified as a significant potential contributor to the Nation's wealth, and an essential link to Nigeria's northern region. The Port government owned, and is sited near Lokoja, capital of Kogi state. The water body in this area is famous for hosting the confluence of Nigeria's major rivers; Niger and Benue. The state serves as an integral link to the greater hinterlands in the semi-desert regions of the North. The expansion of Ganaja Port will serve to reduce dependence on roads, for the transport of agricultural produce from the middle belt and northern regions, to the southern regions, which lie on the coastline. It will therefore cause access of these hinterlands to the export and import market.

Figure 3.1:Dredging work at Lokoja
(Source: AFP, 2009)

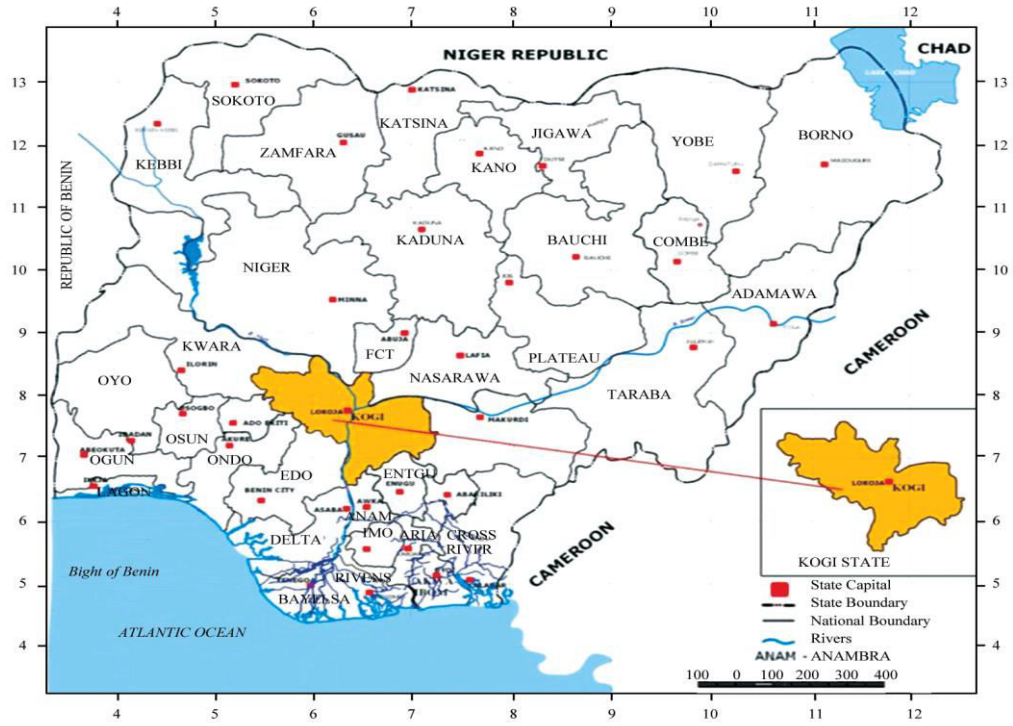

Figure 3.2: Map of Nigeria showing location of Kogi state
(Source: Kogi state ministry of Land and Environment, 2008)

Though the expansion of Ganaja Port remains unexecuted, the government had long identified the grave importance of expanding the port. As proposed, the project was to commence in 1992, and to be financed partly by European Development Fund (EDF); a fund for supporting development of targeted areas that includes transport infrastructure in Africa, Pacific and Caribbean countries.

The expansion project is aimed at increasing the capacity and efficiency of the port in cargo handling, while also providing facilities to ensure it meets up with anticipated future growth. A core part of the project is the construction of a new terminal for fresh milk, and the construction of yard for container storage, an operations office and a maintenance building. The existing wharf will be extended, and repair of other dilapidated existing facilities will be made. The project will also

see the purchase and installation of navigational aid and communication equipments, and a container handling facility.

Even though as at time of commencement Ganaja Port was not already congested, it however had certain limitations such as insufficient ducking length required by larger vessels, deck support insufficient for heavy equipment, insufficient water debt for larger vessels, limited container handling facilities, lack of reliable power supply, and insufficient communication and navigational aid systems, and to cap it up, the Port will reach its peak in handling cargo in year four. As seen in previous paragraph, the project is directed at addressing all these limitations.

3.2 Project Financing and Cost

Table 3.1: Project cost

Phase 1	General repairs	₦11,596,000
	Non construction measures	₦2,160,000
	Container yard 1	₦30,629,000
	Navigational aids	₦406,000
	Phase 1 Total	**₦44,791,000**
Phase 2	Wharf extension/ container yard 2	₦411,653,000
	Fresh milk terminal	₦53,604,000
	Phase 2 total	**₦465,257,000**
TOTAL PROJECT COST ₦510,048,000		

(Note: A detailed breakdown as used in the model is attached as Appendix 1b)

The total project cost amounts to ₦510m (five hundred and ten million naira). The breakdown of the cost is summarized above. Of this, EDF contribution is ₦357,033,600 and that of FGN is valued at ₦153,014,400. The expansion project will be financed in part by the Federal Government of Nigeria (30%), and the European Union through the European Development Fund (70%).

3.2.1 General repairs

In order to maintain the current level of operations on the Port, even without the proposed project, certain essential repairs, and general works must be undertaken. About ₦11.6million is budgeted for these works, which includes repair on electrical and sanitary facilities, repair of the wharf, clearing the deck, amongst other several improvements required for the existing port to function properly. As seen from the analysis however, these improvements can only facilitate growth up until the fourth year, after which the capacity of the existing port will be reached, and the throughput remains fixed. Hence, this proposed expansion project becomes necessary in order to accommodate future growth.

3.2.2 Non-construction measures

This includes personnel improvements, and purchase of communication equipments. The cost for these measures sums up to about ₦2.16m. They form a part of the proposed cost, even though they are not part of the actual physical construction cost. An expanded port will require an increased number of staff, and an improved management team to enable it man and manage the new facilities effectively.

3.2.3 Container yards

The construction of container yards is a core constituent of the port expansion project. This is due primarily to the anticipated increased storage needs due to the expected ship calls and cargo tonnage. The yard 1 will be built in the first phase of the work at ₦26.2million, and will be attached with an emergency generator at the cost of ₦4.4million naira. Container yard 2 will be built during the second phase of the project as part of the wharf extension, and together, the container yards will be a major revenue earner for the project.

3.2.4 Navigational aids

Equipment required for effective navigation in order to provide a smooth and timely berth for the anticipated increased traffic will be procured at the cost of ₦406,000 as part of the project.

3.2.5 Wharf extension

During the second phase, container yard 2 will be built, along with an office, perimeter fencing and gate house, generator, and the relocation of the indigenous Abocho community to make way for construction works. This will gulp about ₦411.6million.

3.2.6 Fresh milk terminal

In the second phase of the project, a terminal will be constructed at the cost of ₦53.6million to serve the dairy farmers seeking to export the fresh milk produced in the middle belt region to other regions in the south, and neighboring countries. This is another major constituent of the expansion project, and a significant revenue generator.

3.3 Project Life

The project commences in 1992, with the total investment being made in the first four years. The repair of existing facilities is undertaken in the first two years, this entails the Phase 1 of the project. The phase 2 of the project involves the relocation of Abocho community, procurement and installation of equipment, construction of container yards and a fresh milk terminal. This second phase is from the first year through to the fourth. The project life is defined as sixteen years for the purpose of this study, with liquidation of the assets done in 2007.

3.4 Methodology

In appraising the Ganaja port project, this study employs part of the methods developed by Jenkins P.G. to access the viability of the project in terms of financial returns, and also by way of assessing the variables that will have a significant effect on the project outcome, by how much.

Infrastructural projects such as this one usually require huge capital outlay, and are often spread over a long period. As such, there is a need for a rigorous appraisal to ensure that they will add value if undertaken. Also, it is critical to identify all the factors that could significantly impair this addition to value that is expected from the project, with a view to engineering them for the benefit of the project.

3.5 Financial Analysis

In order to ascertain the worthiness of a project, a financial analysis should be carried out to show how much value the project will create for the project owners. There are a couple of methods used to determine how much of this value is created; Investment criteria. Examples of investment criteria include the IRR, Pay-back period, Benefit-cost, and the NPV. The NPV is adjudged as the superior criterion in deducing the financial sustainability of a project due to its non-vulnerability to the weaknesses of the others (Jenkins et al. 2004). Some of the weaknesses of the other criteria are; ignoring the time value of money, yielding multiple values in case of irregular cash flow (IRR), and sensitivity to the definition of project costs (Benefit-cost).

As some appraisers have argued, using NPV helps in facilitating sensitivity analysis in order to clarify the possible effects of variable uncertainties bound to be present in a limited cost data that is usually the only data at disposal during the feasibility

period of most project's life. Since many projects normally have a lengthy time-horizon, coupled with critical sources of risk and uncertainty, they certainly require a systematic, consistent and accurate examination of their sensitivity to values of the parameter (Harrison, Cooper, Chaperman; 1988).

In deducing the NPV of this project, certain input data specific to the project (project costs) were collected, and other secondary data such as inflation, discount rate, etc were retrieved from government and other financial sources. These data must be collected and sorted with utmost caution, as they form the basis for a correct result output from the model. A table of parameters is constructed which will serve as a building block for the entire financial model. The model is done on an Excel spreadsheet, and attached as an Appendix.

A forecast of the revenue from the Ports operation is made as a deduction of the fees received in multiples of the expected average tonnage which is itself, a function projected ship calls. The project cost is deducted from the generated revenue over the project life, and the net of that is discounted to give the total value created with the project. This is done on an incremental basis (i.e. the difference from the 'with project' case and 'without project').

3.6 Sensitivity Analysis

Following the Financial, a sensitivity analysis is conducted using the 'what if' function of Excel. It involves the consideration of variables to the project that is critical to its output on a single basis. Gaining from this analysis, the profitability or otherwise of project can be determined, and it facilitates the making of proper decisions by avoiding unprofitable projects (Marshall, 2004). This is done to

ascertain the extent to which a change in each single variable affects the NPV of the project while holding all other variables constant. Those variables with significant effect on the project outcome are fed into the risk analysis. A sensitivity also serves as a debugging tool for assessing the potential correctness or otherwise, from a logical perspective, of the direction of the change emanating from the fluctuation of the variable under consideration. As a shortfall, sensitivity analysis is a one-at-a-time method, and thereby ignores possible correlations between variables under consideration.

3.7 Risk Analysis

This part of the investment analysis is done by assigning probability distributions, minimum and maximum values, and defining possible correlations to the variables that are deemed risky as defined by sensitivity analysis. The Monte Carlo simulation is used in this regard, and run by 10,000 trials. The results from this simulation will describe the riskiness of the project, thereby serving as the tool for defining the desirability of the project to risk averse investors. It also provides the basis for developing a risk mitigation policy.

Chapter 4

FINANCIAL ANALYSIS OF GANAJA PORT EXPANSION PROJECT

The basis for financial analysis is to deduce the net value addition created by a project. It simply shows an investor, the viability of a project and by how much he will be better off (or worse of) should the project be undertaken, instead of just allowing the funds remain in a bank, for instance. Project data and forecasts made are put through an excel model to deduce the net present value (NPV) of the project. The NPV quantifies the amount of value created by the project. A project should be accepted if its NPV is greater than zero (0). Also, another criterion that can be extracted from financial analysis is the internal rate of return (IRR). The IRR of the project should be greater than that of the going discount rate. In this work, value addition is considered on an incremental basis (i.e. difference between 'with' project case and 'without' project case).

4.1 Parameters and Assumptions

A table of parameters is developed which will accommodate basic project data, assumptions and forecasts, rates and indeed all project data upon which the other tables will be built (Table of parameters is attached as Appendix 1).

4.1.1 Project life

The life of the project is 16years, starting from 1992.

4.1.2 Investment cost

The expansion project on Ganaja Port will cost about ₦510,048,000. Seventy percent of this cost will be covered by EDF grant while the FGN will bear the remainder thirty percent. The investment for the project will be made in the first four years beginning in 1992. There are two phases involved in the project. A breakdown on the costs in phases is given in table 4.1 below.

Table 4.1: Investment cost for Phase 1

A. General Repairs		**₦ (000')**
1. Repair of Existing Wharf		6096
2. Repair of Existing Electrical &		
Sanitary Utilities		5500
Subtotal		11596
B. Non-construction measures		
1. Communication Equipment		1698
2. Management Improvements		462
Subtotal		2160
C. Container Yard I		
1. Container Yard I		26251
2. Emergency Generator		4378
3. Equipment		0
Subtotal		30629
D. Navigational Aids		406
Subtotal - Phase I		**44,791**

The phase 1 of this project will be undertaken and completed in the first two years (i.e. 1992 and 1993).

While work is on-going on the phase 1, there is also a simultaneous progress of work on the phase 2. This will last from the first year through the fourth (i.e. 1992-1995) as shown in Table 4.2 below.

Table 4.2: Investment cost for Phase 2

A. Wharf Extension/Container Yard II		**₦ (000')**
1. Wharf Extension, CYII, Dredging,		
Fill, Office		263888
2. Gate House/Scale/Fence		5316
3. Equipment Maintenance Bldg.		8989
4. Equipment II		114225
5. Communication Equipment II		198
6. Emergency Generators II		6511
7. Relocation of Abocho Community		3592
8. Property Purchase		8934
Subtotal Phase II-A		411653
B. Fresh milk Terminal		53604
Subtotal - Phase II - A & B		**465,257**

(Note: A detailed table of Project costs from the model is attached as Appendix 1b)

4.1.3 Operating cost

The operating cost of the project sums up to ₦2,282,682. This equate to about 0.5% of the total investment. A vivid breakdown of the cost is attached as Appendix 1(c).

4.1.4 Depreciation and Asset life

A straight line method is used in the depreciation of this project. The equipment are depreciated during a 15 years asset utilization life span, while the buildings are depreciated over 25 years asset life.

4.1.5 Inflation rate

An eight percent (8%) inflation rate is assigned to the project, and is assumed to be constant for the entire duration of the project.

4.1.6 Taxation

Since project is owned directly and completely by a government agency, earnings are directly remitted to federal government coffers. Hence, it is exempt from all taxes.

4.1.7 Working capital

The accounts receivable is 10% of total port revenue, while Accounts payable will be 15% of operating costs. The cash balance stands at 5% of Port revenue.

4.2 Financial Analysis

The financial analysis for the project is done on the basis of two cases; 'with' the project case, and 'without' the project case. The difference between these two makes the 'incremental project'. The 'without' project case will require some investment in repairs so as to sustain current level of operations, while 'with' project case constitute major expansion of the port (Jenkins and Shukla, 1996). The incremental project cost and revenue projections are built into cash flow statements from which the NPV and IRR are deduced in real terms. These results form the basis of the viability and added value to be created by the project.

This project is considered from one point of view; that of the owners. This is because the project is devoid of any loan or its repayment. Part financing is provided by the EDF grant. Experts agree that if a project benefits from grant or subsidy, this should be included as part of the inflow to the cash flow statement (Glenday, et al 2008).

In this study, the NPV criterion will be adopted as the basis for appraising the incremental investment. The NPV is calculated as the algebraic sum of the discounted net benefits and net costs over the project's lifetime (Jenkins et.al, 2004)

$$NPV^{\text{year } 0} = \frac{(\Sigma \text{ of Net Cash flows in year t})}{(1 + r)^{t}}$$

Where "r" is the discount rate, indicating the cost of capital. This implies the rate of return that owners or investors of the project will expect to earn from their investment. In this case, it is 11% real and 19.88% nominal (David and Esra, 2000).

The internal rate of return (IRR) is not used as a criterion in this study due to some of its shortcomings as a criterion for investment appraisal (See Jenkins et.al, 2004).

4.2.1 Results of Financial Analysis

The real NPV of the 'with project' case is ₦46,862,740, while that of the 'without project' case ₦15,921,670, thus leaving the 'incremental project' with a real NPV of ₦30,941,070. Hence, as a result of the expansion of Ganaja port, a value of almost ₦31million is created over the 15years of project life.

Even though the IRR is not considered reliable in this case (due to multiple negative net cash flows), it is still worthy to note that in all cases (with, without, incremental) the IRR yielded values greater than the discount rate, thus affirming the results of the NPV.

Table 4.3: Results of Financial NPV

Case	**NPV ₦ (000')**	**IRR**
With project	46,862.74	14.19%
Without project	15,921.67	14%
Incremental	30,941.07	14%

(Note: The Cash flow tables are attached in the Appendix)

4.3 Sensitivity Analysis

Investments usually involve capital outlay made for its expected future returns. There are several uncertainties about the future; in fact it is even almost certain that variable factors will not occur exactly as predicted. Hence, there is a need to critically examine such variables whose change would significantly impact the outcome of projects. They form the basis of riskiness for such project.

It is through a sensitivity analysis that we assess the riskiness of a project by identifying those variables that are most influential to a project's outcome, and measure the actual extent of their impact (Belli, 2007). It is done by testing the impact of fluctuations of a variable on a project's NPV or IRR; in this case, the former.

For this study, the variables being tested are inflation rate, cost overrun, percentage change in average cargo tonnage, annual increase in operating costs, and change in estimated number of ship calls.

4.3.1 Results of Sensitivity analysis

All the critical variables that were tested had significant impact on (incremental) project NPV; with quantification of varying degrees. However, within the test (fluctuation) limits, none of the variables will cause a significant negative NPV (loss) to the incremental project.

- **Inflation rate:**

The changes in domestic inflation will significantly affect outcome of the project. The actual inflation data may have actualized over time but its effect on project expansion did not, due to the non-execution of the project. This is why it remains a viable risk. This is partly because most of the project inflows are from the future,

while its cost are within the early years. Since inflation increase will cause future tonnage charges and other revenues to increase by a portion greater than that of inflation increase, the real NPV will also increase as a result. In addition, inflation is critical because changes in the tariff rates are assumed to be adjusted once every five years by the cumulated inflation since the last tariff adjustment. This impact of inflation on a real NPV output is due to the directs and indirect effects of inflation on other components of the cash flow like the cash balance, accounts payable, accounts receivable, and even the tax characteristics of the project.

The 'with' Project case turns negative at an inflation rate of 17%. Even though the 'incremental' project continues to rise with increasing inflation rate (due to the larger negative value of the 'without' project case), it will be logical not to undertake the project if inflation crosses 16%. In fact, it will be most logical to halt to port operations at such circumstance, in terms of financial returns. Executing the expansion project at 17% inflation does provide an attractive NPV, but the entire port interest will be running at a loss, though a much lower loss than would be the case if project is not executed. However, since the entire Port will run at a negative NPV, at that rate, the expansion project, and indeed the port should not be allowed to run.

Table 4.4: Sensitivity test of inflation rate to Real NPV

a). Inflation rate	**With Proj NPV₦ (000')**	**W/out Proj NPV ₦ (000')**	**Incremental NPV₦ (000')**
	46862.74	15921.67	30941.07
1%	126162.18	92048.66	34113.52
4%	85303.05	53512.50	31790.55
8%	46862.74	15921.67	30941.07
12%	20743.06	-11068.76	31811.81
16%	2825.31	-31011.50	33836.80
17%	-697.09	-35177.12	34480.03
18%	-3901.14	-39070.76	35169.62
19%	-6813.29	-42715.48	35902.19
20%	-9457.31	-46132.04	36674.73

- **Cost overrun:**

The cost overrun factor result from sensitivity test indicates a minimal impact on project outcome. This can be traced to the substantial net revenue accruing from the project. Hence, it is only at a cost overrun factor to 1.5 instead of 1.0 (no overrun) that will yield a negative incremental NPV. Provided the overrun is less than half the total cost, the project remains positive. However, beyond 50% overrun, the 'incremental' NPV turns negative. Table 4.5 below shows results of test for cost overrun factor's sensitivity to the NPV.

Table 4.5: Sensitivity of cost overrun factor to NPV

Cost overrun factor	NPV With ₦ (000')	NPV Without ₦ (000')	NPV Incremental ₦ (000')
	46862.74	15921.67	30941.07
0.80	61411.74	18086.62	43325.12
0.85	57774.49	17545.39	40229.10
0.90	54137.24	17004.15	37133.09
0.95	50499.99	16462.91	34037.08
1.00	46862.74	15921.67	30941.07
1.05	43225.49	15380.44	27845.05
1.10	39588.24	14839.20	24749.04
1.15	35950.99	14297.96	21653.03
1.20	32313.74	13756.72	18557.02
1.25	28676.49	13215.49	15461.00
1.30	25039.24	12674.25	12364.99
1.35	21401.99	12133.01	9268.98
1.40	17764.74	11591.77	6172.97
1.45	14127.49	11050.54	3076.95
1.50	10490.24	10509.30	-19.06

- **Percentage change in average cargo tonnage:**

The change in the average cargo tonnage is a critical variable in that it determines a major constituent of the generated revenue. The tariff is charged per unit cargo tonnage, and hence a change in the cargo tonnage will directly impact significantly on the generated revenue. At 0%, the deterministic NPV is attained. A negative

change (below zero) will yield less NPV values, and a positive change (above zero) will yield a higher NPV than the deterministic case. However, testing a 20% negative change still will not result in a bad project (negative NPV).

Table 4.6: Percentage change in average cargo tonnage to NPV

Change in average cargo tonnage	NPV With ₦ (000')	NPV Without ₦ (000')	NPV Incremental ₦ (000')
	46862.74	15921.67	30941.07
-20%	7978.09	-20635.60	28613.69
-16%	15755.02	-13324.14	29079.16
-12%	23531.95	-6012.69	29544.64
-8%	31308.88	1298.77	30010.12
-4%	39085.81	8610.22	30475.59
0%	46862.74	15921.67	30941.07
4%	54639.67	23233.13	31406.54
8%	62416.60	30544.58	31872.02
12%	70193.53	37856.04	32337.49
16%	77970.46	45167.49	32802.97
20%	85747.39	52478.94	33268.44

- **Annual increase in operating costs:**

A change in the annual operating costs of the Port will impact only mildly on the incremental NPV. A negative percentage change indicates that a reduction in operating costs while a positive percentage is an indication of an increase, which in reality is most often the case. The results of the test shows that there is no drastic effect on the incremental project output, as its NPV remains positive up to a 40% test limit. The without project case will turn in a negative NPV at the point where Operating costs increases by 20%. However, the 'with' project NPV remains positive through an increase of 40%. This is shown in table 4.7 below.

Table 4.7: Sensitivity of Annual increase in operating costs to NPV

Annual increase in Operating costs	NPV With ₦ (000')	NPV Without ₦ (000')	NPV Incremental ₦ (000')
	46862.74	15921.67	30941.07
-8.0%	54098.56	22349.38	31749.18
-6.0%	52289.61	20742.45	31547.15
-4.0%	50480.65	19135.53	31345.13
-2.0%	48671.69	17528.60	31143.10
0.0%	46862.74	15921.67	30941.07
2.0%	45053.78	14314.75	30739.04
4.0%	43244.83	12707.82	30537.01
6.0%	41435.87	11100.90	30334.98
8.0%	39626.92	9493.97	30132.95
10.0%	37817.96	7887.04	29930.92
12.0%	36009.01	6280.12	29728.89
14.0%	34200.05	4673.19	29526.86
16.0%	32391.10	3066.27	29324.83
18.0%	30582.14	1459.34	29122.80
20.0%	28773.19	-147.59	28920.77
22.0%	26964.23	-1754.51	28718.74
24.0%	25155.27	-3361.44	28516.71
26.0%	23346.32	-4968.36	28314.68
28.0%	21537.36	-6575.29	28112.65
30.0%	19728.41	-8182.22	27910.62
32.0%	17919.45	-9789.14	27708.59
34.0%	16110.50	-11396.07	27506.57
36.0%	14301.54	-13002.99	27304.54
38.0%	12492.59	-14609.92	27102.51
40.0%	10683.63	-16216.85	26900.48

- **Change in estimated number of ship calls:**

The number of ships calling at the port is critical to the revenue generated by the port. It is however evident from the test that the number of ships calling is less impactful than the average cargo tonnage. Hence, we can deduce that it is not necessarily the number of ships that matters, but the cargo tonnage held in them.

Table 4.8: Sensitivity of Change in number of ships calls to NPV

Change in estimated number of ship calls	NPV With ₦ (000')	NPV Without ₦ (000')	NPV Incremental ₦ (000')
	46862.74	15921.67	30941.07
-10%	27420.42	-2356.96	29777.38
-8%	31308.88	1298.77	30010.12
-6%	35197.35	4954.49	30242.85
-4%	39085.81	8610.22	30475.59
-2%	42974.27	12265.95	30708.33
0%	46862.74	15921.67	30941.07
2%	50751.20	19577.40	31173.80
4%	54639.67	23233.13	31406.54
6%	58528.13	26888.85	31639.28
8%	62416.60	30544.58	31872.02
10%	66305.06	34200.31	32104.75

Chapter 5

RISK ANALYSIS OF GANAJA PORT EXPANSION PROJECT

There is no certainty that all the projections made in the deterministic case will occur precisely as stated over the life of the project. In fact, it is more certain that they will not. This uncertainty will lead to probable deviations from expected project output, and is simply known as the riskiness of the project.

In order to conduct an analysis of the riskiness of a project, first we must define which of the project's variables have significant impact on project outcome, and has got high degree of possible variations. These critical variables are obtained from the results of a sensitivity analysis. From the use of historical data or expert opinion, the variables suggested by sensitivity analysis are given appropriate probability distribution and range of values, and then fed into a Monte Carlo simulation as assumptions, decisions and forecasts of the output. This will run to give results of probability distributions of project's outcome (CRI, 2014).

The Monte Carlo simulation is an excel based computer program which processes the variables projected on a forecasting model, and then run in order to indicate their estimated impact on the riskiness of the project outcome (Savvides, 2004).

5.1 Selection of Variables

From the results of sensitivity analysis presented in chapter 4, those variables with high degree of variability over life of the project, and with the greatest possible impact on project outcome is selected as assumptions for risk simulation. Also the outcome of the project which are measured in terms of real NPV, are selected as forecast of the model.

The risky variables selected are:

- Inflation rate
- Change in average cargo tonnage
- Annual increase in operating costs

5.2 Probabilities distribution

It is critical to correctly select the range and probability distributions for variables in a risk analysis in order for it to yield a correct result. The range can be deduced from historical data or an expert opinion, where such data is unavailable. For the Ganaja port, the probabilities for the selected variables are;

- **Inflation:**

It is somewhat difficult, if not impossible to predict accurately, the direction or volume of an anticipated change in inflation. For this study, historical values were used and step distribution was assigned. The range limits (from 1-50%) and probabilities from years 2 through 16 are given in table 5.1 below.

Table 5.1: Probability distribution of Inflation rate

Range	Probabilities (%)
0.01-0.05	13.33%
0.05-0.10	40%
0.10-0.15	20%
0.15-0.20	13.33%
0.20-0.50	13.33%

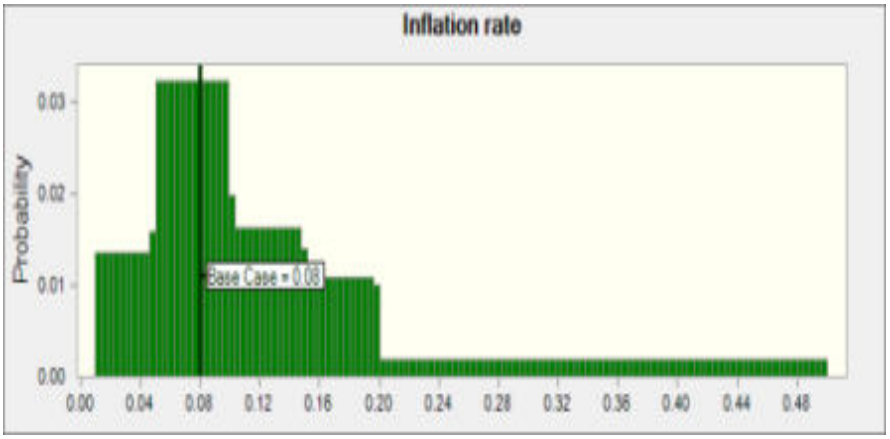

Figure 5.1: Custom (step) distribution of Inflation rate

- **Change in average cargo tonnage:**

The volume of cargo that is being processed through a port is the major determinant of its revenue size. Hence, a change in the average cargo tonnage through the life of the project (years 1 to 15) will significantly affect the value to be created by this expansion. A normal distribution is assigned to the data obtained from educated guess of the likely change of this parameter. A range of -20% to +20% is adopted, with a standard deviation of 0.10, and a uniform distribution is used.

Table 5.2: Probability distribution of Change in cargo tonnage

Mean	Minimum	Maximum
0	-20%	+20%

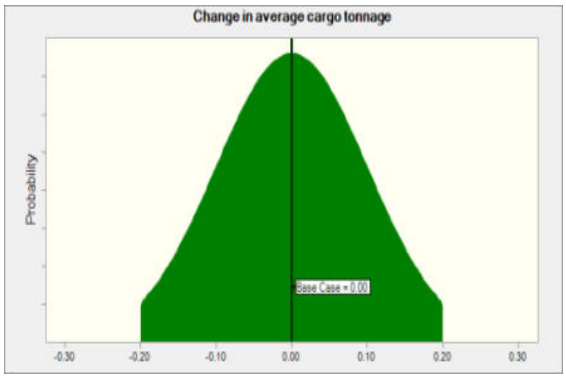

Fig. 5.2: Normal distribution of Change in average cargo tonnage

- **Annual increase in operating costs:**

The operating cost of the port is seen to have significant effect on the project outcome over the years. In analyzing its riskiness, a standard deviation of 0.10 and a range of -10% (decrease in operating cost) to +10% (increase in operating cost) is plotted on a uniform distribution.

Table 5.3: Probability distribution of Annual increase in operating costs

Mean	Minimum	Maximum
0	-10%	+10%

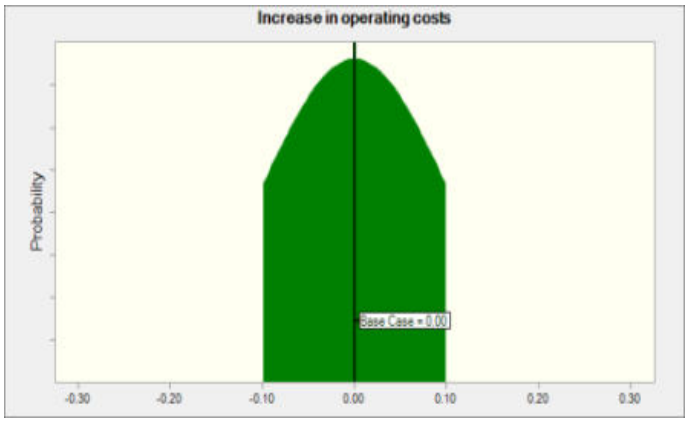

Fig. 5.3: Normal distribution of Annual increase in operating costs

5.3 Results of risk simulation

The identified critical variables as selected above and their assigned appropriate probability distributions stand as the defined assumptions for our risk simulation. They will be used to test the project outcomes which are defined as forecasts of the analysis. These forecasts are;

- Real NPV with project
- Real NPV without project
- Real NPV Incremental

Haven selected both assumptions and forecasts, 10,000 trials are run using the Monte Carlo simulation ofCrystal Ball™. The following results were obtained:

5.3.1 NPV with project

From the 10,000 trials run, the mean NPV with the project stands at ₦ (000') 46,877.51. A median value of ₦ (000') 46,898.22 was also derived and the degree of possible deviation from mean (standard deviation) is ₦ (000') 6,954.67. The minimum possible value is ₦ (000') 21,344.06 while the maximum is ₦ (000') 70,669.53. There is a 100% certainty that a positive NPV will be attained with the project. The high NPV and probability of its occurrence gives the needed assurance that this is indeed a worthwhile project.

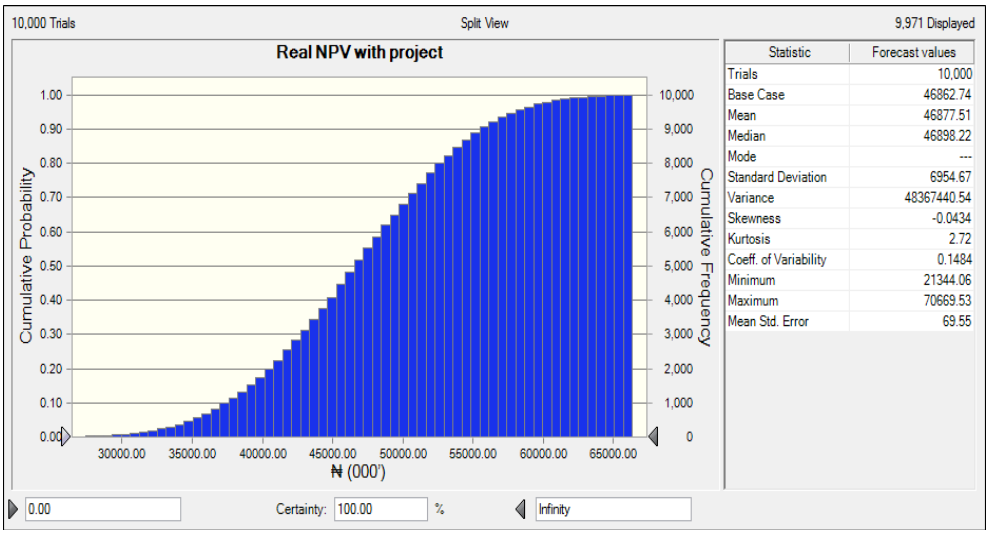

Figure 5.4: Forecast of NPV with project

5.3.2 NPV without project

The results for 10,000 trials of the without project case yields a mean NPV of ₦(000') 15,933.86 and a median value of 15,934.33. The standard deviation is ₦(000') 6,454.64 which is lower than the 'with project' case. This implies that this case has a lower possible fluctuation from the mean value. However, the range runs through a negative valuewith minimum value of ₦(000') -7,920.51 and a maximum of ₦(000') 38,141.24. It has a 99.47% probability of attainting a positive NPV. Hence there is a slight chance (0.53%) that the NPV will be negative.

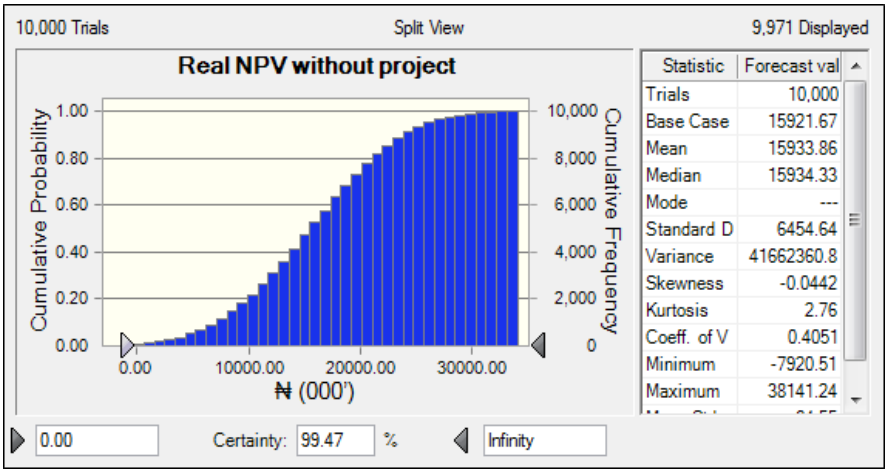

Figure 5.5: Forecast of NPV without project

5.3.3 NPV Incremental project

The NPV of the incremental project case was also run through 10,000 trials. It results in a mean value of ₦(000') 30,943.66 and a median of ₦(000') 30,948.59. Its standard deviation is ₦(000') 629.24 and has a minimum value of 28,862.46 and a maximum of ₦(000') 32,969.77.Apparently, the riskiness of this expansion project is low, as there is only a small degree of variation (Stdev.) from the expected outcome (mean). Also, there is a 100% certainty that a positive NPV will be achieved. Hence it is a worthwhile project.

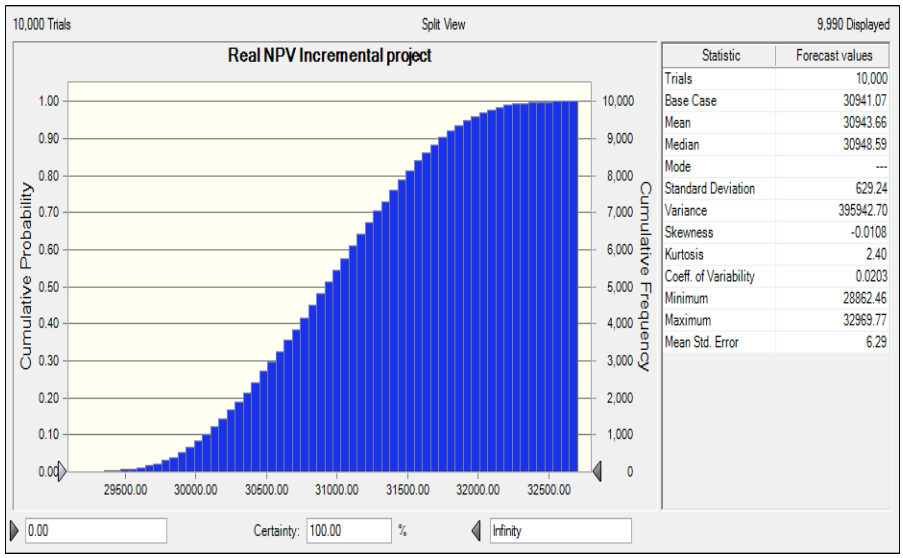

Figure 5.6: Forecast of NPV incremental

Table 5.4: Financial Risk Analysis Results for Ganaja Port

Statistics	**With Project ₦(000')**	**Without Project ₦(000')**	**Incremental Project ₦(000')**
Mean	46,877.51	15,933.86	30,943.66
Median	46,898.22	15,934.33	30,948.59
Standard deviation	6,954.67	6,454.64	629.24
Minimum	21,344.06	-7,920.51	28,862.46
Maximum	70,699.53	38,141.24	32,969.77

The import from this analysis as well as that of financial will be the basis of my conclusions and recommendation on the Ganaja port expansion project.

Chapter 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

In the course of this study, a table of parameter was constructed from where other project data, assumptions, and forecasts were made to yield real NPV and IRR. The study considered three separate cases of with, without and an incremental project. With the project, an expansion work is undertaken, and without project, a repair of existing facilities will be undertaken. The real NPV with project derived is about ₦46.8million, while without project is ₦15.9million, and incremental project is about ₦30.9million over fifteen years of project life.

The alternative of repairing the existing facility (without project case) also yields a positive NPV, but its value is less than half of the NPV with the project. Implementing the expansion project thereby appears tremendously attractive.

From the results of sensitivity test, it is apparent that the incremental project NPV is improved due to adjustment of tariff to annual inflation changes. Also, operating expense and annual cargo tonnage have significant effects on the real NPV. An increasing operating expense reduces the NPV while an increasing cargo tonnage raises the revenue and hence improves the project NPV. The other factors affecting project NPV are cost overrun and estimated ship calls.

The risk analysis of critical variables shows that both the mean and median of the incremental project are hugely positive, with a zero probability of turning negative. With a standard deviation of ₦0.6 million, this expansion project is sufficiently attractive also from the risk perspective.

6.2 Recommendations

For a developing nation like Nigeria, the importance of a robust infrastructural development policy is crucial. But equally significant is the need for a vivid appraisal of project proposals in order to prevent bad projects from being executed, and ensure good ones see the light of day.

This integrated financial and risk analysis of the expansion of Ganaja port shows a risk proof positive addition to value of the project owners (Nigerian Ports Authority), had it been implemented. This study thereby provides a basis to question the non-execution of this project, and many of its kind.

In the same time and conditions as used in this study, I would strongly recommend the undertaking of the expansion project.

REFERENCES

[1] Amanda William, (2013). Mail online; world's oldest port found in Egypt. Retrieved 2014 from, http://www.dailymail.co.uk/sciencetech/article-2309930/Worlds-oldest-port-believed-Egypt-alongside-papyri-revealing-fascinating-details-life-Ancient-Egyptians.html.

[2] Antunes, Catia; Early modern ports of 1500-1750 (2010). European history online; being published by the institute of European history (EGO).

[3] Belli . P., et al (2001) "Chapter 10: risk and sensitivity analysis", economic analysis of operations: analytical tools and practical applications, WBI developmental studies, World bank institute, World bank p.84-91.

[4] Braudel, (1976) La mediterranee vol. 1-2.

[5] Cambridge resources international, Inc. Cambridge, MA, USA, (2004). Integrated investment appraisal : concepts and practice. Limpopo provincial government, Republic of South Africa.

[6] Champman, C.B, Cooper D.F, and Harrison S.L, (1988). Hydropower at Canford: A Case Study in Investment Appraisal" the journal of operational the research society" Vol. 39, No. 5, p.447.

[7] Collier .A.A., and Ledbetter. W .B., (1988) Engineering economics and cost analysis, Harper and Row publications, New York.

[8] David Canning, Esra Bennathan (2000). The Social Rate of Return on Infrastructure Investments. A working paper of World Bank Development Research Group.

[9] Davis, (1973). Rise of the Atlantic Economies.

[10] Dublin-Green C.O., L.F. Awosika and R. Folorunsho, (1999). Climate Variability Research Activities in Nigeria. Nigerian Institute for Oceanography and Marine Research Victoria Island, Lagos, Nigeria.

[11] European Development Fund In a Few Words, (2002), European Commission DE 112, Luxembourg.

[12] Fleetmon: ports of the world. Retrieved 2014 from, http://www.fleetmon.com/en/ports.

[13] Glenday et al (2008); the project appraisal practitioner's guide: volume V.

[14] Nigeria High Commission, UK. http://www.nigeriahc.org.uk/about-nigeria.

[15] Idem, (1979). Civilization materielle, vol. 1-3.

[16] Idem, (1985). La Méditerranée: l'espaceet l'histoire.

[17] Jenkins, et al, (2004). "Project Evaluation Criteria," integrated investment appraisal: Concepts and Practice, p.6.s

[18] Jenkins Glenn and Shukla Gangadhar (1996). Port rehabilitation and expansion; the Makar project in the Philippines. Retrieved 2014 from, http://ideas.repec.org/cgi-bin/htsearch?q=makar+port.

[19] Jenkins Glenn, A.k, (2002). Glenn Paul Jenkins at IDEAS; Economics and finance research. Retrieved 20014 from, http://www.queensjdiexec.org/publications/qed_dp_163.pdf.

[20] Kuruk, P., (2004): Customary Water Laws and Practices: Nigeria. Retrieved 2014, from http://www.fao.org/legal/advserv/FAOIUCNcs/Nigeria.pdf.

[21] Lale Berkoz and Didem Tekba, (1999). The role of ports in the economic development of Turkey, a presentation at the 39th European congress of the regional science association, Dublin, Ireland.

[22] Marshall, H. E. (2004). *The Engineering Handbook, Second Edition.* CRC Press.

[23] Nigeria ports authority, about us, history. Retrieved 2014 from, http://www.nigerianports.org/History.aspx?id=241.

[24] Nigerian high commission UK, about; key data. Retrieved 2014 from, http://www.nigeriahc.org.uk/about-nigeria.

[25] Nil Guler, (2002).Economic evaluation of ports investments, original scientific paper, Pomorskizbornik publication.

[26] Polonia et al, (2007).European Seaport Systems.

[27] Port-Wikipedia; The free encyclopedia: Retrieved 2014 from, http://en.wikipedia.org/wiki/Port.

[28] Rotimi Durojaive, Group business editor, Lagos. Nigeria ranked among world's top 20 economies by 2050. Retrieved 2014 from, http://dailyindependentnig.com/2013/01/nigeria-ranked-among-worlds-top-20-economies-by-2050/.

[29] Sacks and Lynch, (1985) Ports 1540-1700 2000, p. 379; Broeze, port cities, pp 109-225.

[30] Savvides S., (1994). "Risk analysis in investment appraisal", project appraisal, volume 9, number1.

[31] Simon Odey Ering, Felix .U Akpan (2012). The politics of fuel subsidy, populist resistance and its socio-economic implications for Nigeria. Global journal of human science.

[32] UNCTAD, (1977). Appraisal of ports investments, United Nations Conference on Trade and Development

APPENDICES

Appendix 1(a): Pre Assumptions and rates

Working Capital		
1. Accounts receivable (% of port revenues)		10.00%
2. Accounts Payable (% of operating costs)		15.00%
3. Cash Balance (% of port revenues)		5.00%
Discount Rate		
1. Nominal Discount Rate		19.88%
2. Real Discount Rate		11.00%
Depreciation		
1. Equipment	15	years
2. Buildings	25	years
3. Existing Facilities	3056	(₦ '000) per annum
Opportunity Costs:		
a. Value of existing facilities	97500	(₦ '000)
b. Loss of rental income from transit sheds	800	(₦ '000) /annum starting 1992
Residual value of existing facilities in Year 15	51660	(₦ '000)
Inflation rates:		
Domestic	8%	
Foreign	2.5%	

Appendix 1(b): Project Cost and Financing (₦ '000)

Phase I	
A. General Repairs	
1. Repair of Existing Wharf	6096
2. Repair of Existing Electrical &	
Sanitary Utilities	5500
Subtotal	11596
B. Non-construction measures	
1. Communication Equipment	1698
2. Management Improvements	462
Subtotal	2160
C. Container Yard I	
1. Container Yard I	26251
2. Emergency Generator	4378
3. Equipment	0
Subtotal	30629
D. Navigational Aids	406
Subtotal - Phase I	**44,791**

Phase II	
A. Wharf Extension/Container Yard II	
1. Wharf Extension, CYII, Dredging,	
Fill, Office	263888
2. Gate House/Scale/Fence	5316
3. Equipment Maintenance Bldg.	8989
4. Equipment II	114225
5. Communication Equipment II	198
6. Emergency Generators II	6511
7. Relocation of Abocho Community	3592
8. Property Purchase	8934
Subtotal Phase II-A	411653
B. Fresh milk Terminal	53604
Subtotal - Phase II - A & B	**465,257**
Project Total - phase I & II	**510,048**
E. Funding Source	
Federal Government of Nigeria	30.00%
EDF Grant	70%

Appendix 1(c): Operating costs

WITH PROJECT				
1. Personnel Salaries				
	Average Rate Per	No.required	Cost	Cost/annum
Position	Month	per Month	per month	(₦'000)
Managerial	3400.84	3	10202.52	122.43024
Skilled	2600.84	40	104033.6	1248.4032
Semi-skilled	2134.44	10	21344.4	256.1328
Total salaries				1626.96624
2. Fuel cost:				
Cost per litter	0.7	Nairas per litter		
Consumption (in litters):	Per Day	Per Month	Per Year	Amount/Year
	(litters)	(litters)	(litters)	(₦'000)
Emergency Generator I	17	510	6120	4.284
Container Yard II	1444	43320	519840	363.888
Emergency Generator II	36	1080	12960	9.072
Fresh milk Terminal		2500	30000	21
Total				*398.244*
		Total/annum		
3. Electricity	Nairas/mo.	(₦'000)		
Navigational Aids	176	2.112		
Container Yard II	960	11.52		
Fresh milk Terminal	8400	100.8		
Total		*114.432*		

4. Cooling				
Container Yard II	480	5.76		
Fresh milk Terminal	8400	100.8		
Total		*106.56*		
5. Telephone				
Container Yard II	240	2.88		
Fresh milk Terminal	280	3.36		
Total		*6.24*		
6. Office Supplies				
Container Yard II	640	7.68		
Fresh milk Terminal	1600	19.2		
Total		*26.88*		
7. Miscellaneous - Nav. aids	280	3.36		
WITHOUT PROJECT				
a. Personnel Services	4830	(₦'000)/annum		
b. Maintenance & Operating Exp.	5460	(₦'000)/annum		
Total	10290			
G. Opportunity Costs:				
a. Value of existing facilities		97500	(₦'000)	
b. Loss of rental income from transit sheds		800	(₦'000)/annum starting 1992	

Appendix 1(d): Revenue Forecasts

Ratio of Foreign Ships calling at Ganaja Port (based on Yr. 1 data)				
Number of foreign ships	57		Change factor for ship call	0%
Total number of ships	805			
Ratio of foreign ships to total	7.08%			
Ratio of Local Ships calling at Ganaja Port	92.92%			
WITH PROJECT:				
Other income	3600	(₦'000) per annum		

Rental of Container Yard II	6800	(₦'000) per annum starting in Yr. 5 to increase in real terms by 1,000 until Yr. 13 and will remain constant thereafter.
Rental of Container Yard I	4600	thousand per annum starting in Yr. 2
Port Revenue:		
Revenue/ton of cargo handled	30.00	Nairas/ton assuming a 25% increase in tariff rates is approved by NPA
Average cargo per ship in 1992	1,740.00	
Annual cargo growth rate start 1996	4.80%	

	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Estimated no. of ships calling	534	626	683	800	842	861	890	896	918	924	928	931	934	968	987
Estimated throughput	8176004.6	9731679.4	1037758.1	1106214.9	1176469.4	1463567.7	1349582.1	1409416.1	1472429.5	1538445.3	1559123.9	1580067.1	1601277.9	1625290.9	1647073.7
Average cargo per ship (tons)	1,531.09	1,554.58	1,519.41	1,382.77	1,397.23	1,464.30	1,534.59	1,608	1,685	1,766	1,785	1,804	1,822	1,842	1,861
WITHOUT PROJECT:															
Other income	1420	(₦'000) per annum													
Revenue/ton of cargo handled	30.00	Nairas/ton assuming a 25% increase in tariff rates is approved by NPA													
Years	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
	1992	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	2004	2005	2006
Est. maximum cargo/annum	8176004.6	9731679.4	1037758.1	1106214.9	1106214.9	1106214.9	1106214.9	1106214.9	1106214.9	1106214.9	1106214.9	1106214.9	1106214.9	1106214.9	1106214.9
Estimated no. of ships calling	534	626	683	800	800	800	800	800	800	800	800	800	800	800	800

Appendix 2: Port Revenues

WITH PROJECT:															
Projected Number of Ship Calls	534	626	683	800	842	861	890	896	918	924	928	931	934	968	987
No. of Ship Calls - Corrected	534	626	683	800	842	861	890	896	918	924	928	931	934	968	987
Projected Cargo Tonnage	817605	973169	1037758	1106215	1176469	1260762	1365781	1440988	1547235	1632101	1656344	1679114	1702178	1782630	1836668
Projected Port Revenues (000)	24528	29195	31133	33186	35294	37823	40973	43230	46417	48963	49690	50373	51065	53479	55100
No. of foreign ships	38	44	48	57	60	61	63	63	65	65	66	66	66	69	70
Ave. cargo tonnage of foreign ships	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215
Total cargo tonnage of foreign ships	197,185	231,157	252,205	295,409	310,918	317,934	328,642	330,858	338,981	341,197	342,674	343,782	344,890	357,445	364,460
% of foreign cargo to total	24.12%	23.75%	24.30%	26.70%	26.43%	25.22%	24.06%	22.96%	21.91%	20.91%	20.69%	20.47%	20.26%	20.05%	19.84%
Port revenues - foreign	5915.56	6934.72	7566.16	8862.26	9327.53	9538.01	9859.27	9925.73	10169.44	10235.91	10280.22	10313.46	10346.69	10723.34	10933.81
Port revenues - local	18612.58	22260.36	23566.59	24324.19	25966.55	28284.84	31114.17	33303.91	36247.61	38727.11	39410.11	40059.95	40718.65	42755.56	44166.23
Rental of Container Yard II					6800	7800	8800	9800	10800	11800	12800	13800	14800	14800	14800
WITHOUT PROJECT:															
Projected Number of Ship Calls corrected	534	626	683	800	800	800	800	800	800	800	800	800	800	800	800
Projected Cargo Tonnage	817605	973169	1037758	1106215	1117786	1171439	1227668	1286596	1348353	1413074	1427883	1442847	1457968	1473248	1488687
Projected Port Revenues (000)	24528	29195	31133	33186	33534	35143	36830	38598	40451	42392	42836	43285	43739	44197	44661
No. of foreign ships	38	44	48	57	57	57	57	57	57	57	57	57	57	57	57
Ave. cargo tonnage of foreign ships	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215	5,215
Total cargo tonnage of foreign ships	197,185	231,157	252,205	295,409	295,409	295,409	295,409	295,409	295,409	295,409	295,409	295,409	295,409	295,409	295,409
% of foreign cargo to total	24.12%	23.75%	24.30%	26.70%	26.43%	25.22%	24.06%	22.96%	21.91%	20.91%	20.69%	20.47%	20.26%	20.05%	19.84%
Port revenues - foreign	5915.56	6934.72	7566.16	8862.26	8862.26	8862.26	8862.26	8862.26	8862.26	8862.26	8862.26	8862.26	8862.26	8862.26	8862.26
Port revenues - local	18612.58	22260.36	23566.59	24324.19	24671.31	26280.92	27967.79	29735.63	31588.33	33529.96	33974.23	34423.16	34876.79	35335.17	35798.36

Appendix 3: Schedule of investment cost disbursement

	1992	1993	1994	1995
Phase I				
A. General Repairs				
1. Repair of Existing Wharf	40.00%	60.00%		
2. Repair of Existing Electrical &				
Sanitary Utilities	25.00%	75.00%		
B. Non-construction measures				
1. Communication Equipment		100.00%		
2. Management Improvements	70.00%	30.00%		
C. Container Yard I				
1. Container Yard I	40.00%	60.00%		
2. Emergency Generator		100.00%		
D. Navigational Aids		100.00%		
Phase II				
A. Wharf Extension/Container Yard II				
1. Wharf Extension, CYII, Dredging,		25.00%	55.00%	20.00%
Fill, Office				
2. Gate House/Scale/Fence		25.00%	55.00%	20.00%
3. Equipment Maintenance Building		25.00%	55.00%	20.00%
4. Equipment II		25.00%	55.00%	20.00%
5. Communication Equipment II		25.00%	55.00%	20.00%
6. Emergency Generators II				100.00%
7. Relocation of Abocho Community	100.00%			
8. Property Purchase	100.00%			
B. Fresh milk Terminal		25.00%	75.00%	

Appendix 4: Real Cash flow with project (₦'000)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Domestic Inflation Index	1.000	1.080	1.166	1.260	1.360	1.469	1.587	1.714	1.851	1.999	2.159	2.332	2.518	2.720	2.937	3.172
RECEIPTS																
Port Revenues - Foreign	5915.56	6421.04	6486.76	7035.15	6856.01	6491.41	6213.01	5791.57	5494.23	5120.50	4761.73	4423.26	4108.81	3942.95	3722.54	
Port Revenues - Local	18612.58	20611.45	20204.55	19309.32	19086.19	19250.19	19607.20	19432.51	19583.46	19373.19	18254.51	17181.03	16169.94	15721.13	15036.88	
Total port revenues	24528.14	27032.48	26691.31	26344.47	25942.20	25741.59	25820.21	25224.08	25077.69	24493.70	23016.24	21604.29	20278.75	19664.08	18759.42	
Rental income from Container Yard I		4600.00	4600.00	4600.00	4600.00	4600.00	4600.00	4600.00	4600.00	4600.00	4600.00	4600.00	4600.00	4600.00	4600.00	
Rental income from Container Yard II					6800.00	7800.00	8800.00	9800.00	10800.00	11800.00	12800.00	13800.00	14800.00	14800.00	14800.00	
Other Income	3600.00	3600.00	3600.00	3600.00	3600.00	3600.00	3600.00	3600.00	3600.00	3600.00	3600.00	3600.00	3600.00	3600.00	3600.00	
EDF Grant	20577.97	99171.02	179299.26	59523.94												
Government Contribution																
Liquidation Values:																
Existing Facilities																51660.00
New Facilities:																
Communication Equipment I																244.51
Container Yard I																13205.30
Emergency Generator I																630.43
Navigational Aids																58.46
Wharf extension, Container Yard II																171933.31
Gate house/scale/fence																3463.58
Equipment Maintenance Bldg.																5856.68

Equipment II																35439.0
Communication Equipment II																61.43
Emergency Generators II																2187.20
Fresh milkTerminal																31910.25
Total Cash Receipts	48706.11	134403.51	214190.57	94068.41	40942.20	41741.59	42820.21	43224.08	44077.69	44493.70	44016.24	43604.29	43278.75	42664.08	41759.42	316650.22
EXPENDITURES																
Investment cost-non tradable	23017.57	61967.32	112959.14	31305.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Investment cost-tradable	6379.53	79705.57	143182.66	53728.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Opportunity cost of existing facilities	97500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Cost:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Existing Facilities	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	0.00
New Facilities	0.00	0.00	0.00	0.00	2282.68	2282.68	2282.68	2282.68	2282.68	2282.68	2282.68	2282.68	2282.68	2282.68	2282.68	0.00
Loss of rental income from term. shed	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	0.00
Change in Cash balance	818.05	594.17	83.06	81.51	77.46	86.05	99.27	65.82	86.10	63.68	16.84	14.65	13.74	44.37	27.60	-868.49
Change in Accounts Receivable	1808.05	1029.13	166.12	163.03	154.92	172.10	198.54	131.65	172.21	127.36	33.69	29.30	27.48	88.75	55.19	-1736.98
Change in Accounts Payable	-666.05	-926.79	-114.33	-114.33	-456.74	-139.70	-139.70	-139.70	-139.70	-139.70	-139.70	-139.70	-139.70	-139.70	-139.70	1746.21
Total Expenditures	139947.15	153459.40	267366.65	96254.41	13148.32	13491.14	13530.80	13430.46	13491.29	13424.03	13283.52	13276.93	13274.20	13366.10	13315.78	-859.27
NET CASH FLOW	-91241.04	-19055.90	-53176.08	-2186.00	27793.88	28250.45	29289.42	29793.62	30586.40	31069.67	30732.72	30327.36	30004.55	29297.97	28443.64	317509.49
NET PRESENT VALUE AT	11.00%	**46862.74**														
INTERNAL RATE OF RETURN		**14.19%**														

Appendix 5: Real Cash flow without project (₦'000)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Domestic Inflation Index	1.000	1.080	1.166	1.260	1.360	1.469	1.587	1.714	1.851	1.999	2.159	2.332	2.518	2.720	2.937	3.172
RECEIPTS																
Port Revenues - Foreign	5915.56	6421.04	6486.76	7035.15	6514.03	6031.51	5584.73	5171.04	4788.00	4433.34	4104.94	3800.87	3519.33	3258.63	3017.25	
Port Revenues - Local	18612.58	20611.45	20204.55	19309.32	18134.15	17886.35	17624.45	17350.46	17066.19	16773.33	15736.64	14763.50	13850.05	12992.67	12187.95	
Total port revenues	24528.14	27032.48	26691.31	26344.47	24648.17	23917.86	23209.18	22521.50	21854.20	21206.67	19841.58	18564.37	17369.38	16251.31	15205.20	
Rental income from Container Yard I																
Rental income from Container Yard II																
Other Income	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00	1420.00	
EDF Grant																
Government contribution																
Liquidation Values:																
Existing Facilities																51660.00
New Facilities:																
Communication Equipment I																
Container Yard I																
Emergency Generator I																
Navigational Aids																
Wharf extension, Container Yard II																
Gate house/scale/fence																
Equipment Maintenance Bldg.																
Equipment II																

Communication Equipment II																
Emergency Generators II																
Fresh milkTerminal																
Total Cash Receipts	25948.14	28452.48	28111.31	27764.47	26068.17	25337.86	24629.18	23941.50	23274.20	22626.67	21261.58	19984.37	18789.38	17671.31	16625.20	51660.00
EXPENDITURES																
Investment cost-non tradable	1143.27	2686.32														
Investment cost-tradable	2670.13	5096.28														
Opportunity cost of existing facilities	97500.00															
Operating Cost:																
Existing Facilities	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	10290.00	
New Facilities																
Loss of rental income from transit shed																
Change in Cash balance	818.05	594.17	83.06	81.51	12.76	54.77	53.15	51.58	50.05	48.56	10.29	9.63	9.01	8.43	7.88	-703.94
Change in Accounts Receivable	1808.05	1029.13	166.12	163.03	25.51	109.55	106.30	103.15	100.10	97.13	20.58	19.25	18.01	16.85	15.77	-1407.89
Change in Accounts Payable	-666.05	-926.79	-114.33	-114.33	-114.33	-114.33	-114.33	-114.33	-114.33	-114.33	-114.33	-114.33	-114.33	-114.33	-114.33	1429.17
Total Expenditures	113563.45	18769.11	10424.85	10420.21	10213.94	10339.99	10335.12	10330.39	10325.81	10321.36	10206.53	10204.55	10202.69	10200.95	10199.32	-682.67
NET CASH FLOW	-87615.31	9683.37	17686.46	17344.26	15854.24	14997.87	14294.06	13611.11	12948.39	12305.30	11055.05	9779.83	8586.69	7470.36	6425.88	52342.67
NET PRESENT VALUE AT	11%	**15921.67**														
INTERNAL RATE OF RETURN		**14%**														

Appendix 6: Real Cash flow Incremental project (₦'000)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Domestic Inflation Index	1.000	1.080	1.166	1.260	1.360	1.469	1.587	1.714	1.851	1.999	2.159	2.332	2.518	2.720	2.937	3.172
RECEIPTS																
Port Revenues - Foreign	0	0	0	0	341.99	459.90	628.28	620.53	706.23	687.17	656.79	622.39	589.49	684.31	705.28	0
Port Revenues - Local	0	0	0	0	952.04	1363.83	1982.75	2082.05	2517.26	2599.87	2517.86	2417.52	2319.88	2728.46	2848.93	0
Total port revenues	0	0	0	0	1294.03	1823.74	2611.03	2702.58	3223.49	3287.03	3174.65	3039.92	2909.37	3412.77	3554.22	0
Rental income from Container Yard I	0	4600	4600	4600	4600	4600	4600	4600	4600	4600	4600	4600	4600	4600	4600	0
Rental income from Container Yard II	0	0	0	0	6800	7800	8800	9800	10800	11800	12800	13800	14800	14800	14800	0
Other Income	2180	2180	2180	2180	2180	2180	2180	2180	2180	2180	2180	2180	2180	2180	2180	0
EDF Grant	20577.97	99171.02	179299.26	59523.94	0	0	0	0	0	0	0	0	0	0	0	0
Government Contribution	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liquidation Values:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Existing Facilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Facilities:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Communication Equipment I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	244.512
Container Yard I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13205.30304
Emergency Generator I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	630.432
Navigational Aids	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58.464
Wharf extension, Container Yard II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171933.3089
Gate house/scale/fence	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3463.581026
Equipment Maintenance Bldg.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5856.683568
Equipment II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35439.064

																7
Communication Equipment II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61.43081472
Emergency Generators II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2187.195955
Fresh milkTerminal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31910.24678
Total Cash Receipts	22757.97	105951.02	186079.26	66303.94	14874.03	16403.74	18191.03	19282.58	20803.49	21867.03	22754.65	23619.92	24489.37	24992.77	25134.22	264990.22
EXPENDITURES																0
Investment cost-non traded	21874.30	59281.01	112959.14	31305.75	0	0	0	0	0	0	0	0	0	0	0	0
Investment cost-traded	3709.40	74609.28	143182.66	53728.45	0	0	0	0	0	0	0	0	0	0	0	0
Opportunity cost of existing facilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating Cost:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Existing Facilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Facilities	0	0	0	0	2282.68	2282.68	2282.68	2282.68	2282.68	2282.68	2282.68	2282.68	2282.68	2282.68	2282.68	0
Loss of rental income from term. shed	800	800	800	800	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	0
Change in Cash balance	0	0	0	0	64.70	31.28	46.12	14.25	36.06	15.12	6.56	5.02	4.73	35.95	19.71	-164.55
Change in Accounts Receivable	0	0	0	0	129.40	62.56	92.24	28.50	72.11	30.23	13.11	10.04	9.46	71.89	39.42	-329.09
Change in Accounts Payable	0	0	0	0	-342.40	-25.36	-25.36	-25.36	-25.36	-25.36	-25.36	-25.36	-25.36	-25.36	-25.36	317.04
Total Expenditures	26383.7	134690.2902	256941.8	85834.2	2934.38	3151.15	3195.68	3100.06	3165.48	3102.67	3076.98	3072.38	3071.51	3165.16	3116.46	-176.60
NET CASH FLOW	-3625.73	-28739.27	-70862.54	-19530.26	11939.64	13252.58	14995.36	16182.52	17638.01	18764.37	19677.67	20547.53	21417.86	21827.62	22017.76	265166.82
NET PRESENT VALUE AT	11.00%	**30941.07**														
INTERNAL RATE OF RETURN		**14%**														