CRITICAL SUCCESS FACTORS OF LIQUIFIED NATURAL GAS PROJECTS

(A study of NLNG Train-6 Gas Project, Bonny Island)

By

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CERTIFICATION

This is to certify that this project titled "Critical Success Factors of the construction of Liquefied Natural Gas Project" (A case study of NLNG Train 6 Gas Project) was carried out by Nnamdi Godwin Mbata with registration No. 20085657149 in partial fulfilment of the requirements for the award of Master of Business Administration (MBA) in Project Management Technology, Federal University of Technology, Owerri

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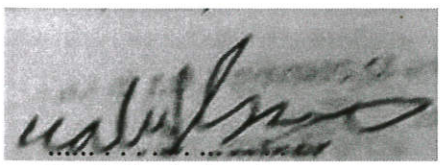

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DEDICATION

This project is dedicated to my late Father, Pa. Gideon Ojinianusi Mbata who passed unto glory on the 17th December 2012.

I also want to dedicate this project to my dear wife who has stood by me through the period of this MBA programme.

In all, I ascribe glory to the Lord God Almighty. Amen

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To the glory of God, this programme came to conclusion and today, by the grace of God, I have completed the MBA programme. It was God 's kindness and mercy that led me through even in the midst of turmoil in the course of this programme .

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Besides these names many others contributed in one way or the other to ensure that I went through this programme. May God bless all of you for your assistance and may God reward all of you.

To God be the Glory.

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ABSTRACT

While success has eluded most LNG projects planned in countries like Bolivia, Venezuela, Iran, Canada, Alaska, Indonesia, Russia, and Australia, a commendable success has been recorded in the construction of Nigeria LNG Train Six project in Bonny Island. The objective of this project work is to find out the various success factors that have made the Train 6 project successful and how these can be of advantage for several other LNG projects planned in several locations in Nigeria would also succeed. By this review conclusions would be drawn and recommendations made for references in future work in the chosen locations. The basic research questionnaires of 5- point scale response were analysed using tables. Two Hypotheses were formulated in the study and were tested using correlation analysis techniques. The two null hypotheses were not true and therefore not acceptable; There were significant project management system that existed that led to the significant success of the T6 NLNG project. Also, significant management of the risk factors, led to the commendable success of the project. Finally, the study concludes that the effective Project management of T6 NLNG project produced the recorded success and any other projects planned; Train 7 project, Olokolo and Brass LNG projects would require a higher level of Project management of both risks and resources to achieve the desired high project performance. Thesis will in turn ensure timely delivery of the projects at the approved budget cost.

Key Words: Evaluation, Success Factors, Construction Projects, NLNG Train 6, Project, Project Performance.

CHAPTER ONE

INTRODUCTION

1.1 Background of Study:

Liquefied Natural Gas projects have taken centre stage in the development of Global economy. This is clearly demonstrated in the number of planned LNG projects in Bolivia, Venezuela, Nigeria, Iran, Canada, Alaska, Indonesia, Russia, and Australia, etc.

In recent years investments in LNG business has increased and there has been large market for the product. LNG gas products (cargoes) are normally shipped under long-term contracts and are sold prior to a sponsor taking the final investment decision on the liquefaction export project. The terms and conditions for the sale of LNG are buyer and seller specific and highly negotiated. Because of the long- term nature of the LNG sale and purchase agreements, opportunity may exist in fluctuating price markets to "divert" sales to other LNG buyers. Flexibility for increased and decreased volumes is often negotiated into the contract. Take-or-pay provisions give rise to terms allowing for make-up quantities to be delivered at a future time.

The foregoing discussion gives basic insight into the very different markets that exist in the LNG and crude oil trading arena. Most of the completed LNG export projects around the world faced several challenges to be completed and the current low trend of Oil prices makes it essential that project sponsors consider those attributes that facilitate a successful project.

Historically proposed LNG export projects that are planned for construction with all favourable condition execution and considered viable were, in the end, cancelled for a various reasons militating against the projects. The competition is fierce and the capital costs are steep. Not all of

the proposed projects will realize success. We looked at several characteristics that successful LNG export projects typically share.

In Nigeria, this challenging and daunting situation has been demonstrated in the construction of several mega projects of different, one of such NLNG T6 project in Bonny Island. For a developing society like Nigeria, construction of such Mega projects have been a herculean task due to several challenges which ordinarily should not be in a developed society. Some of these challenging issues have resulted to several abandon projects and most times a huge loss to the stakeholders of such projects. Every construction project is completed as a result of a combination of many events and interactions. Planned or unplanned, over the life of a facility, with changing participants and processes in a constantly changing environment.

In recent years, participants in the construction industry in Nigeria have become increasingly aware of increasing difficulties in the realization of project success especially in severe terrain like the Niger Delta which are characterized with violence and political instability. Mega projects are characterized by huge and irreversible investments and are faced with various risks ranging from community violence, youth restiveness and other social and political uncertainties. Other risks factors like viability, project completion time, quality, costs, etc. affect the project value significantly ranging from design through the actual construction, commissioning and production.

The construction industry is vital for the development of any nation. In many ways, the pace of the economic growth of any nation can be measured by the development of infrastructural projects of various capacities such as buildings roads and bridges, power plants, liquefaction gas plants etc. Construction project development involves numerous parties, various processes,

different phases and stages of work and a great deal of input from both the public and private sectors, with the major aim being to bring the project to a successful conclusion. The level of success in carrying out construction project development activities will depend heavily on the quality of the managerial, financial, technical and organizational performance of the respective parties, while taking into consideration the associated risk management, the business environment, and economic and political stability. According to Wang (1994), as construction is becoming more complex, a more sophisticated approach is necessary to deal with initiating, planning, financing, designing, approving, implementing and completing a project.

Construction of projects varies from country to country and from city to city. Every location has its own peculiarity and several reasons are responsible in each peculiar situation. Construction of projects in most countries or organizations is run with the aim to achieve some specific goals within a given time frame and with dedicated resources. Financing Mega projects is always a herculean task and considering the huge funds required, the quality of project delivery functions is crucial in order to achieve cost efficiency in operations and deliver the stakeholders desire. Measuring project performance is an important part of project and program management. It allows a Project manager to identify cost and schedule problems early and take steps for remediation quickly. It starts with setting the standards for the size of work packages, applying credit for work performed, and setting value metrics to track the performance. Measuring project performance provides the organization with a clear picture of the health of its projects and can instill confidence in the project teams. Additionally, these performance measures can help the Project Management Office (PMO) to establish continuous improvement initiatives in areas where projects commonly perform at lower levels. The usefulness of measuring project

performance is evident and as long as organizations do not become overwhelmed with them, these measures will remain important contributors to organizational success.

More so, in the construction of projects, Project Management Offices (PMO) should have a standard for applying credit for work performed and it should be determined what earned the value that is being tracked and results are presented to management.

All of these processes require effort and a working knowledge of the cost of things and the conditions in which the project is executed. Depending on the complexity of the project they can require more than one person, and they may occur more than once during the life of a project.

To realize success in a project, it is also relevant to track the Project performance right from the beginning through the planning section of the construction team. Although tracking of performance of a project can be very simple or extreme complex especially when you consider the various aspects of the project in other to realize the success of that project.

Achieving success in public construction projects is difficult because it requires economy, efficiency, quality, fairness and transparency. Such projects are taken up on the requisition of owners/clients and almost always involve multiple entities and are also accountable to external financial audit and vigilance agencies. Train Six of Nigeria Liquefied Natural Gas project was one of such mega projects (Air-cooled, nameplate capacity = 4.2 Million Metric Tons per annum) estimated to cost One Billion, Nine Hundred and Ninety Five Million, Five Hundred United states Dollars (US$1,995,500,000) started in 2004 with the scheduled plan to be completed at the end of December in 2007 (3yrs). At the end of 2007, the project was delivered on the 14th of December, 2007 at the cost of One Billion, Eight hundred and Twelve Million, Eight hundred and Eighteen Thousand, and Twenty Three United States Dollars (US$

$1,812,818,023.00). These confirm that the project was completed within the scheduled time and below budget making a huge difference of other that had overruns and others failed. Identification of the success factors to this project is considered the key to the success of the project. This confirms that achieving success in any project even before the project commences is key to achieving the required success. Through an extensive literature review of similar completed project works professionals have confirmed this base on their success attributes. The analysis yielded four success factors: awareness of and compliance with rules and regulations; pre-project planning and clarity in scope; effective partnering among project participants ; and external monitoring and control. These four success factors were also used in multivariate linear regression in order to explore their relative significance for overall performance, and compliance with anti-corruption and financial norms. The most significant factor for overall performance is awareness of and compliance with rules and regulations. The results would be helpful to public construction project professionals in taking proactive measures for successful completion of public projects.

Kriskal -Wallis conducted a research to gain a renewed understanding of the emerging trend of Construction Success Factors considered by various stakeholders in the local industry. This was achieved through a comparative study of 48 construction stakeholders classified into three categories, namely, developers, consultants and contractors. The Kruskal-Wallis one-way analysis of variance (ANOVA) on the 46 factors suggests that the stakeholders favour a more balanced approach to Construction Success Factors. Apart from the 'hard' factors, there is a strong consistency among the perception of project stakeholders in recognizing the significance of human-related 'soft' factors. The analysis further reveals that the high scoring factors are mostly related to three major aspects: (1) project personnel; (2) commitment and communication;

and (3) site management and supervision. Implementation of human-related factors will help to stimulate an atmosphere of trust among stakeholders amidst a widespread adversarial attitude in the industry.

Project personnel; (2) commitment and communication; and (3) site management and supervision. Implementation of human-related factors will help to stimulate an atmosphere of trust among stakeholders amidst a widespread adversarial attitude in the industry. The traditional approach to success in the construction industry, both in academia and in industry, places great emphasis on the ability to plan and execute projects. In the past, companies completing projects in a timely manner within an established budget and meeting required quality considerations have been considered successful companies. Minimizing an emphasis on management practices and organizational stability, companies with a track record of successful project completion have been considered the construction industries' top- performers. In contrast, other industries emphasize management practices at a corporate level as an essential element of success. However, the future environment of the typical construction company will be much different due to technological and economic advancements. Therefore, a shift in emphasis from project success to corporate success should be examined for construction organizations to compete in an ever-changing marketplace. This paper advocates the adoption of a critical success factor methodology to enhance construction organization success and identify elements that are essential for organizations to achieve this success. The idea of managing a project can seem like a daunting task, however, provided with the right tools, any project can achieve success. When undertaking any type of project management, there must be a working set of guidelines and objectives that must be followed, in order to guarantee success for that particular project objectives are typically what drive each and every person toward a goal or set of series of goals

throughout their lives. This goal or series of goals can be in a shorter or longer terms throughout the individual life of that person.

In many cases, objectives can be modified or changed as a person's goals and interests change. In the world of project management, objectives represent the series of goals or ideals towards which a project team leader or project team will direct their work and work strategies into realistic position in which they hope to advance. Objectives can also refer to a particular purpose that the project management team needs to attain and or any particular results that need to be accomplished. In more tangible scenarios, objectives can refer to a specific series of products that must be produced as well as particular services that need to be performed for the sake of accomplishing a set series of goals. Objectives can be modified as the end goals of a project team may change, although typically they are merely modifications of the original design set in place at a beginning.

When a successful company invests time, money, and other resources in a project, its primary concern is always what it is getting in return for its investment. It is the responsibility of the project manager to ensure these projects stay on schedule and within their approved budget.

Although extensive research has been undertaken on the critical success factors (CSFs) for construction projects, very little of these researches contains information specific to the local context in which this work is directed. While several local studies have been conducted within a similar research boundary, variables with growing importance in the literature, the human-related factors, have yet to garner much attention.

In the United Kingdom, Public-private partnerships (PPPs) are increasingly used in the public facilities and services provision through the Private Finance Initiative (PFI). Despite some

casualties, PPP/PFI projects have been undertaken successfully, but the reasons for success are not entirely clear. Questionnaire survey research examined the relative importance of 18 potential critical success factors (CSF) for PPP/PFI construction projects in the UK. The results show that the three most important factors are: 'a strong and good private consortium', 'appropriate risk allocation ' and 'available financial market. Factor analysis revealed that appropriate factor groupings for the 18 CSFs are: effective procurement, project implementability, government guarantee, favourable economic conditions and available financial market. These findings should influence policy development towards PPPs and the manner in which partners go about the development of PFI projects.

These references are important as to confirm that further research within our localized environment like the Bonny Island is a necessary study that would assist future builders in taking appropriate decisions in what major success factors characterized Train 6 of Nigeria LNG gas project. This is necessary to be considered because of the level of investment to be made in similar construction project.

1.2 Problem Statement

The construction of Mega projects in Nigeria is one of the largest job creators and this applies to other developing countries in the world. In Nigeria, such mega projects have serious peculiarities that have made them more challenging and highly competitive. The high number of project failures suggests the existence of underlying critical success factors which have not been identified. Projects like Aluminium Extrusion Industry (ALSCON), Ajaokuta Steel Complex, Eko Atlantic Project, Lagos Light Rail in Lagos, World trade Centre in Abuja, etc are but a few of the mega projects which have not seen the light of day despite the huge financial resources

committed to them. Consequent to this, these mega projects can be classified as failed projects and not the best for any country lest a growing one like Nigeria.

Project success has eluded the construction industry to the point where keeping existing clients has become a battle, let alone attracting new clients (Toor & Ogunlana, 2005). An assumption is made that, if a project is completed on time, within the agreed budget and set quality, referred to as the 'golden triangle', then the project is deemed successful. Evidence suggests that this is far from the truth. Hence, the construction industry needs to pay special attention to critical success factors, besides the 'golden triangle', if it is to survive the challenges posed by globalization (Toor & Ogunlana, 2005).

We shall undertake critical factors of Liquified Natural gas project with special reference to the NLNG Train 6 gas project which is located in Bonny Island. This project's location is a unique and severe one taking into consideration the island nature of its location and precarious nature of the Niger Delta environment.

Here in this project careful consideration shall be given to the perceptions of contractors and Qroject managers with reference to their functions in determining the critical success factors that lead to project success in the construction industry. Some years ago similar survey and project was undertaken in Durban South Africa among 95 project managers and 61 active grade four contractors. The findings reveal that both project managers and contractors strongly support the identified critical success factors as significant in achieving project success.

There was no significant difference in their perception of critical success factors, based on the biographic characteristics. The recommendations presented may be used as a guideline for successful execution of construction projects. In this project a case of NLNG Train 6 gas project

shall be examined to deduce the underlying success factors which characterized the project since 2005 .

Most mega projects executed in Nigeria especially the Niger Delta regions are either completed with both time and cost overruns or are abandoned because of all manner of reasons. Consequent to this, it is clear that most projects that are completed in this region have very low cost performance indices and as such cannot be said to have achieved the investors' primary intent which is to maximize the cost performance index. This has been a major concern to the investors, whether individuals, corporate bodies or government.

More worrisome and of great concern are that these mega project are usually initiated with the good intention of fulfilling the needs of the mass populace and as such their expectations are dashed to the winds. There are many of these kinds of abandoned projects in the Niger Delta and projects the need to investigate successful and failure factors in the one typical of such project in a severe environment, Bonny Island. The huge finance resources committed into these projects have no way of being recovered because new governments do not embrace them for completion. Generally, constructions in the Niger Delta face uphill tasks to realize.

The Niger Delta area is a hostile and severe environment for the implementation of the infrastructural projects despite the situation that the area has been blessed with huge natural mineral resources that would attract multiple establishment and construction of infrastructural projects.

Meanwhile, all constructions of infrastructural projects are executed with the aim to success in mind in other to achieve optimum project performance. Where the risks of any project are too high, the project value and capital structure are seriously affected and the management objective,

which is to maximize the net present value (NPV) of the project and equity value are undermined. These are the main issues of greatest challenge in the region which if tackled would attract many more projects that would help empower our youths and add to the development of the region.

1.3 Objectives of the Study:

The objectives of this study are

- Identify the critical success factors of Mega Projects in Nigeria

- Review critical factors that impacted on Nigeria Liquefied Natural Gas Train 6 project.

- Recommend to Future investors in the sector within the Riverine communities for optimal delivery.

1.4 Research Questions

A few questions that are necessary to answer in other to establish these facts about the success of this project include

1.) What are the most critical success factors that affected Train 6 of NLNG Gas Project?

2.) What are the key performance indices that drove the success of T-6 Project?

3.) What significant factors affected T-6 Project negatively towards failure?

1.5 Statement of Hypothesis

H0: An effective risk management system existed for the mitigation of the risk exposure of T-6 Project;

a.) H1: There is Significant relationship exists between the project management of T6 and the outstanding success of the Project

b.) H2: There is no Significant relationship existed between the management of the risk factors of T6 and the success of the project.

1.6 Justification of Study:

This study would be useful to investors in the gas business hub of Bonny Island where these NLNG gas projects are sighted. Although construction in this community is a herculean task considering Youth restiveness, local content agitation and difficult road terrain, it would help investors in identifying the success factors that would assist the performance of their projects.

Some of these projects include the planned Train 7 of the NLNG plant, Brass and OK LNG projects all in the Niger Delta. Contractors and builders working or intending to work in the Niger Delta area where challenges of Youth and community restiveness are prevalent, would be better prepared to manage the factors that would be militating against their projects in order to achieve optimal performance.

This study would also aid the federal Government in making objective decision while partnering with individuals or corporate organization in investing in this unique Bonny Island which is a great mine of investment. The on-going plan to site a waste to wealth project in Bonny Island being initiated by the NLNG Ltd would take advantage of this work in the bid to commence the project. These and many other advantages are available in the course and completion of this project.

1.7 Scope/Limitations of the Study

As usual with all researches, there were limitations experienced during the course of this study and these are listed below.

1. The NLNG Train-6 project is sited in remote Bonny Island where road access was and still is a big challenge. The Island does not have any motorable means of transport except through the boat. This implies that all machines and equipment are delivered to site through barge and tug boat movement. All companies servicing these projects have similar challenges which in turn impacted to their cost and deliverables.

2. Another challenge that affected this work was the ability of this research to gather construction data from the local contractors which contributed to the successful completion of these projects. The referenced construction data in this work are as recorded in the NLNG database because they are the main operators of the NLNG gas plant. All other contractors that participated in the construction of the project have demobilized after project completion.

3. The sample space of our questionnaire was limited to 18 core construction staff that is currently present in Bonny Island at this time of this study. Most of the core active staff who were present during the construction of the plant have demobilized from Island of Bonny after the project was delivered.

4. The construction of T6 project was under the Federal Government tax relief grant and as such, the effect of this tax relief could not be factored into the data collected. Although government concessions for investors in the Niger delta would contribute to further attract more investments in the area.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION:

2.1 CONCEPTUAL REVIEW:

Project success has eluded the construction industry to the point where keeping existing clients has become a battle, let alone attracting new clients (Toor & Ogunlana, 2005). An assumption is made that, if a project is completed on time, within the agreed budget and set quality, referred to as the 'golden triangle', then the project is deemed successful. Evidence suggests that this is far from the truth. Hence, the construction industry needs to pay special attention to critical success factors, besides the 'golden triangle', if it is to survive the challenges posed by globalization (Toor & Ogunlana, 2005). Zwikael (2009).

Generally, everyone believes that the work of construction companies is project-oriented, i.e., it is unique and has a definite start and finish point. This requires the use of project management tools and techniques as opposed to conventional management techniques.

Proper usage of project management tools within the project life cycle ensures smooth execution of activities. The project life cycle is the framework upon which the project is carried out. The project manager acts as a single point of contact responsible for harnessing identified critical success factors towards achieving project success According to Yang, Shen & Ho (2009), the unique nature of projects dictates that critical success factors identified in one industry cannot be directly transferred to other industries. The similarities found in the construction industry in developing countries such as South Africa make sharing of knowledge easier.

According to Yang, Shen & Ho.(2009), the nature of projects dictates that critical success factors identified in one industry cannot be directly transferred to their industries. The similarities found in the construction industry in developing countries such as South Africa make sharing of knowledge easier. The construction industry is one of the largest job creators in developing countries and has become highly competitive in the advent of globalization (Nguyem, Ogunlana & Lan, 2004)

Contractors, consultants and project managers in Nigeria should then seek and review the conditions/approach to ensure successful execution of projects to realize their purpose. It is not clear as to what actions need to be taken in order to improve project success. According to Ojiako, Johansen & Greenwood (2008), project success in the construction industry in most developing countries in particular is measured by the 'golden triangle' parameters of time, cost and quality. The high number of project failures suggests that Critical Success factors (CSFs need to be identified and re-examined. This article, therefore, seeks to identify the critical factors that lead to project success with a closer look at the NLNG Train 6 Project.

Swan and Khalfan; 2007) reiterate that achieving project success is becoming more important m the highly competitive construction industry and Large/complex construction Projects are becoming more difficult to complete successfully especially in developing countries.

According to Han, Yusof, Ismail & Choon (2012) success in construction industry can also be redefined under the following sub-headings, Comfort, Competence, Commitment and communication; which is the popular 4 COMs model

2.1.1 The Typical Model of Successful Project

Nguyen, Ogunlana & Lan (2004: 404-413) identified and grouped success factors under four categories which are referred to as the 'four COMs', viz., comfort, competence, commitment and communication.

2.1.2 Comfort

The comfort component emphasizes that successful projects include the involvement of stakeholders. This includes both primary stakeholders who have a legal relationship to the project (e.g. subcontractors) and secondary stakeholders who do not form a direct part of the project, but influence decisions (e.g., community forums). The needs of stakeholders have to be managed and influenced in a manner that ensures project success (Swan & Kalfan, 2007). It is essential that a competent project manager be appointed. Malach-Pines, Dvir & Sadech (2009) believe that Garbharran, et al. such an individual should possess both technical skills, which include being a subject matter expert and having an in-depth knowledge of structures, and "soft" skills, which include team management, emotional intelligence, transformational leadership and conflict management.

According to Newton (2005), the availability of resources is a further critical factor. Competition for resources is a common phenomenon in projects. Unexpected developments during the course of the project must be carefully managed in terms of resource planning. It must be ensured that there is adequate funding throughout the project. A financial plan, which takes into account the project activity schedule, needs to be developed.

Finally, there must be comprehensive contract documentation. It must be ensured that all relevant stakeholders enter into contractual agreements regarding activities and performance

during the course of the project. Cost, time and quality parameters need to be specified so that performance can be assessed (Johnson, Scholes & Wittington, 2006).

2.1.3 Competence

The competence component identifies the following four aspects as being central to successful project management in the construction industry. First, utilization of up-to-date technology. Nguyen, Ogunlana & Lan (2004) believe that adopting new technology and utilizing it to its full potential has become critical in achieving a competitive advantage in the construction industry. The construction industry has witnessed significant technological developments in recent years. Selecting the appropriate new technology and optimal utilization is key to project success. Secondly, there must be proper emphasis on past experience. According to Pathirage, Amaratunga & Haigh (2007), tacit knowledge plays a key role in this regard.

In addition, project members should be encouraged to document tacit knowledge gained from the project in order to prevent mistakes in subsequent projects. Thirdly, there must be competent teams in place, implying that staff members must have the necessary skills (Melkonian & Picq, 2010).

Finally, the aspect of awarding bids to the right project manager/contractor needs consideration. The construction industry in South Africa has witnessed an increase in the number of contractors, resulting in more intensive competition in this sector. Other considerations when selecting contractors include company track record, quality management, health and safety, and technical proficiency (Philips, Martin, Dainty & Price, 2008).

2.1.4 Commitment

Commitment emphasizes the support of top management, commitment to the project, clear objectives and scope, and political support. The support of top management goes beyond the provision of funds and making resources available (Johnson, Scholes & Wittington, 2006). Kerzner (2006) believes that commitment to the project is very closely linked to a sense of collectivism, rather than individualism. An environment needs to be created, in which team members experience job satisfaction and are, therefore, motivated to be part of the team.

Optimal performance by team members is important. Having clear objectives and scope are key in providing direction to team members. Objectives must be clear and scope should be as simple as possible in order to avoid "grey areas". It is inevitable that changes will occur during the course of the project. Flexibility and adaptability are, therefore, central to achieving success. Finally, political support is important for project success, given that a large proportion of projects are public projects. To this end, in execution of mega projects, support government and the top management of the organizations are very important in other for the project to succeed. (Jacobson & Choi, 2008).

2.1.5 Communication

Communication plays an important role in leading, integrating people, and taking decisions to make a project a success. There must be shared project vision, where the project manager identifies the interests of all relevant stakeholders and ensures that there is buy-in to the project (Yang, Shen & Ho, 2009). According to Zwikael (2009), once the project objectives are set and the scope clarified, there must be constant update as the project progresses. Progress on activities assigned to individuals or groups needs to be monitored with a view to achieving overall goals.

These updates must be communicated to the relevant parties ensuring that proper liaison between the project manager and the community (Teo, 2010).

Finally, proper handover procedures need to be developed. This is an important consideration, given that the construction industry is being increasingly viewed as a service industry (Kama, Junnon & Sorvala, 2009). Effective dissemination of information is also another factor that is inevitable as project manager facilitates frequent project meetings throughout the course of the project. Apart from consulting with the community, local residents involvement is a key element for project success taking into cognizance high level of unemployment in Nigeria.

The second stage was by omitting low-effect factors and thereafter a questionnaire was designed based on AHP method to collect the opinions of experts and distributed among 15 persons of the organizational experts. The returned questionnaires of this stage were analyzed through Expert Choice software.

The research findings indicate that the critical success factors in construction projects have different priorities and weights. These weights and factors determine the impact on the project and the achieved goals of the organization .

2.1.6 Success Factors in the Construction of LNG Projects

The success of LNG export projects or failure can be influenced by many factors several of which are within the sponsors' control or influence. Being cognizant of the fact that key success factors can help sponsors stay focused on critical project variables that can dictate whether a projects succeeds as planned, succeeds with delays, or fails. it ensures that areas outside of the direct control of the sponsors are given the proper level of attention and are approached in accordance with market norms. (Pinto, J. K and Slevin D. P. 1988 ‘Critical Success Factors in

effective Project implementation.) Some of these factors that determine the success of the LNG projects are

a.) Securing a Fixed Price Engineering, Procurement and Construction (EPC) Contract

One major challenge every proposed LNG export project would face is to be able to secure sufficient advance LNG sales to allow an affirmative of a final investment decision (FID). This is because LNG may have no real value until it is sold and development will not proceed until target sales quantities are secured. Once sales have been contracted, the project is well on its way to completion. Final investment decision kicks off construction and the beginning of the significant capital expenditure phase of the project. LNG sales contracts are typically 20 year commitments depending on supply, buyer demand and commodity prices.

b.) Attractive Premium Buyers: The project must be both well planned and economic, such that it achieves pricing that meets economic hurdles for both the liquefaction development and for the buyer. Ideally, the project will be attractive to the "premium " buyers who have sufficient creditworthiness and significant long-term gas demands. Historically LNG Qrices in Asia have been twice as high as prices paid by long-term buyers in other regions. In fact, Japan, South Korea and China combined to purchase over 60% of all LNG imported in 2014 . (Pinto, J. K and Slevin D. P. 1988 ‘Critical Success Factors in effective Project implementation).

c.) Strong Resource Base: Gas field characteristics vary from field to field. Some fields have huge deposits and others don't. Buyers look for reliable, steady supply and are attracted to large gas reserves given the long term nature of LNG sale and purchase agreements. Over the course of field life, some fields experience steep declines and this affects the market. This results in issues for some projects and compromises the seller's ability to continue to export and supply

agreed quantities. Force majeure and other contractual consequences may come into play as resources are depleted.

d.) Sponsors Must Have Strong Host Government Backing: Without question the Sponsor's relationship with the Host Government is critical to project success and timing of such success. Host Government support is essential to the project and is often times a critical path factor when establishing project timelines, and the failure to obtain Host Government support might cause delay or even cancellation in some instance. The sponsor must examine and understand the general legal, regulatory, contractual, and fiscal framework which will apply, as well as the interplay among these regimes and the manner in which implementation occurs. In addition to the foregoing, LNG export projects often require a separately negotiated legal and fiscal regime, which in some regions is established in an "LNG Project Agreement" and implemented through related legislation Equity and debt investors will not be keen to accept exposure to risk of changes in laws or in tax which could adversely impact LNG project's economics. The more stable the agreement is with the Host Government the higher the likelihood of project success not only for the sponsor but for all stakeholders. It is critical to project success that international arbitration of disputes is agreed with the Host Government as this provides the lenders, sponsors and other stakeholders a higher degree of certainty should a dispute arise. (Philip Weems & Kathryn Marietta (2015)

e.) Sound project specific approach should be adopted: Critical to project success is the thought and consideration given to project structure to ensure a project specific approach. There are numerous governance and project structures that have been adopted by project sponsors. A variety of structures are viable when establishing the project, including buy-sell models, tolling models, and integrated project models-all of which should at least considered . Unique

characteristics of a particular project will dictate structure and will drive tailoring of existing models for a given project. Disagreement can impact project success. Optimally, existing agreements (such as joint operating agreements) do not hinder development and partners are able to agree and work together in project development. The relationship among sponsor participants should not be underestimated. Disagreement among these participants (e.g., the lingering dispute over the ownership of the Brass LNG site in Nigeria) can weaken the relationship with the Host.

Government causes concern from potential financiers, and cause significant project delays. (Philip Weems & Kathryn Marietta (2015)

f.) Securing an LNG Site: A viable LNG site would be one of major factors that determines the level of success that would be recorded in the construction of an NLNG plant. A good location would help reduce unnecessary waste of funds that could lead to overruns. The location would be as close possible to the discharge to the ship loading point. This in turn checks unnecessary losses from pipeline channels. (Philip Weems & Kathryn Marietta (2015)

g) Natural Gas Pipelines to LNG sites: The integrity of pipeline routing to the plant is another important factor. Good pipeline route to the LNG plant would ensure unnecessary is avoided. Identifying the factors that can make a construction project succeed is a huge task and can make a difference in every organization. The critical success factors are indicative of the subjects which could make the organization successful; if there is deficiency or lack in these fields, the organization would fail in achieving its goals Organizations should concentrate on the more efficient factors or so-called the critical success factors considering their restrictions .

h) Success Factors and Success Criteria It is noteworthy that the differentiation between success criteria and success factors is also important. The success criteria are the measures based on

which the project success or failure is judged; while the success factors are those entered into the management systems and result in project success directly or indirectly. These factors are key and their absence result to issues in the successful Implementation of any project. This, over the years has been a major concern among managers of projects about many slipping and budget.

From another angle, Project Smart Duncan Haughey in his research work, 2014, carried out research work on the various critical factors that produces success in a successful project; he narrates; The buck stops with you, so it is in your interest to make this happen. (S. Duncan Haughey in his research work, 2014,:

2.1.7 Business Case

Make sure there is a strong business case that everyone can buy into, with high level support. The business case is the justification for the project and should list the expected benefits. This is something everyone involved in the project can focus on and the reason the project is taking place. Projects move us from one state to another by delivering a change product or other desired outcome with a business case making a clear explanation.

2.1.8 Identify Critical Factors:

Care should be taken to ensure that a clear cut discussion with the customer about the Critical Success Factors that will make the project a success. The use of these factors at the end of the project to measure your success. This is all that counts and the 'must have' items that the project needs to deliver. All other issues are secondary to these as the Critical Success Factors effectively form your contract with the customer.

2.1.9 Planning

Time spent planning is time well spent. It should be emphasized that all projects must have a plan with enough detail so that everyone involved knows where the project is going. A good plan provides the following

- Clearly documented project milestones and deliverables.

- A valid and realistic timescale.

- Allows accurate cost estimates to be produced.

- Details resource requirements.

- Acts as an early warning system providing visibility of task slippage.

- Keeps the Project team focussed and aware of progress

It must be clear that that to skim on this area is likely to lead to problems. Ensure you build in contingency to any estimate. It is recommended that between I 0 and 15 percent is good enough. (Philip Weems & Kathryn Marietta (2015)

2.1.10 Team Motivation

A motivated team will go the extra mile to deliver a project on time and to budget. Kee your team motivated b involving them throughout the project and by planning frequent milestones to help them feel they are making progress. Communication is key so let our team know when they are performing well, not just when they are performing badly. (Okoroafor, G. (2001)

2.1.11 Saying No

Believe it or not, some project managers and some team members come to that, have a problem saying No. Never promise anything you know you cannot deliver, you are just storing up problems for later. Stick to your guns no matter how senior or important the person is, they'll thank you for it later. If they don’t p perhaps you're in the wrong job. When saying No, be firm and ready to justify the reasons behind your decision. (Okoroafor, G. 2001)

2.1.12 Avoiding Scope Creek

Scope creep is one of the most common reasons projects run over budget and deliver late. The customer may forget the extra work and effort you have put in insisting that you have delivered what they asked for originally. Make sure you set expectations correctly at the outset of project and clearly define what is in and out of scope. Record it in the key project document. Don't assume the customer will read and understand this document. I recommend that you spend an hour with the customer to walk them through the project and make sure that they understand and agree to the scope. Don’t proceed without a firm agreement.

2.1.13 Risk Management

Nobody likes to think about risks, especially early in the project. TO avoid risk management in execution of a project is to ones peril. So it is advisable to that one produce a risk log with an action plan to minimize each risk and then publish it to all the key stakeholders in your project. Knowing what action one will take, should the worst happen, will be a great comfort.

2.1.14 Project Closure

Remember that projects have a finite life. A Project that isn't closed will continue to consume resource. It is in the customer's interest to keep the project open so that they can add features and functionality as they think of them. At the end of the project be firm, agree with the customer that the Critical Success Factors have been met, the project delivered, tested, released and ask them to sign the project off. At this point, you may like to ask your customer to fill out a satisfaction survey. They may have valuable information that can help you and your team improves for future projects. (Okoroafor, G. (2001)

2.2 Scheduling in the Success of a Project

Construction contracts usually specify that time is of the essence in performing the contract work (as defined in the contract). The scheduling of work is often of paramount importance to an owner for reasons including:

The need to complete a project within a certain time frame or by a specific date.

Limitations on the availability of required labour, materials or equipment. The need to perform certain weather-sensitive construction operations. Cost impacts associated with idle labour and equipment.

Schedule delays and disputes over time extensions or impact costs are a major source of claims on a construction project; often because the contractor did not prepare a comprehensive or accurate baseline schedule or did not properly update the schedule as work progressed.

The owner's failure to detail the required information in the project's scheduling specification or to timely review schedule updates can also contribute to scheduling failures.

This Note provides guidance for an owner on:

Preparing a detailed, comprehensive scheduling specification. Examples of key activities to be detailed in the schedule.

Practical solutions to ensure that the baseline schedule and all updates are reviewed and understood. (Okoroafor, G. (2001)

2.3.0 EMPERICAL REVIEW

2.3.1 Purpose of Project Scheduling

Scheduling requirements on a construction project help ensure that all activities required by the contract documents to be performed by the contractor to complete the work are:

- Properly planned.
- Adequately staffed.
- Appropriately coordinated.
- Executed in an orderly and expeditious manner.

Schedules also contribute to the owner's decision-making regarding the evaluation of:

a.) The contractor's monthly progress payment applications (see Practice Note, Payment Provisions in Construction Contracts: Drafting Strategies: Payment Application Process

b.) Proposed changes to the contract, including whether the contract time should be extended depending on the nature and scope of the project, a construction schedule can be as simple as a list of activities that are organized in a logical time-scaled sequence. However, on large

construction projects such simple schedules are likely not adequate to meet their intended purpose. (-Cleland and W. R. Kings; Ronstrand Reinhold, New York, 479 -512)

2.3.1 Procurement and Delivery

The scheduling specification can be written to mandate that fabrication delivery and installation times for all major contractors furnished materials and equipment are separate activities on the construction schedule. Long-lead items requiring significant fabrication time should be identified and separately tracked in the procurement section of the schedule. The engineer should consider identifying in the contract documents which items of equipment fall under this requirement.

Another option is to require the contractor to provide a scheduled report showing the anticipated order and delivery dates for each major piece of equipment. Once again, the contract documents should specify which equipment is included to prevent any disagreement over this defined term. This ensures that critical procurement activities are identified, coordinated and completed as necessary in order to support the project. It also identifies areas of potential risk associated with vendor deliveries. If a specialty schedule, such as a procurement schedule, is determined by the owner to be necessary or desirable, the scheduling specification should include a provision requiring specific coding within the WBS coding structure for procurement activities. This allows the contractor to produce a separate procurement schedule.; (Cleland and W. R. Kings; Ronstrand Reinhold, New York)

2.3.4 Critical Success Factors and Project Management

The role of different project management techniques to implement projects successfully has been widely established in areas such as the tanning and control of time, cost and quality. AK Munns and Bjeirmi- 1996 explained in their paper "The role of project management in achieving project

success" that inspite of this the distinction between a project and project management is less than precise. This paper aims to identify the overlap between the definition of the project and project management and to discuss how the confusion between the two may affect their relationship. It identifies the different individual s involved on the project and project management, together with their objectives, expectations and influences. It demonstrates how a better appreciation of the distinction between the two will bring a higher possibility of project success.

Current project management practices of organizations in the construction industry sector do not always ensure project success. Successful construction project greatly depends on how the project has been managed and controlled. The main problem with projects management practices have always been mentioned as planning, project implementation, cost and time overruns and quality non-achievement. The critical success factors (CSFs) are more useful in decision-making support; more player-based research studies should be conducted.

Architectural, engineering and construction (AEC) firms are main players in the design and construction stages of building projects, and their decisions can significantly affect performance of building projects (Forcada, et al. 2008). To date, there is no comprehensive study that explores the important critical success factors from the perspective of project management practitioners. Thus, comprehensive studies on this problem are necessary.

A great number of decisions need to be taken during the project management process and the decisions made at the earlier phases of the design have a bigger impact on the project management practice as compared at later stages or during building operation or construction. If project managers do not identify the main criteria that would seriously influence their projects

at the very beginning (engineering phase) of the project, their project are likely not to be successful.

Hence, this study will identify the CSFs that were considered by the Project Managers of NLNG Train 6 project that affected this level of project performance through a project management practice. This implies that CSFs will become a gauge by which project managers can evaluate their companies.

Rockart (1982) also mentioned in his work that to ensure future success for any company, that company would need to identify its CSFs which are crucial and if satisfactory, will ensure competitive performance of the organization (Rockart, 1982).

The present trend of things in the construction industry both to construction industries and researchers indicate that many lose sight of corporate management practice in their bid to articulate CSFs. For instance, Pinto and Slevin (1988) identified several factors related to successful implementation of numerous types of projects. They are project schedules/plans, client acceptance, monitoring and feedback, communication, trouble-shooting, and characteristics of the project team leader. However, according to industry literature outside the construction industry, CSFs should include issues important to the activities of the organization's current operations and future success. The construction stage is where all the project goals of the contractual parties like time, cost, performance, quality, safety and so on are established and put to the test. The degree of effectiveness of the project management functions and the degree of success of the project goals will determine the degree to which the individual party will perceive the project as being successful from its own viewpoint (Lim and Mohamed, 1999).

Subsequent to this we shall also here examine the extent of the relationship between CSFs and project performance to determine the success of a construction project. (Muns, A.K. and B. Jeirmi, B. F. (1966).

2.3.5 Critical Success Factors and Project Performance

Project Management can also be seen as being about managing change (Cleland, 1995; Bourne and Walker, 2004) and project managers should consider themselves as change agents adding to the Project Management role an additional focus on so- called 'soft' aspects of relationship management (Bourne and Walker, 2004).

Moreover, according to Bourne and Walker (2004) in most organizations, project managers are accountable for the successful delivery of complete projects. Increasingly, this success depends on project managers' processing and utilizing skills and competencies that may initially appear contradictory. A successful project manager must demonstrate flexibility and competency in many area, hard and soft skills, introverted and reflective, extroverted and social behaviour. Many of the initiatives for improving the practice and profession of project management have been focused on enhancing techniques and method associated with skills that included effective management of time, cost and scope. Hendrickson and Au (1989) pointed out that the management of construction project requires knowledge of modem management as well as an understanding of the design and construction process. Specifically, project management m construction encompasses a set of objectives which may be accomplished by implementing a series of operations subject to resources constraints. Subsequently, the functions of project management for construction generally include the following:

Specification of project objectives and plans including delineation of scope, budgeting scheduling, setting performance requirements and selecting project participants.

- Maximization of efficient resource utilization through procurement of labour, materials and equipment according to the prescribed schedule and plan
- Implementation of various operations through proper coordination and control of planning, design, estimating, contracting and construction in the entire process.
- Development of effective communications and mechanisms for resolving conflicts among the various participants

2.4 ANAYTICAL REVIEW

2.4.0 Factors affecting NLNG Train 6 Project

Thirty-Six (36) construction factors were identified through the administration of survey in the Train 6 location in Bonny Island. These factors had different levels of impact of the execution of Train 6 projects. These factors have various degrees of influence and would be reviewed to identify the level of influence each factor had on the project.

2.4.1 Design Variations (Change Orders) (X1)

Design changes was observed in design and scope of the construction work and as such impacted on the project. This is one of the factors identified .

2.4.2 Poor Site information (X2)

This was also another factor which was identified during this work. Although the information from the earlier Trains constructed were helpful but Train 6 was peculiar in size and needed to be treated the same way .

2.4.3 Project Duration (Timing) (X3)

The timing for Train 6Project was also evaluated to see what impact the project timing had in the overall performance of the project. It took about 2 and a half year for the completion of this project. Was this a good timing for the construction of a Train? This factor had its own impact.

2.4.4 Insufficient Funding (X4)

The Train 6 project was funded by joint stakeholders of NNPC, Shell Petroleum Development Company of Nigeria (SHELL), AGIP and ELF Nigeria Ltd. It was necessary to see if funding was a problem to the performance of the project.

2.4.5 Recruitment of Workers (X5)

The construction of T6 project this T6 project attracted a total of about ten (10) Thousand workers of different categories of skills and professionals. The various continents of the world were represented. This was a major factor too.

2.4.6 Movement of Critical Staff (X6)

Several professionals were moved during this period as they sought for greener pastures and relocated. This was a factor that needed to be considered .

2.4.7 Industrial Action (X7)

The various workers unions, PENGASSEN, National Union of Civil, construction and Wood workers of Nigeria (NUCCWWON) were the major prevailing workers' union during this period. Their activities had impact on the construction of the project.

2.4.8 Community Disturbance (XS)

Although Bonny Island is a peaceful community, the prevailing trend of militancy in the Niger Delta was a critical issue in the community that would have affected the construction of T6 project. This was considered.

2.4.9 Material procurement and Supply (X9)

The location of the T6 project, Bonny Island has been a critical location in the construction of projects. All materials are brought in either through the sea or by air. This impact on the execution of every construction activity in the Island and as such worth of consideration in the construction of T6.

2.4.10 Delay in Equipment/ Tools Delivery (X10)

Equipment delivery is another factor that was considered as placing order for tools and equipment is not readily delivered. This also have impact of the project delivery.

2.4.11 Coordination of Various Companies and Construction Activities (Xll)

The period of construction of T6 was a beehive of construction activities and coordination was a serious challenge as several other subsidiary contractors and suppliers had challenges in the coordination of their activities.

2.4.12 Incompetent Contractors (X12)

Many contractors who were not competent were present on site and as such distinguishing competent ones were a problem. This created some issues also which needed to be considered.

2.4.13 Litigations amongst Contractors Executing work (X13)

There were also issues of litigation among sub-contractors who were carrying out certain aspect of the construction activities for NLNG. This had its own impact.

2.4.14 Restriction to Road Networks and Project Site (X14)

Some road networks within Bonny and the plant site were restricted and as such was a challenge delivering materials and executing certain aspects of the job.

2.4.15 Accidents Due to Poor Safety Conformance in Project Site (XIS)

Several accidents were recorded during this period even though these were amongst local contractors. These impacted on the project accordingly .

2.4.16 Poor Quality of work among sub-contractors (X16)

There were challenges with poor quality of work executed by contractors some of which were critical to the delivery of the T6 plant. These had some impact also.

2.4.17 Inadequacy of Cost Control Procedures (Xl7)

Cost control procedure impacts on project delivery especially mega projects. These most times helps to check cost overrun and maintain discipline, accountability and probity in discharge of project funds. This is one of the factors considered.

2.4.18 Associated and unplanned threats in Project Execution (X18)

Several other unplanned risks which are not part of human act could have affected the execution of this project. This unforeseen threat is also considered in this study.

2.4.19 Clarity of Roles/Responsibilities for Parties Involved (X19)

No clear-cut definition or job roles for individuals participating m the execution of any project also affect that projects. This was also considered the extent of its effect on T6 project.

2.4.20 Conflict of Interests among Project leaders (X20)

Mega projects have been characterised with bribery and corruption among the project leaders and stakeholders. The effect is sometimes very enormous in mega projects.

2.4.21 Changes in Stakeholders Expectation (X21)

Changes in the expectation of stakeholders are very influential in the performance of any project. This change sometimes distorts the flow of the project execution and stalls it. This is a major factor.

2.4.22 Loss of Confidence /Trust from Shareholders (X22)

When confidence is lost among shareholders, change of management could terminate a project.

2.4.23 Preference of Stakeholders of Time/Cost Over Quality (X23)

Some stakeholders in mega projects sometimes prefers time/cost to Quality. This is not a healthy situation in the execution of a project.

2.4.24 Reputation Scandals among Stakeholders (X24)

Reputational Standards disrupts the flow of the construction of projects. Some are terminated and other experience serious setback.

2.4.25 Conflict of Interest among Stakeholders of the Project (X25)

Conflict of interest among stakeholders of any project leaves more to be desired in any project that must be realized.

2.4.26 Unstable Federal Government Policies (X26)

Government policies can easily change especially in countries like Nigeria where continuity of projects are not constitutional. This could thwart the good purpose of the initiators of such projects.

2.4.27 Nigerialisation Policy (X27)

Such policies that do not enshrine good economic growth can hinder the project which is designed to build improve the level of development of the people.

2.4.28 Patent Right (X28)

Patent right also could contribute either positively or negatively to the success of a project.

2.4.29 Employment Legislation (X29)

Many specialists in certain areas could be barred from participating in a certain projects due to such legislation. This would hinder projects especially when government interest is not enshrined in the goal of the investors.

2.4.30 Importation Duties/Bottlenecks (X30)

Importation duties could also be affect project deliveries especially in locations where such materials contravene the countries values. This could stall any project.

2.4.31 Exchange Rate Fluctuations (X31)

This is one of the major causes of overruns m projects delivery and sometimes hinders the success of its delivery. Negative exchange rates might be beneficial to the delivery of any project.

2.4.32 High and Inconsistent Ban k Interest Rates (X32)

Investors into major projects usually borrow from the banks and when there are changes, high interest rates, it leaves the investors with a concern of not being able to fund their projects

2.4.33 Taxes (X33)

Government Taxes could hinder projects especially when the interest of the government is not captured in the investment. T6 project had a Tax holiday during execution.

2.4.34 Inflation Rates (X34)

When there is a high inflation in a country, investors do not derive the pleasure of pursuing their projects. Inflation is one of the factors that affect projects seriously .

2.4.35 Culture, Customs and Language Barrier (X35)

In a community where the culture, custom and language is not friendly, executors of major projects in the location face the risks of not being able to deliver the project. Language is key and can hinder the project.

These 35 factors stated above can be grouped into Internal and External Factors.

The internal factors are those factors that arose from within the contractors and the construction field while the external factors are the ones that came from the external environment. Every other factors not mentioned here can classified into one of these 35 factors.

The paper concluded with recommending a number of issues. The sufficient time and money at the design stage, selection of competent consultant and a reliable contractor to carry out the work and adopting right cost determination system.

Similarly, Ogunlana et al. (1996) in their study titled "Contraction delay in fast growing economy: They classified the main causes of cost overrun in developing economy, as client consultants shortcomings, contractor incompetence and inadequacy of resources supplies.

In another related study, Aibinu and Jagboro (2002), researched on growing problem of construction delay in Nigeria, they studied the effects of delay on the delivery of construction projects in Nigeria. Questionnaire Survey of 61 construction projects was used; the authors identified the impact of delay on project execution. Time and cost overrun were found to be frequent effects of delay.

The study identified as well that the cause of cost overrun as materials related, economy variable changes, labour related, equipment related and wrong choice of cost determination strategy at the various project stages. Appropriate project cost determination strategy; improved clients' project management procedures and inclusion of an appropriate contingency allowance in the pre contract estimate were recommended as a means of minimizing the adverse effects of cost overrun. So also, Elinwa and Joshua (2001) carried out a study titled "Time-cost Overrun Factors in Nigerian Construction Industry". The oral interviews were conducted among the professionals (Architects Quantity Surveyors Engineers and Builders) in the construction industry .

Questionnaires were distributed to different states (five states: Abuja, Jos Bauchi, Minna and Kaduna) with total of 36 questionnaires collated. The research identified the degree of overrun as high-between 80 and 90%, and relative contributions of clients, contractor, and other to overrun are 62, 32 and 6% respectively.

The government takes 62% of the blame, and this arises from refusal today for material fluctuations which leads to delay; wrongful And abrupt termination of contract because of selfishness and greed; government policies and instability in the system; not honoring payment certificates for completed works as and when due.

They further stated that the contractor takes 32% of the blame arising from incompetence, using wrong cost estimation determination approach, poor project supervision, and strikes by worker for improved condition of service.

In conclusion the paper identified the fact that cost and time overruns are more prevalent in government/public sponsored projects which is 89% of the sampled projects and that this is independent that in Nigeria this problem can be averted if government could be sincere in formulating policies, addressing issues of competence and providing stable economy. Professionals also are to be more prudent in their design and more knowledgeable about the availability of materials and tools in construction projects' execution.

The difference between these papers being reviewed and this research work is the fact that, as good and exploratory as these approaches were, no one dealt with cost overrun instigated on account of project related issues, External Factors, industry related factor, organizational factors, and less on contractors and client types on a project rather the papers centered on clients type and contractors liabilities.

This research has identified the factors such as organizational factors, industry related factors, and external factors project related factors, contractors' liability and client type on a project as some of the factors that can cause cost overrun on project work. To this end therefore this will be part of major preoccupation of this research work.

2.5 RESEARCH GAP

2.5.1 Role of Project management in Achieving Project Success.

The role of different project management techniques to implement projects successfully has been widely established in areas such as the planning and control of time, cost and quality. In spite of this the distinction between the project and project management is less than precise. This paper aims to identify the overlap between the definition of the project and project management and to discuss how the confusion between the two may affect their relationship. It identifies the different individuals involved on the project and project management, together with their objectives, expectations and influences. It demonstrates how a better appreciation of the distinction between the two will bring a higher possibility of project success.

2.5.2 Project Performance Processes

Implementing a Project Management Value Measurement System is to measure project performance and value which will help organizations achieve one or more of the following goals:

- To identify the business impact of implementing project performance initiatives in our chosen area especially.
- To compare costs to benefits of project performance of improvement initiatives

- To determine if a project management improvement initiative is accomplishing its objectives of optimal project performance.
- To assist in substantiating optimal project performance improvement initiatives.

These goals are based on determining the value of implementing optimal project performance improvement initiatives in any organization. That value is determined by showing improvement in some measure or measures over time. Choosing those measures is key to the success of the project performance measurement System.

These measures are a starting point for a project performance value Scorecard development processed from initiation of any project. So use the list as a starting point to think about measures that are most important to your organization's goals.

Here we shall be selecting measures of optimal project performance especially within the selected location, the Niger Delta. The key difference in performance measures versus value measures is the reason for doing the measuring. In measuring performance, you are trying to gather information to help you make management decisions to affect change. This change in turn helps you improve performance. For example, project performance measures are undertaken to provide information to managers in order to exert control over the project.

Those measures must be appropriate to the organizational level that it can immediately effect change based on information it learns. In order to control the performance of the project at hand, measuring the earned value of the project will provide information on the performance of the project to allow managers to make critical decisions to bring the project to closure successfully). These measures must be collected fairly often, perhaps even weekly, depending on the duration of the project.

In measuring value, you are trying to demonstrate that decisions you made to implement change (project management improvement initiatives) has indeed added value to the organization. So you are measuring value rather than performance (which may or may not be the same). Sometimes (usually) improved performance can be translated into value. For example, improving schedule performance for all your projects over a period of a year can be translated into improvement in average project cycle time, which can be translated into improvement in time to market, which can add significant value to your organization. Value measures, therefore, provide information on the performance of the organization rather than the performance of a project. They must be collected over a longer period of time (no more than quarterly) and over your portfolio of projects.

Project development and financing is an old concept, the application of project financing in privately financed infrastructure projects is comparatively new. Our project performance measure would encompass multi-sector knowledge and interaction between various disciplines. The key subjects include engineering and construction, project management, project financing, socio-economics, politics, economics, legal etc.

The Nigerian legislative guide explains the methods of bid processes, project pre-requisites and selection criteria, negotiations, risk allocation, contract structure and obligations. It also includes the project finance and risk transfer aspects of construction projects.

The details of concessions for infrastructure are described in a World Bank technical paper (Kerf 1998), that provides guidelines for design and award of concession for contracts. This report provides an overview of the types of concessions, their selection and rationale and responsibilities of the Government/Contracting Authority.

It provides detailed guidelines for design of concession contract including risk allocation, setting tariffs, regulatory arrangements for price adjustment, other contract conditions and selection processes. It covers the entire bidding and award process including competitive bidding, bid negotiations, rules and procedures. It also delineates the responsibilities of regulatory institutions and the role of government support in risk allocation and sharing mechanisms.

Alexander (1997) emphasizes the importance of regulatory institutions to replicate the competition to improve efficiency in privatization of infrastructure services in the absence of competitive markets. Various factors such as threat of bankruptcy, internal control of infrastructure companies and external actions by the market are considered for attainment of such efficiency. A check-list was developed to consider various options of regulatory and governance systems, and their impact on attainment of efficiency. Merna (2002) provides a comprehensive description on management of infrastructure projects under private participation.

RMC (1998) is a report, that describes the use of World Bank guarantees in bidding for private concessions. It identifies the issues involved in bidding and evaluation. The report stresses on the practice of informal selection of bidders, which leads to an ambiguity over the issue of optimal risk transfer to the private sector. The report also proposes the advantages of guarantees to be integrated into the bidding process for competitive and formal selection process of concession contracts. The World Bank Guarantees Handbook (1997) provides detailed information on the use of guarantees, their operations and management of private sector involvement in infrastructure projects.

Estache (2002) discusses the sector-wide regulatory issues including price, quality and safety regulation for Gas plants, airports, seaports, railways and toll roads, etc The report also includes

performance indicators for each sector, which has been set as a main element in the concession design and award. Baker (2000) emphasizes on the service quality and the regulatory instruments required for marinating infrastructure service quality.

The Report of the Construction Industry Task Force (1998 highlighted a range of problems that the UK construction industry suffered from and a range of solutions that members of the Task Force felt should be implemented to remedy these problems. A resume of problems and challenges facing the industry can be gotten from report 1: The North Tyneside Partnering Agreement NTPA). One of the recommendations proposals was that targets and performance measurement mechanisms (or benchmarking) be introduced to improve performance.

The Task Force proposed that:

1. The Construction Industry set itself clear and measurable objectives that were industry wide in scope.
2. Targets, milestones and performance indicators be set.
3. The construction industry do this in a way that clearly shows to their clients that improvement is taking place.

This report that was commissioned by central government received its full support as it fitted well with the government's wider approach to public policy. For in common with Labour's approach the re ort focuses on performance measurement that the government has made an integral part of its approach to public services.

Best Value is perhaps the most obvious example of this. As a result of its commitment the government established a number of initiatives to implement the above recommendations (and others) of the report - Part of the developments spurred by the report of The Construction Task

Force was the establishment of The Key Performance Indicators (KPIs) Working Group. This group's work was the official answer to the Task Force's proposal that the industry establish a set of performance indicators as outlined above (KPI Working Group industry a common, systematic set of performance measures covering all aspects of construction that organizations can use to compare and benchmark both com any and project performance (KPI Working Group, 2000). (Udom, Ezekiel John (2011)

Benchmarking is a generic term for several different activities and the KPIs are designed to facilitate each of these. Benchmarking involves looking closely at business processes with a view to improving these. It includes:

1. A study of internal processes

2. Comparison

3. Continuous Improvement

2.5.3 Measuring Cost and Project Performance:

Cost is a very important aspect of a Construction project and measuring of performance of any project would largely depend on the cost of that project. The cost of the project depends on the capital flow, as well as labour resources, which has cost implications. Adequate management of these resources is considered an important aspect of project works; it determines to a large extent the overall success of project works. (Udom, Ezekiel John (2011)

More so, if the capital flow in terms of material and labour resources are adequately harnessed, issues that pertains to cost overrun would not arise which could result to variations and claims. Some firms rely on claim as a result of variation incurred during the course of the project

execution and afterward evaluate their profit after incurring necessary and unnecessary cost on a project.

An effective cost management strategy is therefore necessary, this could be achieved through putting in place a proactive cost management strategy. (Love et al, 2005; Ogunsemi and Jagboro, 2005; Ferry et al, 1998).

Through the implementation of performance measures (what to measure) and selection of measuring tools (how to measure) an organization communicates to its members the priorities, objectives, and values which the company looks for in the achievement of strategic objectives. The selection of appropriate measurement parameters and procedures is very important to achieving a good monitoring, control and evaluation of variations and improvements. The definition of what parameters to use as performance measures will depend on the specific characteristics of each case.

It is important to recognize that traditional performance measurement practices are usually inadequate and that very often performance is strongly associated with a reward and punishment system. This is part of a control philosophy where many times the objective is to find the guilty party and to impose a sanction . Thus, the primary objective of improving the organization in a team effort is overlooked. Under these circumstances it is difficult to find unbiased performance information and a collaborative attitude of people. Therefore, the implementation of an unbiased performance measurement system makes it necessary to change this philosophy of control. The measurement of performance should be oriented toward the search of "improvement opportunities," where all the participants are actively involved in the improvement effort.

It is also important to note that traditional performance parameters measured in projects, namely costs and schedule, are not appropriate for continuous improvement; because they are not effective in identifying causes of productivity and quality losses. These parameters do not provide an adequate vision of the potential for improvement and the information obtained usually arrives too late to take corrective actions. Nearly all non-value-adding activities become invisible within traditional control systems since these center their attention in conversion activities and ignore flow activities. For this reason it is of great importance to incorporate performance measures that promote continuous improvement in company processes and make visible non-value-adding activities

The most commonly used measurement parameters for projects are listed below. Most of these are used periodically during construction as well as at completion:

- Actual Cost I Budgeted Cost
- Actual Man Hours/Budgeted Man hours.
- Actual Duration/Planned Duration
- Labor and Equipment Productivity
- Project Profit
- Progress Measurements – ((Udom, Ezekiel John (2011)

2. 5.4 Performance Measuring, Benchmarking & Modeling of Construction projects.

A typical project described in this paper comprises the design and implementation of project performance measurement systems in construction companies, with the dual purpose of

supporting continuous improvement for company operations and to generate a database with empirical information on projects. This database will be useful to develop third party benchmarking to contribute to the improvement of the industry as a whole. This research proposes the development of computer models that combine empirical information with expert knowledge to perform model based benchmarking. The achievement of the objectives of this research should affect the way in which performance is measured and decisions are made in projects. The implementation of performance measurement systems, that include measures adapted to lean construction can be a real driver for continuous improvement of project processes.

The compilation of empirical information and its integration with the experience found in the industry and in project teams, will provide new evidence on project performance. This will assist in exploring the mechanisms and existing interactions through the use of simulation models. The proposed analysis may take a first step in deriving first principles on project performance. This research project lends itself to a collaborative research effort which could be carried out in different countries and locations.

There is consensus among researchers and industry experts that one of the principal barriers to promote improvement in construction projects is the lack of appropriate performance measurement. For continuous improvement to occur it is necessary to have performance measures which check and monitor performance, to verify changes and the effect of improvement actions, to understand the variability of the processes, and in general, it is a necessity to have objective information available in order to make effective decisions.

In recent research by Alarcon and Serpell (1996), a comprehensive review of existing literature was carried out in order to identify performance measures at both company and individual project levels. Concurrently, an exploratory study was carried out in seven major chilean construction companies to assess the performance measures used in current construction practice. The purpose of this research is to promote and support the implementation of performance measurement systems in Chilean companies. In supporting the continuous improvement within this companies and establishing a basis for the accomplishment of third party benchmarking, the research will contribute to the progress of the construction industry.

Development of models using empirical information from the project database would contribute to a better understanding of the causalities and mechanisms by which the projects obtain better or worse results.

In a subsequent stage, this research intends to implement the analysis and the validation in time of the developed models, using computer simulation. The result will be a decision support tool to analyse strategies and predict project results. This paper summarizes the main aspects of this research, which can be enhanced with the collaboration of researchers in other countries particularly with respect to the development and compilation of project performance measures.

2.5.5 Measuring Performance

Through the implementation of performance measures what to measure) and selection of measuring tools how to measure) an organization communicates to its members the priorities, objectives, and values which the com any looks for in the achievement of strategic objectives. The selection of an appropriate measurement parameters and procedures is very important to achieving a good monitoring, control and evaluation of variations and improvements. The

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2.5.6 Project and Infrastructure Financing

Project financing has been used widely since 1970 for large scale infrastructure projects worldwide. Statistical evidence shows that the use of project finance investments worldwide has increased from $10 Billion per year in 1980 to $220 billion per year in 2001 (Esty 2003). The classic examples of the use of project finance include the famous Eurotunnel, Eurodisney, Enron's Dhabol Power project etc. Esty (2002) and most recently in Nigeria, the Liquefied Natural Gas Project which is our case study provides a comprehensive overview of the evolution of project financing in large scale projects.

Dailami (1998) addresses the importance of introducing private capital in public infrastructure in developing countries. Private participation and supply of long- term debt capital are considered as the key factors for capital flows in infrastructure sectors.

This paper, through an analytical framework, shows risk premium as it relates to country risks and project-specific risks in private infrastructure development projects. Determination of the cost of foreign currency borrowing cost to infrastructure projects shows that the high premiums are charged for countries with high inflation rates.

Standard and Poor's (2002) report on project and infrastructure finance specifies the challenge in obtaining credit for Project Sponsors and utility providers. With increasing project defaults and their associated losses, the Lenders focus on incorporating the loss of defaults in loans. A comprehensive analytical framework for project financing criteria to analyze the impact of project-level risks and external risks on the project cash flow is provided.

Estache (2000) discusse the roles of project finance in the transport sector, their advantages and disadvantages, management of risks and the roles of public sector organizations in project

financing deals. Buljevich (1999), Pollio (2002), Nevitt (1995), Yescombe (2002), Finnerty (1996) and Beenhakker (1997) are some of the authors of useful literature concerning the project financing mechanism , financial engineering techniques, risk management; cost of capital and capital structure decisions project financing and real options will be made.

2.5.7 Characteristics of Project Finance

In traditional corporate finance lenders rely on the overall creditworthiness of the company to provide them with security when financing a new project. Consequently, lenders have full recourse (or claim) to the company's assets. Project finance implies that the lenders of a project have recourse only to the project's cash flows and assets. When a company gives a loan, the amount is accounted for in its balance sheet as well as in the balance sheet of the company that receives the loan. If a company only functions as intermediary between a lender and a borrower. The loan will not be accounted for in its balance sheet. However, if the company guarantees art of the risk of the loan, the guarantees are exclusively annotated in the financial statements of the company and do not affect the consolidated financial statements.

In the annual report, a company's liabilities for its projects are accounted for as contingent liabilities. As such, they do not burden the balance sheet and consequently the credits do not need to be covered by correspnding assets.

Therefore, the advantage with project financing when acting as an intermediary is that the debt financing of the projects is not reflected in the financial statements of the supplier. (Buljevich & Park, 1999 Effectively the project is financed "off the balance sheet". (Jechoutek & Lame<ill, 1995), However, the benefits of the off-balance-sheet treatment can prove illusory when it comes to investors and rating agencies that are able to translate the Project off-balance sheet is

termed non-recourse and it is placed at one extreme of the financial continuum, where lenders rely solely on the creditworthiness of the project. In practice, project finance is often backed by sponsor or government guarantees provided to give lenders extra comfort. This is limited recourse project finance, involving at least a small degree of corporate support or other kinds of guarantees. Effectively, these two different approaches deal with the level of risk that the project sponsors assume. In other words, they describe where the sponsor's responsibility end in case of non-payment (Jechoutek &Lamech, 1995)

Classic non-recourse project finance does not impose any obligation to guarantee the repayment of the project debt upon the project sponsor if the cash flows are insufficient to cover principal and interest payment.

This protects the sponsors' general assets from most difficulties in any particular project. In addition, the project finance structure allows a project sponsor to protect its other assets from political risks of any individual project.

Finally, project finance permits the sponsors to share project risks and consequently get funds for rojects that could not have been funded by direct finance. (Hoffman, 1998)

In traditional corporate finance, if the business is publicly held information on its performance and viability is usually available through stock markets rating Agencies and other institutions. This combinations of security, liquidity and information availability allows debt to be issued at low cost.

Further, because the company's overall risk is diversified over its portfolio of assets, the cost of equity is also low. The debt raised on a non or limited recourse basis protects the sponsors from certain project and country risk.

As a result, compensation for lenders and equity investors is proportionate with the risk they are willing to accept in the project structure. (Jechoutek' & lamech, 1995)

The main disadvantage of project finance as compared to direct financing is the high arranging cost. In project finance, the financial agreement is often of uttermost complexity, involving many participants with diverse interest.

There is a risk for tensions arising regarding risk allocation between lenders and project sponsors. Finally in some cases project-finance risks cannot be effectively allocated or the resulting credit risk enhance . These results in higher rates and fees charged by lenders for the transaction than are charged in traditional corporate finance. (Hoffman, 1998).

2.5.8 Project Valuation Methods and Capital Structure Theory

Project valuation methods encompass a wide variety of literature from academics to practice. The following literature is considered more relevant to PF projects and current research.

Kim (1978) proposed a model for determining debt capacity and optimal capital structure when firms are subjected to bankruptcy costs and taxes. The model provides a debt capacity of the firm before determining the optimal debt ratio. The results reveal that when firms are subjected to bankruptcy costs, their debt capacities are reached before one hundred percent debt. Esty (1999) explains the importance of project finance investments and limitations of constant discount rate methods such as free cash flow (FCF) and equity cash flow (ECF) in valuing Projects. He extended the valuation technique to include quasi-market valuation and real option analysis in valuing large-scale engineering projects.

Shah (1986) proposed a theory of optimal capital structure that links risk, leverage and value. In addition, an economic rationale is suggested for use in project financing for high risk and high leverage projects. The results show that under conditions of equilibrium, firms with high risk choose higher debts. Casey (2000) provided a stochastic framework for investment and risk management, specifying the fact that the investment, finance and hedging activities should be considered together.

Chemmanur (1996) proposed a model to analyze the impact of multiple projects and the effect of corporate financial structure on the overall management ability to control. The model provides interaction between the capital structure and the optimal incorporation of multiple projects and allocation of debt capital across the projects. Babusiaux (2001) formulated After Tax Weighted Average Cost of Capital (ATWACC) for determination of economic value of the project m consistent with the overall firms target capital structure. This formulation has an advantage because of its independence from any target debt ratios. In addition, another formulation called Before Tax Weighted Average Cost of Capital (BTWACC) was proposed to adapt to any debt ratio similar to the known Arditti- Levy method. It was observed that the former method ATWACC was identified with more advantages for its simplicity as well as adaptability for any differing project debt ratio from the firm's target debt ratio.

Smith (1995) compared different project valuation approaches such as risk- adjusted discount-rate analysis, option pricing analysis, and decision analysis. The paper suggested ways to integrate both the option pricing and the decision analysis methods for valuation . The paper confirms the compatibility and consistency of both valuation methods and lies within the same optimal set. In addition, the paper also confirms that in incomplete markets, the integration of both the valuation methods can simplify the analysis by partial hedging.

Ho (2002) provides an option based pricing model for PFI project valuation. The model considers the dynamic risk characteristics of the project and evaluates the impact of government guarantee and negotiations options in determining the project viability . This model considered project value and project cost as the key uncertain- ties and used a reverse binomial pyramid to compute the BOT equity payoff This model also considered the chances of bankruptcy and their conditions during the project development period. Ranasinghe (1999) proposed a methodology to analyze the viability of PFI projects based on the consideration of financial risks. This model explicitly considers the value of subsidies received from the government, under the conditions of uncertainties in cost estimates, rate of debt and escalation parameter

Dias (1995) developed a model to determine the debt capacity and optimal capital structure for the project, considering both the possibility of project bankruptcy as well as effect of taxes on the returns. The optimal capital structure is aimed at maximizing either the equity returns or project's NPV. The results explain that the debt levels required for these objectives are less than the debt capacity for the project.

Bakatjan (2003) presented a model to determine the optimum equity level for a BOT project, using linear programming aiming at maximizing the equity returns.

The use of real options to value flexibility in managerial decisions has been established for valuing real assets. However, the use of real options in PFI projects has not been substantially made so far. According to Dixit (1994), projects with high uncertainties in payoff increase the value of flexibility. PFI projects are observed with high uncertainties, in which the value of flexibility can be captured efficiently by the real options concept (Esty 1999). Real options in the production and industrial sector has been pronounced with types of options such as to defer,

switch, expand or contract, abandon, etc (Trigeorgis (1996) and Kulatilaka (1993)). For more real options references, literatures are referred in the corresponding model development sections. From the understanding of the value of flexibility, the real options concept is applied in this research for dynamic capital structure decisions for the PFI project.

More specific references are being made in the corresponding sections, where proposed models are being discussed.

Construction of mega projects even though have serious challenges but construction industry in Nigeria had been a major source of employment and contributes about 70% of labour force in the country, thus it controls the capital flow, as well as labour resources, which has cost implications. Even in the face of adequate management of these resources overruns and deviations have affected to a large extent the cost impact on the projects. Having carefully observed the huge impact on a mega projects like these, it determines to a large extent the overall success of the project works. Many have thought that if the resources available for a given mega project are adequately harnessed, issues that pertains to cost overrun would not arise. However, deviations in design and construction impacts seriously to the final cost of a project as would show in variations and claims.

2.5.9 Risk Management Strategies in Projects

Project risk management is an inherent knowledge area in Project Management Processes (PMBOK 2000). However, in early identification of Project risk, risk allocation and transfer is the key to project success. Though there are numerous articles available for project risk management, Senbet (1997) provides strategies for risk management through financial contract design. This includes identifying and classifying the risks according to their sources and

discusses the rationale for risk management. The use of financial market mechanisms for risk management including hedging and insurance using derivatives for exogenous risks, and incentive contracting for endogenous risks are discussed in detail.

Erhardt (2004) analyzes the impact of infrastructure regulation on bankruptcy and leverage ratios. A model is prepared to identify the impact of government support on project value for various regulatory arrangements. In addition, the policy options towards facing bankruptcy threats are discussed in detail. A discussion of implicit guarantees and possibilities for making bankruptcy a credible threat is also discussed in detail.

INFRISK is a well-known computer simulation software system dealing with risk evaluation and management in infrastructure finance transactions (Dailami 1999). INFRISK analyzes different risks such as market, credit and performance to determine the economic viability of PFI projects. Vega (1997) explains the appropriate risk allocation mechanism for major risks that are common to most infrastructure projects. The paper emphasizes the importance of individual project- based risk management solutions for each project. Grimsey (2002) analyzes the principles of risk analysis and management of public-private-partnership projects.

Grimsey discusses the complexities in evaluating various risks from the perspectives of the government and private sector and presented a framework for assessing the risks. The framework includes defining, analyzing and evaluating project risks in a practical perspective through case studies.

Tiong (1990) explains the importance of the role of government in PFI projects through supporting mechanisms for risk management. He provides a guideline for negotiations for Project Companies and the assistance and supports which should be required from the

Contracting Authority/host government. He also suggested a risk mitigation solution for construction and operation phase risks

2.5.10 Project Risks and Management

Managing of Risks in project is a major issue in ensuring that successful execution is achieved in construction. As we identified earlier, if the successful factors to any project are not identified earlier, the project would run a risk of failure at the end.

Risk management in the construction project management context is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives. The benefits of the risk management process include identifying and analyzing risks, and improvement of construction project management processes and effective use of resources.

Construction projects can be extremely complex and fraught with uncertainty. More so, Risks and uncertainty can potentially have damaging consequences for the construction projects is not addressed with caution.

Project risks can be ascertained by their impact on the project value. The principle of limited-recourse or non-recourse financing is that it insulates the project risks from the assets and activities of the sponsors. Therefore, in case of bankruptcy of the Project Company, the Government and/or Lenders bear the risk of continuing the service. Therefore, it is within all participants' interest to have information and the control on a global risk management process for managing the project risks during project development phase as well as operation phase According to Senbet et al. (1997), risks can be classified as endogenous and exogenous to the project. The major risks considered for risk analysis in PFI projects are project performance risks (completion time, completion cost, project quality), economic risks, financial risks, political risks

and regulatory risks. In particular, the importance of project performance risk management is highly pronounced in the project development period, since project capital investments are made to a large extent in this period. Therefore, project performance during the development period will have a significant impact on the overall financial feasibility of the project. In this section, the focus is given to developing an efficient measurement process for such project performance risks.

2.5.11 Project Performance Risk Management

Project performance risks can be expressed through project completion time (time overrun) and cost risks (cost overrun). Project completion time, or time overrun risk, deals with the uncertainty of the project to be completed on or before the planned time. Similarly, project completion cost, or cost overrun risk, deals with the uncertainty of the project to be completed on or within budgeted costs. Projects not completed on time are unlikely to start operation and generate revenues on time.

Furthermore, this may lead to failure in satisfying the debt obligations of the Project Company. Similarly, projects with actual costs higher than the planned costs may affect the financial feasibility of the project In addition, high cost overruns increase the project capital cost, which would have to be funded through additional debt and equity. In turn, this would affect the capital structure. Similarly, lengthy time overruns may also lead to early termination of the project Projects with long delays combined with high actual costs can be disastrous to the Project Company, as there will be cost overrun as well as time overrun. It is also required by the Project Company and often the Lender, to monitor project quality risks of the end product, as these can affect the project to perform as expected on its physical completion.

It is important to the Project Company that the potential problems, that could cause time and cost overruns are identified early and earmarked for their mitigation.

It is required that the causes of time and cost overruns, which can be controlled before or during project implementation, be considered for analysis to determine their impact on the overall duration and total cost of the project. However, uncertainties causing time overruns and cost overruns within the project are not uncommon . These uncertainties have been generally considered as the randomness in the duration and estimated cost of the activities. The uncertainties within the completion period can be attributed to various reasons such as the result of defective design and I or construction, use of inadequate technology, land acquisition delays, unforeseen geological conditions, delay in permits, poor workmanship, regulatory changes, escalation etc. Many researchers (Ranasinghe 1994; Pontrandolfo 2000; Etgar et al. 1996)

But, no substantial research has been done to specifically address the uniqueness of PFI projects. Project completion time, completion cost and end-product quality in Privately Funded projects have a special significance characterized by additional loss of revenue on delays and failure in satisfying the repayment of debt obligations. Yescombe (2002) discusses the importance of project performance impact on overall project cost. . (Ranasinghe 1994; Pontrandolfo 2000; Etgar et al. 1996).

2.5.12 Impact of performance risks on a Privately Financed Project

To highlight, the performance risks (time overrun and cost overrun) can introduce several upshots in a project as listed below.

- Increase in financing cost(s)

This additional financing cost during the delay period is due to the additional interest costs for the debt obtained. Since there will not be revenues in the project development period, the interest cost will be accumulated.

- Additional increase in cost overrun due to financing cost

Due to the increase in financing cost, the total project cost would also increase. This will further increase the cost overrun.

- Loss of revenue due to interruption in business/operation startup

This loss of revenue is due to the delay in starting the operation of the facility. This impact will be very high when the facility operates in a competitive market.

- Damages and other applicable penalties imposed by the Contracting Authority

In case of a delay in starting the operation of a facility, the Contracting Authority (Government) can impose damage and penalties for not providing the facility for the public use in a timely manner.

- Loss of revenue due to inability/poor quality of the project's end product

The loss of revenue can also happen when the project is unable to provide service due to poor end-product quality. This condition can lead to poor satisfaction of the user demand, which will eventually reduce the revenue.

The completion risks (time and cost overruns) mitigation arrangements are generally accomplished by transferring such risks to the Project Company. This mitigation arrangement is transferred one step further to the design and construction contractor.

However, it should be noted that the Project Company is generally assigned wholly responsible for all project-specific risks including the completion risks. This risk transfer commonly relies on fixed-price, certain-date construction contracts for handling completion risks using liquidity damages (Bond 1994; Finnerty 1996; Grimsey 2002; Kerf 1998; Tiong 1990 and Vega 1997). The Public Private Partnership forum (PPP) of the UK provides a study result in which more than 20% of the PFI projects are faced with cost overruns and 24% of the projects are faced with time overruns in the UK. A report by the International Financial Corporation (IFC) provides information that a study conducted on performance of 233 Greenfield projects shows that more than 45% of projects had experienced cost overruns. Another study revealed that out of 48 PFI projects, an average of 22% schedule overrun was observed (Esty 2002).

According to Esty (2002), PFI projects experience severe time and cost overruns. The smallest impact of these project performance risks can reduce the equity returns to the Project Company sponsors, and their worst effect can lead to project bankruptcies affecting both debt and equity returns. Therefore, the impact of project performance risks, irrespective of their magnitude, can significantly affect the equity and debt returns of a PFI project.

Since the most widely used risk allocation mechanism for project performance is only through fixed-price-certain-date contracts, it is believed that most to all of these study projects have relied on these contracts for mitigation of project performance risks. Jaafari (1996) acknowledges the limitations in handling delay risks by using only liquidity damages and warranties. He also proposed a new incentive-based contracting method for an optimum performance outcome. It can be observed from the study results that the need for a better project performance management system is evident.

In addition, these traditional fixed-price-certain-date contracts impose damages based on fixed project milestone performances oftener than those based on a continuous performance measurement. The limitations of such contract conditions to react to impact of project performance risks demands a dynamic/active project management.

The impacts of performance risks on the project has to be modelled stochastically such that the current project performance information can be available at any time period for decision making. Therefore, the PF project development decision making evolves an effective cost management strategy is therefore necessary and this could be achieved through putting in place a proactive cost management strategy. (Love et al, 2005; Ogunsemi and Jagboro, 2005; Ferry et al, 1998).

Many have defined Cost management system as a process that should be carried out throughout the life cycle of a project, from the inception to final completion and final payment to the contractor. In the light of this, the timeliness and cost effectiveness of various operations and decision carried out will determine to an extent the magnitude of cost that could be saved on the project. (Kerzner, 2005; Ogunsemi and Jagboro, 2005).

However Dissanayaka and Kumaraswamy,(1999) opined that Time, Cost, Quality target as well as project satisfaction tend to be most important key to measure the overall performance of a project work. These in turn become a driving force towards deviations in project design and execution. Furthermore, various research works have also indicated that most project records cost or time overrun during their tenure of execution.(Odusami and Olusanya, 2000). (Mbachu and Olaoye, 1989; Madewsley, et al, 2004); opined that 51percent of average delay were experienced yearly which culminates in cost overrun, certain factors are responsible for this, to this end however this study attempts at investigating such factors and proffer solution to

the pandemic. The scope of this research work shall be limited to the Niger Delta especially Bonny Island, in the building of the latest liquefied Natural Gas plant (Train 6) in Bonny Island. Although this might be typical of the other states in Nigeria but with slight difference due to the severity and unique attribute of our sea bound location of the site. The aim and objectives of the research are as follows: The research work is to determine the various factors that interplay in impacting project cost performance due to deviations, investigating the order of severity of these factors, and recommending ways of curtailing the effects.

Cost overrun is defined as exceeding of the Contract sum, i.e. the agreed budget sum between the contractor and the specified contract sum is specified and based on a number of concerned items including the rate for each item and the total amount of required money for the construction of the project. (D. J. Cleland and W.R, King, ed, (2011) Van Nostrand Reinhold, New York,

2.5.13 Cost Overruns in Construction projects.

One of the main functions of project management is to forecast and track costs to avoid cost overruns. While poor execution of project management tasks can lead to increased costs, you can link less obvious reasons to the processes of project management and the underlying nature of complex projects.

AMUSAN.L.M in his book, "Factors affecting Project Performance in Nigerian Construction Sites" identifies several factors that can lead a project into cost overrun. He explains that contractors' inexperience is the highest ranking of factors that cause overrun. This factor is followed by unstable economy that leads to inflation, Incessant variation order, and change in project design were ranked 4^{th} (fourth) project complexity, shortening of Contract period and fraudulent practices were ranked 6th (sixth) as determinants factor of project cost overrun.

Effective project management identifies these possible sources of cost overruns early and mitigates their effect caused poor design by the project designers and Bert Markgraf, Demand in his book "Reasons for Cost overruns Project management" examined some of these factors which cause overruns in projects These overrun factors has several consequences such as project abandonment, unproductivity , tying down of contractors capital, bankruptcy , etc. Angelo, W. J. &Reina, P. (2002)

2.5.14 Estimates

A. common reason for cost overruns is the inaccuracy of cost estimates. When the bids for subcontracts or the actual costs come in, they are often higher than anticipated. Such cost overruns are due either to incorrect estimates or to changed conditions in the marketplace. You can review cost estimates before placing orders to identify mistakes or changed conditions. An overall review may find that increases in some areas are compensated by decreases in others. You may be able to adjust requirements to reduce costs or seek out lower-cost suppliers. Advising the business owners or managers of possible higher costs at this stage gives them the .option of making changes and maintaining their budgets. Schuette, S. A. (1994)

2.5.15 Design

Sometimes the designs or drawings that form the basis of the project are not realistic. You may find that a combination of specified features is difficult to achieve or that drawings show an incorrect arrangement. Executing the project as specified will either cost extra or cause problems that must be resolved later at additional cost. As a project manager you have to continuously compare plans executed work to find such discrepancies early and correct them.

2.5.16 Planning

It is long recognized by the industry practitioners that how well pre project planning is conducted has great impact on project outcome. Yu-Ren Wang and G. Edward Gibson, (Jr.) June 2008 in their publication clarifies that it is at the early stage of the project life cycle, essential project information is collected and crucial decisions are made. It is also at this stage where risks associated with the project are analysed and the specific project execution approach is defined. The project progresses according to a plan that assigns durations to project tasks. If the projected durations can be too short, the project takes longer than anticipated and cause cost overruns. Monitoring project tasks on the critical path which is the task sequence from project start to finish that takes the longest to complete.

The findings suggest that project success is insensitive to the level of implementation of management processes and procedures, which are readily supported by modern computerized tools and project management training. On the other hand, project success is positively correlated with the investment in requirements' definition and development of technical specifications between tasks that you can use to compensate for delays.

2.5.12 Scope

Changes in the scope of supply within a project frequently cause overruns. These changes result from new requirements that the owners introduce and fixes for functions that don't work as specified. As project manager, you must make sure the owners understand that additional requirements result in higher costs which you can classified as improvements rather than cost overruns. When you discover that parts of the project don't work as specified you must explore

different solutions and present them to the owners. Sometimes you can find acceptable levels of functionality that don't cause cost overruns.

CHAPTER THREE

METHODOLOGY

3.0 INTRODUCTION

In this chapter, we shall be discussing the method with which this work was carried out; the design, sources of data and method of data analysis for the research work.

3.1 RESEARCH DESIGN

NLNG Train 6 Gas projects is the biggest Project in Rivers State during the construction phase and in its location; the Bonny Island is unique to be a model to managing huge LNG project in the area. It was based on this that the questions have been drawn on the peculiarities of the project and available details in participation by respondents and available publi shed details in literatures and journals. Since this is a case study of the Sixth newly built train of NLNG plant, this research design shall be partly historical and our data would be primarily on the review of documented records during the actual construction of this train six project.

Other questions would centre on the general implementation of the successful mega projects located within and outside thin the country. The purpose is to harmonize and draw inferences of the actual success factors for Train 6 NLNG gas project.

3.2 SOURCES OF DATA

3.2.1 Method of Data Collection

NLNG Train 6 Project was completed some 3years ago and most of the contractors that supported the construction were indigenous except the multinationals who were the main builders of the train.

Most of these contractors that participated have demobilized from site after the commissioning, leaving a running live plant.

Based on this fact, most of the data we collected for this research are mainly primary and secondary sources. Interviews, Questionnaires and Documented published data from the Date base of NLNG Ltd.

3.2.2 Primary Sources of Data

The T-6 project which was started in 2007 has gone into full operation with some active participants during the construction retained for the production process and operation. These participants provided us some first-hand information and data for the project work. These individuals who participated in the construction of Train 6 were contacted and briefed on the type and purpose of the questionnaires' that would be sent to them. When the designed questionnaires were ready, they were sent across to them via e-mail for completion and return . The questionnaire was sent to them because they are the remnant of the construction team still in Bonny Island. Besides individuals, there are also existing companies today in the Island which participated in one form or the other during the actual construction of the T-6 project. These provided the data for the work.

3.2.3 Secondary Sources of Data

The secondary sources of data were the progress reports collected from the department of document control and NLNG library. Most of these reports are not published but in the archive of the company. There were other sets of data collected from the published literatures in NLNG Magazine and journals like Facts and Figures, 2010 and 2011 editions.

3.2.4 Population of Study

In deciding to draw up the questionnaire with the purpose of analyzing the performance of the Train Six project, consideration was given to the various factors which have affected the project positively or negatively as the case may be. These factors were use severe in some cases and not severe in others. In some cases they could not contribute any meaningful effect on the project during construction. In this case, we shall be listing all the factors no matter their level of impact.

3.2.5 Sample Size Determination

Part A of the questionnaire has Thirty Five (35) general questions on the general factors that affect construction activities of any project no matter the location. Part B had fifteen (15) Questions on Quality factors that had affected the project also. This made up Fifty (50) questions that form the entire sample size for our analysis.

3.3.0 Sample Size Determination

The questionnaire shall be sampled through the participants during the construction of the project and first hand response shall be gathered for analysis. The classification rating of the factors that affected the project in the two parts were arranged in the Likert scale of a - ie. Strongly agreed (a) Agreed (b), Neutral(c)

Disagree (d) and strongly disagree (d). These questionnaire were responded by members of the Train 6 construction team which have formed part of the production team of the company in Bonny Island where the Train is located.

3.3.1 Population of Study:

In this work, questionnaire was personally delivered to the respondents by mail and a follow up contact to confirm they saw and would respond after completing them.

A total of 30 questionnaires were raised and 18 persons completed and returned but 12persons did not return theirs. So we shall be taking a sample size of 18.

3.4.0 Method of Data Collection:

In total, seven interviews were conducted for this thesis. These interviews were conducted to verify some data which makes part of this work.

Despite the fact that the NLNG T6 project has been completed and the project running in full capacity, some professionals in different fields who participated during this construction have demobilized from the Island and other contractors who also partook in the construction have been demobilized. Some of the persons interviewed were in administration, engineering, quality control, finance, supervision. etc. These persons were actual team players and have provided firsthand information according to their participation and involvements. The information collected was contributory to the analysis carried for the project.

3.5.0 Method of data Analysis

In the analysis of the that was collected, we have adopted the tool of Regression Analysis to determine the management of the risk factors of the construction of the project was affected by

the various factors surrounding the project. In carrying out this investigation the Regression tool was used to review the relationship that exists between the effects of these factors from the 18 respondents and the success of the project.

The results will show the weighted sum of success variables the T-6 Project. These weighted variable scores will be plotted along the Y axis and the individual assessment of the exposure of the risk variables are plotted along the X axis. The resultant equation would be a Model of linear equation with which we were able to test the Hypothesis stated earlier in chapter 1. The correlation shall be assessed at 5% level of significance.

CHAPTER FOUR

RESULT DISCUSSION

4.0 Data Presentation

The questionnaire developed was a collection of 50 items in which the factors are divided into two (2) segments for a closer look at the performance of the project. The First segment, section A, consist of 35 factors which were collected for the analysis of the performance of the project. The second segment consist of 15 quality assurance questions which gave a general overview of how the completion of the entire project.

In the Analysis of the returned 18 questionnaires, responses have been given values ranging from strongly agreed as -2; Agreed as -1; neutral as O; Agreed as 1 and strongly agreed as 2.

For the sake of our analysis, we shall be using regression analysis method to determine the effect of these factors to the overall success of Train Six(6) Project. We shall also examine the severity of the factors and how effective was the management of these associated risks to the project.

4.1 Project Performance Data

Table I defined the Severity of the risks on T6 project; X-axis - the influence of the 35nos general factors of Construction and Y-axis showed the l 8 respondents who returned their questionnaire.

Table 1: OSBL/ASI

Unit	Contractual RFSU	Actual RFSU
OSBL		
LNG Tank	27/06/2008	21/08/2008 (Completed)
LPG Tanks	19/04/2008	12/03/2009 (Completed)
Condensate Tank	16/04/2007	10/04/2008 (Completed)
ASI		
Instrument Air	27/03/2007	15/07/2008 (Completed)
Nitrogen Production/Storage	09/04/2007	08/08/2008 (Completed)
Condensate Stabilisation Unit	19/06/2008	05/06/2009 (Completed)
Amine Thermal Oxidiser unit	04/09/2007	21/08/2009 (Completed)
132 kV/ENMC	30/01/2008	End April 2010 (Forecast)

Source: NLNG Ltd

Three distinct planning and progress reporting systems were is adopted for the Engineering, Procurement & Construction phases of the three separate scopes of work. The following weightings were applied to the elements of Engineering, Procurement & Construction to calculate progress as shown on table 2.

Table 2: Weightings for calculating progress

ISBL	OSBL	ASI
Management : Included	23.48%	15.66%
Engineering : 15%	3.69%	15.48%
Procurement : 35%	30.15%	31.92%
Construction : 50%	50.50%	29.12%

Source: NLNG Ltd

Engineering and Procurement progress was reported by TSKJ and ECDRN on a monthly basis, while Construction progress was reported on a weekly basis. The graphs for the overall progress for ISBI. (fig. 1) and OSBLASI (fig. 2) are shown below.

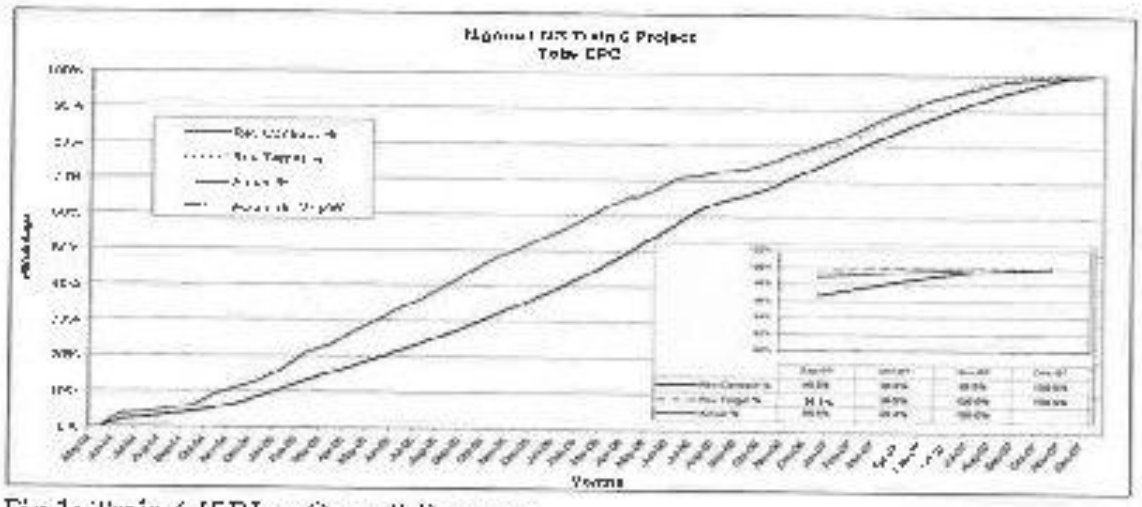


Fig.1: Train 6 ISBI. – Overall Progress

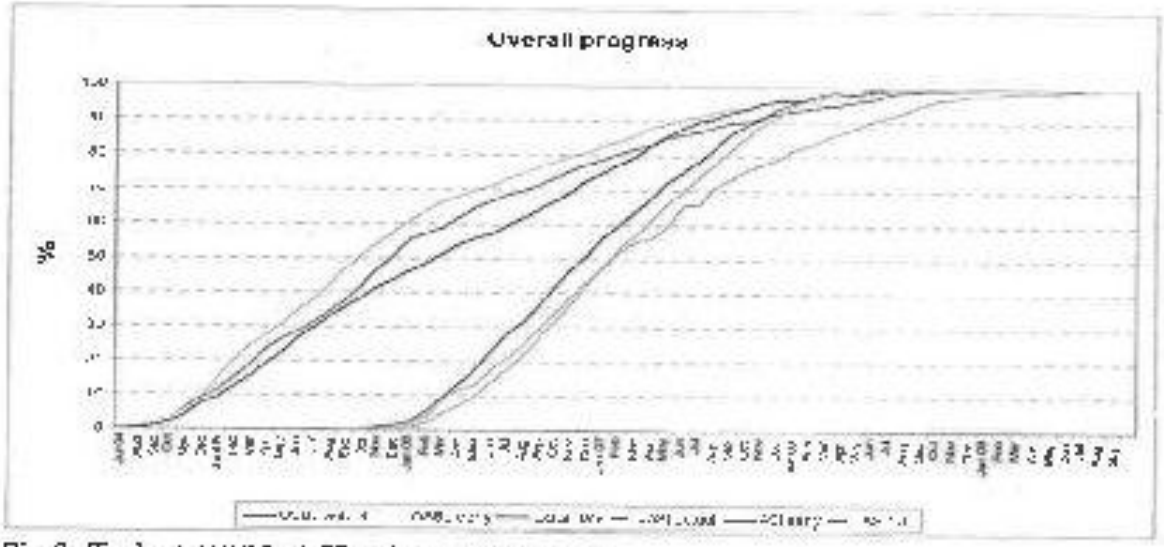


Fig 2: Train 6 OSBL/ASI – Overall Progress

Budget performance

At the Effective Date of Contract(s) (EDC) in July 2004, the budget approved for the NLNG-6 Project amounted to $1,995,500,000 broken down as follows:-

EPC Contract(s)	$1,238,478,023
ASI Work	$182,000,000
Owners Costs	$124,500,000
Contingency	$60,000,000
Total Budget	$1,604,978,023

Throughout the Project life the approved budget was revised and increased as stated on table 3.

Table 3: Budget increases

Reason	Amount	Area affected
In October 2005; award of ASI work	$55,000,000	incremental increase to line item
In February 2007; high value items associated with additional security measures & abnormally high labour cost increases	$89,000,000	new line item
In July 2009; for budget overruns	$63,840,000	allocated to several line items
Current approved Budget	**$1,812,818,023**	

Source: NLNG Train 6 Close out report

From the above projection, it can be seen that Train-6 Project was on track to complete within its approved budget.

As at the end of 3 Quarter 2009, the Project Contingency of $60,000,000 had been exhausted against Changes in the Work for both ISBL and OSBI.. However, the supplementary budget increase approved in July 2009 of $63,840,000 funded a minor shortfall to contingency together with other shortfalls to line items in the Owners' Costs section of the budget.

4.2 Data Analysis and Interpretation

The questionnaire developed was a collection at 50 items in which the factors are divided into two (2) segments for a closer look at the performance of the project. The First segment, section A, consist of 35 factors which were collected for the analysis of the performance of the project. The second segment consist of 15 quality assurance questions which gave a general overview of how the completion of the entire project.

In the Analysis of the returned 18 questionnaires, responses have been given values ranging from strongly agreed us -2; Agreed as -1; neutral as 0; Agreed as 1 and strongly agreed as 2.

For the sake of our analysis, we shall be using regression analysis method to determine the effect of these factors to the overall success of 'Train Six(6) project. We shall also examine the severity of the lactors and how effective was the management of these associated risks to the project.

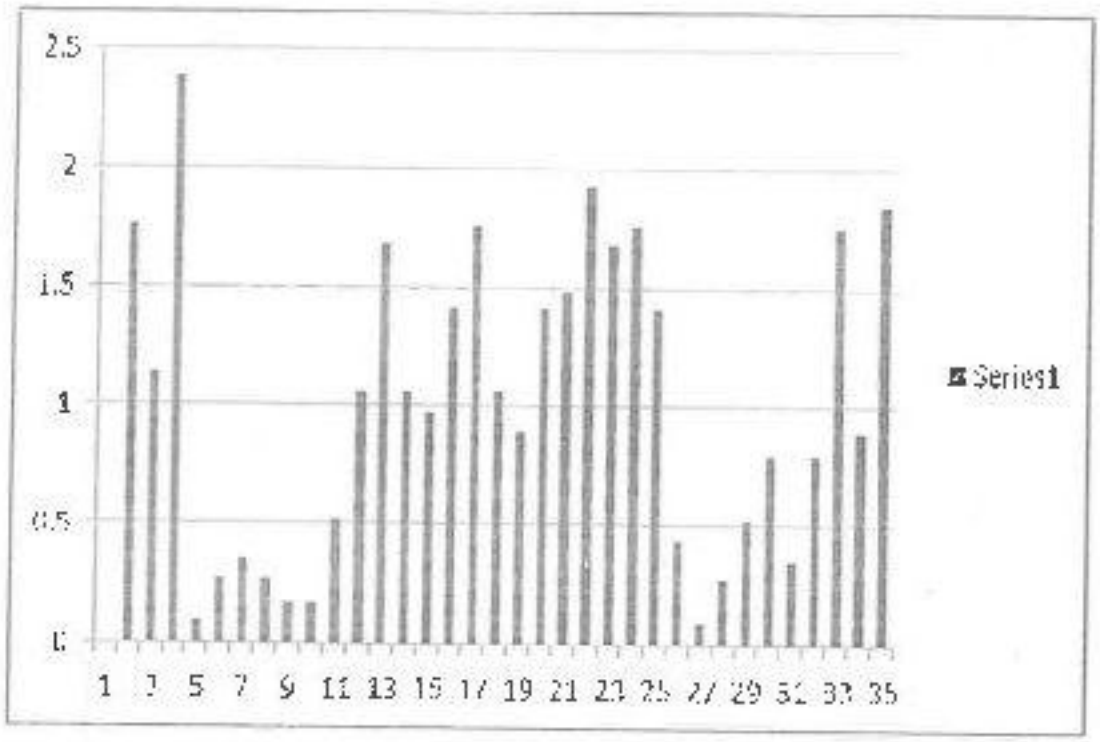
Table defined the Severity of the risks on T6 project; X-axis the influence of - the 35nos general factors of Construction and Y-axis showed the 18respondents who returned their questionnaire.

TABLE 1

Res	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	X24	X25	X26	X27	X28	X29	X30	X31	X32	X33	X34	X35	Sum
R1	0	-2	0	-2	1	1	2	2	1	.	1	0	1	1	1	0	-2	-2	0	+2	-2	2	-2	+2	-2	1	0	0	+2	-2	2	-2	0	-2	-2	-17
R2	0	-2	-2	-2	-2	-2	1	0	-2	+1	-1	0	+1	-2	-2	+1	+2	+1	+1	-2	0	+1	+2	-2	+1	-2	+1	+1	-2	+1	-2	-2	-1	-2	-2	-41
R3	-1	+1	1	+1	-1	1	+1	1	0	0	0	0	0	-2	0	0	1	0	1	0	+1	0	1	0	+1	-2	-1	1	0	-2	-2	-2	+2	0	+1	-12
R4	-2	-2	-2	-2	1	-2	+1	0	-2	1	+2	2	+2	-2	-2	-2	+2	-2	-2	-2	+2	-2	-2	-2	+1	+1	-1	2	+1	1	'	-2	+1	+2	-2	49
R5	-1	2	-2	-1	+1	-.	+1	-2	1	1	+2	-1	-2	+1	-1	0	+1	0	-1	-1	+1	2	2	-2	+1	+1	-2	+2	-2	2	-'	+1	+1	+1	-1	-35
R6	-1	-'	+1	+2	1	'	+1	-2	2	+1	1	+1	2	+1	+1	-1	+1	+1	1	-2	0	+1	-1	-2	+1	+1	2	1	1	-2	+2	1	-2	+1	+2	-21
R7	1	0	+1	+1	0	0	0	0	+1	0	0	+1	0	2	0	1	0	2	1	1	1	0	0	0	0	1	+1	0	1	0	0	1	-2	-2	-2	-'
R8		-2	-1	+2	+2	2	2	2	0	+2	+1	+1	+1	1	1	+1	-2	0	+2	+1	-2	-2	-2	2	-1	1	1	0	1	2	2	0	0	2	0	16
R9	+2	-2	-2	-2	-'	1	2	1	+1	-'	+1	1	+1	+1	+1	+1	-1	+1	+1	+1	-2	-2	-2	+2	2	2	+1	+2	1	+2	-2	-2	-2	-2	2	-40
R10	2	+1	1	2	'	1	.	1	1	1	1	-2	+2	2	1	2	-2	-2	+2	+1	+1	+1	-2	+2	2	1	1	0	1	-2	-2	1	1	1	-2	-9
R11	2	-2	-2	2	1	1	-2	-2	1	1	1	-2	-2	+2	-1	-2	-2	+2	+1	+2	2	-1	+1	+2	+1	0	1		1	2	1	0	+1	1	+1	18
R12	2	+2	+2	-2	+1	+1	+1	+2	2	0	0	-1	+1	-2	-1	+1	+1	-2	+1	+1	+1	-2	+1	+2	-2	0	1	+1	0	+1	1	2	+1	1	+1	-25
R13	1	0	2	+1	1	+1	1	1	+2	+1	+'	1	+1	+1	+1	1	+1	1	+1	+1	+1	+2	+1	+1	+1	+1	+1	0	+1	0	+1	+1	-	+1	-16
R14	2	1	2	1	0	1	1	+1	+1	1	+2	2	+'	+1	+1	+1	+1	+1	+1	1	0	+1	+1	0	0	0	0	1	0	0	+1	0	+1	0	+1	-6
R15	+1	0	+2	-2	+2	+2	+1	+2	0	+1	+1	+1	-2	-2	+2	+2	+2	+1	0	+1	+1	+1	-2	-2	+'	+1	+'	+1	'	+1	0	0	+1	0	0	-37
R16	1	0	0	-2	2	1	1	2	1	0	1	0	0	1	0	-2	0	0	2	0	-2	+2	0	+2	1	1	.	1	+2	-2	1	2	-2	+2	-2	-3
R17	-'	+2	-2	1	0	0	1	-2	-2	+2	-2	+2	2	-2	-2	+2	-2	1	-2	-2	-2	-2	1	1	-2	1	1	1	-2	1	1	-2	-2	1	0	-3.
R18	1	-2	-2	-2	2	1	1	0	1	1	-2	2	+2	-2	0	-2	+2	-2	2	1	+2	+2	0	0	0	1	1	1	1	1	1	1	0	-2	0	-9
sum	0	-22	-15	24	-'	-3	4	-3	-2	-3	-6	17	-19	-12	-11	-16	2[illegible]	-12	-1[illegible]	-16	-17	-22	-15	-20	-16	-5	-1	-3	-6	-9	-4	-9	-20	-[illegible]	21	
Ave.	+[illegible]	+1	+1	+2	-2.[illegible]	-0.[illegible]	[illegible]	-0.[illegible]	-0.[illegible]	-0.[illegible]	0.[illegible]	-0.[illegible]	-1.[illegible]	-0.[illegible]	-0.[illegible]	-0.[illegible]	-1.[illegible]	0.[illegible]	-0.[illegible]	-0.[illegible]	-0.[illegible]	-1.[illegible]	-1.[illegible]	-1.[illegible]	-0.8	-0.[illegible]	-0.[illegible]	-0.[illegible]	0.[illegible]	-0.[illegible]	-0.[illegible]	-0.5	-1.[illegible]	0.[illegible]	+1.[illegible]	-67.[illegible]
Seve	0	1.8	1.1	2.4	0.1	0.3	0.1	0.3	0.2	0.2	0.5	1.1	1.7	1.1	1	1.4	1.8	1.1	0.9	1.4	1.9	1.9	1.7	1.8	1.4	0.4	0.1	0.3	0.5	0.8	0.4	0.8	1.8	0.9	1.9	

Source: Calculated from Field Survey Data

SEVERITY OF RISK FACTORS FOR TRAIN SIX(T6) GAS PROJECT

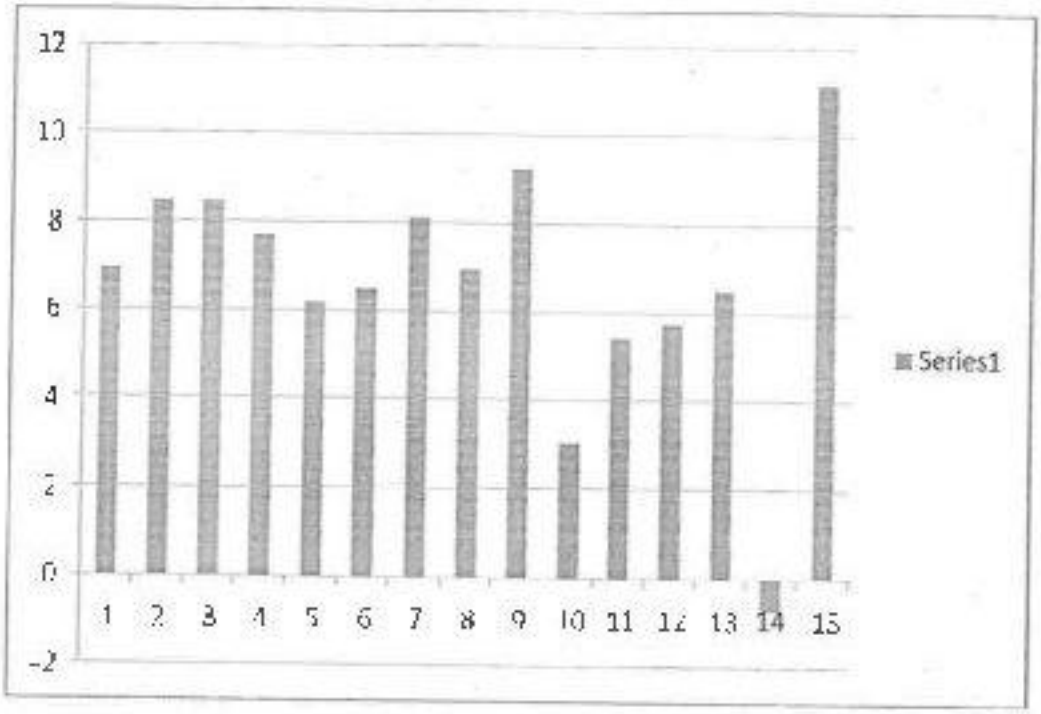


Source: Charted Using Table 1 data

Table 1 and fig. 1 shows that based on weighted responses of top T-6 Project team members Variable XI did not expose the project to any risk given the zero severity index. On the other hand variable X4 (Insufficient Funding) has the highest severity index of 2.38. Also variables X2, X13, X17, X20, X23, X24, X33 and X35 exhibits severity above 1.5 but less than 2.0. Equally, variables X3, X2, X14, X18, X20, X21 and X25 indicated severity above 10 but less than 1.5. Variables X11, XIS, X19, X29, X30, X32 and X34 have severities less that 1.0 but more than 0.5. Variables that have severity above zero but less than 0.5 include X5, X6, X, X8, X9, X10, X26, X27, X28 and X31. We can therefore conclude that variable with severity index above 1.0 are the high risk variables whose frequencyof occurrence or effect of occurrence is high, while those with severity index above 0.5 but lower than 1.0 are the moderate risk whose frequency of occurrence or effect of occurrence is moderate. On the other hand those variables

with severity index below 0.5 are the insignificant risk sources whose frequency of occurrence or effect of occurrence is low.

Fig. 2: Schedule of Performance Variables of T-6 Project



Sources: Charted Using Table 2 Data

Table 2 and Fig. 2 shows that Performance variables 1, 2, 3, 4, 5, 6, 7, 8, 9, 13 and 15 exhibited above 6.0 percent contribution to the success of T-6 Project. Variables 10, 11and 12 exhibited above 2% but below 6% contribution to the success of the project. On the other hand variable 14 is the only performance variable that exhibited negative contribution to the success of T-6 Project.

4.3 Research Questions:

The research questions earlier stated in chapter one is answered at this point based on the results of analysis.

Question 1:

What were the most critical factors (Risk variables) that T-6 Project was exposed TO?

In answering this question reference is made to Table 1 and Fig. 1. Variables X4, X2, X13, X17, X20, X23, X24, X33 and X35 exhibits severity above 1.5 and were considered the most critical risk variables that T-6 Project was exposed to during its life. Even though there are other factors that affected the 16 projects, the most critical ones are considered here as they impacted the project most to make a significant difference.

Question 2:

What are the key main factors (performance indices) that drove the success of I-6 Project?

In answering this question reference is made to Table 2 and Fig. 2.

Variables 1, 2, 3, 4, 5, 6, 7, 8, 9, 13 and 15 exhibited above 6.0 percent contribution to the success of T-6 Project,

Question 3;

What key factors (performance index) that drove T-6 Project towards failure? Fig. 2 shows performance variable 14 is the only one with negative value, implying that as oppose to driving T-6 towards success, it clogged the success wheel of the project.

Assessment of the effect of T-6 Project factors (Risk) Management on Success of the Project.

In carrying out this investigation the Regression tool of analysis was adopted in analyzing the relationship between respondents' weighted sum of T-6 Project success variables score (Table 2) represented as Y in Table 3 and their individual assessment of exposure of T-6 Project to all the risk variables (Table 1) represented as Xie Table 3.1

Table 3: Summary of Weighed Scores

Respondents	Y	X
R1	9	-17
R2	10	-48
R3	12	-14
R4	12	-49
R5	17	-35
R6	17	-21
R7	0	-1
R8	18	-10
R9	24	-40
R10	21	-9
R11	15	-18
R12	19	-25
R13	19	-16
R14	18	-6
R15	13	-37
R16	6	-3
R17	10	-31
R18	9	-9

Source: Extracted from Tables 1 &2

Table 4: Descriptive Statistics

	Mean	Standard. Deviation	N
Y	14.3889	5.62702	18
X	-21.6111	15.13134	18

Source: Result of Analysis of Table 3 with SPSS

Table 4 shows that mean of Y is 14.39 with a standard deviation of 5.63, while that of X is -21.61 with a standard deviation of 15.13.

Table 5: Correlations

		Y	X
Pearson Correlation	Y	1.000	-.103
	X	-0.103	1.000
Sig. (1-tailed)	Y	-	0.341
	X	0.341	-
N	Y	18	18
	X	18	18

Source: Result of Analysis of Table 3 with SPSS

Table 5 shows that an inverse correlation of 10.3 percent exist between Y (Success level of T-6 Project) and X (risk exposure) of the project. The above inverse correlation is consistent with theoretical framework of effect of risk on project success, though the correlation is not significant at 5% level.

Table 6: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Standard. Error	Beta	t	Sig.
(Constant)	13.558	2.417		5.609	0.000
X	-0.038	0.092	-0.103	-0.416	0.683

a Dependent Variable: Y

Using the parameters of Table 6, equation 1 is generated for purposes of analysis the effect of risk management on the success of 1-6 Project and testing the hypothesis earlier stated in chapter one.

Effect Model: V 13.57 - 0.038X (1)
(-0.416)

Where:

Y = Success level of T6 Projects

X= Weighted Risk Exposure.

Equation 1 shows that if no effort was made to manage the risk variables of T-6

Project, the project would have recorded 13.57 percent success level (see the intercept value of equation 1).

On the other hand for every failure in managing any of the risk variables T-6 Project experience 3.8 percent failure in its performance with specific regard to quality and time schedules (see the coefficient of X in equation]), though the above impact.

Table7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.103[a]	0.011	-0.051	5.76909

a. Predictors: (Constant), X

Table 7 shows that 10.3 percent relationship existed between the risk exposure shows that frequent changes in the risk variables of T-6 Project during its life level of T-6 Project (X) and its success level (Y) see R value of 0.103. it equally The above result indicates that the risk variables of T-6 were adequately managed by the project team members.

Table 8: ANOVA[b]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.759	1	5.759	0.173	0.683[a]
Residual	532.518	16	33.282		
Total	538.278	17			

a. Predictors: (Constant), X

b. Dependent Variable: Y

Table 7 and 8 as well as equation 1 are used to test the hypothesis of this study.

Test of Hypothesis

HO: There was no eflective risk management system existed for the mitigation of the risk exposure of T-6 Project, hence the effect of the risk exposure variables on T-6 success was insignificant.

It is not significant at 5% level.

4.4 TEST RESULTS:

a.) H01: There was an effective risk management system that existed for the mitigation of the risk exposure of T-6 Project, hence the effect of the risk exposure variables on T-6 success was insignificant. It can be seen '16 and the outstanding success recorded in the project.

b.)1102: There is no significant relationship between the management of the risk factors of 16 and the success of the project.

Also confirming above 1102 is not acceptable; there were significant management of the risk factors of 16 and the success of T6 project. This produced a successful project.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

This study was carried out to analyze the various factors that affect major construction projects in Nigeria especially within the Niger delta region where multi -billion dollar Oil and gas project, Nigeria L. N. G. is situated . This project is called the Train Six Project in Bonny Island.

In chapter two, the researcher tried to see the various research works that has been done on critical success factors of a project and why many project fail. It was clear that any project in which the managers do not sit down to identify the factors that would be militating against their proposed project have started to fail. When these factors are identified, adequate measures are put in place to ensure proper management of the risks associated with those factors. The four success model of any project, Comfort, competence, commitment and communication would always be the driving force in any project. Stakeholders in any project have keen watch on these and would insist that project managers maintain this model for a successful project. Success factors• those entered into the management system to produce success or failure of that project and success criteria; the measures on which the success or failure of a project is judged are different and every manager needs to distinguish and focus on them for effective performance . More so, the thirty five factors of project construction of Train Six project were listed. These factors had different degree of impacts and these analyzes on chapter three to see the very critical and less critical ones. The severest of them all as shown in our analysis is funding which stood out remarkably, contributing a severity of up to 2.38. The issue of why Project Financing is a

difficult task in a developing country was substantiated majoring on security associated and the high level of interest rates.

The Measurement of the cost of project has to be monitored closely to ensure that the performance of the project is realized. The lack of close monitoring of these have also contributed greatly to the overrun of the project cost. Proper planning is also necessary to ensure project performance and management of the risks associated . On another, the writer also tried to discuss the cost of project performance which is a great link between cost and the performance of any project.

Benchmarking of related projects were also discussed and the criteria to show the reason why a project has performed in its typical location and specific characteristics. The above issues were generally brought to bear as the construction of Train 6 Project of Nigeria Liquefied Gas project was analyzed and the various factors which affected the project positively or negatively were discussed.

The location of Train 6 project in Bonny Island was a unique one as typical of any Island, construction is a hard task keeping in mind of factors which could mar or make the construction of the project.

The researcher here has selected about 35 major factors that affect major projects in any location and has compiled this in a questionnaire which was administered to members of the construction team of the Train 6 of the Liquefied Natural Gas project in Bonny with which analysis was made. The analysis received in this questionnaire were used by the researcher to confirm that all factors if properly managed in the construction of major projects like the construction of any other.

Liquefied Gas project as planned for Train, Brass LNG or Olokola LNG Train would positively influence and achieve the greater result. The researcher in charter three continued the research by explaining the research methodology under the following headings, Research Design, Selection of Data, Data collection for both !Primary and secondary Sources. Furthermore, the analysis and interpretation of the result of this work have proven that most of the factors influenced the project positive. The risks associated with these factors were properly managed and did not impact negatively to the project. Majority of the interviewees were all part of the construction of Train 6 project. All these are captured in the questionnaire.

Analysis of the results of these research confirmed that the effect of the risks variables on T-6 project were more of positive than negative. These variables where managed effectively that the negative factors were negligible because the project was successfully delivered. This also implies that the hypothesis made that the effective management system set up was able to reduce the risk exposure of the Train 6 project.

This research confirms that while many factors affect the success of any project, the management of these factors play a major role to determine the level of success that is achieved. The severest of all the factors that that affected the T6 project is insufficient funding. The effective management of this factor could not impact negatively of the success of the T6 project. There were several other factors that affected the project but were properly managed resulting to no negative impact.

In the event that these factors were not properly managed, only about 14% success would have been recorded in this project. This goes a long way to confirm earlier findings by A.K mums/B.

F. Bjiermi (1996) and Barne & Walker (1982) that achieving success is more of the role of the Project managers and their expertise.

Construction in the riverine areas is unique and more stringent measures are required to achieve the level of success that is achieved for T6 Project. The only factor that was not managed properly and resulted negatively to the performance of the T6 project; Road interconnectivity is typical of the riverine areas. This factor if approached differently with a more robust approach could improve the project performance to a higher degree.

5.2 RECOMMENDATIONS

a.) Construction of the Train Seven project which is one of the targets of this work would achieve better performance if the would-be project managers approach logistics with a closer caution in other to realize optimal performance of their projects.

It has been confirmed that insufficient funding has the severest impact on Train 6 but any experienced project manager for Train 7 would give more attention to this factor in ensuring that procedures for funds management are maintained.

Companies investing in projects in the riverine areas should also ensure robust logistic procedures are put in place. Road interconnectivity is a challenge and construction team should adopt a more effective logistic risk management. This would enhance performance and produce a better result.

b.) Construction of other NLNG projects e.g. Brass LNG, Olokola LNG, etc. should ensure that they identify the project success and risk factors for their various locations as these might be

different for every unique location. Analyzing these factors would help improve the project performance.

c.) Government projects in the riverine areas should be given a careful monitoring and for experienced management is required to achieve the expected performance because of the stringent factors that militate against such project.

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APPENDICES

Federal University of Technology, Owerri

Department of Project Management Technology

Thesis on

Project Cost Performance for NLNG Train 6 Gas Project in Bonny Island.

by

Engr. Nnamdi Mbata

Questionnaire

PART A (General Factors)

Please kindly circle the level at which the following issues affected the T-6 Project during the construction.

1.) Design Variations (Change orders)

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

2) Inadequate or Poor Site information (Soil Test, Survey Report, etc.)

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

3) Project Timing was very tight.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

4.) Insufficient Funding.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

5) Recruitment, attraction of expertise skills and Professional.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

6.) Movement of critical staff during the actual construction.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

7.) Industrial Action by workforce.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

8.) Community unrests, Disputes and Disturbances.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

9) Material procurement and Supply

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

10) Delay in Equipment delivery and performance.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

11) Coordination of various companies and construction activities.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

12) Incompetence of Contractors in their various work assignments

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

13) Litigations among various companies executing the work

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

14). Restricted road networks and limitation to project site

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

15). Accidents due to poor Safety conformance of various Contractors

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

16.) Poor Quality output of construction works of Contractors.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

17.) Inadequacy of cost control procedures (Poor Budget Management)

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

18.) Associated threats and opportunities not identified and properly managed.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

19.) Clarity of roles and responsibilities of parties involved.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

20.) Conflict of interest amongst project participants (Bribery and Corruption).

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

21.) Changes in Stakeholders expectations.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

22.) Loss of confidence and trust from Stakeholders.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

23.) Stakeholders prefer time and/ cost over Quality

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

24) Reputational Scandals involving Key Stakeholders

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

25.) Conflicting interest from influential Stakeholders

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

26.) Unstable Federal Government Policies

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

27.) Nigerialisation Policy

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

28.) Patent Right Authorization

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

29.) Employment Legislation

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

30) Importation Levies and duties

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

31.) Exchange Rate Fluctuations

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

32.) High and Inconsistent Bank interest rate and charges.

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

33.) Taxes

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

34.) Inflation rates and instability in the economy

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

35.) Culture, Customs and Language Barriers

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

PART B (Quality)

36.) There was a high Quality control process in the construction of NLNG Train 6?

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

37.) Quality requirements of Train 6 Project were realized during the construction?

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

38.) Value for money was realized after construction of T6 of NLNG Project?

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

39.) Train 6 project was completed on time?

a.) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

40.) The project was completed within Budget?

a) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

41.) There was a good understanding of QMS during the construction of T6.

a) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

42.) Quality management system documentation and procedures were adhered to.

a) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

43.) Proper documentation for supplies and materials were done during construction.

a) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

44.) Proper planning for the implementation of QMS was done.

a) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

45.) There was continuous professional development during construction.

a) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

46.) There was adequate QMS exposure among workers during T6 construction.

a) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

47.) The benefits of QMS were enjoyed during the construction of T6.

a) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

48.) Contractors and Suppliers during T6 observed QMS also.

a) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

49.) The cost of Implementation of QMS was very high.

a) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree

50.) Generally Construction of T6 would be rated as successfull.

a) Strongly Agree b.) Agree c.) Neutral d.) Disagree e.) Strongly Disagree