TIME AND COST PERFORMANCE LIABILITY ALLOCATION IN THE BUILDING PROCESS

BY

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DECLARATION

I hereby declare that this thesis has been prepared by me and that it is a record of my own research. It has not been presented in any previous application for higher degree. All quotations are indicated and the source of information are specifically acknowledged by means of references.

ADETUNJI, Olalekan Adeleye

SEPTEMBER, 1988

CERTIFICATION

This thesis entitled: Time and cost performance Liability Allocation in the Building Process by Adetunji, O.A meets the regulations governing the award of the degree of Master of Science of Ahmadu Bello University, and is approve for its contribution to knowledge and literary presentation.

Chairman, Supervisory Committee — Date 30/10/88

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Dean, Postgraduate School — Date 26-1-89

Dedication

To my parents,

Dr. and Mrs. S. A. Adetunji

Take things as they come and

don't hold on to them as they go

- Toni Cagle

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ABSTRACT

The subject of this thesis is construction risks and the allocation of any loss incurred as a result of their occurrence amongst parties to a contract. This is with the broad aim of improving on the achievement of cost and time targets for a project, hence, reducing cases of abandoned projects in Nigeria. To this end, the following objectives were pursued. The identification of those factors that constitute risk, examination of the roles of the conditions and types of contract in the allocation of these risks, and the determination of a reasonable proportion of allocation among the parties to a contract.

In pursuance of the objectives of this thesis, a pre-tested questionnaire was administered in conjunction with personal interviews of consultants in the construction industry. The survey covered Lagos, Oyo, Kacluna, Bauchi and Borno States.

Seventy-six percent (76%) of respondents argued that poor achievement of cost and time targets in building projects can be attributed to non-compliance with the conditions of contract which is the main vehicle for allocating construction risks. The major reason advanced for this situation is that the conditions of contract as presently constituted does not reflect the Nigerian construction environment. The need to review the conditions of contract to take into proper consideration, those risks *oi* particular relevance to the Nigerian

construction environment was emphasised.

This thesis has identified risks that often adversely affect construction projects when they occur. Proportions of allocation amongst the parties to a contract that are anticipated to effectively provide for any loss incurred as a result of the occurrence of these risks were subsequently proposed.

The likely benefits when the proportions of allocation are implemented include the minimization of litigations and conflicts among the parties to a contract and the achievement of more competitive and realistic tenders from contractors. The responsibility for a percentage of the loss caused by the occurrence of an externally arising risk factor by each of the parties to a contract, ensures the utilization of their incentive to mitigate losses. Their commitment to the successful completion of the project is thus assured.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

There has been a growing concern in the country about the poor performance of construction projects. Evidence of this abound. For example, as far back as 1984, the Federal Government, worried about the spate of abandoned projects all over the country, set up a panel to assess the desirability of continuing with projects requiring 30 million naira and above to complete. The situation in the construction industry was so disturbing, that the New Nigerian in the same year, published a list of construction projects in 3 States of the Federation, worth about one billion naira, on which work had been halted. One cannot but appreciate the cost of abandoned projects to the country when Giwa (1987) cited over 30 cases of such projects from the different States of the Federation on which billions of naira had already been spent. This situation has prompted the Minister of the Federal Capital, Abuja and other personalities to express concern over the numerous uncompleted projects started as far back as 10 years thence. (New Nigerian, 27/1/87).

Projects are often abandoned due to serious over runs in budgets for the projects. Cases of abandoned projects can therefore be reduced through improvement in the achievement of cost and time targets for the projects. Though abandonment of construction projects is not a common sight in developed countries, that is not to say that their projects do suffer from overruns in cost and time. Infact, work has been done by researchers in

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these countries on causes and means of controlling overruns in cost and time. Among such researchers are Perry and Hayes (1985) who suggested that many cost and time overruns are attributable to either unforeseen events or foreseen events for which uncertainty was not appropriately accummodated. Risk and uncertainty are inherently present in construction projects and are associated with specific events or activities which can be individually identified. Perry and Hayes state that a risk event implies that there is a range of outcomes of the event and each outcome has a probability of occurrence and stress that in the practice of construction management, distinctions between risk and uncertainty are usually unnecessary and may even be unhelpful. Most risks offer only the prospect of adverse consequences. Risk can thus be defined as possibility of a loss which may be in terms of money, time and/or functional performance.

Schofield (1975) calls attention to the fact that in all walks of life, the future is clouded with risk and it is therefore important to understand what it entails to improve the situation prevailing at a given time. Akinkoutu (1987) however, notes that in Nigeria, many construction projects are embarked upon without adequate plans to incorporate the management of risks associated with such projects. Little wonder, that many multi-million naira projects fail to justify the huge amount invested on them. The country cannot afford to continue with such wastage of scarce resources through inappropriate routine management style. It is therefore imperative to include risk management as an integral part of the management decision making in the construction industry.

The success of a business tends to depend to a large extent on the accuracy of forecasts for future demands and conditions. Schofield (1975) however notes that the main problem when evaluating risk is that the final evaluation is still clouded in uncertainty. This may not be unconnected with the urgency with which most estimates are required. When estimators are pricing in competition, they are usually working against the clock and are expected to be able to price low enough to land sufficient work to achieve their company's target in terms of turnover and also high enough to realise their firm's expectations in terms of profit. The situation is summarised by Hull (1980) when he asserts that the most important stage in the evaluation of an investment opportunity is the stage during which estimates are made for uncertain variables, but unfortunately, it is all too often the case that estimates are hastily prepared and totally unrealistic.

Thus, although more accurate estimates are desirable, this is usually not possible due to the time factor. It is therefore not surprising that most estimates fail to make adequate provisions for risks that may be encountered on a project. Pugh and Soden (1986) stress that it is dangerous to leave the future of a project entirely to such an estimate. The risks that occur must be provided for. The importance of providing for construction risks by allocation between the client and the contractor was highlighted by Levitt et all (1980). They emphasized that proper allocation of risks between these parties optimizes the final cost of a project. Opportunities therefore exists for improving project performance through allocation of risks.

1.2 OBJECTIVES

The objectives of this thesis are:-

(i) To identify factors that are regarded as risks in the Nigerian construction industry.

(ii) To examine the present roles of the conditions of contract for building projects and the different types of contract in the allocation of risks.

(iii) To determine a reasonable proportion of allocation among the parties to a contract.

1.3 METHODOLOGY

The first step in the pursuance of the objectives of this thesis was a critical review of existing literature and the JCT conditions of contract for the standard form of building contract. A questionnaire was subsequently designed which was pre-tested to ensure good response. The questionnaires were mostly self-administered and were supported by oral interviews of the respondents.

For reliability of data, it was ensured that the background of the respondents (who are mainly consultants in the construction industry) is representative of the professions in the construction industry, that is, quantity surveyors, architects, civil engineers ans so on. Also, effort was made to ensure that the respondents had at least five years working experience. The information obtained from the questionnaire supported by the oral interview of the respondents formed the basis of data for this thesis. From the data, proposals were made on how to effectively allocate the identified risks.

1.4 SCOPE AND LIMITATIONS

This thesis covers the identification and allocation of construction risks. Ideally, data should have been collected from the client and the contractor as they are the main parties of interest in this allocation or sharing of risks. It was however, not possible to conduct separate interviews for them due to time and resource constraints. It was therefore assumed that consultants (in the construction industry) are not party to events that constitute risk. It follows therefore, that they are in the best position to provide unbiased and reliable information. Hence, consultants provided most of the information used in this thesis.

It was not possible to obtain a nationwide view of the subject of this thesis because of the great requirements of such a survey in terms of time and other resources. Data was however obtained from States whose construction industry is fairly active namely: Lagos, Oyo, Kaduna, Bauchi and Borno States.

CHAPTER 2

ESTIMATES AND RISKS

2.1 ESTIMATES IN PROJECT PERFORMANCE

The success of a project usually depends to a large extent on the accuracy of the estimates. Vergara and Boyer (1974) observed that traditionally, estimates (of duration and cost) have been treated as deterministic, that is, having a known, set, single-value outcome. However, these estimates must be assessed in the context of future events and performance as basically estimates attempt to forecast the future. In most cases, the forecast value will deviate from the actual outcome due to a lack of complete information about future events. Hillebrandt (1974) is of the opinion that this should not be unexpected when it is considered that the contractor is assessing the correct price for a project not yet built, for which he may not have seen detailed drawings, on a site about which he may have no knowledge, and with a labour work-force not yet organized. It is perhaps surprising that any firm price can be quoted at all.

Shaifer and Lifson (1982) point out that factors that complicate the preparation of estimates are their dynamic and uncertain nature. They are dynamic becuase conditions are continually changing and equilibrium is rarely encountered. They are uncertain because their value cannot be known with certainty and is changeable. However, in the preparation of estimates for projects, a mark-up is often added to take care of uncertainties. This is a single sum often set by using a percentage of the estimated capital expenditure. This percentage addition implies a degree

of certainty that has no justification in reality. It is therefore, often the case that overruns occur in estimates for a project.

Lichtenberg (1981) argues that overruns stem from 'real world uncertainties' which are due to lack of complete information when preparing estimates, nature and a broad variety of human and social factors. Nature, including 'Acts of God' plus a group of uncertainties known as human and social factors are usually responsible for deviations from budgets. Examples are weather, soil, accidents, inflation, political forces, lack of supplies and so on.

Hertz (1964) observed that uncertainties affect estimates as a result of assumption that have to be made in the preparation of the estimates. Each assumption involves its own degree of uncertainty and taken together, these combined uncertainties can multiply into a total uncertainty of critical proportions. This is where the element of risk enters. Schofield (1975) in relating risk and uncertainty defined risk as a situation where the outcome of an event is not known with certainty but where it is possible to ascertain the number of alternative possible outcomes, the probability of occurrence and value of each outcome, while uncertainty is a situation where the outcome of an event is not known with certainty and it is not possible to ascertain all three of the risk criteria.

2.2 PROVISION FOR RISKS IN ESTIMATES

When cost estimates for a particular contract are prepared by a contractor, profit margins representing an adequate return

commensurate with the risk involved are added to arrive at the tender sum. To make adequate provisions for risks in the estimate, Perry and Hayes (1985) are of the opinion that the primary tasks of the contractor are to:

- assess the impact of the separate risks;
- decide which risks can be transferred to the sub-contractor, supplier or back to the client;
- establish management controls for those risks which must be retained;
- set the amount of risk contingencies to be included in the tender sum.

For the contractor, risk at this stage not only originates from the construction of the project and the allocation of any other risk by the client, but also from the tendering process itself. Errors in assessing productivity for example or a lack of appreciation of the contract documentation, can create new risks which must be considered.

2.3 RISK AND ITS MANAGEMENT

Schofield (1975) called attention to the fact that in all walks of life, the future is clouded with uncertainty. It is important therefore, that we understand the problem involved in evaluation of risk and uncertainty if we wish to maintain or improve the situation prevailing at a given time, be it a situation involving the individual, the firm or the government. The successful business or project tends to be the one that most accurately forecasts future demands and conditions. The main problem with evaluating risk

and uncertainty, however, is that the final evaluation is still clouded with uncertainty. Attempts to find a solution to this problem led to the development of the concept of risk management. Among the pioneering work in this field is that credited to Healy (1981). His approach to construction risk management can be broken down into three stages:

i) Risk Identification

ii) Risk Analysis

iii) Risk Response.

2.3.1 Risk Identification

The identification and initial assessment of risk associated with a project or contract is a necessary first step prior to risk analysis and response. In the early stages of appraisal of a project, risk identification is of direct assistance in establishing project constraints and providing useful data to assist in choosing between different projects. Later, this identification of the risks provides basis from which the appropriate organisational structure, tendering procedure, type of contract and risk allocation through the contract documents can be formulated. The contractor will need to identify both the risks allocated to him in the contract and also those inherent in the nature of the work in order to prepare his tender. Perry and Hayes (1985) however, stressed that the ultimate burden of responsibility for the identification of risks and their subsequent treatment rests with the client. He should be motivated to take this responsibility by the threat posed to the achievement of the project's objectives which are likely to be in terms of cost, time and functional performance.

2.3.2 Risk Analysis

The purpose of risk analysis is to quantify the effects on the project of the major risks identified. Most risks are quantifiable in terms of their effects on cost or time or revenue. The risk analysis techniques recognised by Perry and Hayes (1985) as having the most relevance to construction projects are sensitivity analysis, probability analysis, decision tree analysis and utility theory. Hull (1980) notes that the principle behind these techniques is that estimates are not given single values but are considered over a range of possible values with 'optimistic' and 'pessimistic' estimates at extremes.

Sensitivity analysis is the simplest form of risk analysis. It involves taking each of the variables in turn and examining its effect on the project performance by varying the value of the variable between its pessimistic and its optimistic estimate. A major weakness of sensitivity analysis is that the variables are treated individually which leads to severe limits on the extent to which combinations of the variables can be assessed.

Probability analysis is a more sophisticated form of risk analysis in that it overcomes the limitations of sensitivity analysis by specifying a probability distribution for each variable and then considering situations where any or all of these variables can change their initial values at the same time. The problem of assessing how risks can occur in combination is usually overcome by using a sampling approach, that is, running the analysis a number of times taking random values of each variable, for example the 'Monte Carlo' technique which is simulation by means of random numbers.

A feature of most major projects is that a number of different routes may be followed to reach the goal. Before considering a project in detail, the decision maker is faced with an array of investment possibilities and a sequence of decision choices. The decision tree is a graphical means of bringing together the information. It shows the present possible course of action and all future possibilities. One of the principal advantages of this approach to risk and decision is that it forces the decision maker to place some degree of chance on an outcome occurring. Future outcomes are considered, the likelihood of failure is quantified and some value is placed on each decision.

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Utility theory endeavours to assess the decision preferences of the individual or corporate decision maker in terms of risk. It proposes that an individual faced with a choice between risky ventures chooses the alternative that maximises the expected value of what is refered to as utility. Utility can be said to be a measure of satisfaction.

As can be seen, risk analysis requires time and a knowledge of the relevant mathematics. This has prompted researchers in this field to stress the need for a method that will not involve undue analysis and will take care of the risk. Levitt, et al (1980) are of the opinion that proper allocation of construction risks between clients and their contractors has a significant impact on the total construction costs paid by clients.

2.3.3 Risk Response

Avoidance, reduction, transfer or retention of risk is generally referred to as risk response. This is usually done by re-design, use of a different method of construction and so on. In extreme cases, however, risks may have such serious consequences as to warrant a re-appraisal of the project or even its abandonment.

The essential characteristic of the transfer response is that the consequences of the risks, if they occur, are shared with or totally carried by a party other than the client. The responsibility for initiating this form of risk response therefore lies with the client. Factors highlighted by Perry and Hayes (1985) as necessary for consideration by the client when transferring the risk include:

- which party can best control the event which may lead to the risk occurring?
- which party can best control the risk if it occurs?
- whether or not it is preferable for the client to carry the risk or part of it;
- whether the premium to be charged by the party to which the risk is allocated is likely to be reasonable and acceptable;
- whether this party is likely to be able to sustain the consequences if the risk occurs?
- whether if the risk is transferred, it leads to the possibility of risks of a different nature being transferred back to the client.

A decision to transfer or allocate a risk to another party is usually implemented through the conditions of contract. However, the opportunity to manage risk through the choice of type of contract should not be ignored.

2.4 THE ROLE OF TYPES OF CONTRACT IN RISK ALLOCATION

Before estimates can be prepared for a construction project, it has to be commissioned by the client. Tenders are then invited from contractors and the client is expected to choose a contractor that will satisfy his needs, in other words, the one that will give the client value for his money. The client, in the light of advice received from his professional advisers (architect, quantity surveyor and so on) decides on the type of contract to be entered into with the contractor.

Seeley (1984) states that a contract consists of an agreement entered into by two parties whereby one of the parties undertakes to do something in return for something to be undertaken by the other. Thus, a contract can be defined as an agreement that directly creates and contemplates an obligation. The law imposes on each party to a contract, a legal obligation to perform or observe the terms of the contract. After deciding on the type of contract, arrangements are made for the signing of the contract documents which normally consists of articles of agreement, specifications, drawings and bill of quantities.

Perry (1986) notes that all types of contract can be defined in terms of their payment mechanism, that is, price-based or cost-based. Price-based contracts usually require the contractor to carry a greater proportion of the risks than the client while in cost-based contracts, majority of risks are paid for by the client. Price-based contracts include lump sum, admeasurement/bill of quantities and schedule of rates while cost-based contracts include target cost and various approaches to cost-reimbursable plus fee contracts. The different types of contract according to Seeley's (1984) classification and their implication to the client and contractor in terms of risk is now briefly examined.

2.4.1 Target Cost Contract

Target cost contracts are used to encourage the contractor to execute the work as cheaply as possible. The actual fee paid to the contractor is determined by increasing or reducing the basic fee by an agreed percentage of the saving or excess between the actual cost and the adjusted target estimate. Fluctuations in fee due to differences between target and actual costs operate as a bonus to the contractor if his management is efficient or as a penalty if it is inefficient. The Aqua group (1982) warned that target cost contracts should not be entered into lightly as they are expensive to manage, requiring accurate measurement and careful costing on the employer's behalf as there is a great incentive for contractor to increase the estimated price as much as possible in the first instance. It can be seen that most risks encountered in

this type of contract are borne by the client.

2.4.2 Lump Sum Contracts

In the strict sense, the lump sum contracts are entire contracts where performance is a condition precedent to payment. The contract sum is pre-determined and is not subject to ammendment. The documentation often includes drawings and specifications only. The contract price is fixed and is not varied as a result of errors in quantification by the contractor or as a result of cost fluctuations. More recently, the strict provision for payment after completion of the work has been modified to allow for stage payments during construction. The fixed contract price makes it imperative that any risk encountered in this type of contract is borne by the contractor.

2.4.3 Bill of Quantities and Schedule of Rates

Bill of quantities are bills with quantities already included. They eliminate the need for all of the tendering contractors to measure quantities themselves before preparing an estimate. Absence of bills leads to greater variability in tenders and increased risk in estimating. The detailed breakdown of the contract sum permits proper financial management.

Schedule of rates, though similar to the bill of quantities is best suited for maintenance and repair contracts where the exact nature and extent of the works may not be known until the work is executed. The contractor is usually required to insert rates in the schedule for the listed items of work.

Risks in this type of contract are usually shared between the client and the contractor.

2.4.4 Cost Reimbursement Contracts

In cost reimbursement contracts, the client pays the contractor the actual cost of the work plus a management fee which will include the contractor's overhead charges, supervision costs and profit. Cost reimbursement contracts can be further classified depending on the method employed in assessing the sum the contractor should be paid. Risks in this type of contract are borne by the client since he is responsible for any expenditure on the works.

2.4.5 Package Deal Contract

This type of contract is also referred to as design and build contract. The contractor offers to design and build a construction project for a sum inclusive of both the design and construction costs. Where they include the total financing of the project by the contractor, they are referred to as turn-key projects. The nature of this type of contract is such that the contractor, who does both the design and the construction of the project, bears any risk that may arise.

Other types of agreement such as continuity contracts, joint venture contracts, negotiated contracts and management contracts which may lead to a contract may be entered into by the concerned parties.

As can be seen; it is only in the admeasurement type of contract that risks are shared. One should therefore not overlook the possibility that the allocation of 100% of risks to either the client or the contractor in the other types of contract may be a cause of poor performance of projects. The discussion above is summarised in Table 2.4 which is a modification of Perry's (1986) table.

2.5 RISKS IN THE CONSTRUCTION PROCESS

Erikson, et.al. (1978) classified risks in the construction process as either contractual or construction risks.

Contractual risks are introduced through lack of contract clarity, absence of perfect communication between the parties involved and problems associated with contract administration. These risks expose both the client and contractor to uncertainties which may increase both parties' costs. Contractual risks can however be reduced if drafters of contract documents avoid ambiguity and concentrate on improving contract clarity.

Table 2.4: Some Modified Risk Implications of Different Types of Contract

Type of Contract / Characteristic	Lump Sum	Admeasurement	Target Cost	Cost Reimbursement	Package Deal
Financial objectives of client and contractor	Different but reasoanably independent. Client is attempting to protect himself from risk while the contractor aims to make extra profit by charging premiums for risks that may never occur.	Different and potential conflict.	Considerable harmony. Reduction of actual cost is common objective if cost remains in the incentive region.	Both based on actual cost but potentially in conflict. No real incentive for the contractor to reduce costs.	Considerable harmony cost overrun problem is minimal.
Flexibility for design change variations.	Very limited	Some	Extensive	Unlimited	Unlimited
Design/construction Overlap: early start to completion.	Impracticable	Feasible but relatively limited.	Considerable opportunity	Construction may be started when first design package is available.	Greatest opportunity; no time overrun problem as expertise and experience of the contractor is available at the design stage.
Payment for risks	Undisclosed contingency in contractor's tender.	Undisclosed contigency in contractor's tender plus claims	Payment of actual cost of dealing with risk only if it occurs. Target adjusted accordingly	Payment of actual cost.	Undisclosed contigency in contractor's tender

Table 2.4 (Cont'd)

Type of Contract / Characteristic	Lump Sum	Admeasurement	Target Cost	Cost Reimbursement	Package Deal
Claims Resolution	Very difficult-no basis for evaluation	Difficult - client has no knowledge of actual cost or hidden contingencies.	Potentially easy - based on actual costs or target costs Mechanism needs careful drafting	Unnecessary except for fee adjustment - usually relatively easy.	Not difficult
Knowledge of Final Price at Tender (excluding inflation)	Known	Uncertain. Tender price usually increased by variations and claims.	Uncertain. Tender target cost usually increased by variations but effective joint management and efficient working can reduce final payment to below target cost.	Unknown	Fairly certain

Construction risks are risks that may affect the completion of the project within time and budget and would still be present even if a company with an ideal administrative system performed all of the construction process functions. Contractors usually allow for construction risks in the form of contingency sums. If however, the client assumes some of the risks, he may obtain bids containing less contingency, Barnes (1982) assets that risks over which the contractor has no control or influence may be best assumed by the client while the contractor should be responsible for all risks arising out of operations on site. A contractor allocated a lower total risk with the risks making up the total those over which the contractor has some control, is not under pressure to underestimate risk at the tender stage. This ensures that a contractor who is knowledgeable and experienced in the technology of the work but is not a gambler is likely to submit the lowest tender. Also, the client will not be paying the contractor for uncertain events which may not occur. Barnes emphsizes that 'It is better for the owner to pay for what does happen rather than for what the contractor thought might happen in those areas of doubt over which the contractor has no influence.' Inspite of this, Erikson et. al. (1978) are of the opinion that the contractor's experience, ingenuity and ability to manage may put him in a better position than the client to assume some risks. They suggested that those risks the contractor has some control over may be appropriate for sharing between the client and the contractor. In such cases, appropriate adjustments must be made to the conditions of contract which is the main vehicle for allocation of risks in construction projects.

The conditions set out to establish the relationships between the parties to a contract. It covers the method of ordering work by the client, dealing with delays and defaults, arrangement of insurance, variations in cost and so on.

The conditions of contract most often adherred to in the country is the JCT 1963 (1977 revision) Standard Form of Building Contract. Some elements of risk as covered in this conditions of contract are discussed in the following sections.

2.5.1 Changes in Project Design

Changes in project design cause delays and disorganization of the construction work, hence, one may regard it as a source of risk. It is treated under "Variations" in clause 11 of the conditions of contract and is interpreted as the alteration or modification of the design, quality or quantity of the works as shown on the contract drawings and described by or referred to in the contract bills. This includes the addition, omission or substitution of any work, the alteration of the kind or standard of any of the materials or goods to be used in the works and the removal from the site of any work materials or goods executed or brough for the purpose of the works by the contractor, except for work materials or goods which are not in accordance with the contract.

Variations are usually made at the instance of the architect, otherwise, must be sanctioned by him in writing. All such variations are measured and valued by the quantity surveyor who will give the contractor an opportunity of being present at the time of such measurement. Effect is given to the valuation of any variation by

necessary adjustment of the contract sum. Thus, it can be seen that responsibility falls on the client to bear this risk.

2.5.2 Nominated Sub-contractor Default

The failure of a nominated sub-contractor to carry out the works within the specified period is a source of risk in that it affects the timely completion of the contractor's work. The construction process is a whole package and default on any part affects the process which may lead to extension of time and possibly increase in costs. Provisions as regards nominated sub-contractors are dealt with in clause 27 of the conditions and the highlights of this clause is discussed below.

Specialists or others nominated by the architect to supply and fix materials or goods or to execute work are known as nominated sub-contractors provided the architect does not nominate any person against whom the contractor makes reasonable objection.

The nominated sub-contractor is expected to carry out and complete the sub-contract works as to enable the contractor to discharge his obligations according to the contract documents using materials and workmanship that is to the reasonable satisfaction and approval of the architect. Thus, the sub-contract works should be carried out in conformity with all reasonable directions and requirements of the contractor.

The nominated sub-contractor should idemnify the contractor against the same liabilities in respect of sub-contract works as those for which the contractor is liable to indemnify the client under the contract including claims in respect of any negligence, omission or

default of sub-contractor, his servants or agents or any misuse by him or them of any equipment.

The sub-contract works should be completed within the period or (where they are to be completed in sections) periods specified by the contractor. The architect should be informed of any representation made by the nominated sub-contractor as to the cause of any delay in the progress or completion of the sub-contract works or of any section. If the nominated sub-contractor fails to complete the sub-contract works or any of its sections within the period specified, he should pay or allow to the contractor a sum equivalent to any loss or damage suffered or incurred by the contractor for the period during which the works will remain incomplete.

The employment of the nominated sub-contractor under the sub-contract should determine immediately upon the determination (for any reason) of the contractor's employment under the contract. This is because nothing contained in the conditions of contract renders the client in any way liable to any nominated sub-contractor. Thus, the default of a nominated sub-contractor is a risk carried by the contractor in terms of expenses that may be incurred from such delays. However, clause 23 provides that the architect should grant the contractor a fair and reasonable extension of time for completion of the works as long as the contractor endeavours and takes all practicable steps to avoid or reduce delays on the part of the nominated sub-contractors. The client is thus deprived of his means of redress by way of liquidated damages which would

have been paid by the contractor. This seems to indicate that the right relationship does not exist amongst these parties. This was confirmed by the Aqua group (1981) when they noted that in the JCT 1980 Edition, the "Form of Agreement" between the client and the nominated sub-contractor establishes a direct relationship between the client and the nominated sub-contractor. One of its conditions is that if the sub-contractor is responsible for delaying the contract, the client will have an enforceable remedy against the sub-contractor, despite the general contractor's right to an extension of time under clause 23.

2.5.3 Failure of a Nominated Supplier to Supply Construction Materials

Failure of a nominated supplier to supply construction materials as directed byu the contractor can unavoidably lead to the construction work being delayed as a result of inavailability of the necessary materials and goods when they are needed, and therefore is a source of risk. Provisions governing the activites of nominated suppliers are made in Clause 28 of the conditions of contract, and these provisions are briefly highlighted below.

Nominated suppliers are merchants, tradesmen or others who are nominated by the architect to supply materials or goods to the contractor. The materials or goods supplied should be to the reasonable satisfaction of the architect and the nominated supplier should make good by replacement or otherwise any defects in such materials or goods supplied. Also, the supplies should be delivered at such times as the contractor may reasonably direct.

Where the contract of sale between the contractor and nominated supplier in any way restricts, limits or excludes the liability of the nominated supplier to the contractor in respect of materials or goods supplied or to be supplied, and the architech has specifically approved in writing the said restrictions, limitations or exclusions, the liability of the contractor to the client in respect of the said materials or goods should be restricted or excluded to the same extent.

Clause 23 provides that the architect should grant the contractor a fair and reasonable extension of time for completion of the works if delayed by failure of nominated suppliers to supply construction materials provided the contractor endeavours and takes all practicable steps to avoid or reduce such delays. Thus, it can be seen that this risk can be borne either by the contractor or the client depending on the prevailing circumstances.

2.5.4 Inflation

Sullivan and Bontadelli (1980) state that inflation applies to the 'disproportionate and relatively sharp and sudden increase in the quantity of money or credit or both relative to goods available for purchase". Inflation produces a general rise in price levels but more importantly causes a decrease in monetary unit with time and these consequences are proportional to the rate of inflation. Inflation in most cases, is a risk borne by the client and is as treated in clause 31A of the conditions of contract under "Fluctuations". Inflation is however, relevant to the upward trend in fluctuations, that is, increase in wages, emoluments, expenses and so forth. The relevant portions of the clause are discussed below.

If the rates of wages or other emoluments and expenses are increased by reason of alteration in the rules, decisions or agreements, promulgated by the relevant body governing the building and civil engineering industry after the date of tender, then the net amount of the increase in wages and other emoluments and expenses should be paid to the contractor. The prices contained in the contract bills submitted by the contractor are based upon the current market prices of the materials and goods specified as at the date of tender. Such prices are referred to as 'basic prices'. If after the date of tender, the market price of any of the materials or goods specified increases, then the net amount of the difference between the basic price and the market price payable by the contractor and current when the materials or goods are bought should be paid to the contractor.

If however, the parties to the contract agree to delete or limit the operation of clause 31 in any way, then the contract may tilt from the variable price ones towards the fixed price ones with the contractor bearing a greater price risk. Barnes (1982) observes that for fixed price contracts, contractors tend to underestimate future inflation in order to submit low tenders. Clients who are deceived by such tenders thereby employing a contractor on the basis of low tender price usually had problems in getting their work complete to a satisfactory standard and without substantial additional cost. This is because the contractors, in order to absorb losses, seek extra payment through claims or they lower workmanship standards. The contractor may even go bankrupt and both the client and contractor lose because of delay and litigation.

2.5.5 Injury to Persons and Property

Clause 18 is the relevant clause to this risk. It states that the contractor will be liable for and should indemnify the employer against any expense, liability, loss, claim or proceedings in respect of:

i) injury to or the death of any person whomsoever arising out of or in the course of or cause by the carrying out of the works, unless due to any act or neglect of the employer or of any person for whom the employer is responsible;

ii) injury or damage whatsoever to any property real or personal in so far as such injury or damage arises out of or in the course of or by reason of carrying out of the works and provided always that the same is due to any negligence, omission or default of the contractor, his servants or agents or of any sub-contractor, his servants or agents.

It can thus be seen that the contractor bears the risk of injury to persons and property. However, without prejudice to his liability to indemnify the employer, Clause 19 provides that the contractor maintains and should cause any sub-contractor to maintain such insurances as are necessary, to cover personal injury or death and injury or damage to property arising out of or in the course of or caused by the carrying out of the works. It is therefore possible for the contractor to limit the risk by maintaining the insurances.

2.5.6 Other Factors that may be a Source of Risk

Other factors that may be a source of risk such as those treated under clauses 23 and 24 are highlighted below:

(a) the contractor not receiving in due time necessary instructions, drawings, details or levels from the architect for which he specifically applied in writing;

(b) the opening up for inspection of any work covered up or the testing of any of the work materials or goods (including making good in consequence of such opening up or testing) unless the inspection or test showed that the materials or goods were not in according with the contract;

(c) any discrepancy in or divergence between the contract drawings and/or the contract bills.

(d) delay on the part of artists, tradesmen or others engaged by the client in executing work not forming part of the contract;

(e) architect's instructions issued in regard to the postponement of any work to be executed under the provisions of this contract;

(f) force majeure; fire, lightning, explosion, storm, flood, any exceptionally inclement weather and other acts of God';

(g) civil commotion, strike or lockout affecting any of trades employed upon the works or any of the trades engaged in the preparation, manufacture or transportation of any goods or materials required for the works;

(h) the contractor's inability for reasons beyond his control and which he could not reasonably have foreseen at the date of the contract to secure such labour or goods and/or materials essential to the proper carrying out of the works;

(i) compliance with the provisions of any other clause in the conditions of contract;

(j) a local authority or statutory undertaker in carrying out work in pursuance of its statutory obligations in relation to the works, or in failing to carry out such work.

If the architect, upon written application being made to him by the contractor, is of the opinion that the contractor has been involved in direct loss and/or expense, or that the completion of the works is likely to be or has been delayed beyond the date for completion, then as soon as the amount of such loss and/or expense or length of delay has been ascertained, the architect will (as is relevant) make provisions for the amount to be added to the contract sum or make in writing a fair and reasonable extension of time for completion of the works. The risks highlighted above, as can be seen are borne by the client. However, where relevant (see clause 20), the contractor will in the joint names of the client and contractor, insure against loss and damage, all work executed and all unfixed materials and goods, delivered to, placed on or adjacent to the works and intended for the works but excluding temporary buildings, plant, tools and equipment owned or hired by the contractor or any sub-contractor.

As can be seen from the discussion in this section, risks as dealt with in the conditions of contract are usually borne fully either by the client or the contractor. One should therefore not overlook the possibility that this lack of flexibility in the allocation of risks between the parties to a contract may be a major cause of poor performance of projects in achieving time and cost targets. This is supported by Perry's (1986) observation that existing standard forms of contract do not greatly help the achievement of targets (that is, they do not make a significant contribution to reducing the effects of risk) and believes that new approaches to contract forms should be considered which contain incentives for performance and emphsize good management practice for risk reduction. He argues further that though existing forms of contract have stood the test of time, they have become outdated and too rigid for today's needs. For conditions of contract to make valuable contributions to risk management, Perry proposes that they should possess the following characteristics:

- improved incentives linked to risk allocation
- flexibility for different allocation of risk between the parties;
- strong emphasis on good management practice, particularly in working to time.

CHAPTER 3

3.0 A SURVEY OF CURRENT PRACTICES IN BUILDING PROJECTS

INTRODUCTION

One would not be working in realism without a knowledge of what operates in the building industry. A knowledge of what happens in practice will go a long way in assessing risk allocation. A questionnaire was employed in obtaining the necessary information from practioners in the construction industry. The design, distribution, and response to the questionnaire are considered first in this chapter.

3.1 DESIGN OF QUESTIONNAIRE

The design of the questionnaire followed a pattern that can be grouped into three sections; the risk factors and their allocation, the role of the condition of contract and the types of contract in risk allocation and questions about the respondent and his organization.

In the first section, each risk factor is treated as a question with four parts. Each question sought to determine if the respondent had been involved in a project adversely affected by the particular risk and if so which party to the contract bore the consequent effects of the risk. Opportunity is then given to the respondent to air his views as to how the risk should have been allocated.

The second section seeks to find out if a lack of understanding or non-compliance with the conditions of contract is a major cause of poor performance in the construction industry and if so what remedies are available. Also, respondents were asked to identify the type of contract (if any) that can best take care of risks encountered on a project. (See appendix for prototype of the questionnaire).

The last section is geared towards finding out relevant background information about the respondent and the company.

To ensure good quality data, the questionnaire was pretested. The risk factors in this first questionnaire were those obtained from literature and the conditions of contract. Respondents were asked to delete or add to the risk factors as the case may be in order to reflect those risks encountered in the Nigerian construction industry. It was on the basis of this information that the questionnaire was re-designed.

3.1.1 Distribution and Response

The questionnaires which were preceeded by a covering letter spelling out details about the thesis were distributed in Lagos, Oyo, Kaduna, Bauchi and Borno States. In all, 100 questionnaires were distributed and 62 were returned filled withing two months. The questionnaires for Lagos and Oyo States were personally administered by the researcher while those for Kaduna, Bauchi and Borno States were carried out with the assistance of colleagues working in the construction industry in

these States. Responses from Lagos and Oyo States make up 44% and 15% of the total number of questionnaires filled by respondents respectively. Thirty-three (33%) per cent of the responses were from Kaduna State while the remaining 8% were from Bauchi and Borno States.

Respondents, who were mainly consultants selected at random from the construction industry clearly demonstrated apathy in filling the questionnaires as several visits had to be made to the same company before any positive response was forthcoming. The excuse often advanced by most respondents for not filling the questionnaires in time was a busy schedule while those that did not fill the questionnaires felt they were not in a position to provide the required information.

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3.1.2 The Respondent

The respondents are all professionals in the construction industry, that is, building/civil engineers, architects, quantity surveyors and technicians. Of the total number of respondents, 41% are engineers, 34% architects, 18% quantity surveyors and 7% technicians.

Most of the respondents are degree holders. Thirty-seven (37%) per cent of the respondents have bachelor of science degrees in their respective fields while a further 29% have the bachelors degree plus a postgraduate qualification. Of the remaining respondents, 22% have diplomas while 12% have one professional qualification or the other. Also, the respondents on the average have had 9 years working experience in the construction industry.

Forty per cent (40%) of the companies for which the respondents are working are consulting companies, 30% handle construction projects only while the remaining 30% can handle projects from the design stage to completion of construction. These companies are currently handling about 7 projects on the average.

It can be seen that if representation, qualification and experience of the respondents is anything to go by, one would expect reliability of the data collected.

3.2 ANALYSIS OF RESPONSE

In analysing the data, a total allocation of risk to the client or the contractor was given a value of 100%. In cases where the respondents shared the risk between the client and contractor, the average ratio of client: contractor was computed. This was then combined with the 100% allocations to the client or contractor to obtain the overall average ratios. The principle employed in this analysis is that of the weighted average theory. According to Blalock (1981) the weighted average $\bar{X}$ for a sample of n variaties X1, X2, X3, ... Xn that occurs f_1, f_2, f_3 .....f_n times respectively is given by

$$\frac{\sum_{i=1}^{n} f_i \bar{X}_i}{N}$$

Where f_i - number of cases in the ith category

Xi - the mean for the ith category

n - number of categories

N - total number of variates and is given by

$$\sum_{i=1}^{n} f_i$$

The sample means thus obtained are used to establish limits within which the population means will fall with a specified probability or confidence (95% is used in this thesis).

According to Alder and Roessler (1977), the following are the steps to follow in estimating confidence limits.

(i) the standard deviation δ for the set of N number is determined

$$\delta = \sqrt{\frac{\sum_{i=1}^{N} (X_i - \bar{X})^2 f_i}{\sum_{i=1}^{N} f_i}}$$

(ii) the standard deviation for the population is obtained

$$\delta_{\bar{x}} = \frac{\delta}{\sqrt{N}}$$

(iii) for a 95% confidence interval, the population mean M is given by $\bar{X} \pm 1.96\,\delta_{\bar{x}}$

Where 1.96 is the value of Z (a measure of standard deviations of an observation above or below the mean) corresponding the 95% confidence level. The values M1 and M2 constitute the lower and upper 95% confidence limits for the mean of the population.

3.2.1 Risk Factor Results

Table 3.1 shows the risk factors often encountered in the Nigerian construction industry and the percentage number of respondents that have been involved in a project adversely affected by a particular risk factor. Each risk factor will now be analysed to see how it should be allocated between the parties to a contract.

(i) Change of Government Policy

Eighty-one (81%) per cent of respondents indicated they have been involved in projects that were adversely affected by changes in government policies. This is the second highest number of respondents who have been involved in a project affected by one risk factor or the other. This is not surprising as the Nigerian governments have shown a lack of continuity in its policies. This is not in the least due to frequent changes of government. Each change of government brings with it changes in policies and/or priorities. In tracing the activity of successive governments, Giwa (1987) points out that after the civil war, there were major programmes of reconstruction. The regime that followed switched emphasis to agriculture, thereby leaving many of the projects embarked

Table 3.1 Chance of Occurrence of Risk Factors

Factor	Number of Respondents involved in projects adversely affected by factor	Percentage of Total Number of Respondents (62)
1. Change of Government Policy	50	81
2. Nominated sub-contractor Default	44	71
3. Inflation	59	95
4. Change in Project Design	48	77
5. Failure of Nominnated Supplier to Supply Construction Materials	36	58
6. Use of Poor Construction Methods by Contractor	46	74
7. Lack of Proper Pre-contract Planning	38	61
8. Undetected Poor Soil Condition	32	52
9. Communication Gap between Consultant and Contractor	29	47

upon by the previous regime uncompleted. The civilian regime that followed diverted most of the funds available to housing and the movement of Abuja, the Federal Capital. This adversely affected the agricultural and other programmes of the previous regime. The regime that followed came in the midst of serious economic constraints and virtually all projects embarked upon before their arrival were abandoned.

This shift in policy that usually occurs leads to an increase in funds allocated to the new priority area with a corresponding decrease to non-favoured sectors and hence, neglect of such sectors. This is because funds available to government at any point in time is limited; it will therefore see nothing wrong in shirking its financial obligations to contractors engaged in projects it does not see as a priority. An example of this is the new education policy, that is, the 6-3-3-4 system. This has caused a shift of emphasis from the provision of elaborate boarding facilities to workshops and laboratories. Although, these examples are more applicable to government sponsored projects, this does not exclude the fact that government policy changes affect privately sponsored projects too. For example the non-issuance of import licence a few years ago, affected a lot of projects that depended on importation of materials and/or goods either for the building itself or for the equipments to be used in the building when completed.

Table 3.2.1: Change of Government Policy

Number of respondents involved in projects adversely affected by factor = 50.

Allocation of Factor	Allocation in Percentage	Number of Respondnets	No. of respondents in Percentage
a) Totally borne by client	100:00	26	52
b) Totally borned by Contractor	0;100	6	12
c) Shared between the parties	53:47	18	36

For Client

X	F	FX	$\lvert X-\bar{X}\rvert$	$(X-\bar{X})^2 f$
100	26	2600	28.92	21746
0	6	0	71.08	30331
53	18	954	18.08	5884
		3554		57961

$$\bar{X} = \frac{3554}{50} = 71.08$$

$$\delta = \sqrt{\frac{57961}{50}} = 34.05$$

$$\delta_{\bar{x}} = \frac{\delta}{\sqrt{n}} = 4.82$$

For a 95% confidence interval

$M = \bar{X} \pm 1.96 \times 4.82 = 71.08 \pm 9.44$

$M = 71 \pm 9$

For contrctor

X	F	FX	$\lvert X-\bar{X}\rvert$
0	26	0	28.92
100	6	600	71.08
47	18	846	18.08
		1446	

$\bar{X} = \frac{1446}{50} = 28.92$

For a 95% confidence interval $M = 29 \pm 9$.

It can thus be seen why respondents regard indiscriminate changes in government policies as a major source of risk in the country despite the fact that it is not treated in the conditions of contract, as there is not only the danger of overruns in time and budget, but that of a complete abandonment of the construction project.

Analysis of responses indicate that the consequences of government policy changes should be shared between the client and the contractor in the ratio (71 $\pm$ 9)% to (29 $\pm$ 9)% respectively. One can infer that though the client should bear most of the risk caused by government policy changes, the contractor should bear some of the risk therebny protecting the client from additional expenses that could have arisen from having to compensate the contractor. Thus, in the event of such government policy changes causing direct loss and/or expense, the client will provide for any expense incurred directly on the works while the contractor will take care of any expense he might suffer.

(ii) Nominated Sub-contractor Default

Seventy-one percent (71%) of the respondents indicated they had been involved with projects affected by the default of a nominated sub-contractor. The conditions of contract provides that the contractor will indemnify the employer for any negligence, omission or default of the sub-contractor. This implies that the contractor is bearing 100% of this risk.

Table 3.2.2: Nominated Sub-contractor Default

Number of respondents involved in projects adversely affected by factor 44.

	Allocation of Factor	Allocation in Percentage	No. of Respondent	No. of Respondents in Percentage
a)	Totally borne by Client	100:0:0	13	30
b)	Totally borne by Contractor	0:100:0	2	4
c)	Totally borne by Nominated Sub-Contractor	0:0:100	7	16
d)	Shared between parties - Client: Contractor: nom. Sub-contractor	29:28:43	22	50

For Client

X	F	FX	$\lvert X-\bar{X}\rvert$	$(X-\bar{X})^2F$
100	13	1300	56	40768
0	2	0	44	3872
0	7	0	44	13552
29	22	638	15	4950
		1938		63142

$$\bar{X} = \frac{1938}{44} = 44.05$$

$$\delta = \sqrt{\frac{63142}{44}} = 37.88$$

$$\delta\bar{x} = \frac{\delta}{\sqrt{n}} = 5.71$$

For a 95% confidence interval

$$M = \bar{X} \pm 1.96 \times 5.71$$

$$M = 44 \pm 11$$

For Contractor

X	F	FX	$\lvert X-\bar{X}\rvert$	$(X-\bar{X})^2F$
0	13	0	18.55	4471
100	2	200	81.46	13270
0	7	0	18.55	2407
28	22	616	9.46	1967
	816			22115

$$\bar{X} = \frac{816}{44} = 18.55$$

$$\delta = \sqrt{\frac{22115}{44}} = 22.42$$

$$\delta_{\bar{x}} = \frac{\delta}{\sqrt{n}} = 3.38$$

For a 95% confidence interval

$$M = \bar{X} \pm 1.96 \times 3.38$$

$$= 18.55 \pm 6.62$$

$$M = 19 \pm 7$$

For Nominated Sub-Contractor

X	F	FX	$\lvert X-\bar{X}\rvert$	$(X-\bar{X})^2F$
0	13	0	37.41	18194
0	2	0	37.41	2799
100	7	700	62.59	27423
43	22	946	5.59	687
		1646		49103

$$\bar{X} = \frac{1646}{44} = 37.41$$

$$\delta = \sqrt{\frac{49103}{44}} = 33.41 \qquad \delta_{\bar{x}} = \frac{\delta}{\sqrt{n}} = 5.04$$

For a 95% confidence interval

$$M = \bar{X} + 1.96 \times 5.04$$

$$= 37.41 \pm 9.87$$

$$M = 37 \pm 10$$

Results from this study however shows that (44 ± 11)% of the risk should be borne by the client, (19 ± 7)% by the contractor and (37 ± 10)% by the nominated sub-contractor.

The most apparent observation from the results is the lowest allocation of (19 ± 7)% to the contractor. This implies that respondents feel the contractor should not be blamed or made liable for the 'mis-deeds' of the nominated sub-contractor. It is however, felt that the contractor should carry some risk to ensure that the contractor constantly uses his best endeavours to prevent delays to the progress of the works that may be caused by such events.

The allocation to the client suggests that as the client has the most to lose if progress to the works is adversely affected, it is his duty to ensure that a sub-contractor so nominated is up to the task. The bearing of almost the same amount of risk as the nominated sub-contractor implies that the client is as much to blame for nominating an incompetent sub-contractor as the nominated sub-contractor is to blame for carrying out the works inefficiently.

The allocation of (37 ± 10)% of the risk to the nominated sub-contractor implies the need for the nominated sub-contractor to be held responsible for his defaults. Thus, there should be a direct employment of nominated sub-contractors by client. Proper contract documentation to show this new allocation in the conditions of contract is therefore necessary.

(iii) Inflation

This factor was indicated by respondents as the most often encountered form of risk in the construction field as can be inferred from the fact that almost all of the respondents (95%) have been involved in projects adversely affected by inflation.

The result obtained from the data analysis is the sharing of the consequent effects of inflation in the nation (79 $\pm$ 6)% of the risk to the client and (21 $\pm$ 6)% to the contractor. Though the conditions of contract states that risk due to inflation should be borne by the client, it was discovered that for fixed price contracts, clients leave much of the inflation risk allocated to contractors. Thus, contractors, in order to achieve low tender prices usually underestimate future inflation. Such contractors often got jobs from clients who are deceived by the low tender prices. As Barnes (1982) points out, this results in the clients having problems getting their work complete to a satisfactory standard and without substantial extra costs.

Thus, one can conclude that the client should always bear most of the inflation risk say (79 $\pm$ 6)% while the contractor bears the remaining (21 $\pm$ 6)% in order to maintain his incentive

Table 3.2.3: Inflation

Number of respondents involved in projects adversely affected by factor = 59

	Allocation of Factor	Allocation in Percentage	No. of Respondents	No. of Respondents in Percentage
a)	Totally borne by client	100:00	30	51
b)	Totally borne by contractor	0:100	3	5
c)	Shared between parties	64.36	26	44

For the Client

X	F	FX	$\|X-\bar{X}\|$	$(X-\bar{X})^2F$
100	30	3000	20.95	13167
0	3	0	79.05	18747
64	26	1664	15.05	5889
		4664		37803

$$\bar{X} = \frac{4664}{59} = 79.05$$

$$\delta = \sqrt{\frac{37803}{59}} = 25.31$$

$$\delta\bar{x} = \frac{\delta}{\sqrt{n}} = 3.3$$

For a 95% confidence interval

$$M = \bar{X} \pm 1.96 \times 3.3$$

$$= 79.05 \pm 6.47$$

$$M = \underline{79 \pm 6}$$

For the contractor

X	F	FX	$\|X-\bar{X}\|$
0	30	0	20.95
100	3	300	79.05
36	26	936	15.05
		1236	

$$\bar{X} = \frac{1236}{59} = 20.95$$

For a 95 confidence interval

$$M = 21 \pm 6$$

to mitigate losses. This will ensure that the contractor scouts properly for where good quality materials and goods are cheapest and also gives the client the confidence that he is not being cheated by the contractor. These apart, the contractor's low share of this risk eliminates any gambling tendency when estimating inflation thereby leading to more reliable tender prices.

(iv) Changes in Project Design

The adverse effect of changes in project design on construction work has been experienced by 77% of the respondents. The result from data analysis indicates that the client should bear fully the consequences of this risk factor. it can thus be inferred that the client should be entirely responsible for any alterations to the works as these alterations are usually at the instance of the client or the consultants he appoints. This agrees with the allocation in the conditions of contract where variations to the project are taken care of by necessary adjustments to the contract sum.

(v) Failure of Nominated Supplier to Supply Construction Materials

Fifty-eight per cent (58%) of the respondents have been involved in a project where the nominated supplier's failure to supply construction materials as scheduled affected progress of the works. Analysis of the responses indicates an allocation of (41 $\pm$ 10)% of the risk to the client and (59 $\pm$ 10)% to the contractor.

Table 3.2.4 Change in Project Design

Number of respondents who have experienced adverse effects of factor on a project = 48

	Allocation of Factor	Allocation in Percentage	No. of Respondents	No. of Respondents in Percentages
a)	Totally borne by client	100:0	43	90
b)	Totally borne by contractor	0:100	0	0
c)	Shared between parties	60:40	5	10

For Client

X	F	FX	$\lvert X-\bar{X}\rvert$	$(X-\bar{X})^2F$
100	43	4300	4.17	748
0	0	0	95.83	0
60	5	300	35.83	6419
		4600		7167

$\bar{X} = \frac{4600}{48} = 12.22$

$\delta = \sqrt{\frac{7167}{48}} = 12.22$

$\delta\bar{x} = \frac{\delta}{\sqrt{n}} = 1.76$

For a 95% confidence interval

$M = \bar{X} \pm 1.96 \times 1.76 = 95.83 \pm 3.45$

$M = \underline{96 \pm 3}$

For contractor

X	F	FX	$\lvert X-\bar{X}\rvert$
0	43	0	4.17
100	0	0	95.83
40	5	200	35.83
		200	

$\bar{X} = \frac{200}{48} = 4.17$

For a 95% confidence interval

$M = 4 \pm 3.$

Table 3.2.5: Failure of a Nominated Supplier to Supply Construction Materials

Number of respondents who have witnessed the adverse effects of factor on a project = 36

	Allocation of Factor	Allocation in Percentage	Number of Respondents	No. of Respondents in Percentage
a)	Totally borne by client	100:0:0	7	19
b)	Totally borne by contractor	0:100:0	10	28
c)	Shared between the parties	41:59	19	53

For Client

X	F	FX	$\lvert X-\bar{X}\rvert$	$(X-\bar{X})^2F$
100	7	700	58.92	24301
0	10	0	41.08	16876
41	19	779	0.08	0
		1479		41177

$$\bar{X} = \frac{1479}{36} = 41.08$$

$$\delta = \sqrt{\frac{41177}{36}} = 33.82$$

$$\delta_{\bar{x}} = \frac{\delta}{\sqrt{n}} = 5.64$$

For a 95% confidence interval

$$M = \bar{X} \pm 1.96 \times 5.64 = 41.08 \pm 10.05$$

$$M = 41 \pm 10$$

X	F	FX	$\lvert X-\bar{X}\rvert$
0	7	0	58.92
100	10	1,000	41.08
59	19	1,121	0.08
		2,122	

$$\bar{X} = \frac{2121}{36} = 58.92$$

For a 95% confidence interval

$$M = 59 \pm 10.$$

This result implies that failure of a nominated supplier to supply construction materials is not often a cause of poor project performance and when it does occur, it is usually not due to incompetence on the part of the nominated supplier but probably due to inavailability of the materials. Thus, when a nominated supplier fails to supply construction materials, the client should bear (41 ± 10)% of any loss and/or expenses incurred while the contractor should bear the remaining (59 ± 10)% of such loss and/or expense. This is contrary to the allocation in the conditions of contract in which the contractor bears the risk unless the contractor can prove that all practicable steps were taken to avoid or reduce overruns in budget and time in which case the contractor will no longer be liable.

(vi) Use of Poor Construction Methods by Contractor

Seventy-four per cent (74%) of respondents have been involved in a project where the use of poor construction methods by the contractor led to extra costs in terms of time and money. Although the conditions of contract does not treat risk caused by a contractor's poor construction method, this factor was identified from the preliminary test caried out as a source of risk. This is an example of the inadequacy of the conditions of contract for the Nigerian construction industry as can be seen from the high number of respondents who have been involved in projects adversely affected by poor construction methods. This is becuase a high number of Nigerian contractors either do not possess the

Table 3.2.6: Use of Poor Construction Methods by Contractor

Number of respondents involved in projects adversely affected by factor = 46.

	Allocation of Factor	Allocation in Percentage	Number of Respondents	No. of Respondent in Percentage
a)	Totally borne by client	100:0	14	30
b)	Totally borne by contractor	0:100	23	50
c)	Shared between the parties	46:54	9	20

For Client

X	F	FX	$\lvert X-\bar{X}\rvert$	$(X-\bar{X})^2F$
100	14	1400	60.57	51362
0	23	6	39.43	35759
46	9	414	6.57	388
		1814		87509

$$\bar{X} = \frac{1814}{46} = 39.43$$

$$\delta = \sqrt{\frac{87509}{46}} = 43.62$$

$$\delta\bar{x} = \frac{\delta}{\sqrt{n}} = 6.43$$

For a 95% confidence interval

$M = \bar{X} \pm 1.96 \times 6.43 = 39.43 \pm 12.61$

$M = 39 \pm 13$

For Contractor

X	F	FX	$\lvert X-\bar{X}\rvert$
0	14	0	60.57
100	23	2300	39.43
54	9	486	6.57
		2786	

$$\bar{X} = \frac{2786}{46} = 60.57$$

For a 95% confidence interval

$M = 61 \pm 13$

technological know-how or do not possess the necessary equipment and it is not unusual to, perhaps, find a contractor using labourers to carry out a job that should ideally be carried out with a crane. This, of course, will lead to extra costs being incurred in terms of both time and money.

Analysis of data obtained shows that the adverse effects of this risk should be shared between the client and the contractor in the ratio (39 $\pm$ 13)% to (61 $\pm$ 13)% respectively. Thus, one can infer that the client is almost as much to blame for engaging an incompetent contractor as the contractor is to blame for using poor construction methods.

(vii) Lack of Proper Pre-contract Planning

Respondents who have been involved in projects that were affected by lack of proper pre-contract (financial and programme) planning make up 61% of the total number of respondents. This factor came to be regarded as a risk from the result of the preliminary test carried out. This shows once more the failure of the conditions of contract in its use in Nigeria as no reference was made to this factor in it.

Pre-contract planning is the planning which takes place after the award of a contract, immediately prior to commencement of construction work on the project.

The planning can usually be broken down into tow the financial and programme planning. Some of the stages considered in the programme planning are:

a) appointment of sub-contractors and suppliers

b) site layout planning

c) obtaining information about requirements and resources (Labour, material, Plant)

d) preparation of the master programme

e) preparation of contract budgets and so on.

From the above elaboration of what programme planning entails, it can be seen that its improper planning is a source of risk.

The second part which is the financial planning is basically the sole prerogative of the client and the onus is on him to ensure that funds are adequate before embarking on a project. Lack of proper financial planning is a source of risk as inefficient financing of a project or delay of payments to a contractor seriously affects progress of the works.

It can thus be seen that without a plan against which to monitor performance, there can be no control of the work. Proper pre-contract planning is therefore essential if events that may lead to overruns in budgets and time are to be detected and controlled.

Analysis of the data obtained show an allocation of (78 $\pm$ 8)% of the risk to the client, and the remaining (22 $\pm$ 8)% to the contractor.

Table 3.2.7: Lack of Proper Pre-Contract(financial and Programme) Planning

Number of respondents involved in projects adversely affected by factor = 38.

	Allocation of Factor	Allocation in Percentage	Number of Respondents	No. of Respondents in Percentages
a)	Totally borne by client	100:0	20	52
b)	Totally born by contractor	0:100	1	3
c)	Shared between the parties	56:44	17	45

For Client

X	F	FX	$\lvert X-\bar{X}\rvert$	$(X-\bar{X})^2F$
100	20	2000	22.32	9964
0	1	0	77.68	6034
56	17	952	21.68	7990
		2952		23988

$\bar{X} = \frac{2952}{38} = 77.68$

$\delta = \sqrt{\frac{23988}{38}} = 25.13$

$\delta\bar{x} = \frac{\delta}{\sqrt{n}} = 4.08$

For a 95% confidence interval

$M = \bar{X} \pm 1.96 \times 4.08 = 77.68 \pm 7.99$

$M = 78 \pm 8$

For Contractor

X	F	FX	$\lvert X-\bar{X}\rvert$
0	20	0	22.32
100	1	200	77.68
44	17	748	21.68

$\bar{X} = \frac{848}{38} = 22.32$

For a 95% confidence interval

$M = 22 \pm 8$

The high percentage being borne by the client is due to the fact that the risk due to poor financial planning which makes up 50% of the total risk due to lack of proper pre-contract planning is totally borne by the client. This implies that of the remaining 50% due to improper programme planning the client bears (28 ± 8)% of the risk while the contractor bears the remainning (22 ± 8)%. It was deduced from the oral interview conducted after receipt of the questionnaires that the almost equal allocation of risk due to improper programme planning between the client and contractor, is because though the programme planning is the contractor's duty, the client's consultant should properly supervise and monitor such planning.

Thus, it can be inferred that the onus is on the client to ensure that proper pre-contract planning is carried out, both in terms of the financial and programme planning before embarking on a project.

(viii) Undetected Poor Soil Condition

Thirty-two (32) respondents, which is 52% of the total number of respondents have been involved in projects where poor soil condition was undetected before commencement of construction. This is a source of risk in that a poor condition of soil that goes undetected may not only affect progress of the construction work, but may render the completed building uninhabitable. This may necessitate the demolition or abandonment of the building. It is therefore imperative that provisions should be made for this factor in the conditions of contract.

Table 3.2.8: Undetected Poor Soil Condition

Number of respondents involved in projects adversely affected by factor = 32

	Allocation of Factor	Allocation in Percentage	Number of Respondents	No. of Respondents in Percentages
a)	Totally borne by client	100:0	24	75
b)	Totally borne by contractor	0:100	3	9
c)	Shared between the parties	66:34	5	16

For Client

X	F	FX	$\lvert X-\bar{X}\rvert$	$(X-\bar{X})^2F$
100	24	2400	14.69	5179
0	3	0	85.31	21833
66	5	330	19.31	1864
		2730		28876

$$\bar{X} = \frac{2730}{32} = 85.31$$

$$\delta = \frac{28876}{32} = 30.04$$

$$\delta_{\bar{x}} = \frac{\delta}{\sqrt{n}} = 5.31$$

For a 95% confidence interval

$$M = \bar{X} \pm 1.96 \times 5.31 = 85.31 \pm 10.41$$

$$M = 85 \pm 10$$

For Contractor

X	F	FX	$\lvert X-\bar{X}\rvert$
0	24	0	14.69
100	3	300	85.31
34	5	170	19.31
		470	

$$\bar{X} = \frac{470}{32} = 14.69$$

For a 95% confidence interval

$$M = 15 \pm 10$$

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Results from data collected show an allocation of (85 ± 10)% to the client and (15 ± 10)% to the contractor. It can thus be deduced that the client should see to the carrying out of proper soil tests. This is best done right from the design stage, thereby facilitating the consideration of the soil condition in the preparation of the structural designs and hence, the construction work itself. The contractor should however, carry out a confirmatory test before commencing work on site.

(ix) Communication Gap Between Consultant and Contractor

Of all the factors included in the questionnaire, this factor, communication gap between the consultant and the contractor was the least encountered by respondents as a source of risk. Only 47% of respondents have been involved in projects adversely affected by this factor.

Communication gap between consultant and contractor is usually due to poor selection of the consultant and contractor and is characterised by insufficient communication between the consultant and contractor at post contract stage with regards to drawings and details, incomplete documentation at tender stage, poor monitoring of progress and cost during construction and so on.

Analysis of the data obtained show an allocation of (65 ± 11)% of the risk to the client and (35 ± 11)% to the contractor. It can be seen that the major share of the risk goes to the client as he engages the consultant who later plays a major role in the selection of the contractor. As this factor is not an often encountered source of

Table 3.2.9: Communication Gap Between Consultant and Contractor

Number of respondents involved in projects adversely affected by factor = 29.

Allocation of Factor	Allocation in Percentage	Number of Respondents	No. of Respondents in Percentages
a) Totally borne by client	100:0	9	31
b) Totally borne by contractor	0:100	3	10
c) Shared between the parties	58:42	17	59

For Cient

X	F	FX	$\lvert X-\bar{X}\rvert$	$(X-\bar{X})^2F$
100	9	900	34.97	11006
0	3	0	65.03	12687
58	17	986	7.03	840
		1886		24533

$$\bar{X} = \frac{1886}{29} = 65.03$$

$$\delta = \sqrt{\frac{24533}{29}} = 29.09$$

$$\delta_{\bar{x}} = \frac{\delta}{\sqrt{n}} = 5.40$$

For a 95% confidence interval

$$M = \bar{X} \pm 1.96 \times 5.40 = 65.03 \pm 10.59$$

$$M = 65 \pm 11$$

For Contractor

X	F	FX	$\lvert X-\bar{X}\rvert$
0	9	0	34.97
100	3	300	65.03
42	17	714	7.03
		1014	

$$\bar{X} = \frac{1014}{29} = 34.97$$

For a 95% confidence interval

$$M = 35 \pm 11$$

risk (as is indicated by the low number of respondents) it may not be necessary to make any new provisions for this risk factor in the conditions of contract. The choice of competent and experienced consultant and contractor will further reduce the possibility of occurrence of this risk factor.

3.2.2 Adequacy of the Conditions of Contract

It is imperative that the conditions of contract, as the main vehicle for allocating risks in construction projects, should be suitable for the society in which it is being operated. It is noteworthy therefore that 76% of respondents are of the opinion that poor performance in projects is due to non-compliance with the conditions of contract. Part of the reasons advanced by respondents for this are the lack of experienced, skilled and competent professionals in the contractor's organization and that the conditions of contract does not reflect the situation in the Nigerian construction industry. This is perhaps an indication that the conditions of contract should be reviewed. The need to re-assess the conditions of contract is further buttressed by the fact that there is no clear preference by respondents for a particular type of contract in providing for risks. As shown in Table 3.3. 37% of respondents feel that the bill of quantities contract is ideal, 29% of respondents prefer the package deal of turnkey contract while 13% of respondents advocate the lump sum contract. Others are the cost-reimbursement type of contract, 8%, and the target cost contract, 2%. However, the highest figure of 37% to the bill of quantities (which is the only type of contract where

risks are somewhat shared between the client and the contractor) is a confirmation of the necessity of sharing construction risks between the parties to a contract, which as we know, is best done through the conditions of contract.

The conditions of contract should be reviewed to take into proper consideration risks in the Nigerian construction industry. It should contain clear definitions of such risks and their allocations between the parties to a contract. A condition of contract with these modifications will contribute greatly to eliminating most of the problems plaguing the Nigerian construction industry.

3.2.3 Comments by Respondents

A high number of respondents felt certain factors should have been treated as risks in the questionnaire. The three major factors highlighted are:

1) Interference of the client with the consultant's duties such as appointment of the contractor sub-contractor and so on.
2) Lack of proper supervision of the works by consultants.
3) Undetected errors in structural designs.

It is apparent that the last two factors are risks caused by inefficiency and/or incompetence on the part of consultants. It is therefore not surprising that the main criticisms of the questionnaire by respondents is that it presumes competence of consultants who invariably are involved in events that constitute

Table 3.3: Preferential Table for Different Types of Contract

Types of Contract	Number of Respondents in favour of a particular type of contract	Percentage of the number of respondents (48)
Bill of Quantities	18	37
Package deal or Turn-key contract	14	29
Lump Sum	6	13
Cost - Reimbursement	4	8
Target Cost	1	2
Problem not type of contract	5	11

risk in the construction industry. Though this is a valid criticisms, it should be borne in mind that most risk arising out of incompetence on the part of consultants will invariably be chouldered by the client. The client should therefore, in his own interest, see that reputable and experienced consultants are appointed right from the on-set, to handle the job. This will ensure efficiency, as a reputable consultant will not like to lose his reputation.

3.3 SUMMARY

This chapter dealt with the design of the questionnaire used for the data collection, its distribution, response and anslysis of the response. Results obtained from the analysis are briefly highlighted below:

The first factor examined is the change of governmentpolicy. Results indicate the necessity for its inclusion in the conditions of contract, as a high number of respondents, 81% affirmed they had been involved in projects adversely affected by government policy changes. The client should bear (71 ± 9)% and the contractor (29 ± 9)% of such adverse effects.

Seventy-one per cent (71%) of respondents indicated involvement with projects affected by the default of a nominated sub-contractor. Data analysis show an allocation to the client, contractor and nominated sub-contractor of (44 ± 11)% (19 ± 7)% and (37 ± 10)% of the risk respectively. The almost equal percentage allocation to the client and the nominated sub-contractor is in

agreement with the Aqua group's (1981) observation of the establishment of a direct relationship between the client and the nominated sub-contractor in the JCT, 1980 Edition.

Almost all respondents, 95% have participated in projects adversely affected by inflation. Deduction from the data collected is that (79 ± 6)% of this risk should be borne by the client while the contractor should bear the remaining (21 ± 6)%.

The adverse effects of changes in project design on construction work has been experienced by 77% of the respondents. Results obtained is in agreement with the conditions of contract where the client is entirely responsible for any alterations of the design, quality or quantity of the works.

Fifty-eight per cent (58%) of respondents have been involved in projects affected by failure of nominated supplier to supply construction materials. Responses indicate an allocation of (41 ± 10)% of the risk to the client and (59 ± 10)% to the contractor.

The use of poor construction methods by the contractor has affected projects handled by 74% of the respondents. The high number of respondents is a pointer to the necessity for the inclusion of this factor in the conditions of contract. The client and the contractor should bear (39 ± 13)% and (61 ± 13)% of this risk respectively.

Projects affected by lack of proper pre-contract planning have been experienced by 61% of respondents. This is another factor that the conditions of contract have failed to make provisions for. Analysis of data obtained how an allocation of $(78 \pm 8)\%$ to the contractor.

A relatively low number of respondents, 52%, have been involved in projects affected by an undetected poor soil condition. This low number of respondents however, does not imply a reduction in the gravity of the consequences of this factor when it occurs. When this factor affects a project, its consequences should be borne by the client and the contractor at $(85 \pm 10)\%$ and $(15 \pm 10)\%$ respectively.

The last factor, communication gap between the consultant and the contractor has been experienced by only 47% of respondents. This low number of respondents coupled with the fact that this risk can be largely taken care of by the choice of competent consultants, eliminates the need to make any special provisions for this factor.

The need to review the conditions of contract in order to take proper cognizance of risks in the Nigerian construction industry and to effectively allocate these risks between parties to a contract was observed.

The contributions of consultants to events that constitute risk was brought to light. The appointment of only efficient and competent consultants to handle construction projects was consequently emphasized.

CHAPTER 4

4.0 PROPOSAL FOR EFFECTIVE RISK ALLOCATION

As has been shown in Section 3.2.1 risks encountered in the construction process not caused by either the client or the contractor are best managed by the client assuming a greater percentage of the loss resulting from a particular risk exposure. The contractor on the other hand retains a smaller share to maintain his incentive to use his experience and ingenuity to reduce the risk through proper management. This is in agreement with Erikson et. al's (1978) view that construction risks should be managed by sharing them between the parties to a contract. Conflicts between the parties, which may lead to litigation or arbitration are thus reduced. This of course, results in a general improvement in project performance and hence, that of achieving budget and time targets.

In the light of results obtained from Section 3.2, proposals for the effective allocation of the risks are presented in this chapter. These proposals are best implemented through the conditions of contract which is the main vehicle for allocation of risks in the construction industry. They should therefore be reflected in the conditions of contract either as ammendments to existing clauses or as new clauses. Attempt has been made by the researcher to present these proposals in legal terms. This is however, only as a guide for the specialists who will put the proposals in the proper frame if accepted.

4.1 FACTORS FOR AMMENDMENT

In this section, those factors that have been treated in the conditions of contract are examined and necessary ammendments proposed.

4.1.1 Nominated Sub-Contractor Default

Provisions guiding the relationship of the nominated sub-contractor, the contractor and the client was highlighted in Section 2.5.2. One's attention is drawn to the fact that the contractor indemnifies the client fully for any default on the part of the nominated sub-sontractor. There is no direct relationship between the client and the nominated sub-contractor. Thus, in a situation where it can be shown that the contractor has taken all practicable steps to proceed diligently with the works, the client is deprived of his means of redress by way of liquidated damages for any loss he might have incurred. However, analysis of the results as presented in Section 3.2.1 indicates allocation of a percentage of the loss incurred as a result of default on the part of a nominated sub-contractor, to the nominated sub-contrator. This not only creates a direct relationship between the client and the nominated sub-contractor, it also ensures that the nominated sub-contractor does not escape responsibility for his 'Mis-deeds'. Also, the allocation of $(19 \pm 7)\%$ to the contractor ensures that he will take allpracticable steps to see that progress of the works is not disturbed. It is thus proposed that the relevant part of clause 27 be ammended as follows.

In the event of a nominated sub-contractor defaulting by failing to complete the sub-contract works or any section thereof withing the period therein specified or within any extended time granted by the contractor with the written consent of the architect, and the architech satisfies in writing to the contrator that the same ought reasonably so to have been completed, the sum calculated at the rate therein agreed as liquidated and ascertained damages for the period during which the said works or any section thereof as the case may be shall so remain or have remained incomplete or a sum equivalent to any loss or damage suffered or incurred by the client shall be shared between the client, the contractor and the nominated sub-contractor at (44 $\pm$ 11)%, (19 $\pm$ 7)% and (37 $\pm$ 10)% of the sum respectively.

4.1.2 Failure of Nominated Supplier to Supply Construction Materials

The conditions governing the activities of a nominated supplier is as discussed in Section 2.5.3. The contractor is liable to the client for failure of the nominated supplier to supply materials or goods. The contractor is however free of this liability and should be granted a fair and reasonable extension of time for completion of the works if he has taken all practicable steps to avoid or reduce delays caused by the nominated supplier. It can thus be seen that this risk factor is borne fully either by the contractor or the client as the case may be. Since construction risks are however best shared, the following proposal is made in the light of results obtained from Section 3.2.1.

In the event of a nominated supplier failing to supply materials and goods meant for the works at such times as the contractor may reasonably direct, any expenses incurred by the client or the contractor as a result of such default shall be shared in the ration (41 ± 10)% to (59 ± 10)% respectively.

4.1.3 Inflation

Inflation is provided for in Clause 31A and has been reviewed in Section 2.5.4. In a contract where the inflation clause is operational, the client reimburses the contractor fully for any certified increase in the price of materials or goods. The contractor therefore has no incentive to mitigate losses that may be caused by such increases in prices. Ammendment to the relevant part of the Clause is hereby proposed as follows:

If after the date of tender, the market price of any of the materials or goods specified as aforesaid increases or decreases, then the net amount of the difference between the basic price thereof and the market price payable by the contractor and current when the materials or goods are bought, shall, as the case may be, be shared between the client and the contractor as (79 ± 6)% and (21 ± 6)% of such amount respectively.

4.2 FACTORS PROPOSED FOR INCLUSION IN THE CONDITIONS OF CONTRACT

In this section, those factors that have not been previously treated in the conditions of contract but which were recognised from this study as sources of risk are proposed for inclusion in the conditions of contract.

4.2.1 Change of Government Policy

The following provisions of this condition shall apply where progress of the works is delayed by a change of government policy, provided always that the contractor shall do all that may reasonably be required to the satisfaction of the architect to proceed with the works:

(a) Such policy change shall apply to any change of decree, law or priority by the Federal Government of Nigeria after the date of tender which may involve the contractor in direct loss and/or expense.

(b) In the event of the above occurrence, the architect shall either himself ascertain or shall instruct the quantity surveyor to ascertain the amount of such expense. (71 ± 9)% of any amount so ascertained shall be added to the contract sum, and if an interim certificate is issued after the date of ascertainment, any such amount shall be added to the amount which would otherwise be stated as due in such certificate.

4.2.2 Undetected Poor Soil Condition

The following provisions of this condition shall apply where a poor soil condition that was undetected before commencement of construction work has delayed progress of the works or has been detrimental to the permanent works.

In the event of a poor soil condition of the project site being undetected until after commencement of construction work, any loss and/or expense incurred by the contractor as a result of damage

to the works shall either be ascertained by the architect himself or he shall instruct the quantity surveyor to ascertain the amount of such loss and/or expense. (85 ± 10)% of any amount so ascertained shall be added to the contract sum, and if an interim certificate is issued after the date of ascertainment, any such amount shall be added to the amount which would otherwise be stated as due in such certificate.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSIONS

Risks that are most often encountered in construction projects in Nigeria have been identified and subsequently allocated amongst the parties to a contract. The allocations are deemed to be the ones that will give the client optimum value for his money.

The benefits accuring from effective allocation of risks have been identified as including the minimization of litigations and conflicts amongst the parties to a contract. This is essentially as a result of each party's awareness of its responsibilities, before signing of the contract, in the case of an event that constitute risk occurring. Such awareness, especially on the contractor's part, facilitates better project performance as the contractor's management then pursues effective construction and not extra payment through claims and litigations. This improvement in project performance implies a better chance of achieving budget and time targets, and thus, reduction in the number of cases of abandoned projects.

Another major benefit of effectively allocating risks is the achievement of more competitive and realistic tenders from contractors. The bearing of part of the risk by the client encourages contractors who are technically competent but who would otherwise have been discouraged from tendering, to compete for the job.

Also, more realistic tenders are made by contractors as the need to provide for risks through contingency sums that are often either too high or too low are reduced. When these contingency sums are too high, the contractor might lose the tender, otherwise the client might be paying for risks that may never occur and when too low, the contractor might run into financial difficulties which results in the client having problems getting the project completed within time and budget and to a satisfactory workmanship standard.

The role of the conditions of contract, which is the main vehicle for allocating construction risk, and the different types of contract, in the allocation of risks was examined. No particular type of contract was found most adequate for providing for risks. However, it was observed that there is a general preference for the type of contract in which risks tend to be shared. This further lends support to the need to share risks amongst the parties to a contract. Of course, in cases where the occurence of a risk factor is due to negligence on the part of one of the parties, the party should bear fully the adverse consequences of the risk factor. In most cases, guidelines governing such situations have already been provided in the conditions of contract. However, risks that are not of this nature (that is, externally arising risks) should be shared, which has not been done in the conditions of contract. The assumption of a percentage of the damages resulting from a particular risk exposure by each of the parties to a contract ensures that all concerned have the incentive

to mitigate losses thereby assuring their commitment to the success of the project. Thus, if one also considers that some factors not provided for in the conditions of contract were identified as risks, it may not be inappropriate to call for a general review of the conditions of contract.

5.2 RECOMMENDATIONS FOR FURTHER STUDIES

The following recommendations for further research, which are in no particular order of priority are made in the light of the overall aim of this thesis, which is the improvement of project performance in terms of cost and time.

1. The scope of this thesis covered the identification and allocation of risk in the Nigerian construction industry and the role of the conditions of contract was examined in this regard. Based on the results of this investigation, it is perhaps inevitable to call for a general review of the conditions of contract.

2. Due to resource and time constraints, data for this thesis was collected mainly from consultants. The full complement of parties to a contract however, needs to be considered, especially the client and the contractor.

3. It will be necessary to research into other causes of overruns in budget and time on a construction project. An example in this area is communication gap between the contractor and the consultant which was actually identified as a source of overruns in time and budget in the earlier stages of this thesis.

4. Finally, the proposals made in this thesis need to be tested on real life projects in order to identify obstacles to their practical implementation.

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APPENDIX

A H M A D U B E L L O U N I V E R S I T Y

ZARIA - NIGERIA

DEPARTMENT OF BUILDING

Our Ref: CM/RS2 16th December, 1987.

Dear Respondents,

As you already know, many construction projects are usually not completed within the estimated budget and time. This is often due to the occurrence of certain unforeseen events during construction. Uncertain future events which if they actually occur will cause significant extra cost or delay are considered as risks. Risk is therefore the possibility of a loss which may be in terms of money, time and/or functional performance. The determination of which of the parties to a contract (client or contractor) is in the best position to bear these risks (risk allocation) is the main concern of this questionnaire.

You will agree, that proper allocation of risks to the parties involved in a contract can be done only after a careful assessment of events that constitute risk. Your help is therefore needed in providing facts, judgements and perceptions called for in this questionnaire.

We wish to assure you that all the data supplied in completing this questionnaire will be held in the strictest confidence. We will however, be glad to acknowledge your help in future publication(s) if you permit us.

Your prompt attention, inspite of your busy schedule will be very much appreciated and will facilitate the completion of this important study. By your positive action, you may be contributing to the systematic approach of providing solution to a major problem plaguing the Nigerian construction industry. Thank you for your cooperation.

Yours faithfully,

Dr. J.O. Kilawole
Chairman, Supervisory Committee

O. A. Adetunji
Research Student
M.Sc. Construction Management.

Questionnaire on Risk Allocation in Construction Projects in Nigeria.

1. a) Have you ever been involved in a project where a change of government policy affected the construction work?

Yes _____

No _____

b) If yes, who shouldered the adverse effects?

i) Client ____

ii) Contractor ____

iii) Client and Contractor ____

If (iii), in what proportion (client: Contractor)?

---

c) Do you think the allocation of the effect in (b) above is appropriate?

Yes ____

No ____

d) If No, How should it have been allocated?

---

2. a) Have you been involved in a project where a Nominated sub-contractor defaulted?

Yes ____

No ____

b) If yes, who shouldered the adverse effects?

i) Client ____

ii) Contractor ____

iii) Client and Contractor ____

iv) Client and Nominated Sub-contractor ____

v) Contractor and Nominated Sub-Contractor _____

vi) Client, Contractor and Nominated Sub-Contractor _____

If the effect of the default was shared (iii - vi), in what proportion?

---

c) In your opinion, should the default of the Nominated sub-contractor have been shouldered by the party/ parties indicated in (b) above?

Yes _____ No _____

d) If No, how should it have been allocated?

---

3. a) Have you been involved in a project where inflation adversely affected cost and/or time targets?

Yes _____ No _____

b) If Yes, who shouldered the adverse effects?

i) Client _____

ii) Contractor _____

iii) Client and Contractor _____

If (iii), in what proportion (Client:Contractor)?

---

c) Do you think the allocation of the effect in (b) above is appropriate?

Yes _____

No _____

If No, how should it have been allocated?

---

4. a) Have you been involved in a project where changes in project.design caused overruns in budget and/or time targets?

Yes ____

No ____

b) If Yes, who shouldered the effects of the overruns?

i) Client ____

ii) Contractor ____

iii) Client and Contractor ____

If (iii), in what proportion (Client : Contractor)?

---0---

c.) Do you think the allocation of the effect in (b) above is appropriate?

Yes ____

No ____

d) If No; how should it have been allocated?

---

5. a) Have you been involved in a project where failure of Nominated supplier to supply construction materials affected progress of work on site?

Yes ____

No ____

b) If Yes, who shouldered the effects of the delays on the project?

i) Client ____

ii) Contractor ____

iii) Client and Nominated Supplier ____

iv) Contractor and Nominated supplier _____

v) Client, Contractor and Nominated Supplier _____

If the effect of the delay was shared (iii - v), in what proportion?

---

c) Do you think the allocation of the effect in (b) above is appropriate?

Yes _____

No _____

d) If No, how should it have been allocated?

---

6. a) Have you been involved in a project where the contractor (chosen by the client or his consultant) used poor construction methods?

Yes _____

No _____

b) If yes, who shouldered the resultant adverse effects?

i) Client _____

ii) Contractor _____

iii) Client and Contractor _____

If (iii), in what proportion (Client : Contractor)?

---

c) Do you think the allocation of the effect in (b) above is appropriate?

Yes _____

No _____

d) If No, how should it have been allocated?

---

a) Have you been involved in a project where lack of proper pre-contract (financial and programme) planning affected time and/or cost targets?

Yes _____

No _____

b) If Yes, who shouldered the adverse effects?

i) Client _____

ii) Contractor _____

iii) Client and Contractor _____

If (iii), in what proportion (Client : Contractor)?

---

c) Do you think the allocation of the effect in (b) above is appropriate?

Yes _____

No _____

d) If No, how should it have been allocated?

---

a) Have you been involved in a project where poor soil condition was undetected before commencement of work on site?

Yes _____

No _____

b) If Yes, who shouldered the resultant adverse effects?

i) Client _____

ii) Contractor _____

iii) Client and Contractor _____

If (iii), in what proportion (Client: Contractor)?

---

c) Do you think the allocation of the effect in (b) above is appropriate?

Yes _____

No _____

d) If No, how should it have been allocated?

---

9. a) Have you been involved in a project where communication gap between the consultant and contractor affected cost and/or time targets?

Yes ____

No ____

b) If Yes, who shouldered the effects?

i) Client ____

ii) Contractor ____

iii) Client and Contractor ____

If (iii), in what proportion (Client : Contractor?

---

c) Do you think the allocation of the effect in (b) above is appropriate?

Yes ____

No ____

d) If No, how should it have been allocated?

---

10. Are there other factors you think should have been included in this questionnaire?

Yes ____

No ____

11. If yes, please enumerate such factors and indicate which party or parties should shoulder their adverse effects

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12. Please, list in order of importance the factors you think may have the gravest consequences on a project when they occur.

---

13. Do you think non-compliance with conditions of contract is a major cause of poor performance/overruns in time and budgets for a project?

Yes _____

No _____

14. If Yes, what do you suggest should be done to take care of this problem?

---

15. Do you feel there is a form of contract that can best take care of these risks?

Yes ____

No ____

16. If yes, Please tick as appropriate

i) Bill of quantities and schedule of rates (admeasurement) contract ____

ii) Lump sum contract ____

iii) cost reimbursement contract ____

iv) Target cost contract ____

v) Package deal or turn-key contract ____

vi) Other (please specify)

AND NOW, SOME BACKGROUND QUESTIONS ABOUT YOUR ORGANIZATION AND YOU.

17. Name of Company (optional) ----------

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18. Please tick as appropriate the type of company:

Consulting _____

Contracting _____

19. Address/City ----------

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20. How many projects are currently being handled by your company?

---------- projects.

21. Name of respondent (optional) ----------

---

22. Please indicate what professional or academic qualification you hold

WASC/GCE _____

Diploma _____

Degree _____

Postgraduate Diploma/Degree _____

Other (Please specify) _____

23. What is your position or present job title?

----------JOB TITLE.

24. How many years have you been in the construction industry?

----------years.

25. Do you wish your help to be acknowledged in future publication(s)?

Yes _____

No _____

Any additional comments: ----------

THANK YOU FOR YOUR COOPERATION AND ASSISTANCE.