

**THE PROFESSIONALS' PERCEPTION OF SUCCESSFUL
PROJECT MANAGEMENT PARAMETERS**

By

KABIR BALA

**Department of Building
Faculty of Environmental Design
Ahmadu Bello University
Zaria - Nigeria**

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the
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DECLARATION

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



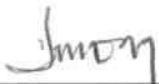
KABIR BALA

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CERTIFICATION

This thesis entitled: "THE PROFESSIONALS' PERCEPTION OF PROJECT MANAGEMENT PARAMETERS" by KABIR BALA, meets the regulations governing the award of the degree of Doctor of Philosophy in Construction Management of Ahmadu Bello University, Zaria, Nigeria and is approved for its contribution to knowledge and literary presentation.



 Chairman, Supervisory Committee

25-07-001
 Date



 Member, Supervisory Committee

06/08/2001
 Date



 Head of Department

06/08/2001
 Date



 Dean, Postgraduate School

24/07/01
 Date

DEDICATION

This work is dedicated to individuals and organizations that doggedly pursue the objective of opening up new frontiers of knowledge for the benefit of mankind. And to the memory of my late brothers Ibrahim (1985), Auwal (1992) and Yusuf (1998).

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ABSTRACT

The construction industry occupies a major position among the sub-sectors of the Nigerian economy, contributing about 7% of the Gross Domestic Product (GDP). In spite of the huge expenditures on construction, and its strategic importance on the economy, the industry is bedeviled by a multitude of problems which very often affect the successful execution of projects.

The concept of successful project execution, and success parameters for building projects were reviewed from literature. Several viewpoints were highlighted and discussed, from which a set of criteria for assessing success were streamlined and selected. The criteria were used to analyse five completed projects, which were used as case studies. The case studies were conducted by the use of project records. The projects were then explored longitudinally and analysed qualitatively.

A survey was also conducted by the use of a questionnaire. The questionnaire was prepared based on the selected criteria and validated through a pilot study. The essence of the survey was to assess the perception of the criteria by the members of project teams. The data generated from the survey was analysed qualitatively. The analysis of variance (ANOVA), correlation analysis, and stepwise regression were performed on the data, using the Statistical Package for Social Sciences (SPSS).

The results of the analyses showed that improvements could be made on the administration and management of building construction projects. It was also inferred that the various members of

the building project team perceive the success criteria differently and that conflicts do arise between different parties in the project environment.

It was recommended that the partnering process should be included as a milestone in the project development process. It will go a long way in mitigating the negative effects of the conflicts that arise due to the different perceptions and objectives of members of the project team. By so doing, the achievement of successful project outcomes will be enhanced. Further research in this area is advocated. There are enormous potentials.

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CHAPTER ONE

INTRODUCTION

1.0 BACKGROUND

The building industry has recorded phenomenal growth since the mid 1970s, which has been attributed to the unprecedented increase in crude oil revenue (Ugwu, 1992 and Mansfield *et al* 1994). Consequent to the growth of the industry, building projects have increased in both size and complexity. The main activities of the industry being the construction of buildings for residential accommodation, large office complexes, commercial and industrial purposes. Other activities include repair and renovation of existing building stock, etc.

The industry involves interlinkages between different organizations to varying degrees and in varying ways throughout the project cycle. According to Levitt (1981), the “industry organizes a group of specialty designers and contractors to meet the needs of each project”. Other stakeholders in the industry include manufacturers and suppliers of inputs, craftsmen and specialist subcontractors. Eccles (1981), employing Williamson’s (1975) framework described the core of the construction project as a ‘quasifirm’. Also, Cherns and Bryant (1984) classified the relevant unit of analysis for a construction project as a temporary ‘multi-organization’.

Bresnen (1990) mentioned that the building construction industry has historically been characterized by a split between those organizations involved in the design and construction of project work. Levitt (1981) corroborated this when he wrote, “the construction process is divided into the design and the build phases...”. Thus, professionals (architects, engineers, quantity surveyors, builders and contractors) are the parties to the construction process.

The traditional system of project delivery, which is the most popular system of project delivery, has been summarised by Newcombe (1996) thus:

.... A client approaches an architect whom he briefs regarding his requirements. The complexity in designing modern buildings necessitates the appointment of other professional specialists, who, together with the architect, form the design team. ... when the design is ‘complete’, main contractors from a select list are invited to tender for the work based on the drawings and bill of quantities. The successful contractors (usually the lowest bidder) signs a standard form of contract with the client which retains the architect as project manager and arbitrator, and the professional team as advisors during the construction production stage of the project. The main contractor usually subcontracts the majority of the site work and obtains materials through a network of builders merchants and suppliers....

In short, a building project requires the interaction of many individuals from several distinct organizations to construct a unique facility in a limited time. Each organization and/or individuals pursues its own goals although all of them have the common goal of successfully completing the project within the agreed budget and duration. Obviously, this requires a lot of co-ordination and communication.

It is then obvious that the organization design of project work should be accorded necessary attention. The organisation design problem has been summarised by Galbraith (1973) as a selection of the proper balance between the benefits of specialization and communication thus: “the greater the degree of specialisation, the greater the effectiveness of subtask performance. But the greater the difficulty of integrating the subtasks into the successful performance of the entire task”.

Consequently conflicts do arise among members of the building team (the design and the construction teams). For instance, Anonymous (1994) opined that it invariably turns out that contractors “feel that engineers lack pragmatic knowledge about construction; engineers think prime contractors are overly profit-driven without any concern for design intent”. Levitt (1981) also stated that conflicts often occur between the architect and the contractor during the construction process because the contractor is typically not consulted during the design process. According to Anonymous (1994), these types of conflicts between various members of the building team can determine the difference between a successful project and one where problems result such as delays, litigation and belligerent negotiations.

1.2 NEED FOR THE STUDY

The construction industry occupies a major position among the sub sectors of the Nigerian Economy. For instance, according to the Central Bank of Nigeria (1994), it contributes about 7% of the GDP. Also, the capital expenditure of the Federal

Government on Housing alone amounted to 8% of the total in 1989 although this declined to about 5% in 1993, which is not insignificant.

Olaloku (1987), in a study of the construction industry, wrote that “the relative large investment commitment to construction makes the industry an important source of demand generation and that this multiplier effect (i.e., the great capacity to generate employment, income and expenditure in other sectors of the economy) constitutes another contribution it makes to the economy”.

In spite of the huge expenditures on construction, and its strategic importance in the economy the industry is plagued with a number of problems such as spiraling costs, disappointingly long schedules, belligerent negotiations etc., which often impinge on the successful execution of projects. This in turn results from the interactions of the many individuals and organizations in the ‘quasifirm’. Mansfield *et al* (1994) in a study of Nigerian Construction projects concluded that “these problems will continue to occupy the attention of decision makers in the construction industry for some years to come. Some researches have been conducted on the parameters for project success (Ashley, 1987; Carroll, 1989; Bentley and Rafferty, 1992 and Freeman and Beale, 1992). It is therefore necessary to study the perception of these parameters among the members of the building team in order to further enhance the achievement of successful building projects.

1.3 AIM AND OBJECTIVES

Aim

The aim of this work is to establish the nature of the influences of project success parameters on the various members of the building team and to propose strategies that will enhance the achievement of successful project outcomes.

Objectives

- i. To identify the criteria and determinants of construction project success (from literature);
- ii. To undertake some case studies of completed projects (from project records);
- iii. To assess the performance of the case studies using the success criteria;
- iv. To determine the perception of the criteria by members of the building team;
- v. To suggest strategies that will enhance the achievement of successful project outcomes;

1.4 METHODOLOGY

In order to achieve the set objectives of this study, two methods of field data collection were employed, namely the case study method and the survey method. For the case study, a total of five completed projects were carefully examined. The projects include

residential, institutional and public buildings. This was done by the use of completed project records. It was assumed that 'fairly regular' procedures for construction project undertakings were followed for all the cases chosen. This means that designs prepared by appointed professionals emanated from the client's brief and the contract administrations were professionally executed.

The cases were explored longitudinally and each case was reported in four parts viz.: Project brief, appointment of consultants, tendering and contract award and highlights of project development. The strategy chosen was to rely on qualitative method of analysis. The case studies were undertaken in order to gain insight into the dynamics of real project environments.

The more broadly based survey method was also employed for this research work. The major research instrument was a questionnaire. The questionnaire was designed in a way that it encompassed all the factors identified as contributing to project success. Insight into the factors identified was gained through literature reviews of relevant texts and journals.

An initial questionnaire was drafted and tested on the respondents (Architects, Engineers, Quantity Surveyors, Builders and Contractors). A total of 50 questionnaires were administered, out of which 36 were returned. The purpose of the pre-test was to establish the validity of the research questions. For this, item analysis was performed. The quantitative data used for this was obtained by the application of the Likert point-

scaling technique with a scoring range of 1 – 3. From the analysis, all the factors were retained. From the result of the analysis, the final questionnaire was designed and drafted with a total of 126 questions. The questionnaire is shown in Appendix A.

Due to the nature of the questionnaire, stratified random sampling was employed in its administration. A total of 250 questionnaires were administered, 50 for each category of respondents.

The survey was conducted in 4 towns- Abuja, Kaduna, Kano, and Zaria. A total of 10 questionnaires were administered on each category of respondents in each of the 4 towns. It should be remarked that the receipt of completed questionnaires was very slow, and as such it was done in two phases. In the first phase, the total number of questionnaires received after a period of about six months were not considered to be representative of the population and therefore not adequate for analysis. The second phase was therefore necessitated in which another sets of questionnaires were administered. The number administered depended on the responses received for each category. The main target was to receive at least 30 questionnaires from each category so that the assumption of theoretical normality would be fulfilled. This was achieved after efforts were intensified at collection. This was in fact the major difficulty of the study.

The data generated from the survey was subjected to the following analyses:

- i. Analysis of Variance (ANOVA)

- ii. Correlation Analysis
- iii. Regression Analysis

The ANOVA

The ANOVA is a statistical procedure for comparing population means Afonja (1985). The basis for ANOVA is the decomposition of sums of squares corrected for means referred to as SS (Nie et al 1975). In order to conduct a formal test of hypothesis with ANOVA, the measures of variability within data sets have to be measured. The variation within samples is measured by the pooled standard deviation (S^2). According to Sincich (1992) the within sample variation is given by;

$$S^2 = \frac{\sum_{i=1}^{n_1} (y_{i1} - \bar{y}_{i1})^2 + \sum_{i=1}^{n_2} (y_{i2} - \bar{y}_{i2})^2}{n_1 + n_2 - 2}$$

$$= \frac{SSE}{n-2}$$

Where y_{i1} is the i th observation in sample 1 (e.g., Engineers) and y_{i2} is the i th observation in sample 2, $n = (n_1+n_2)$ is the total sample size. SSE, which is the quantity in the numerator of S^2 , is referred to as the sum of square errors. The expression (2) is called the mean square for errors (MSE).

A measure of the between-sample variations is given by:

$$\frac{n_1(\bar{y}_1 - \bar{y})^2 + n_2(\bar{y}_2 - \bar{y})^2}{2-1} = \frac{SST}{1}$$

SST is referred to as sum of squares for treatments.

$SST/2-1$ is called mean square for treatments or MST.

The total sum of squares is given by:

$$SS(Total) = \sum (y_i - \bar{y})^2 = SSE + SST$$

In a randomized block design, the ANOVA provides an easy way to analyze data by partitioning SS (total) into two components SSE and SST.

For the purpose of this work, randomized design was used. This involved the comparison of the means for a number k (5- categories of respondents) based on independent random samples, $(n) 1, 2, 3, \dots, n$, where n is the total number of measurements (30). The two sources of variability mentioned above are compared using the F statistic, where

$$F = MST/MSE$$

The F distribution depends on numerator and denominator degrees of freedom.

$$F = k-1/n-k$$

If the computed value of F exceeds the upper critical value F alpha, the null hypothesis is rejected and a conclusion is drawn that at least two of the treatment means differ otherwise the alternative hypothesis is accepted.

The Statistical Package for Social Sciences (SPSS) was used for ANOVA. The output contains the ANOVA table, the means and the standard deviations. The values of F in the table were compared with F alpha and inferences were made as explained in the text.

Correlation Analysis

Correlation analysis provides a single number, which summarises the relationship between two variables (Afonja, 1985; Onyeka, 1992; Sincich, 1992). These relationships in the form of "correlation coefficients" indicate the degree to which variation (or change) in one variable is related to the variation (or change) in another. According to Nie *et al* (1975), a correlation coefficient not only summarises the strength of association between a pair of variables, but also provides an easy means for comparing the strength of the relationship of one pair of variables and a different pair.

The coefficient of correlation r between two variables (x and y) is computed as follows: (Sincich, 1992; Nie *et al* 1975):

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{[\sum_{i=1}^n (x_i - \bar{x})^2][\sum_{i=1}^n (y_i - \bar{y})^2]}}$$

Where x_i = i th observation of variable x

y_i = i th observation of variable y

\bar{x} = mean of variable x

\bar{y} = mean of variable y

n = number of observations

The magnitude of the correlation coefficient (high or low) is an indication of the closeness or otherwise of the variables (Afonja, 1985). Tests of significance are carried out for each coefficient using Student's t distribution with n-2 degrees of freedom for the computed quantity, for one or two tailed tests.

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

The SPSS was also used for these analyses and the results are presented in chapter 6.

The output includes the coefficients, the tests of significance (at the 5% level) and the number of cases upon which the coefficients were computed.

Stepwise Regression

According to Onyeka (1992), regression is a statistical tool, which helps to predict one variable from another variable or variables on the assumed nature of their relationship.

He also stated that the variable being predicted is usually referred to as the unknown or dependent variable, because its values are dependent on the values of the other variable or variables variously referred to independent variables, explanatory variables or predictor variables.

A regression model is said to be simple if there is only one independent variable. Thus only two variables are of interest – the dependent and the independent variable (e.g., x and y). According to Nie *et al* (1975) “in simple regression the values of the dependent variable are predicted from the linear equation of the form

$$Y' = A + BX$$

Where Y is the estimated value of the dependent variable, B is a constant by which all values of the independent variable X are multiplied, and A is a constant which is added to each case. The optimum values for B and A are obtained from the following formulae

$$B = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2} \quad (8)$$

$$A = Y - BX$$

Regression analysis may be applied in situations where there are two or more independent variables in which case equation 7 becomes

$$Y' = A + B_1X_1 + B_2X_2 + \dots + B_kX_k$$

When it is intended to isolate a subset of available predictor variables that will yield an optimum prediction equation with as few terms as possible, it is appropriate to enter

independent variables one by one on the basis of some pre-established statistical criteria. In other words stepwise regression is performed.

This was the model that was employed for the purpose of this work. Consequently, the regression of each of the three independent variables was done on each of the nine predictors for each of the categories of respondents. A total of 15 regressions were done.

The SPSS was also used for these analyses. The output indicates the constants and the overall influence (R^2) for the predictors that were picked. This was performed in order to establish the factor or set of factors that will influence the determinant for each category of respondents. From this analysis, the combined influence of the factors (predictors) is clearly evident.

1.5 SCOPE

The projects for the case studies were sited in Akure, Kaduna, Kano, and Sokoto. The cases were explored longitudinally.

The survey has been limited to respondents with at least five years post qualification experience. It was conducted in Abuja, Kaduna, Kano and Zaria. It should be mentioned that the questionnaire was designed in way that locational bias is eliminated.

CHAPTER - TWO

THE PROJECT MANAGEMENT PROCESS

2.1 PROJECT MANAGEMENT

Project management has been defined by Lock (1987) as "achieving successful project completion with the resources available", the resources being time, money, materials, equipment and people. Obviously, this is no minor task and requires an experienced project manager to provide leadership and direction.

The Chartered Institute Of Building (C.I.O.B. 1992) defined project management as "the overall planning, control and co-ordination of a project from inception to completion aimed at meeting a client's requirements in order that the project will be completed on time, within authorised cost and to the required quality standards". In this connection, the project manager, acting on behalf of, and representing the client has the duty of providing a cost effective and independent service correlating, integrating and managing different disciplines and expertise to satisfy the objectives of the project brief from inception to completion. The service provided must however be to the client's satisfaction, safeguard his interests at all times and where possible give consideration to the needs of the eventual user of the built facility.

According to Briner *et al* (1992), project management can be defined as "managing the visible and the invisible team to achieve the objectives of the stakeholders". They

further opined that there are six concepts that underline this definition; four explicit and two implicit.

The Explicit

1. The visible team: Refers to the group of people working directly on the project who come together from time to time to make the project happen.
2. The invisible team: The group of people who contribute indirectly to the work of the visible team. Their support and co-operation are vital to the success of the project.
3. The multiple stakeholders: People who have an interest in the project.
4. Managing organisational team working: i.e., project leaders consciously directing the efforts of those involved inside and outside the organisation toward collaboration of high quality.

The Implicit

1. The organisational context: Every project is about more than just time cost and specification. It is about organisational politics, about change, about the wider commercial, business, strategic significance of the project to the organisation as a whole.

2. The people factor: The people factor is an important dimension of increasing importance.

Kliem *et al* (1997) believe that project management is a "loaded term that says a lot more and means much more". It provides the tools, knowledge and techniques for leading, defining, planning, organising, controlling and closing a project.

2.2 THE PROCESS OF PROJECT MANAGEMENT

Projects are temporary undertakings that have a definite beginning and an end (Haynes, 1993 and Kliem *et al* 1997). This feature makes it imperative for a structured approach in order to achieve project objectives.

According to Barrett and Males (1991), "most analyses of the process of project management, produce a list of functions covering the project life-cycle, starting at the inception and ending when the project is complete". The exact terms may vary but the stages are similar. Barrett and Males further suggested "a typical list of project management functions" which comprise selection of project, definition of the project requirements, organisational structure, planning, monitoring, control and termination.

A schematic representation of the elements involved in the construction of a major project and their interrelationships, reproduced from the CIOB (1992) is shown in figure 2.1.

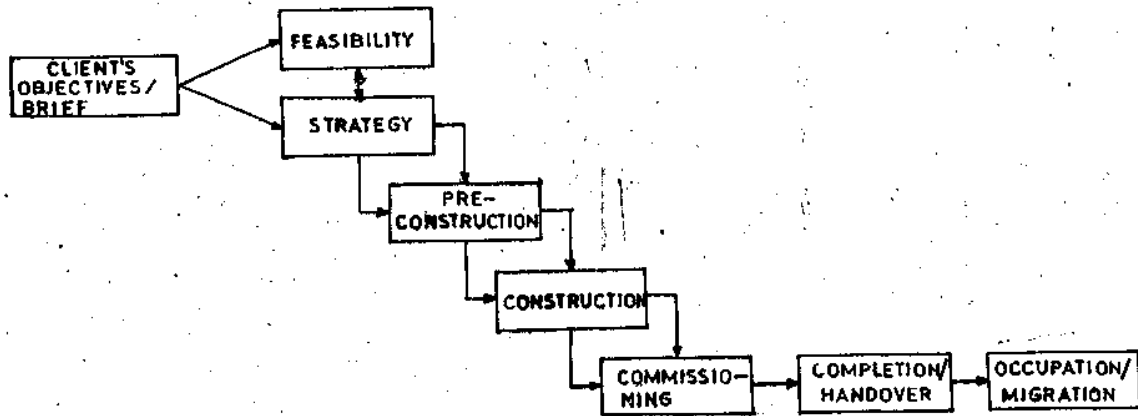


Figure 2.1: Major Elements of Construction Project Success
Source: C.I.O.B., 1992

Haynes (1993) condensed the processes of project management into four phases as shown in figure 2.2.

Haynes further explained that not every project requires the same attention being given to each of these activities as this will depend on the type of project undertaking, its size and scope. It is then left to the judgement of the project manager to select the steps that are important to his/her own project.

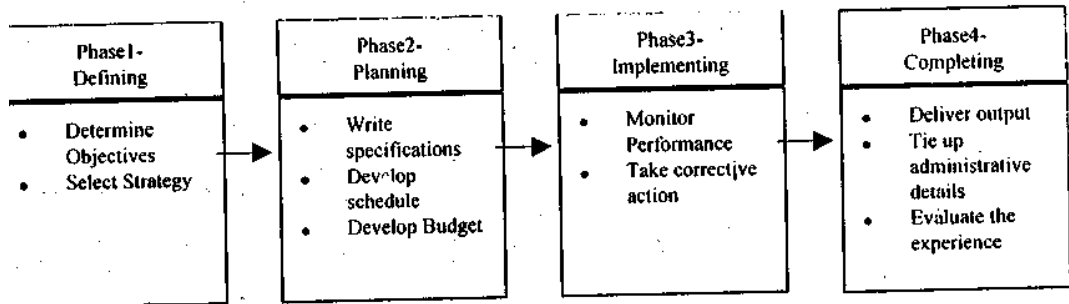


Figure 2.2: Project Management Phases
Source: Haynes 1993

Lock (1987) proposed the ten-stage model shown in Appendix B. However, it will be observed that stages 1 - 6 are all components of the planning process, while stages 8 and 9 are the control and monitoring processes.

Olateju (1992) stated the following characteristics of project management principles

- (a) Create the ground rules for the project in terms of costing, timing, planning consent etc.
- (b) Appoint the project team including the architect, the engineers, the quantity surveyors, the builder and suppliers.
- (c) Build the necessary professional interrelationship, which enables the optimum utilisation of each professional's talents effectively.

Olateju further opined that in the spirit of professional interdependence and efficiency, project management's mode of operation streamlines the usually 'fratricidal' site operations.

Duncan (1993) reported that the Project Management Institute (PMI) has developed a model of the processes involved in project management. The model is shown in figure 2.3.

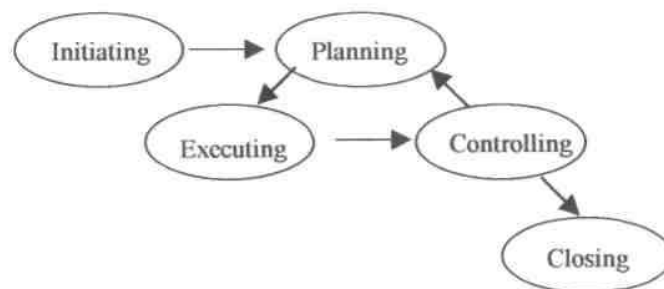


Figure 2.3: Basic Project Management Processes
Source: Duncan 1993.

Initiating was referred to as a description of the project, initial documentation of project objectives, and the assignment of a project manager, while planning deals with a documented project plan and documented updates as the project progresses. Executing was referred to as completing project deliverables; controlling is periodic measurements of progress versus plan, corrective action when needed, and identification of when the project is complete.

Kliem, et al (1997) proposed another model which comprises five steps viz.: project definition, project planning, project organisation, project controlling and project closure. The model is shown in Figure 2.4.

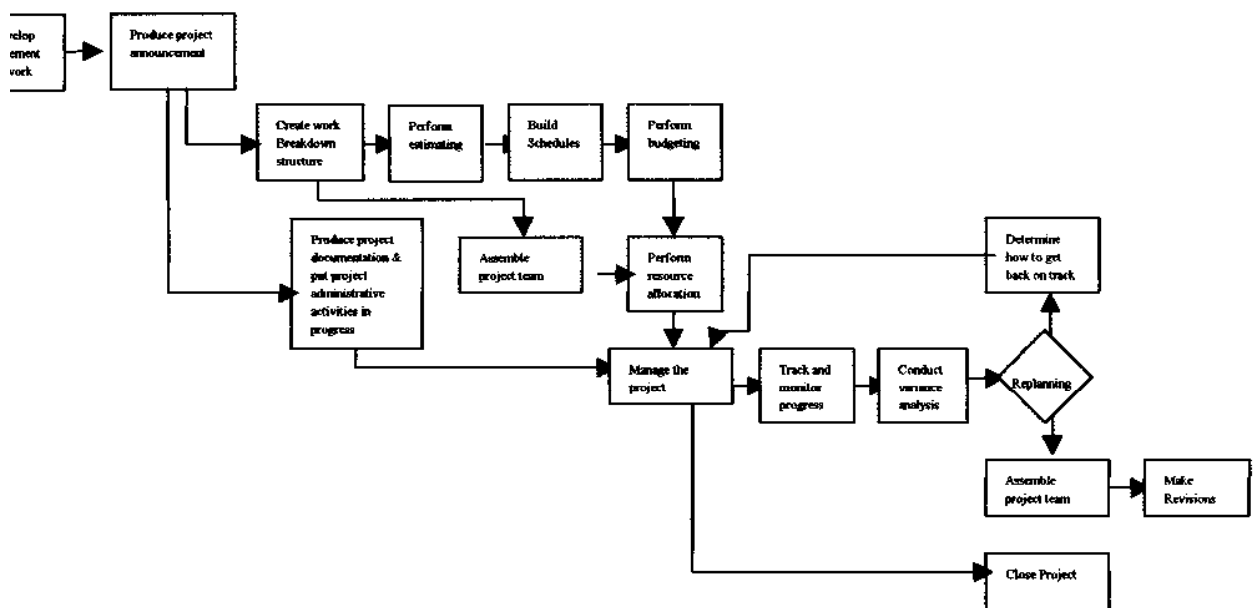


Figure 2.4: Project Management Processes
Source: Kliem et al 1997

It will be observed that in all the preceding discussions, the processes or elements are similar, spanning between feasibility/initiation and closing/termination. The variations between these extremes largely depend on the style of presentation of the author as

opined by Barrett and Males (1992). However, the following elements are distinguishable.

1. Feasibility/ initiation
2. Project planning
3. Execution
4. Monitoring and controlling
5. Closing and termination

Ward (1982) mentioned another element, which should be separately considered. In his words, "documentation is an important element in project management". In the actualisation of a project, an owner, architect, engineers and contractor work together, and they are also "the causal agents in the change order process". For instance, an owner may request a scope change while an architect or engineer may introduce a design change. Ward believes that it is important to document such orders properly. The introduction of documentation as an element produces six 'basic' elements as a useful guide to the process of project management.

2.2.1. Interaction of the Processes

The process of project management is an integrative one. Suffice is to say that an action (or failure to take action) in one area will usually affect other areas. For example a change in scope will usually affect cost and schedule estimates. It may also have an impact on other remote factors such as team morale and product quality. It

must be mentioned that interactions among the processes require trade-offs among project objectives. In effect, successful project management requires actively managing these interactions.

2.2.2 Initiating

This is the preliminary stage in which appraisals are carried out to ensure that the project is technically and economically viable and that funds can be made available.

Morris (1994) developed a model of those factors which "must be achieved if a project is to be successful". He believes that all the items of the model in figure 2.5 must be considered from the onset to optimise the chances of the project success.

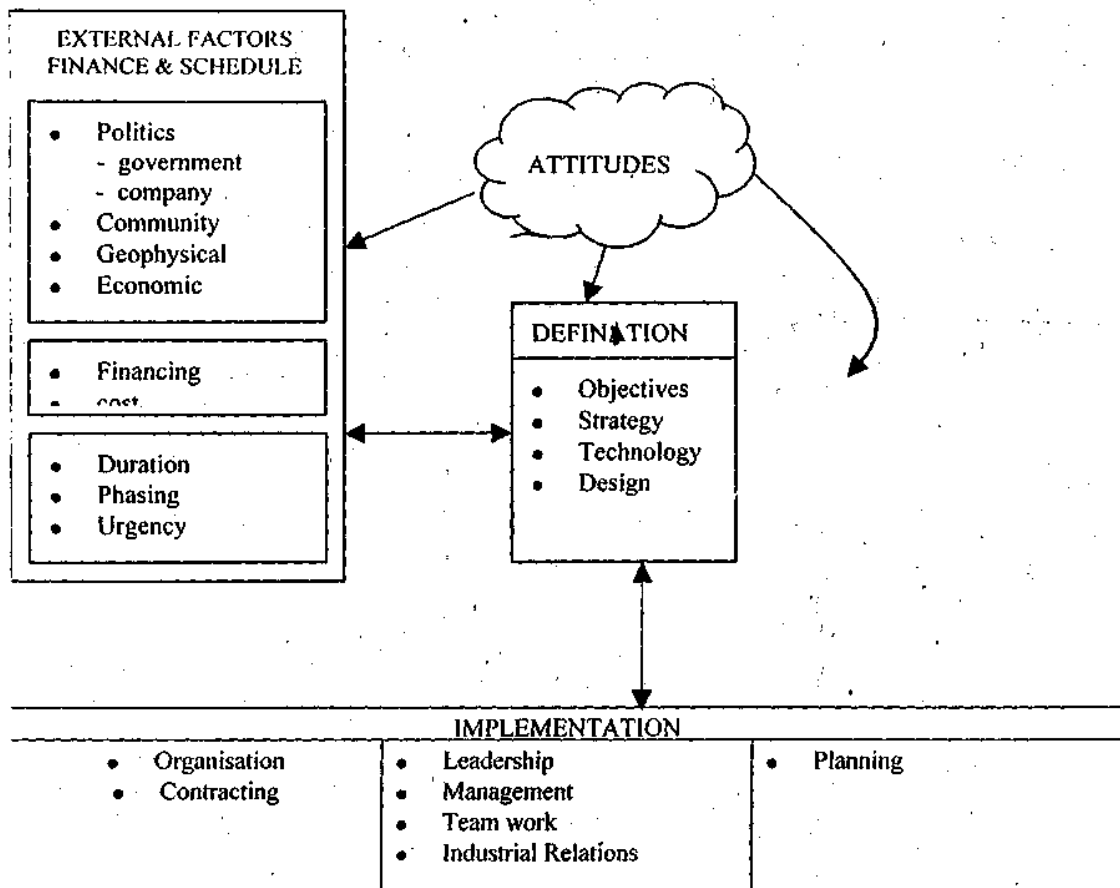


Figure 2.5: The Management of Projects
Source: Morris 1994

In the first place, the project has to be properly and unequivocally defined. According to Lock (1987), this is the process of ensuring that the "objectives of performance,

timely completion and containment of costs within budgets" are clearly set out before any work starts. Morris (1994) similarly, but more specifically, opined that "project objectives, technical base and general strategic planning need to be adequately considered and developed and the design firmly managed in line with its strategic plans" to ensure successful completion.

It was reported by the CIOB (1992) that the main functions of feasibility study involve advising the client on issues like relevant project resourcing, evaluating construction materials and methods, consideration of alternative locations, as well as advising on potential costs involved in overcoming specific problems. These considerations and more "assist the client in establishing a comprehensive project brief, which highlights the parameters of cost, time, facility function and also specifies the contractual aspects and applicable agreements".

The project definition could be affected by changes in external factors such as those listed in Figure 2.5. These interactions must therefore be predicted and thoroughly assessed.

The attitude of the parties essential to the project's success must also be assessed otherwise the project specifications of time, quality and cost, its interactions with external financial and other matters as well as its implementation (execution) will be much harder to manage and quite possibly damagingly prejudiced "if the attitude of the parties involved is negative", Ward (1992).

Finally for the successful implementation of the project, such factors as organisation and management, planning and control, leadership and teamwork should also be properly assessed.

2.2.3 Planning

Planning is of major importance in a project. In fact, the amount of time spent in planning a project largely determines how successful it will be (Morris, 1991). There are more detailed sub-processes under the planning process.

Foremost on the planning agenda should be the overall project execution plan, which marks the beginning of the planning exercise. Tighe (1997) opined that for effective planning of a major project, the project strategic objectives are the first consideration. The strategic objectives, together with the key elements and functions of project definition and organisational structure need to be identified with a high degree of confidence. This is because an appreciation of these issues is necessary in order to develop the main aim of the project execution plan which is to focus the project team on critical management issues such as the approach, scope, methodology, programme, organisation and resources. An important output from this exercise is the identification of the key planning processes. Typical key processes include management reports, financial modelling and risk analysis, constructability, document control, engineering and environmental standards; and civil, structural and system engineering, (Tighe,

1997). After these processes have been identified, a project master schedule is developed from which all other subsequent levels of planning will emanate.

Good planning entails dividing a project into a series of progressively smaller and more manageable pieces while keeping sight of the overall plan. The project is then disseminated into its constituent areas, sections, locations and pieces, along with an organisational breakdown structure indicating who has the responsibility for managing each area.

Some detailed planning processes have clear dependencies that require them to be performed in sequence. The dependent planning processes, according to Duncan (1993) include:-

- **Scope Definition:** This entails developing a written scope statement, project justification, the major deliverables and project objectives.
- **Project Definition:** This entails decomposing the major deliverables into more granular deliverables for better control.
- **Task Definition:** Identifying the tasks that will be performed in order to produce the project deliverables.
- **Task Sequencing:** Identifying dependencies among tasks.
- **Duration Estimating:** Estimating the probable duration of individually schedulable tasks and activities.

- **Schedule Development:** Determining and documenting specific dates for tasks.
- **Cost estimating:** Developing initial estimates for the overall project cost.
- **Cost Budgeting:** Developing detailed estimates for the cost of individual tasks.
- **Plan Integration:** Creating and documenting a coherent project plan from the outputs of the other planning processes.

It should be mentioned, however, that interactions among planning stages are more dependent on the nature of the project. As a result, there are "facilitating processes" which are performed sporadically throughout the course of project planning. These processes which Duncan (1993) postulated, are reproduced below.

- **Quality planning:**
Determining how to ensure that the project quality objectives will be met.
- **Role and responsibility definition:**
Determining the broad outlines of project responsibilities.
- **Organisation planning:**
Deciding how the project will be organised, establishing reporting relationships.
- **Project staffing:**
Deciding who will fill what positions and assume which roles over time.

- Communications planning:
Determining who needs what information, when they will need it and how it will be given to them.
- Risk identification:
Determining which risks are likely to affect the project.
- Risk assessment:
Quantifying and evaluating the probability of risk occurrence and risk impact.
- Solution development:
Defining deflections and investigating steps for downside risk and enhancement steps for opportunities.
- Procurement planning:
Deciding what items will be obtained under contract and how such contracts will be defined and awarded.
- Solicitation:
Identifying possible sources of contractual services and obtaining responses for them.
- Procurement:
Negotiating and contracting for outside products and services.

A pictorial representation of the relationships among the project planning processes is shown in figure 2.6. It should be borne in mind that the amount of planning should always be commensurate with the scope of the project.

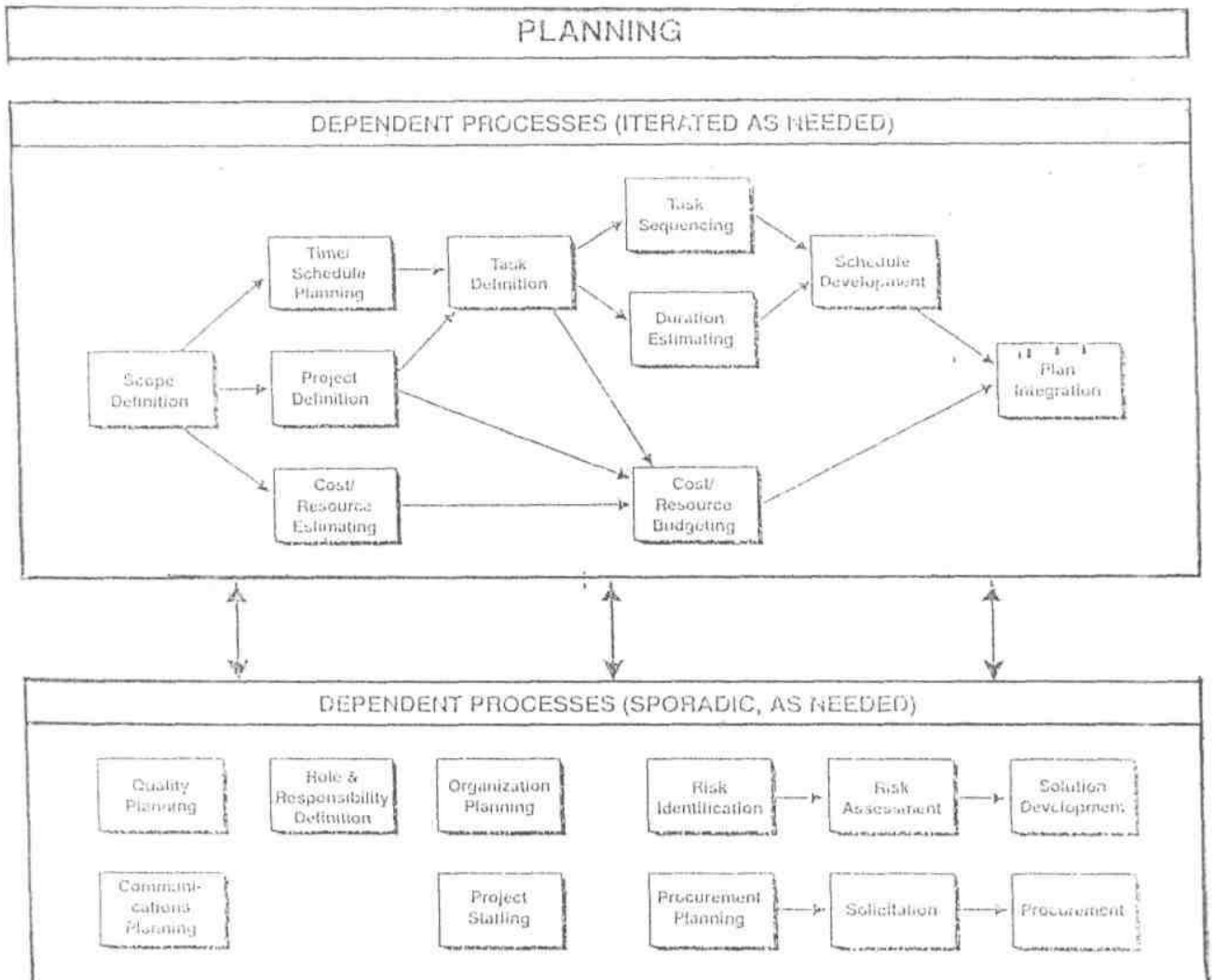


Figure: 2.6: The Planning Processes
Source: Duncan 1993.

2.2.4 Executing

The basic process of executing essentially comprises of two detail processes. These are:

1. Plan Execution:

Carrying out the project plan by performing the tasks identified therein and managing the technical and organisational interfaces.

2. Contract Administration:

Contract administration entails managing the contractual aspects of the procured products and services. In carrying out the plan execution, various parties are involved. The contractor is busy trying to actualise the client's objectives, while the architect is responsible for seeing that what is built is what has been agreed upon. The Quantity Surveyor on the other hand is concerned with measuring work done so that the contractor may be paid (Hillebrandt, 1984).

In the project plan execution phase, all necessary permits and authorisations must be obtained from the relevant government agencies. According to Aubrey (1991), "many construction starting times had to be postponed because approvals had not been received".

Some of the delays in obtaining a plan permission can be avoided if due consideration is given to such areas as building regulations and environmental and safety regulations from the onset.

According to Moyses (1994) contracts are required to formalise the complex arrangements and relationships between the various parties involved in a project.

There are many forms of contract and the client will have to take a decision as to which form of contract should be adopted. The decision may be made on the basis of his experience on previous projects or it may be made based on the advice of appointed consultants.

The contracting philosophy chosen by the client will determine how the broad areas of activity such as design/engineering, material procurement and construction are to be handled. To a large extent, it will also depend on the level of involvement and control he wishes to have on the execution of the contracts.

In simple terms, the contract specifies the responsibilities, liabilities, method of payment and apportionment of risk between the parties in achieving the desired objectives of quality, time and cost, (Moyes, 1994). It identifies the various documents, which together represent the legally binding contract. These will normally comprise:

- the agreement
- the conditions
- the tender (where applicable)
- the pricing provisions

- the specifications and
- the drawings.

2.2.5 Documenting

Documentation is an essential aspect of project management. It is worth noting that the participants in a project (client, architect, engineers, quantity surveyors, builders and contractors) who have important roles to play in the actualisation of a project are also the "causal agents in the change order process", (Ward, 1992). A change order may emanate from any one of them. For instance, a client may request for change in scope; a contractor may initiate a change order as a result of site condition; it may also be as a result of design change made by the engineer or architect. All these make documentation "an important element of the project management process", (Ward, 1992).

Depending on the type of contract, some otherwise salient issues such as quality control and inspection may enter into the picture. Under such conditions, more role players may be involved in the project. Their roles must be documented so as to minimise areas of acrimony or conflict in case of arbitration or litigation.

Consequently, document approval procedure must be established and formalised. Document distribution procedures must also be established in order to identify who gets what, as noted by Stebbing (1987). He further observed that the procedures, more

importantly, need to be based on who really needs what. A formalised procedure will also ensure that the person needing documents gets them in the right quantity, of the correct form, and that the initial issues are backed up by all.

2.2.6 Controlling

Project plans will not be useful if they are not followed. This makes control an important aspect of the execution programme of any major project, which is certain to have a master strategy or plan. According to Ward (1992), this plan or strategy is usually affected by the "actions of people, objects, physical obstacles, weather, delinquent delivery, and lack of continuity between mental picturing and the real problem". The combined effect of all of these makes it imperative to measure progress on a fairly regular basis on any major project in order to identify variances with the original plan. These variances are then fed into the 'control' processes. If they are significant enough to jeopardise the project, control is then exercised through the traditional cycle of planning, monitoring, identifying variances and taking corrective action in order to put the original plan back on course, (Tighe, 1997).

In effect project control is dependent on monitoring and measurement of progress against a base line which is essentially a level of expectancy. Wills (1991), Ward (1992), Duncan (1993) and Tighe (1997) all concurred on this. Tighe also gave typical examples of project controls as "co-ordinated master project programmes" critical path

method networked programmes, and establishing a project baseline to measure progress against".

It is worth noting that although construction projects have increased in complexity, improvement in tracking systems have also emerged and enlarged. Computer software packages such as 'Power Project' are available which, if properly and effectively utilised, can make the process of project control efficient. Some of the keys to successful project control as opined by Tighe (1997) are "a dedicated and stable information technology and environment, and structural and systematic approach to data input". According to Ward (1992), the process is not magical, but rather "demands an ever constant alertness on the part of those team members playing their roles in the project's actualisation and fulfillment ..." and that it also "requires co-operation, motivation, a sense of urgency and an acute awareness of events destined to go wrong".

The major areas that normally require control in a project are enumerated below as given by Duncan (1993):

- i. Progress measurement and reporting - Collecting and disseminating progress information.
- ii. Scope change management - Documenting and controlling changes to project scope.

- iii. **Quality control - Measuring project deliverables and activities to assess whether quality objectives are being met.**
- iv. **Quality improvement - Evaluating project performance on a regular basis to determine how to improve project quality.**
- v. **Time/Schedule Control - Controlling and responding to schedule changes.**
- vi. **Cost Control - Controlling and responding to cost changes.**
- vii. **Risk Control - Responding to changes in risk over the course of the project.**

2.2.7 Completion and Handover

The completion of a project is a basic process, which encompasses some detail processes. These include the following as given by Duncan (1993):

- i. **Scope Verification - Ensuring that the project deliverables are completed satisfactorily.**
- ii. **Contract Closeout - Resolution of any outstanding administrative matters and archiving of contract documentation.**
- iii. **Project Closure - gathering and disseminating information to formalise project completion.**

However, the Code of Practice for project management of the Chartered Institute of Building establishes that completion and handover are closely related. They are done

under the "co-ordination and supervision of the project manager, in close working relationship with the professional team". The Code specifies the main aspects of completion and handover, which are reproduced below.

- Preparation of lists identifying deficiencies e.g. unfinished work and materials, goods and workmanship not in accordance with standards;
- All remedial and completion work carried out within the specified time under the direct supervision of nominated, qualified and experienced personnel;
- Monitoring and supervising completion and handover against the programme;
- The provision of the required number of 'as built' and installed record drawings, plans, schedules, specifications, performance data and test results;
- Commissioning and test reports, calibration records, operating and maintenance manuals including related health, safety and emergency procedures;
- Planned maintenance schedules;
- *Monitoring proposals for the training of engineering and other services staff and assistance in the actual implementation of agreed schemes;*
- Ensuring that hand over takes place when all statutory inspections and approvals are satisfactorily completed but does not take place if the client/tenant cannot have beneficial use of the facility, i.e., not before specified defects are 'made good', indicating likely consequences and drawbacks of premature occupation;

- Setting up procedures to monitor and supervise any post-hand over works, which do not form part of the main contract and to monitor the defects liability period;
- Initiating, in close cooperation with the Professional Team contract-charging measures in cases of difficulties with completing outstanding works or making 'good defects';
- Monitoring progress of final accounts by assisting in any controversial aspects or disputes, and by ascertaining that draft final accounts are available on time, and accurate.

CHAPTER – THREE

CRITERIA FOR ACHIEVING PROJECT SUCCESS

3.1 PROJECT MANAGEMENT SUCCESS

The use of Project Management techniques in achieving project objective has become popular over the years. Consequently, the success of Project Management is often associated with the final outcome of the project. But according to Munns and Bjeirmi (1996), it has been shown over time that project management and project success are not directly related. They further wrote that the objectives of both project management and the project are different and the control of time, cost and progress, which are often the project management objectives, should not be confused with measuring project success. This viewpoint is corroborated by Wit (1988) who stated that “experience has shown that it is possible to achieve a successful project even when management has failed”. There are many examples of life projects, which are relatively successful despite not being completed on time, or being over budget.

3.2 FACTORS THAT INFLUENCE PROJECT MANAGEMENT SUCCESS

The outcomes of project management success are many. Munns and Bjeirmi (1996) believe that the outcomes would include the obvious indicators of completion to budget, satisfying the project schedule, adequate quality standards, and meeting the project goal. Conversely,

Avots (1969) believes that the factors which may cause project management to fail to achieve these would include, among others,

Lack of project management techniques

Inadequately defined tasks

Inadequate basis for project

Top management unsupportive

Avots further opined that these factors and others would suggest that project management requires planning with a commitment to complete the project; spending time to define the project adequately; ensuring correct and adequate information flows; accommodating employees' personal goals with performance and rewards; and making a fresh start when mistakes in implementation have been identified.

Goldhaber (1977) listed four factors that affect a project's success as;

- i. Economic and Financial Planning
- ii. Technology
- iii. Increased Size of Project
- iv. Inflation and Construction Speed

The first factor refers to the economic feasibility of financing a project. In other words, the value or benefit and costs of a project should be appraised at the inception of the project.

The concept of value however differs between public and private organisations. Private organisations have to weigh the cost of funds against the potential benefits that will be

derived by the organisation while the value of public projects is mostly social in nature. Increased project size, on the other hand, requires greater involvement of a variety of experts during the early stages of planning and design. With regards to technology, there is an increasing availability of a wide range of design and material alternatives with respect to probable cost savings. Information technology has also gained greater prominence in recent years.

Inflation in relation to construction speed is also an important consideration. Prices of construction materials have soared over the years. For instance, the cost of a bag of cement rose from ₦ 55.00 in 1993 to about ₦ 1200.00 in 1997, an increase of over 2000%. The trend is similar for other building materials.

Mosaku (1982) stated some of the factors that hinder progress on construction projects as design changes and inadequacies, design priorities being at complete variance with other requirements and the stage of technological development, the management procedure adopted and government policies.

In an empirical study, Ashley *et al* (1987) discovered that; "successful construction projects result, at least particularly, from more emphasis on the following areas: planning effort (construction and design), project manager goal commitment, project team motivation, project manager technical capabilities, scope and work definition, and control systems".

Hendrickson and Au (1989) reported the responses, obtained from six contractors with regards to successful projects. These are:

- i. Well defined scope
- ii. Extensive early planning
- iii. Good leadership, management, and first-line supervision
- iv. Proper project team chemistry
- v. Quick response to changes
- vi. Engineering managers concerned with total project not just the engineering elements.

Whereas, the major factors cited for unsuccessful projects are:

- i. Ill-defined scope
- ii. Poor management
- iii. Poor planning
- iv. Breakdown in communication between engineering and construction
- v. Unrealistic scope schedules and budgets
- vi. Many changes at various stages of progress
- vii. Lack of good project control.

Carrroll (1989), reported that the Construction Industry Institute (C.I.I) of the United States of America has identified eight elements that determine project success. The

elements, which define the relationship between the owner, designer and builder are stated as follows:

- i. Key Leaders
- ii. Compatible Objectives
- iii. Design Basis
- iv. Project Strategy
- v. Roles and Responsibilities
- vi. Information Systems
- vii. Qualified People
- viii. Working Relationships

The items listed above which define the relationship between the owner, designer, and builder are discussed below.

- i. Key Leaders

It is believed that "there are three key leaders that are concerned primarily with the flow of work rather than the accomplishment of specific work packages. These leaders are the "Project Executive", the "Owner's Project Manager", and a "General Superintendent".

The project executive's function is during the definition and planning stages. He establishes a clear direction for the project.

The owner's project manager on the other hand, "takes direction from the project executive in the management of design, procurement and construction activities".

The owners project manager may not have direct control of resources and the work might be contracted to different business units. However, he must ensure that the work is accomplished. This is a very important management function.

A general superintendent's principal function is "the co-ordination of field activities. The design is transformed into physical reality by specialised groups of people and equipment who should work in harmony.

ii. Compatible Objectives

This can be viewed from two vantage points, viz; intra and inter organisational. The intra organisational objectives deal with the various parts of the owner's organisation. There is the need to prioritize, on an overall basis, the safety, quality, schedule, cost, administrative requirements and social and regulatory requirements.

When all these have been established, they should be reinforced and communicated through "the various contracts and planning documents". This is the beginning of the second interface, or inter-organisational relations. The communication should continue throughout the life of the project so that differences could be discussed and settled without delay.

iii. Design Basis

The design basis is "the definition of the understanding between the owner and the designer". This needs more improvement than any other step in the construction process. It is a reiterative process in which a change in one area can produce a change in another.

A constructability analysis should also be undertaken. It is an effort to reduce the actual construction cost. Although it is the responsibility of the contractor, it should be undertaken as part of the design basis so that "significant improvements in construction methods can be accommodated by the detail design".

iv. Project Strategy

The project strategy is "an overall plan to accomplish the project and a schedule to accomplish this plan". The major constituent parts of a project strategy include contracting strategy, a facilities plan, an external map and project schedule.

A contracting strategy includes an organisational chart and functions, an acquisition plan that identifies potential sources of services, and the means of obtaining these resources. It also defines how the necessary people and skills will be brought together.

A facilities plan identifies the general environment in which the work will be accomplished; "Work locations, temporary facilities, logistics and communications must be defined.

An external map is necessary because of environmental interactions. Many factors such as individuals, groups or organisations may influence the project even though, they may not have direct contractual relationship.

The project schedule is the "time-phasing of engineering, procurement, and construction tasks required for each system within each facility on the project". Interestingly, it corresponds to the work package definitions from the contracting strategy. Typically, a project schedule must include input from all significant parties.

v. Roles and Responsibilities

Roles and responsibilities of the participants on a project are normally established by contractual agreements. The emphasis is normally on "specifying the facility or services to be purchased, the price, and the penalties for non-performance".

During the contract phase, they should be written to promote co-operation. It was observed that many contracts that bind business units together tend to isolate the individuals assigned to do the work.

It should be remembered that responsibility goes with authority, so risks should be assigned to the party that can best control them.

vi. Information System

The ability to integrate data within each key construction process is a very important aspect of project management. This should always be done promptly as erroneous or late information can jeopardise the chances of the project being successful.

The construction industry has tried to adopt the use of computer technology for information processing purposes with "mixed results". This is due to the presence of different data phases for each process on the project. Project management information systems should be able to integrate the data for each process on an overall basis. Current systems, however, do not offer this level of functionality, (Tighe 1997). There are however good prospects for the future. For instance, Power Project 4, which is the most useful project management software in the construction industry, according to ASTA (1997), has the following features:

- a. Ease of use
- b. Unique segmented linked bar charts
- c. Powerful annotation communicating plans effectively

- d. Comprehensive resource management features with dynamic onscreen histograms and resource modelling
- e. Integrated costing for budget control and cash flow forecasts
- f. Baseline provides immediate analysis of past performance
- g. The best presentation quality output.

These features promise substantial savings in the project cost, especially personnel cost and also readily available information. It is also possible that in future "paperless" systems will be achieved.

vii. Working Relationships

Right from the beginning, participants to a project should have as their primary objective, a personal commitment so as to make their system work. In order to enhance this, individuals should be encouraged to jointly develop a flow diagram of the relationships.

Bently and Rafferty (1992) believe that, successful projects are alike in many ways. They outlined the "common denominators of successfully completed construction projects" as;

- a. Goals Commitment
- b. Contracts
- c. Project Team Staffing
- d. Communication

- e. Pre-construction Planning Sessions
- f. Procedures Manual
- g. Schedule Control
- h. Sub-contracts
- i. Monthly Progress Reports
- j. Meetings
- k. Job Close-out
- l. Quality Control

a. Goals Commitment (Compatible Objectives)

The owner, architect/engineer and contractor must agree on a philosophy at the onset of a project. They may have different goals in mind for the project but they must spell out their common goals.

b. Contracts

Well written contracts are direct benefits of establishing project goals because they merely restate the commitments that the owner, architect/engineer and contractor have made. They will be equitable and state the scope of work and performance, including owner's responsibility for performance required to support goals.

c. Project Team Staffing (Qualified People)

Each organisational unit on the project should be staffed with qualified people. Obviously, the project leader is the most important, (followed by other key leaders). This is so because the project leader has to coordinate and integrate the sub tasks of other people into the overall task of successfully completing the project.

d. Communication (Information Systems)

The communication of project information is of paramount importance to the successful execution of the project. Project managers (leaders) have to communicate with team members in a wide range of issues. According to Kliem *et al* (1997), “whatever the topic under discussion, it is important to have mechanisms in place to sustain communications throughout the course of the project” through “reports, forms, meetings, newsletters and procedures”. They also opined that the idea is to communicate openly and honestly on a regular basis.

e. Pre-construction Planning Sessions

Pre-construction planning sessions entail reviewing site plans, architectural plans, major project control systems and other parts of the project. The participants objectively review all these documents and proffer solutions and alternatives in materials and constructional methods. The aim is to achieve the most important objective, i.e. to construct the facility with the intended aesthetics for the lowest possible cost in the shortest possible time frame.

Pre-construction planning is important towards achieving a successful project. Traditionally, it is the duty of the project manager and the superintendent, but other personnel with special expertise could also be co-opted. The sessions are more effective "if held away from the distractions of the office".

f. Procedures Manual

If pre-construction planning sessions are fruitful, a comprehensive project procedure manual will be the outcome. The document should outline precisely, specific methods, systems and flow of information required, to attain the stated goals and objectives.

g. Schedule Control

Schedule control is the process of ensuring that milestones are successfully achieved. Schedule control is derived from the project goals and contract provisions. The immediate milestones are those agreed on by the project manager and the superintendent. Detail schedules are then built around the milestones.

The construction schedule yields a detail procurement schedule listing all items, the dates that they will be needed and fabrication times (if applicable).

The procurement schedule becomes the means for monitoring the availability of materials required to support construction.

h. Cost Control

Cost control is essentially a "matter of adequately projecting the remaining estimated hours of design and construction". This requires detail actual costs. A cash flow curve is a good monitoring aid for this purpose with a plot of planned versus actual costs. The project manager on a project must always have a firm grasp on the efforts being made in comparison with the projected plan.

i. Subcontracts

On a big construction project, subcontractors do a substantial percentage of the works. If they are to carry out their functions effectively it becomes imperative to negotiate their contracts "promptly, fairly, and accurately". And it has been observed that subcontractors work best with general contractors who:

- i. Pay on time
- ii. Support them in the change order process
- iii. Plan and co-ordinate the work components efficiently
- iv. Give them credit when credit is due and constructive criticism when it is called for.

j. Monthly Progress Reports

Monthly progress reports should contain things like planned versus actual cost schedule, subcontract negotiation status, procurement cash flow problems and planned solutions. They are essential and should be regular. They should not be complicated.

k. Meetings

Meetings (site) are a means of communicating the truth about the project, so that team members, can identify problem areas and develop 'recovery' plans. This is done after reviewing costs and the health of the schedule. The frequency of holding meetings will depend on the type of project. The important participants at these meetings are the owner's project manager, the architect/engineers and the contractor.

l. Job Close Out

The procedures for a smooth job closeout should be stated concisely in the procedure manual. They could be modified during construction but the general provisions will remain the same. If adequate precautions are not taken, an "otherwise smooth construction project" can be marred by long, drawn-out, unprofitable close out.

m. Quality Control

Quality control is an essential ingredient of any successful project. It must be designed and built to the level of quality agreed to in the project goals and it must be closely scrutinized throughout the entire process.

According to Ward (1994), "effectively planning the three variables – work, resources and time - is what ensures project success". He also wrote that;

A predictable pattern results when project managers fail to understand the dynamics of work, resources, and time. First, schedules are extended, usually more than once. When this does not work, resources are added, making problems that much worse. Finally, in an attempt to bring the project to a conclusion, the work effort is cut back, often to the point at which the resulting system no longer meets the requirements it was originally meant to address. Heroic efforts to meet the original schedule by working large amounts of overtime for extended periods will not work. Error rates will soar, project communication will become increasingly difficult, and team-work will be severely strained. Often, this drives the project into a never-ending sequence...

Finally, Ward concluded that by understanding the dynamics and interrelationships of the variables of work, resources and time, resources can be better managed, people and time can be balanced and projects can be kept on course.

In his paper, Ward discussed project management methodologies, which are directed at controlling the work to be done, the resources to be assigned to the project and the schedule within which the project is to be completed.

It is obvious that all these factors are directly under the control of the project manager. However, there are other factors, which may determine the likelihood of project success or failure. Ward (1995) identified these as organisational forces and that these must be overcome in the course of the project. A knowledge of organisational behaviour is of

paramount importance especially on projects with tight time constraints. He concluded as follows:

There will always be people who feel that their own interests (or the interests of the organisation) are best served if the project fails. Failure is always possible if the project team is not diligent... There are no easy answers for these problems, and may be no answers at all. The best a project manager can hope for is to be aware of the problems and to make management aware of them as well. Management support will always be a major determinant of project success, especially on projects with tight time schedules.

In an exploratory study into the problems being encountered when implementing projects, Falshaw (1994) adduced the causes of failure of projects to inadequate planning procedures, lack of commitment to project, inadequate control procedures and inadequacy of financial resources committed to the project. The major recommendation of the study was that many organisations need to improve their project planning procedures.

Dingle (1997) listed a number of pre-conditions for project success based on a very detailed study of case histories of large projects. Some of these are:

- i. Comprehensive and clearly communicated project definition;
- ii. Clear recognition of effect of external factors on the measures of project success;
- iii. Potentially harmful effects of urgency properly appreciated;
- iv. Good design/technology management, especially where there is technical uncertainty or complexity;
- v. Good planning, clear schedules and adequate back-up strategies;
- vi. Full financial analysis of all project risks undertaken;

- vii. Support obtained from relevant authorities;
- viii. Proper consideration and control of community factors;
- ix. Good, positive client, parent company and senior management attitudes, interrelationships and commitment;

The author mentioned that the list is not an exhaustive one and that it is not in any particular order. These preconditions, however 'constitute a kind of scene-setting for the project manager in front of which he must play his role'.

3.3 PARTNERING (A NEW APPROACH TO SUCCESSFUL PROJECT MANAGEMENT)

Traditionally, large-scale construction projects present a "number of challenges with respect to successful project management (Moore, *et al* 1992). The client and contractor organisations are different and distinct, and might not have even met before. They have a different set of objectives and interaction is generally formal. This sometimes results in conflict and adversarial relationships which result in "cost over-runs, delays, litigation..." (Anonymous 1994).

Partnering is an alternative management process that seeks to produce organisational change to resolve these traditional problems. Moore, *et al* (1992) defined it as; "a long-term commitment between two or more organisations for the purpose of achieving specific business objectives by maximising the effectiveness of each participant's resources". The

relationship is based on trust, dedication to common goals, and an understanding of each other's individual expectations and values. It can be start-up partnering (which is established at the beginning of a major project) or turnover partnering, (which is done in order to put a faulty project back on track). It is a relatively new phenomenon and according to Anonymous (1994), "it has become increasingly prominent in the last few years".

The primary advantage of partnering is that it recognises and honours the objectives of all the parties to the process thereby creating true synergy for project success.

3.3.1 The Partnering Process

Partnering is generally established through a structured, facilitated process. According to Anonymous (1994), in a "start-up partnering process, members of a project team - owner, general contractor, engineer, major subcontractors, equipment suppliers - come for a one day conference prior to the start of construction". The conference is normally held in an environment of total neutrality. All team members are encouraged by a facilitator to express their conceived perceptions about other participants. By this, the project starts on a clean slate and the participants go on to make commitments to one another that are grounded on mutual trust.

Moore et al (1992) proposed a step-by-step, structured approach to the partnering process.

It consists of eight flexible elements. The steps are reproduced below:

i. Begin Early

If partnering is to be used effectively, the decision by both parties is needed as early as possible and the process initiated before the contract is awarded.

ii. Obtain Commitment from Top Management

It is essential that top levels of management in both organisations must be fully committed to the concept and the process. In other words, without the continuing commitment and support of management, the process will have little chance of success. The commitment must clearly run from top down.

iii. Select Members of the Partnering Team

The core members of the partnering effort will be the on-site managers. The number of participants will however vary from project to project.

Care should be taken in creating an equitable and balanced team so that it is not "loaded" with personnel from either side. The total number should be kept to a minimum in order to facilitate teamwork. However, provision should be made to enable new members join the team if the need arises

iv Identify a "Champion"

In order to track, care for, monitor and develop the process, individuals from each organisation must be assigned responsibility for maintaining the momentum of

partnering throughout the life of the project. This is because partnering enhances the objectives (such as quality, safety, cost management, etc) that are of mutual interest to project managers of both organisations.

The individuals provide the administrative and logistic support that is required to make the process effective. Their activities include scheduling and arranging follow-up meetings, distributing information to all parties, and follow up on procedures.

v. Select Facilitators

Facilitators are individuals who are "objective participants" skilled in team building and group dynamics. They are not members of the technical managerial groups and as such have no vested interests in the decisions reached by the group. They serve to manage the process of meetings. They must remain neutral and their aim is to assist the team in reaching a consensus. The skills needed by a facilitator are in the fields of management training, organisational development, and communication.

vi. Conduct the Initial Workshop

An initial workshop, which is facilitated, should be organised as soon as possible after the contract award. The workshop is generally held over a three-day period away from the site or offices of the participants as this enhances the "group dynamics" that are necessary for partnering to succeed. The workshop activities are divided into three general categories, viz.:

- (a) Team building and self-examination exercises.
- (b) Examination of experiences gained from previous projects, and development of partnering goals.
- (c) Development of a partnering process including team problem solving, conflict management, communication channels, and an implementation plan.

vii. Follow-up

Follow-up sessions are necessary for maintaining the momentum of the partnership.

They should be scheduled at regular intervals to reinforce team-building skills and to assess the progress of the partnership. They also offer an opportunity to engage in team problem solving of current project issues and to revise plans with respect to current project status.

viii. Perks

These are items or actions done for the sole aim of adding to team spirit, e.g. a logo for the project. On very large projects the beginning of the project is celebrated by fanfares and keepsake items such as coffee mugs, caps, vests, etc. can be provided.

The eight elements discussed above are represented in Figure 3.1.

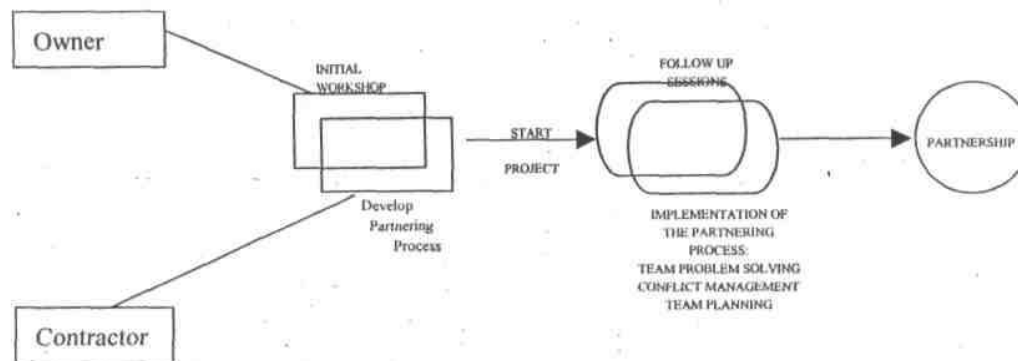


Figure 3.1: Evolution of Partnership Process
SOURCE: Moore, *et al* (1992)

3.4 STEPS TO SUCCESSFUL PARTNERSHIPS

The ingredients to a successful partnering relationship was describe by Kanter (1989) in the form of “Six Is”. These are:

- i. Importance
- ii. Investment
- iii. Interdependence
- iv. Integration
- v. Information
- vi. Institutionalisation

Their overall effect was summarised by Moore *et al* (1992) as follows:

The relationship is important enough to both parties that each provides the resources and organisational inputs necessary to make the partnership work. The partners agree that the long-term nature of the relationship justifies such investment in the project, and then recognize their interdependence. To keep the partnering process working, the organisations integrate their communications and activities, and keep each other informed. Finally, the commitment to the partnership is such that partnering activities are institutionalised in the organisations through mechanisms as diverse as social ties.

According to Kanter, when these "Is" are present, the trust necessary for a successful partnership can develop. And consequently, successful project outcomes are achieved. The "six Is" are depicted in Figure 3.2.

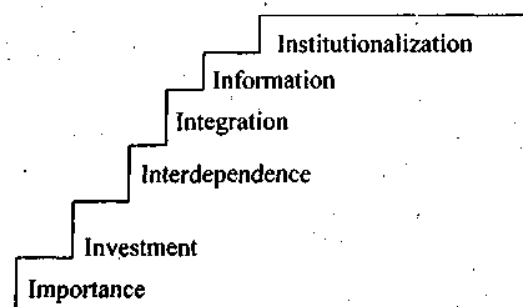


Figure 3.2: Steps to Successful Partnerships
SOURCE: Moore et al (1992)

3.5 DETERMINANTS OF PROJECT SUCCESS

The measures or determinants of success are the outputs of the parameters (inputs) of success. They are indications of the degree to which initial project objectives are achieved

at the end of the project. The various definitions of success in projects encompass criteria that can actually be considered as standards against which to measure performance.

In their empirical study, Ashley *et al* (1987) identified "Six criteria used to measure construction project success". They are budget performance, schedule performance, client satisfaction, functionality, contractor satisfaction, project manager/team satisfaction.

Similarly, Freeman and Beale (1992) identified seven such measures of success as follows:

i. Technical Performance

This measures the extent to which technical requirements specified at the commencement of the execution phase were achieved.

ii. Efficiency of Project Execution

This measures the degree to which targets of time and cost were met.

iii. Managerial and Organisational Implication

This is a measure of client and user satisfaction, incorporating the degree to which the project was carried out without disturbing corporate culture or values.

iv. Personal Growth

The satisfaction of the project team, particularly in terms of interest, challenge, and professional development.

v. Project Termination

The completeness of termination, the absence of post-project problems, and the quality of post audit analysis (where relevant).

vi. Technical Innovativeness

The ease with which the product resulting from the project can be manufactured, and its commercial performance (where relevant).

The last item, i.e. manufacturability and business performance, clearly refer more to the success of ventures rather than for construction projects. It was observed that project sponsors are predominantly concerned with meeting the three targets of technical performance, cost and duration.

3.6 THE PROPOSED CRITERIA

The concept of project success generally, and in construction projects in particular, the parameters that influence success and the determinants or measures of success have been discussed. Several viewpoints by various authors have been highlighted. The views expressed are generally similar with minor variations depending upon the focus of the author.

For instance, extensive early planning (Hendrickson and Au, 1989) refers to most of the components of project strategy (Carroll, 1989). In the same vein, qualified people and

working relationships (Carroll, 1989) both have to do with project team staffing (Bentley and Rafferty, 1992).

After an appraisal of the various contributions, a set of nine streamlined criteria was selected. These are;

1. Economic and financial planning
2. Project controls
3. Project strategy
4. Management, leadership and supervision
5. Staffing
6. Information and communication
7. Technology
8. Project planning
9. Inflation and construction speed

In the same vein, a set of three streamlined factors, which can be used to measure success (determinants), was derived. These factors are;

1. Efficiency of project execution
2. Client satisfaction
3. Participant satisfaction

3.7 RESUMÉ OF THE CRITERIA

In subsequent discussions, letters F and D followed by Arabic numerals will be used to denote the factors and the determinants respectively. For instance, Factor 1 will be denoted F1 while determinant 3 will be denoted D3.

Factor 1 (F1) Economic and Financial Planning

This refers to the appraisal of a project's economic and financial viability, and should of necessity be undertaken at the inception of the project. Here, the project value and cost are of paramount importance, the value of the project being the utility or benefit of the completed project, according to Hutchinson (1993). On the other hand, project costs are all the expenditures incurred in completing the project to the condition for which value was calculated. In other words, there is need for a cost benefit analysis because, to a large extent the degree of Client commitment to a project will depend on the perceived benefits of the project. It is also important to prepare a financial plan (budget) which will enhance cash flow during the execution phase of the project.

Factor 2 (F2) Project Control

According to Wills (1992), project control provides information that is necessary for reporting on project status. "Projects, typically, are dynamic and cannot be subject to rigid procedures", (Briner, 1993). However, there is need to keep track of events and costs so

that modifications can be made where and when necessary as work progresses. Kliem et al (1997) believe that status collection and assessment are two ways to ensure that project plans are followed and that these methods involve collecting data about the impact of performance on the entire project.

According to Lock (1987), controlling the cost and time scale of a project must be accorded top priority, if the project is to stand any chance of success. This is more so in Nigeria where time lost can result in enormous costs.

Factor 3 (F3) Project Strategy

Project strategy is an overall plan to accomplish the project and a schedule to accomplish the plan. The major constituent components of project strategy include contract strategy, a facilities plan an external map and a project schedule, (Carroll, 1989).

Factor 4 (F4) Leadership and Supervision

This factor is concerned with providing good leadership, motivation and effective supervision of the workforce. According to Kliem et al (1997), project leadership is an important function in the successful completion of any project endeavour; and that regardless of the size and complexity of a project, leadership can have tremendous impact on the results achieved.

There is therefore the need to create an environment that encourages people to bring out their best in a way that meets the project goals and objectives. A structure should be instituted that will help to maximize the effectiveness and efficiency of people.

Factor 5 (F5) Project Team Staffing

This factor deals with the issue of assembling a team together. It is important to get the right mixture of people and combinations of roles to achieve the task/project objectives. The pursuit of qualified and experienced personnel should therefore, be given adequate attention. Briner, *et al* (1992) mentioned two approaches (theories) about the relation between task, people and roles. The 'classical' theory starts with analysing the tasks to be done, from which roles are defined. The second theory starts with the tasks but focuses on success criteria. It then looks for people who would be committed and able to contribute towards fulfilling those criteria. Their roles are then defined in line with what they can contribute.

Factor 6 (F6) Information and Communication

Information and communication channels are very important in the achievement of successful project outcomes. Kliem *et al* (1997) believe that developing a good communication structure for a project is a prerequisite for success, and involves employing mechanisms of effective communication up and down the chain of command. It should be borne in mind that correct information may still not cause things to happen, but erroneous

or late information can cause a lot of trouble. Therefore, appropriate ways that will facilitate the access and distribution of project information should be developed and implemented.

Factor 7 (F7) Technology

The technologies that will be adopted during construction should normally be determined during the design stage and must be thoroughly considered. It is helpful to review previous projects in order to explore the possibility of applying previous technology. Both architectural and engineering designs should be carefully reviewed. Innovative managers will normally have an advantage in providing solutions to emerging problems.

Factor 8 (F8) Planning

Planning is undoubtedly one of the most important aspects of project management. The project manager/team should determine, to the best of their abilities, a series of actions to be undertaken to complete the project. In order to accomplish this task, the project manager/team must initiate a planning process. A definitive listing of tasks is made which provides the necessary information to anticipate and the quantity and quality of resources to complete the project. It also enhances the preparation of a meaningful budget and time estimates. The plan also provides a basis for measuring progress.

Factor 9 (F9) Inflation and Construction Speed

This is important especially in a dynamic economy such as Nigeria's. The commitment of the client and the project team to the successful completion of the project is of paramount importance. Facilities and materials should be provided early and variations to original designs should be reduced to a minimum if not completely eliminated. In order that the speed of construction may not be retarded, an organisational arrangement should be established early and lines of authority and responsibility clearly delineated. This will ensure that appropriate actions are promptly instituted.

An important point to note here is the issue of fluctuations. Advance payments can be used to reduce the incidence of fluctuations on projects, especially where such payments are tied to specific materials that are prone to inflation.

Determinant 1 (D1) Efficiency of Project Execution

This deals with the degree to which targets of cost, time and quality are met. Normally, there is always an element of risk and uncertainty especially associated with estimates-which according to Hutchinson (1993), are "expert predictions of future occurrences". He further asserted that risk is the possibility of a forecast not being accurately fulfilled by the actual occurrence of cost. So it is expedient to identify risk elements so that strategies to accommodate them can be designed at the earliest stages of a project. This factor also refers to the completeness of termination and the absence of post- project problems.

Determinant (D2) Client Satisfaction

These are some of the generally accepted parameters used to measure the success of a project undertaking. Wills (1992) mentioned it among the “criteria most commonly used to measure a project’s success. Here the issues to be considered include the degree to which a built facility satisfies the needs of the users of the facility and the client’s objectives, whether the client is public or private.

Determinant (D3) Participant Satisfaction

Both Ashley et al (1987) and Wills (1993) have referred to this factor as the satisfaction of the contractor and the professional team. It is concerned with the degree of realisation of the participants’ expectations. Kezsbom (1990) mentioned that “people enter into projects with a variety of expectations” some of which are “ professional respect, material benefit and technical growth”.

CHAPTER FOUR

PROFILES OF LIFE PROJECTS

4.1 INTRODUCTION

The case study approach was one of the research strategies adopted. This is partly due to the exploratory nature of the research. Bresnen (1990) used this approach for his study. Also, for this aspect of the work, a more general overview of specific cases was undertaken. For this reason, the cases were explored longitudinally and analysed qualitatively. Qualitative techniques were employed because specific information about a particular project largely depends on situational factors.

Five cases were studied. In all the cases, a formal contract was signed. The unit of analysis for each case was taken to be the particular project's environment. It was not for instance, intended to investigate the full range of activities undertaken by any single organisation e.g. the main contractor. Rather, the main focus of attention was the 'core project', the unit of analysis encompassing the network of inter-organisational relationships. The boundaries of the research were defined to be the overall period over which the project was executed.

Each of the five cases was discussed under five broad classifications as follows:

Brief preparation

Appointment of consultants

Tendering and contract award

Highlights of project development

4.2 THE TEACHING HOSPITAL PROJECT (THP)

4.2.1 Brief Preparation

The Federal Government sponsored the establishment of a 500-bed standard Teaching Hospital in one of the Federal Universities. In order to achieve the project's objective, a Task Force was set up to implement the "execution and construction of the hospital", (see Appendix C). The project was to be executed between October, 1990 and October 1992.

A project manager was appointed to directly oversee the activities of the project. At the outset, the project manager had observed that "in view of reports received on new Teaching Hospital Projects around the country, it would be extremely difficult to construct and equip a 500-bed hospital within the time envisaged". He then advised that the design of the hospital should be done in phases such that Phase I would provide tertiary medical services and clinical training for medical students of the University. The Design philosophy adopted should therefore take cognisance of these.

The project manager's proposals were accepted. It was also agreed that the hospital would be low rise with the least possible reliance upon mechanical and electrical

equipment. All buildings would have cross ventilation and natural lighting. Deep plans would be avoided. Air conditioning would only be used in departments whose functions require it such as operation theatres, x-ray unit and special baby unit. The success of any design would depend on how effective the proposal was able to integrate these requirements. The checklist of buildings for Phase I of the hospital complex was:

1. Accident and emergency block
2. Medical ward
3. Theatre block
4. Maternity ward
5. Gynaecology ward
6. Surgical ward
7. Service block (kitchen, laundry and dining)
8. Mortuary
9. Ambulance station and workshop

Consulting architects were invited to submit proposals for the design of the hospital in October 1990.

4.2.2 Appointment of Consultants

The prime consultants for the project were appointed and officially informed in October 1990. The prime consultants were also appointed as consultant architects and

structural engineers. They were to a large extent successful in meeting the requirements of the brief. Other consultants on the project who worked under the supervision of the prime consultants were also appointed in October 1990 but this was communicated to the prime consultants only in February 1991. The list of all the consultants is presented below.

Architects/Structural Engineers

Messrs. Hospitex (Nigeria) Limited,

22 Ahmadu Bello Way, Kaduna.

Quantity Surveyors

Messrs. Prime and Bell,

10A Wurno Road, Kaduna.

Mechanical/Electrical Engineers

Messrs. Ecological Consultants,

29 Rabah Road, Kaduna.

The first meeting of the professional team was held on the 3 January 1991. The aim of the meeting was for the team “to acquaint themselves with each other, set targets and prepare contract documents for endorsement”. The second meeting of the professional team was held on the 7 February 1991. Its purpose was for the team members to know their responsibilities.

4.2.3 Tendering and Contract Award

The main Contract

Invitations to tender for the project were sent out on the 28 January 1991 before some consultants were informed of their roles. Prospective tenderers were required to submit their programme of work as an integral part of their tenders. It formed part of the criteria for determining the most successful tender. Four contractors were invited to tender. They were:

1. Messrs. A. G. Ferrero and Company Limited
P. O. Box 125, Kaduna.
2. Messrs. Vicinanza Construction Limited
I Bida Road, Kaduna.
3. Messrs. Technoexport (Nigeria) Limited
168 Awolowo Road, Ikoyi, Lagos.
4. Messrs. Necco Limited
KM 24 Tama Road, Kano.

The tenders received were opened on the 2 April 1991 at a meeting of the Technical Committee of the Task Force. Relevant details as quoted by the contractors were recorded as shown in table 4.1.

Table-4.1: Tender Records for the Main Contract

Serial Number	Company	Tender Figure	Tendered Time
1.	AG. Ferrero	68,274,129:80	26 Weeks
2.	Necco	68,801,274:57	85 “
3.	Technoexport	67,856,662:04	56 “
4.	Vicinanza	59,069,703:05	85 “
5.	Consultants	59,355,693:78	30

A scheduled meeting of consultants was held on the 9 of April 1991 to consider these tenders after general analysis. The highlights of the tender analysis were:

1. Tender figures were very high in some cases. The Quantity Surveyors could not assess the level of overheads and preliminaries as a result of different company policy.
2. As advance payment generally decreases fluctuation, it should be made to the winning contractors if backed by a bond, reliability records and readiness to work. The consultants suggested an advance payment for between 25% and 30% of the contract sum.
3. Financial evidence and technical capabilities of the tenderers were compared.
4. Messrs. A.G. Ferrero were recommended for award at consultants' figure and an advance payment of 30% of the contract sum.

Messrs. A. G. Ferrero declined to accept the contract at the consultants' figure. It was therefore decided to invite them for negotiations. A discount of between five to seven

percent of their tendered figure was to be negotiated. During the negotiations, the contractors agreed to offer a discount of ₦ 1,000,000:00 from builder's work. In return, they requested for an advance payment of 40 percent. A bond would secure the payment. The contract was signed on the 18 of April 1991. The contractors officially took over site on the 24 of April 1991.

The Subcontracts

Selective tendering was adopted for the mechanical and electrical subcontracts. The mechanical and electrical consultants submitted the tender report on 1 May 1991. The subcontracts were awarded on the 17 of May and signed on the 18 of May 1991. The subcontract tender records are shown in table-4.2.

TABLE-4.2: Subcontract Tender Records

Serial Number	Subcontractor	Contract	Tender Sum ₦	Award Sum ₦
1.	Messrs. Taj World Wide	Generator set	3,585,384:00	Tender Sum
2.	Messrs. Scan Engineers	Incinerator	2,357,799:00	Tender Sum
3.	Messrs. 2-Way Comm. Limited	Telephone	4,848,800:00	Tender Sum
4.	Messrs. Benks	Plumbing, Waste Disposal	3,881,848:00	3,981,848:12
5.	Messrs. Elessy (Nig.) Limited	Electrical Installation	4,141,548:00	4,841,463:96
6.	Messrs. Olis Eng'g Ltd	Electrical Installation	7,454,866:35	7,754,887:00
7.	Messrs. Soko-Tech (Nig) Ltd.	Mechanical: Water Supply	1,253,899:92	1,403,898:90
		Boreholes	897,990:00	Tender Sum
		Sewage	8,500,000:00	Tender Sum

The electrical and mechanical engineering consultants observed some irregularities with the subcontract awards, which they communicated to the Task Force chairman on the 24 of July. The letters of award had earlier been copied to them. Their observations were:

1. In their tender report, they had recommended a 20% discount to the tender figure of Messrs. Olis Engineering. This had not been effected and they wanted to know if the discount had been waived.
2. The consultants had noticed that the award figure for Messrs. Elesy did not conform to their tender figure. After careful scrutiny, however, they discovered that the tender figure for Messrs. Olis was used. In the preparation of the contract documents, they wanted to use Messrs. Elesy's tender figure.
3. The consultants also recalled that earlier on Messrs. Taj Worldwide had offered a discount of ₦ 100,000:00, which was not reflected in their award letter.

Messrs. Ecological consultants sought for clarification on the issues raised in order to finalise the preparation of the contract documents. The main contractors also intimated the Task Force on some "irregularities" that they had observed in the award of subcontracts. They mentioned that with respect to the main contract agreement, they were responsible for the entire work, which made up the contract sum (which included all specialist items). However they could take responsibility only if:

1. Details of accepted quotations were made available to them.

2. Nominated subcontractors forthwith got in touch with them for the formalisation and signing of the various sub-contract documents.

The main contractors further advised that henceforth all communication and payments be made through them otherwise they would decline responsibility for things they knew not. Impliedly they could only assume responsibility for their own work items (i.e., excluding all subcontracts).

Messrs. Prime and Bell also intimated the Task Force on some “crucial issues” when they received copies of some of the subcontract award letters. Their observations were:

1. All services works had been included in the main contract agreement as specialist items and should be signed between the main contractors and the respective subcontractors. However, should the employer (the Task Force) desire making any direct payments to the subcontractors, it must be with the consent of the main contractors.
2. They had only received award letters for generators, incinerators and plumbing. They were awaiting the receipt of the other specialist subcontract awards.

4.2.4 Highlights of Project Development

All architectural designs were completed by the 19 of February, 1991. The Quantity Surveyors prepared and submitted budget estimates for the project during the second week of February. All electrical and mechanical drawings were completed by the first week of April.

The issue of irregularities in the subcontract awards raised by the main contractors was only partially resolved. The subcontractors were informed that their work must always be certified by the main contractors before any further consideration. However, Messrs. A. G. Ferrero were still aggrieved that all correspondences by the subcontractors were routed directly through the consultants and not their “goodselves”. In some cases they were not even copied.

The grievances expressed by Messrs. Ecological Consultants with regards to the subcontract awards were addressed. They were informed that such issues were beyond their jurisdiction. Their responsibilities were strictly advisory and as such they had no right to question any decisions made by the Task Force.

Messrs. Prime and Bell prepared the first financial statement of the project in line with the directives of the Task Force. This became necessary in view of some “inadvertent

expenditure incurred". The statement of accounts as at 12 July, 1991 is shown in table-4.3.

TABLE-4.3: Statement of Accounts as at 12 July, 1991

Original Contract Sum	₦ 67,325,153:00
Notional (projected) Final Account Figure as at 12 July, 1991	₦ 97,025,624:00
Additional Budgetary Requirement	₦ 29,696,471:00
Total Payments to Date	₦ 16,352,902:00
Retention as at Today	₦ 375,325:00
Additions Due to Nominated Subcontractors	₦ 10,016,682:00
Additions Due to Architects' Instructions	₦ 74,325:00
Anticipated Escalations	₦ 21,604,996:00

The following variations were introduced during construction.

1. Change in conventional sewage treatment plant. This increased the power requirement, which prompted a change in the size of the transformer (from 500 to 750 KVA).
2. A variation to the ceiling originally designed.
3. Change in some electrical accessories.

The cost implications of these variations were not reported.

It is noteworthy that the project's expenditure had already far exceeded the preliminary budget. When the original budget was expended, progress was halted and additional

funds had to be sourced for in order to complete the project. This took a long time and the initial Completion time of 26 weeks was also over run.

The Task Force was only able to acquire the funds in May 1992, when all outstanding claims were immediately settled. The Task Force therefore directed the consultants, the main contractors, and the subcontractors to expedite action in order to complete the project. In spite of the Task Force's effort to promptly settle all certified outstanding claims, progress was slow.

On the 21 of July, 1992 the Task Force Chairman wrote "to all concerned" that "in view of the government's commitment to the Task Force that funds would be provided to start Phase 2 of the project in earnest, and all works should be completed by the end of August 1992, before inspection would take place on the 27 of August. Any contractor or supplier that failed to meet the target should count themselves out of phase 2".

The anticipated completion by the end of August was not achieved. At the prompting of the Task Force, the prime consultants reported the progress on the project on the 9 of November 1992. In their report, the prime consultants concluded that several subcontractors were performing below expectation. Specific problems included:

1. The main cable linking the generator house with the treatment plant had failed the test and was to be replaced. Real action had however, not been taken. It was therefore questionable whether the contractor would be able to complete the job.
2. Boreholes and treatment plant had not been commissioned in the presence of consultants. The excuse that tests could not be carried out was not tenable, as mobile generating sets could have been used.
3. Medical gas plant had been supplied but installation had not been done. All efforts to persuade the subcontractor to finish the job proved abortive.

In view of the above, the prime consultants recommended "stringent action". However, the main contractors' performance was remarkable. A certificate of practical completion was issued to them on the 10 of December 1992.

Due to the persistent and subtle threats of the Task Force, all outstanding works were completed by the 31 December 1992. The final account figures are shown in table-4.4.

TABLE-4.4: Final Account Figures as at 31 December, 1992

Original Contract Sum	₦ 67,329,153:00
Notional Final	₦ 128,148,808:00
Certificates Issued to Date	₦ 118,715,355:00
Amount Due	₦ 9,432,958:85

4.3 THE BANK BRANCH OFFICE DEVELOPMENT PROJECT.

4.3.1 Brief Preparation

The government of a Northern State had incorporated a state-owned Bank. It hoped to open up more branches nationwide, consistent with the Central bank of Nigeria guidelines for the incorporation of commercial banks.

When a new State was created out of the former state, the Bank became the property of the two new states. In line with the bank's policy of opening more branches, the management of the bank decided, as a matter of priority, to open a branch in the capital of the newly created State because of its role as a co-owner of the Bank.

The Management approached the architects with a request to design a single storey building with a banking hall on the ground floor and offices on the first floor.

4.3.2 Appointment of Consultants

There were no records to show how the consultants were selected. However, the followings were appointed as consultants to this project in October 1992.

Architects

Messrs. Triad Associates, Kaduna.

Quantity Surveyors

Messrs. Prime and Bell, Kaduna.

Messrs. Aliyu Associates, Kaduna.

Structural Engineers

The consultants were instructed to prepare preliminary designs and cost estimates for the project before the end of December 1992. The architects prepared and forwarded sketch designs to the quantity surveyors on the 25 of November 1992. The Quantity Surveyors prepared the preliminary cost estimate in the sum of (₦ 10,280,859:00). It was however stated that the estimate excluded the cost of any abnormal foundations, cost of site surveys and site investigation, cost of strong room doors and cost escalations after the 14 of December 1992.

4.3.3 Tendering and Contract Award

The consultant architects were instructed to send out invitations to tender on the 7 of February 1993. The architects sent out invitations to three contractors in compliance with the instruction. However the client later forwarded the name of a contractor and directed the consultants to “invite any other company in the locality” and that completed tender documents should be sent directly to the client by the 1 of March

1993. The consultants sent out an invitation to tender to the contractor whose name was forwarded by the client and sent a blank Bill of Quantities to the clients advising them to “identify the local company and invite them”. As a result, the client provided a list of four more contractors all of whom were invited to tender. The record of tenders opened on the 3 of March is shown In table 4.5.

Table 4.5: Record of Tenders as at 3 March 1993

Company	Tendered Figure	Tendered Time of Completion
Pawa Enterprises Limited, Sokoto.	₦ 16, 703,302:00	40 weeks
Carlen (Nigeria) Limited, Kaduna.	₦ 14,119,261:93	36 “
Sanbath (Nigeria) Limited, Kaduna,	₦ 17,270,971:28	35 “
Aminci Construction Company, Sokoto.	Did not Tender	
Alhaji Saidu Usman (Consultants)	₦ 14,347,066:00	52 “
Recommendation (Consultants)	₦ 15,723,732:51	26 “

The consultants prepared and submitted the tender report on the 4 of March 1993. A meeting of the client and the consultants was subsequently held on the 31 of March to discuss the tender report. After deliberations the contract was awarded to Messrs. Pawa Enterprises in the sum of (₦13,500,000:00) and a completion period of 28 weeks. The award was however only communicated to the contractor (by the client) on the 21 of April 1993. The contractor’s acceptance letter was received on the 29 April 1993.

It was agreed that the site would be officially handed over to the contractor on the 14 of May. It was also agreed that the main contractor would be invited to tender for the Mechanical and Electrical subcontracts with other contractors since they were prime cost items.

4.3.4 Highlights of Project Development

A meeting of the consultants and the contractor was held on the 3 of May, during which a site handover arrangement was agreed as follows:

Appraisal and recommendation to client	6/5/93
Client's response	12/5/93
Site handover	14/5/93

It was also agreed that the contractor would apply for an advance payment. An application for the sum of ₦ 6,857,724.24 was subsequently submitted by the contractor. The consultant architects however, recommended for the payment of ₦ 5,244,077.00, which represented 60% of builder's work. It was stated that this decision was taken in order to realise a non-fluctuating contract for materials. Payment of this amount would be made to the contractor only on presentation of an advance payment bond. Messrs. Triad then advised the client to give this issue prompt attention so as to forestall any delays in the completion programme.

The contractor presented an advance payment bond obtained from a Bank to the architects on the 14 of May. The client was accordingly informed of this development. However, the bond presented by the contractor covered only 50% of the contract sum.

The details of the bond policy are as follows:

Nature of Contract	Proposed Bank Branch
Contract Sum	₦ 13,500,000:00
Period of Contract	28 Weeks
Premium Due	₦ 68,577:24

With the payment of the premium, the Bank assumed risk on 50% of the contract sum only. This meant that the Bank's liability would cease at the end of 50% completion. The advance was made to the contractor and the site was handed over to him officially on the 14 of May.

Shortly after the site was handed over, a meeting was convened. The main objects of the meeting were summarised and presented as follows:

Contract

Commencement date	14 May 1993
Completion date	24 December, 1993
Duration	28 Weeks

Site Meetings

Site meetings would be held on the last Friday of every month during which the contractor was expected to submit written progress reports and photographs. Questions on drawings, specifications and schedules could be raised. The architects would chair the meetings.

Information and Communication

All instructions to the contractor were to be issued through the architects only. All correspondence should be channeled through the architects or directly to the parties concerned but copied to the architects.

Programme of Work

The contractor would present an outline work programme for approval. The programme would be reviewed at every site meeting.

Finance

Payments would be based on monthly valuations and interim certificates. The certificates would be issued immediately after the monthly valuations, a week at the latest. Variations and re-measurements would be carried out jointly by the consultant Quantity Surveyors and the contractor's Quantity Surveyor although the employer might carry out a cross check.

Quality Control

The contractors would make all samples of materials available for the architects' approval and cube tests for the engineers' approval. The consultants would make occasional checks.

On the 22 of June, the contractor intimated the architects on the increased cost of sandcrete blocks (fluctuations) due to non-availability in the locality. The blocks were obtained from a nearby town. Transportation costs had also increased as a result of fuel shortage. The advice of the consultant Quantity Surveyors was promptly sought. The Quantity Surveyors' response was that fuel scarcity was no ground for fluctuation claims.

A site meeting was held on the 25 of June, during which the consultants expressed satisfaction with the contractor's progress. The next site meeting scheduled for the 30 of July could not hold and was in fact postponed twice.

On the 11 of August, the contractor communicated some grievances to the architects. The site meeting twice postponed (due to the inability of the consultants to attend) was affecting his payment due to valuations already carried out. This had an adverse effect on his cash flow and might affect the progress of work. On the 23 of August the contractor informed the architects that he would close the site temporarily because the labour force had been forced to travel to their various towns "in view of the political uncertainty in the country".

During the temporary closure of the site, the consultants prepared the Mechanical and Electrical documents for tender. Invitations to tender for the subcontractors were sent out to five contractors, including the main contractor on the 19 of October.

On the 10 of November, the severally postponed site meeting was eventually held. The main issue addressed was the contractor's request for extension of time. The contractor was advised to apply formally. In compliance the contractor submitted his formal application on the 10 of November. After consultations with the client the

architects notified the contractor on the 18 of November that his request had been granted for the following reasons:

Delays in nominating subcontractors.

Exceptionally adverse conditions.

Force Majeure, as a result of which the site was closed.

Compliance with architects' instructions.

The new completion date was fixed for the 21 of March 1994. On the 6 of December, 1993 the award of both the Mechanical and Electrical subcontracts were conveyed to the main contractor at the sums of N 1,700,000:00 and N 2,286,122:00 respectively.

At a site meeting held on the 18 of January 1994 the contractor raised the issue of fluctuations in prices of materials. He was advised to substantiate his claim. The contractor forwarded materials fluctuation claims in the sum of N 3,376,035:00 only. He also presented labour fluctuation claims in the sum of N 1,978,627:00 on the 24 of January 1994. The architects recommended for the payment of the labour fluctuation claims only, based on the advice of the Quantity Surveyors. However the client approved the payment of only N 1,600,000:00, which was conveyed to the Contractor on the 9 of March.

A site meeting scheduled for the 8 of March was postponed because the contractor did not turn up. The consultants demanded for an explanation for this. They also wanted

to know why the site was partially closed. The contractor was also reminded of the importance of meeting the target completion date. The client was eager to have the building ready for occupation. The architects also raised the issue of roofing sheets in the same letter. They had noticed that what was installed was at variance with the initial specification.

While the issues raised were being resolved it became apparent that the targeted completion date would not be met. As a result the client expressed a desire to hold a meeting to resolve any possible disputes. After deliberations, it was agreed that the architects and the contractors would meet again and reach an agreement on a new completion date. The Architects and Messrs. Pawa, the contractors, met on the 9 of April and set a new completion date for the 31 of May 1994.

Work progressed steadily on site. However, the contractor intimated the architects on the increase in the price of cashier cubicles to the tune of N 110,411:73. In their response on the 13 of April, the architects informed the contractor that the increase was too high and therefore, recommended that other contractors be invited to tender for this item. The record of tenders opened on the 28 of April is shown in Table 4.6.

TABLE-4.6: Record of Tenders for Cashier Cubicles

Contractor	Tender Figure (N)
Pawa Enterprises	290,411:00
Components and Finishes	196,400:00
Crittall Hope	227,798:11
El-Mansoor Ventures	275,000:00

The subcontract was awarded to Messrs. Components and Finishes at their tender figure. In the letter conveying the award on the 2 of May, Messrs. Component and Finishes were requested to deliver within two weeks of the date of award.

Earlier on a joint site inspection of the consultants and contractors was undertaken, and a pre-handover inspection was fixed for the 24 of May.

Earlier, the architects unilaterally awarded a subcontract for art works (construction of Logo) to Messrs. Consdale in the sum of N 70,000:00 on the 2 of May.

The quantity surveyors expressed their displeasure at the way that the architects handled the art works contract. In a letter to the architect on the 1 of July, they wrote; "...architects arrogate to themselves the responsibility of preparing tender documents, inviting tenders, vetting and subsequently awarding contracts" and that "these responsibilities are vested in the Quantity Surveyors". In their response on the 4 of

July, the architects argued that they never usurped any consultants' role. The Architect further argued that they awarded the contracts because the costs at which they were executed differed significantly from the Quantity Surveyors' provision in the bill due to their inability to forecast reasonably. On the same day, the architects also informed the Quantity Surveyors that they had undertaken a site inspection on the 30 of June in view of the contractor's inability to complete the project on the scheduled date. The contractor had also not fulfilled his pledge to forward a concise completion programme for outstanding works. During the inspection, they had observed that the progress recorded in the past few weeks was not encouraging. They had therefore, drawn up a programme of execution for the contractor. The architects requested the Quantity Surveyors to prepare a valuation for works properly executed. The final handover was yet rescheduled for the 28 of July. But this new date was also not met. As a result the architects contacted Messrs. Pawa on the 8 of August and requested for yet another completion date. For more than five weeks, there was no response. The client therefore, requested for a meeting with the contractor on the 23 of September 1994 in order that the parties concerned could appraise themselves of progress. During the meeting, the contractor enumerated the causes of delay as follows:

- i. Site flooding during the rainy season
- ii. Political instability
- iii. Changes in specifications
- iv. Labour fluctuation claims

At the end of the meeting, a new completion date was fixed for the 31 of October. As this date approached, it became obvious that the contractor would not deliver. The client and the consultants met on the 26 of October and deliberated on appropriate measures to take. After the deliberations, it was agreed that the contractor was frustrating the completion of the project. The meeting then resolved as follows:

- i. Another quotation be obtained from a reputable Mechanical sub-contractor and another quotation be obtained from a reputable Mechanical sub-contractor and if reasonable, be awarded the supply and installation of air conditioners.
- ii. The client took up the installation of transformers.
- iii. The architects would instruct the contractor to delete the two items above and return the payment cheques in their respect.
- iv. The client would move into the building while the contractor continued outstanding minor works

The contract for the supply and installation of air conditioners was awarded to a Messrs. Solid at the sum of ₦ 1,971,500:00 on the 27 October.

The contractor did not complete the project by the 31 of October as scheduled. Therefore, The architects directed the contractor to complete works by the 14 of November. Otherwise the client would be advised to “employ and pay other persons to carry out and complete the works” as provided for in the contract conditions.

The architects in the installation of air conditioners noticed some delay. After discussions with Messrs. Solid, the reason for the delay was established. Kaduna drawn cheques were mistakenly taken to Lagos. The issue was resolved when the cheque was finally returned and cleared.

The contractors and the consultants jointly undertook the pre-handover inspection on the 19 of November during which some defects and outstanding works were observed.

After the inspection, it was agreed that the final hand-over date would only be fixed after all parties had been notified of their outstanding works. Prominent among the works observed included:

- i. Telephone cables not in place
- ii. 4-Zone fire alarm and cables not in place
- iii. Smoke detectors yet to be provided

All these were supposed to be executed by the main contractor. In order to express their dissatisfaction with the main contractor's performance, the Client excluded them from the payment of valuations for the month of November. The contractors could not immediately register their grievances because the consultants had gone on recess.

The consultants resumed on 12 January 1995 and the main contractor promptly contacted them. The client confirmed the action taken against the contractor. The client believed that the action was justified in view of the contractor's constant breach of the contract. The Client then directed the architects to arrange a meeting in order to resolve the following issues:

- i. Diversion of part payment of N 2,340,000:00 on mechanical and electrical work.
- ii. Protracted delay on the completion of project. and architects.
- iv. Possibility of completing outstanding works by direct labour under the supervision of the architects and the clients

In their response dated 26 February 1995, the architects made the following observations:

- i. The client still had the contractual obligation to pay the contractor for work properly executed on site.
- ii. The main contractor still had the obligation to complete all outstanding works.
- iii. The contractor would be advised to complete all outstanding works within seven days, failing which other persons to would be employed to carry out and complete the project.

In apparent disregard of established procedure, and in order to express his intense displeasure, the main contractor wrote directly to the client and sought clarification on why his outstanding claims were not paid, using strongly worded language. The letter was silently ignored.

On the 28 of February, the Client proposed to purchase outstanding electrical items as a result of Messrs. Pawa's persistent failure to deliver the project. Earlier, the Client had offered the contractor money on the condition that they purchased the items in "the physical presence of their representative" but they declined. The Client therefore sought confirmation of their intended action from the Architects.

The consultants prevailed on the client to pay the contractor his outstanding claims. Further, they informed the client that since the status of the contract had not changed, the contractor was still obliged to purchase and install all items. However, the contractor was reminded of the "penalty for non performance".

On the 21 of May 1995, Messrs. Pawa informed the architects that the building was ready for formal hand-over. Accordingly, the architects fixed the 3 of June for final inspection and hand-over. The building was handed over as scheduled although there were still some outstanding minor works. It was agreed that the Bank Manager would

inform the headquarters when all minor works had been completed, which was not until the 7 of July.

The main contractor received his outstanding claims on the 25 August. However, the main contractor, once again, contacted the client directly requesting for compensation of liabilities incurred which included interest on loans and unpaid expenses of main suppliers. This was silently ignored. The final account figures are shown in table 4.7

TABLE – 4.7: Clients Reference Summary

Original Contract Sum	₦ 13,500,000:00
Final Account Figure	₦ 18,790,385:73
Certificates Issued to Date	₦ 17,902,096:72
Amount Outstanding	₦ 888,289:01
Commencement Date	14/5/93
Completion Date (Initial)	2/3/94

4.4 THE RESIDENTIAL DEVELOPMENT PROJECT (RDP)

4.4.1 Brief Preparation

This was a large-scale residential development, which originally included tennis courts and a swimming pool. The client passed on soon after the project was commenced.

However, the family of the deceased client decided to scale down the project and complete it. The reviewed brief included the following components:

The main house
Children's quarters
Boys' quarters
Office/Reception block
Gate house
Fence work

4.4.2 Appointment of Consultants

The client formally contacted the architects, with his brief in February 1991. The architects requested the client to write a formal letter commissioning them as his consultant architects. In the commissioning letter, the client also mandated the architects to “act as the project leaders and to suggest the names of reputable engineers and quantity surveyors” for his consideration and subsequent appointment. The Architect presented a list of other consultants for the client's consideration. The list of all the consultants appointed on this project was as follows:

1. Architects

Messrs. Triad Associates, Kaduna.

2. Structural Engineers

Messrs. Azim Associates, Kaduna.

3. Mechanical/Structural Engineers

Messrs. 2-Ess Engineering, Kaduna.

4. Quantity Surveyors

Messrs. Prime and Bell, Kaduna.

4.4.3 Tendering and Contract Award

Available records indicated that there was indeed a tender but the record of tenders was not available. However, the contract was awarded to a Messrs. Beamco (Nigeria) Limited on the 18 April, 1991 in the sum of ₦ 14,886,587.50 and a completion period of 52 weeks, including two weeks for mobilisation. The site was officially handed over to the contractors on the 9 May 1991. During the handing over ceremony, the contractors requested for an advance payment. This request was granted, but the contractors were informed that payment would be made only on presentation of a contractors' "all risk insurance" from a reputable insurance company (see Appendix-D).

4.4.4 Highlights of Project Development

The project was started with incomplete structural details. This constituted a hindrance to progress soon after work was commenced which prompted a meeting between the Structural Engineers and the Architects on the 6 June, 1991 to discuss the "revision of structural drawings and their implications". The Engineers informed the meeting that

the revision was necessitated by the discovery of some omissions and errors in the original design. The details included column bases, columns, slanting walls, roof beams and window hoods. It was then observed that the revisions were not mere details but additional works with substantial cost implications. In view of this development, the meeting resolved that drawings for all other buildings should be reviewed in order to forestall similar late discoveries.

Meanwhile, the contractors were instructed to continue with other sections of the building that would not be affected by the revisions. The architects issued specific instructions on the children's quarters on the 6 June 1991. Messrs. Beamco completed all works on the children's quarters by the 26 June and conveyed it to the architects. They were however, still awaiting modifications on the main house.

On the 2 July, the contractors were advised to forward the list of materials required to be purchased in advance, further to their letter of 6 May. The list was prepared and forwarded.

The contractors intimated the architects that they were still awaiting structural drawings and modifications on the main house so as to proceed with the job. In their progress report of 25 July, the contractors informed the architects that "delay had started to occur due to lack of structural decision on the main house". In order to

shorten the delays, the architects issued instructions to Messrs. Beamco to install conduits in the boys quarters. On the same day, the contractors were informed of the client's intention to supply some materials.

Progress was steady even though the final structural drawings were still not completed.

A scheduled site meeting was held on the 29 August, during which it was observed that the contractors' progress was on schedule. Messrs. Beamco also requested for the reversal of the percentage retention being deducted from 10% to 5% because it had serious negative effects on their cash flow. This request was granted. It was also agreed that the final structural drawings would be made available by the 31 August. Messrs. Beamco were then requested to submit a new programme of work in accordance with the delays that were experienced.

The contractors intimated the architects on the issue of structural drawings on the 3 of September. They stated that they would appreciate prompt action in order to prevent further delays. On the 6 of September, the contractors confirmed the receipt of some drawings. But they were still awaiting first floor beams details to proceed with work in the main building. With the receipt of the structural drawings, Messrs Beamco submitted their revised programme of work as earlier requested on the 10 September. This revised programme was yet to be approved by the 10 October.

As work progressed, it became obvious that certain materials, which were not included in the materials advance, were required. The contractors submitted a quotation for one of these materials (marble tiles) on the 23 December, with a delivery period of two months from the date of confirmation of order. The prices quoted were based on the prevailing currency exchange rates, as the material had to be imported. The quantity surveyors also submitted two quotations; one for the supply, delivery and installation of solid timber doors and another for "other materials", which included;

- Ceramic tiles
- 200 KVA diesel generator set and accessories
- 1.5, 2 and 3 HP split air condition units, remote controlled and wall mounted
- Gypsum ceiling
- Electrical fittings

The reference numbers of some electrical fittings were not available in the catalogue used. The contractors thus provided an alternative catalogue. While a decision was being awaited on this issue, a supplier of windows, Messrs Sistrans Limited arrived on the site on the 31 January 1992 without the prior notice of the main contractor. Messrs Sistrans was on the site to take measurements for the boys' quarters and office block. On the 1 February 1992; Messrs. Beamco contacted the architects and complained that

the development was a violation of the contract agreement and was unfair. The architects responded on the 3 February and drew the attention of the main contractors to the following:

- i. That they (the architects) were aware of the conditions that were contained in the contract documents.
- ii. They confirmed that Messrs Sistrans would supply the windows while Messrs Beamco would undertake the installation.
- iii. In future they would notify Messrs Beamco of their intention to nominate suppliers. They would convene a meeting to conclude on outstanding materials to be supplied.

Messrs Beamco responded on the 23 February. They accepted to install the windows if the materials would be treated as items procured on their behalf. It would then be in line with the contract conditions.

Progress was smooth until the 23 March when the main contractor communicated with the architects and observed as follows:

- i. The roofing subcontractor was unable to complete the job, only after which they could proceed.

- ii. Prices of most materials had witnessed an increase of more than 100%, which had been checked and approved by the quantity surveyors in previous valuations.
- iii. 43 weeks after the commencement of the project, the value of builder's work executed represented only about 22% of the original contract sum.

In view of the above Messrs. Beamco formally requested for an extension of time, sequel to delays not caused by them.

In their response of 14 April, the architects mentioned that they were aware of the delays resulting from the different aspects of the project. They were however surprised that they were treated as separate contracts. And that since most of the delays occurred simultaneously, they should have been treated as one. In the end the architects recommended for a 9weeks extension.

Messrs. Beamco were not satisfied, and promptly conveyed this to the architects. The advice of the quantity surveyors was sought. In their submission on the 12 May, the quantity surveyors wrote that; "the delay on the part of the employer and his representative with regards to such items as supply and installation of finishes further created more delays. The main contractor was further instructed not to procure any material until the employer authorised". They summed up their report thus; "the entire

work had been critically delayed by twenty five weeks” and advised the client to take necessary precautions to curtail further delays.

Activities slowed down at the site and the project almost ground to a halt until October 2, 1992. The main contractors informed the architects that they were unable to proceed with the remaining work since their outstanding certificates and claims had not been honoured. The delays were causing them lots of damage, “which were only too well known”.

On October 5, the architects informed all parties to the project of the client’s resolve to continue with the project to completion. Accordingly, a meeting was scheduled for October 7 in order to resolve all outstanding issues and to map out new strategies for completing the project. The decisions reached at the meeting were formally conveyed to the main contractors on the 12 November. These were that:

- i. Messrs. Beamco returned to site immediately.
- ii. Payment for loss and expenses for the period of twenty-five weeks be made to Messrs. Beamco in accordance with the conditions.
- iii. An additional 10% be paid on overheads and profit as further compensation.
- iv. Part retention be released on completion of the carcass.

In spite of the apparently favourable conditions, Messrs. Beamco did not respond until 26th April 1993 when they submitted a fresh tender for the outstanding works. They however, returned to the site on the 30 April to continue work in earnest.

On the 25 May, the main contractors informed the architects that the works as per the contract had practically been completed and as such requested for the issuance of a certificate of practical completion as well as the release of part of the retention.

The architects responded a month later (25 June). They had conducted a site inspection and confirmed that the works had been reasonably completed. They issued the certificate of practical completion and advised the client to settle all claims due to the contractor. The final account figures are shown in table 4.8

TABLE – 4.8: Clients Reference Summary

Original Contract Sum	N 14,886,587:50
Certificates Issued to Date	N 6,817,285:13
Notional Final Account	N 17,104,269:58
Commencement Date	25/4/91
Completion Date (Initial)	23/4/92

4.5 THE UNIVERSITY GUEST HOUSE PROJECT

4.5.1 Brief Preparation

This University, a Federal University of Technology, is one of Nigeria's "third generation" Universities established in the early 1980s. In line with the objective of providing adequate infrastructure for the proper functioning of the University, it was decided that a guesthouse should be built. The architectural design of the guesthouse, which included a main building and chalets, was undertaken by the Physical Planning Unit (P.P.U) of the University while the Structural designs were prepared by the consultants appointed.

4.5.2 Appointment of Consultants

The "Capital Projects Implementation Task Force" of the University, oversaw the project and appointed the following consultants in September 1994.

1. Architects
Messrs. Ahimie and Associates, Ikeja.
2. Engineers
C.E.A.M. Engineering Services, Lagos.
3. Quantity Surveyors
Physical Planning Unit (PPU), Federal University of Technology.

4.5.3 Tendering and Contract Award

There were documents that suggested that there was a tender but the tender report was not available. However, the contract was awarded to Messrs. Shiloh Development in the sum of ₦ 7,468,050:00 and a completion period of 26 weeks on the 14 October 1994. In a letter conveying acceptance dated 24 October, Messrs. Shiloh pledged to “endeavour to execute the work satisfactorily in accordance with high standards of performance”. They also looked forward to a fruitful relationship and co-operation of all concerned parties.

4.5.4 Highlights of Project Development

The inaugural meeting of the consultants, contractors and the Task Force was held on the 27 October at the Physical Planning Unit (P.P.U), the Chairman of the Task Force (and of the meeting) informed members that the “prevailing economic conditions in the country called for prudent management of resources” and hoped that discussions would be held on best options in the management of the project at hand. Messrs Shiloh were instructed to submit a programme of work for the 26-Week period, which would be used to monitor actual progress on site on a weekly basis. It was also agreed that the contractors would keep 2 site instruction books. Any site instruction that would have financial implications would be reported to the Physical Planning Unit (P.P.U) and would be resolved within a week of the issuance of such instruction. The meeting also resolved to make a materials advance payment to the contractors to be paid in two

installments. However, the payment would be made only presentation of a “contractor’s all risk insurance policy”. As for payment of valuations, the procedure would be such that the contractors would submit their valuations at least 2 days before the monthly site meetings and architects’ certificates would be released 48 hours after site meetings. The chairman also informed the meeting that although the contract was non-fluctuating, they (the Task Force) were compelled to reconsider any areas adversely affected due to “recent economic policies of the Federal Government with a view to reviewing the rates to such a level that would minimise the negative effect on the entire project. After the meeting, the site was officially handed over to the contractors.

Work progressed steadily on the site and on the 11 November, Messrs. Shiloh received a commendation letter from the Task Force with particular reference to the good pace “notwithstanding the fact that the University was yet to mobilise you” which was “an assurance that you are going to keep to the scheduled time of the project”.

The first site meeting was held on the 17 November at which all parties were represented. The meeting was informed that the client had decided to convert aluminium doors and windows to prime cost items due to cash flow problems. The decision was made so that the “limited funds available” could be used to honour valuation certificates. The doors and windows would be procured later. Also, the

structural engineers presented structural designs for the project during the meeting. An adjustment was made to the room partitions. Accordingly, the Structural Engineers were requested to provide roof truss drawings. Two soakaway pits were relocated. In this case also, the Structural Engineers were requested to issue structural details.

The progress of work reported during the second site meeting held on the 15 December was:

- i. Guest Chalet ready up to wall plate, awaiting roofing frames.
- ii. More than 50% of the main house building at or above lintel.
- iii. About 40% of aluminium doors and windows delivered to site.
- iv. Drainage from courtyard already in position.

The contractors were commended for the progress recorded thus far. The Physical Planning Unit (P.P.U) directed that the fence to abut existing adjoining properties be suspended in the interim. Furthermore, the Physical Planning Unit (P.P.U) also directed that all external drains be suspended until after the main structures had been erected and that all internal doors be wood panels except in water closets and baths which would have flush doors. Two aluminium sliding doors were replaced with wood panel doors. The architects submitted detail architectural designs for the gatehouse during this meeting. After vetting, the Physical Planning Unit (P.P.U) deleted the shower, kitchenette and changing room that formed part of the gate house. Roof truss drawings were also made available to Messrs. Shiloh.

At the third site meeting held on the 16 February, 1995 the Physical Planning Unit (P.P.U) confirmed that there were problems with the client's cash flow when the issue of unpaid valuation certificates was raised. The reason given was the "non receipt of first quarter allocation". However, it was agreed that valuations would still be prepared pending the availability of funds.

New requirements with resultant cost implications were introduced. These included 7 fluorescent fittings, an unspecified number of lighting points and an overhead water tank. The structural engineers were directed to produce structural designs for the overhead water tank support.

The structural details of the overhead water tank supports were tendered by the Engineers during the fourth site meeting held on the 16 March 1995. The stage and quality of work was deliberated upon and since there was apparently no issue in dispute, the meeting was adjourned.

The major observation made by the Physical Planning Unit (P.P.U) during the fifth site meeting held on the 20 April was that the tempo of work had slowed down. The contractors attributed this to cash flow problems. They were then informed to collect their cheque for the valuation certificate for the month of February after the meeting.

Pursuant to this, uncertainties were expressed about the completion date. The contractors proposed the 7 May as realistic “if all things were equal”. Nevertheless, Messrs Shiloh applied for an extension of time a week after the meeting, precisely on the 27 April. In their application, they mentioned the major factors, which directly affected the progress of work and the completion time as:

i. Architects’ Instructions and Variations

The scope of work had been increased. Additional works included generator house, gate house, soil drainage works and burglary proofing.

ii. Rock Outcrops

During the excavation of foundation trenches, rock outcrops were encountered which required blasting. For this, the permission of the appropriate government authorities had to be sought. As a result progress was stalled for 3 weeks.

iii. Determination of Ground Floor Levels

The topography of the site initially assumed to be flat in the architectural drawings was actually undulating. As such determination of ground floor level could not be immediately resolved as a result of which 2 weeks were lost.

While conveying that the overall time lost was 8 weeks, Messrs. Shiloh requested for an additional 5 weeks only to complete the project. The request was granted.

The sixth and seventh site meetings were respectively held on the 18 May and 15 June 1995. The only outstanding issue that needed prompt attention during both meetings was the payment of valuation certificates.

A pre-handover meeting was held on the 3 July 1995. It was observed that the outstanding work items were minor. The testing and commissioning of Mechanical and Electrical work was scheduled for the 20 July, when Messrs. Shiloh pledged to officially handover the building to the University. The pledge was fulfilled.

On the 17 of August 1995, Messrs. Shiloh received a commendation letter from the Task Force for “the good quality of work displayed in the construction, particularly for completing the project a week ahead of schedule “even in the face of the University’s inability to meet all it’s financial obligations to your company”.

4.6 THE OFFICE DEVELOPMENT PROJECT

4.6.1 Brief Preparation

A government agency (Area administration office) was operating from a rented office in Sokoto. In an attempt to mitigate their liabilities and to generally improve the asset base of the agency, it was decided to build a permanent area office in Sokoto.

The project was a prototype building meant for all the agency's area offices in the country. The works in the project comprised the construction of office and ancillary buildings. The buildings were to be fitted out with electrical, plumbing, air conditioning and telephone services. The external works designed to be carried out in the project included drives and parking, paved walkways, improvement to existing fencing and gates, drainage, landscaping and external lighting.

4.6.2 Appointment of Consultants

The Sokoto Area Administration of the agency contacted Messrs. Triad Associates, an architectural consulting firm on the possibility of engaging them as their consultants for their new office building project in April 1991. In the letter conveying this information, the agency informed Messrs. Triad that the project was a prototype design, which was being constructed around the country. As such, only supervisory services were required since the designs were available. The prototype designs were included. However the architectural firm proposed a design and cost review. The agency consented to the proposal and requested Messrs. Triad to "nominate other professionals to consult on the project". The nominations submitted by the architects were approved by the agency. The team of consultants included:

1. Structural Engineers

Messrs. Spick Associates, Kaduna.

2. Mechanical/Electrical Engineers

Messrs. Aliyu Associates, Kaduna.

3. Quantity Surveyors

Messrs. Prime and Bell, Kaduna.

The client also appointed the architects as “major consultants”.

4.6.3 Tendering and Contract Award

On the 29 July the architects informed the client that tender documents were almost finalised, in view of which they proposed a list of five contractors to be invited to tender. A meeting of the consultants and the client was held on the 5 August to deliberate on the issue of tenders. The agency remarked that they could not approve the proposed list of contractors, as they ought to have been liaised with before the compilation. It was finally decided that the agency would present a list of contractors to be invited to tender while the architects would make available blank copies of the Bill of Quantities (B.O.Q) and the consultancy services agreement at a meeting scheduled for the 14 of August. The client also remarked that the consultants’ estimate was too high. To this the architects responded that the figures were not inflated but based on current market prices. They said that effort were however being made to scale down the figure in designing the first floor slab. It was also agreed that the client

would organise for soil tests and forward the results to the consultants during the meeting of 14 August.

At the scheduled meeting of the client and consultants held on 14 August, the latter made available blank copies of the B.O.Q as initially agreed. The client however did not provide the list of contractors to be invited to tender until in the first week of September when they forwarded a list of five contractors. Accordingly, the architects sent out invitations to tender to the shortlisted contractors on 19 September. The tenderers were required to pay a non-refundable fee of ₦ 1,000:00 to the client. They would then collect copies of the blank B.O.Qs from the architects. The quantity surveyors were informed of these developments on the 23 of September. On the 14th of October, the architect sent out invitations to all the consultants that tenders were going to be opened on the 23 of October in the client's headquarters in Jos and that they should all endeavour to attend. The official record of tenders is shown in table 4.9.

TABLE-4.9: ^{Project} Record of tenders for the Area Office†23/10/91

Company's Name	Tender Figure N	Time (Weeks)
Messrs. Zuriya	N 4,987,382:70	50
Amici	Did not tender	-
Craftcon Builders	N 7,851,206:38	65
Pawa Enterprises	N 7,423,599:00	40
Sanfroid	N 6,752,750:73	48
Consultant's Figure	N 7,179,462:25	42

It was decided that the consultants would analyse the tenders and submit a report within two weeks. The aim of the analysis was to give the client "a clear basis for selecting a befitting contractor for the project".

The tenders were subjected to detail analyses, which included checking and correcting all arithmetical errors detected and making further adjustments in specification to ensure that the budget is kept within the one prepared in May (N 5,348,000:00). The adjusted figures are shown in table 4.10.

TABLE-4.10: Adjusted Tender Figures for the Area Office Project

Company's Name	Tender Figure N
Zuriya	N 3,711,087:95
Craftcon Builders	N 6,485,955:55
Pawa Enterprises	N 6,192,192:00
Sanfroid	N 5,359,146:93
Consultants Figure	N 5,681,388:97

The report also included analysis of the financial implications of any additions or omissions from each tender in order to achieve hypothetical parity of tenders. Appraisals of corporate track records and resources were also undertaken. Consequently, the following recommendations were made in decreasing order of preference.

1. Messrs Zuriya

But subject to an upward negotiated figure using consultants' estimate as a guide in order to eliminate the risk of abandonment due to low pricing.

2. Messrs. Sanfroid

But subject to an update of the schedule of basic rates.

3. Messrs. Pawa

But subject to a downward negotiated tender figure using consultants' estimate as a guide. An update of the schedule of basic rates would also be necessary.

While acknowledging receipt of the tender report on the 8 of November, the client invited the consultants to a meeting held in Enugu on the 12 and 13 of November. The purpose of the meeting was to discuss one of the recommended tenders. At the end of the meeting, it was decided that all the recommended contractors be invited for negotiations on the 20 of November. The main highlights of the report of the negotiations with the contractors forwarded to the client on the 22 of November were:

1. Messrs. Sanfroid and Messrs. Pawa failed to show up. Messrs Zuriya agreed to execute the contract at the consultants' price. They however requested for some advance payment to purchase certain key materials to minimise fluctuation claims.
2. The consultants recommended payment on the following conditions:
 - i. The contractors must take an advance payment bond to cover the client in case of default.

- ii. Fluctuation would not be paid for any such materials for which advance payment was made.
- iii. The contractors should immediately proceed to buy and stockpile such materials upon payment.

The client awarded the contract to Messrs Zuriya in the sum of ₦ 4,925,555:33 on the 24 of December. In the letter conveying the award, the client stated that:

- The contract was lump sum and would attract no variation;
- Payments would be made only on presentation of valuation certificates issued by the supervising architects;
- The contractors should convey acceptance.

In a letter dated 14 January 1992, Messrs. Zuriya sought the advice of the quantity surveyors on how the conditions of the contract would affect the cost administration of the project. In response, the quantity surveyor opined that it was impracticable not to give consideration to “fluctuations and variations in Nigeria today”. Where such conditions were imposed, such contracts were either abandoned or the client did not receive value for money. The quantity surveyor therefore advised the client not to enforce the conditions in totality. The agency could however, minimise fluctuations arising out of the contract.

There was a long period of inactivity by the client. Then on the 22 May, the agency expressed their wish to hold a meeting with the consultants “to discuss the modalities for the takeoff of the project”. However, the quantity surveyors advised that the client should be made to understand that the initial tenders had lapsed as prices had almost doubled. The B.O.Q. had to be re-priced and the tender process started again. Otherwise negotiations should be held with any of the past tenderers. Consequently, Messrs. Zuriya were invited to submit a fresh tender but they voluntarily withdrew. Messrs. Sanfroid were then invited to tender on the 25 of May. They submitted a new tender on the 5 of June 1992 in the sum of ₦ 7,180,439:00 as against the consultants’ revalidated figure of ₦ 7,206,428:70. The client awarded the contract to Messrs Sanfroid at their price and a completion period of 42 weeks on the 25 of June 1992. Messrs. Sanfroid conveyed acceptance on the 30 of June.

4.6.4 Highlights of Project Development

By the 8 of May 1991, the architects had completed and forwarded their designs to the quantity surveyors requesting them to prepare a cost estimate for the purpose of signing consultancy services agreement with the client. The estimate was in the sum of ₦ 5,348,097:00. The consultancy services agreement was signed in June. On the 11 of July, the architects requested the quantity surveyors to prepare complete B.O.Q. and contract documents based on the architectural drawings with the understanding that the

structural, electrical and mechanical drawings would be forwarded at the end of the week. The architects also attached a program of execution, which the client had approved as shown in Table-4.11.

TABLE-4.11: Programme of Execution for the Area Office Project

Activity	Date (1991)
Formal approval of amendments and revisions	3 July
Execution of consultancy services agreement	10 July
Site surveys and soil tests	17 July
Preparation of final drawings	24 July
Preparation of B.O.Q.	31 July
Short listing of tenders	2 August
Tender action	12 August
Placement of contract	19 August

The architects forwarded the complete sets of structural, mechanical and electrical drawings to the quantity surveyors and implored them to endeavour to meet the July 31 1991 deadline. The short listing of tenderers, tender action and placement of contract have been discussed in Section 4.5.3, which lasted until July 1992. The contract was eventually signed on the 29 July 1992. The contractors took over the site on the 5 of August 1992.

On the 28 of October, Messrs. Sanfroid informed the architects that while progress at the site was steady, they could no longer proceed unless electrical conduits were

installed. As the mechanical and electrical subcontracts had not yet been awarded, they sought approval to execute any items of work that would otherwise hinder progress until the client resolved the subcontract issue.

In November, Messrs. Sanfroid informed the architects of their inability to obtain hollow pot clay blocks (for the first floor) from Kano as initially planned. They requested for the approval of an alternative sample from Lagos, which they obtained on the 9 of December 1992. On the 13 of January 1993. Messrs. Sanfroid intimated the architects on the difference in price between the Lagos sample and the B.O.Q price. The contractors contacted the architects again on the 25 of January and appealed for “urgent reconsideration of the contract sum for the project” in view of the following reasons:

- i. Current unprecedented high cost of cement and other building materials.
- ii. Delayed payment of first valuation.
- iii. They were unable to cast the first floor because of the consultants’ closure for annual break for three weeks as a result of which needed approvals could not be secured.

The contractors appealed that considering these unforeseen and uninformed delays which emanated from the client and consultants, and coupled with transitional changes

which affected economic trends nation-wide, prices have shot up fiercely out of proportion. They suggested that for their plight to be appreciated, independent market surveys could be conducted. In the architects' response on the 26 of January 1993, the contractors were reminded that the contract was non-fluctuating. That was in fact the reason why advance payment was made and hoped that the timely completion of the project would not be jeopardized.

Messrs. Sanfroid responded again on the 2 of February 1993 highlighting four major issues viz.

- i. The approval given for hollow pot earlier was for Minna. But the Minna factory was out of production. The one used was procured from Lagos through a dealer in Kano.
- ii. They had informed the architects of the cost implication to which approval was given to procure.
- iii. The materials advance payment did not cover the procurement of all materials for the project. More so the list did not include hollow pot clay.
- iv. They were not requesting for fluctuation, but ex-gratia payment of the difference between the Lagos and the B.O.Q. prices.

There was no response to this letter. Then on the 24 of February 1993, the client requested the consultants to prepare mechanical and electrical documents and

commence tender action. Invitations to tender were sent out to the main contractor and three other subcontractors. The subcontractors were advised to return completed tenders not later than 25 March 1993. Work continued on site while decision on the subcontracts was being awaited.

On the 8 March 1993, the contractors made the following observations regarding a valuation prepared by the consultants.

1. Some items were not fully paid.
2. The consultants' argument that there was an arithmetical error long after the contract had been signed was not tenable. Messrs. Sanfroid referred the consultants to a clause in the contract conditions which read thus; "the contract sum shall not be adjusted or altered in any way whatsoever... an error whether of arithmetic or not in the computation of the contract sum shall be deemed to have been accepted by the parties thereto". Messrs. Sanfroid then reminded the consultants that they had no right to adjust a figure from N 443,973:00 to N 413,973:00.
3. They also alerted the consultants of the client's delay in payment, which was slowing down the pace of work. They therefore, suggested that the client be made aware of the consequence of delayed payments especially as the contract was non-fluctuating .

While awaiting response to their observations, Messrs. Sanfroid intimated the architects on 1 April that “recent increases in workers salaries nationwide had also affected the construction sector of the economy”. As a result, they were paying more than the rates agreed when the contract was signed. They wrote that the increase had also affected material prices adversely. These made it difficult for them to operate within the provisions of the contract agreement. In view of this, they appealed for approval of “labour, if not general fluctuation”. The quantity surveyors advice was sought on this issue.

On 5 April 1993 Messrs. Sanfroid notified the architects that the indecision on the services subcontract had made it impossible to progress “since electrical conduits had to be installed before concrete”. They could not continue with terrazzo work for the same reason. Messrs. Sanfroid then remarked that the contract was already 2 months behind schedule and there might yet be need to request for extension of time. On the same day, the contractors also informed the Quantity Surveyors about additional works. They sent a priced B.O.Q. executed at the sum of ₦ 376,807:00. They also mentioned that the total area for hollow pot sections was 512m² as against 154m² included in the contract B.O.Q., which they treated as variation. The quantity surveyors remarked; “how does this compare with your letter of 8 March, 1993?”

In an apparent move to intervene, the client contacted the consultants on 14 April 1993; on Messrs. Sanfroid's complain about the increase in labour cost and material prices. The agency sought their opinion before making a decision. The agency also reminded the consultants that the tender report on mechanical and electrical subcontracts was still being awaited.

In their response on 23 April 1993, the consultants observed that:

1. The contractors were contractually not entitled to any fluctuation claim.
2. The client might however, consider paying for labour fluctuation as a result of the new wages policy.
3. As for materials, they believed that the advance payment made at the onset of the project should have enabled the contractors to procure all key materials required for the execution of the project to forestall escalation.

While the client was studying the quantity surveyors' recommendations, the consultants sent the subcontracts tender report on 4 May 1993. The client awarded both contracts to the main contractor on 5 May and communicated same to the consultants. On receipt of the letter, the Quantity Surveyors promptly observed that the award did not include external works. They had earlier suggested that the works should be awarded

in the sum of ₦ 1,070,915:00. The Quantity surveyors therefore sent the contract documents to the client for signing with the contractor on 10 June, excluding external works. On the same day, the client wrote the Quantity Surveyors and remarked that the rate at which they proposed the external works was “unacceptable as there was not enough money in the budget for it”. They sought the quantity surveyors’ advise on aspects that must be executed immediately.

Progress at the site was steady with minor events occurring until 12 July when Messrs Sanfroid expressed their fervent displeasure over the settlement of a valuation certificate dated 9 June 1993. The client effected payment on 21 June. Exactly 34 days after the payment, the cheque was returned unpaid. In view of this, a possible delay in completion was anticipated. Expectedly the contractors formally requested for 4 weeks extension on 28 July, to begin from 31 July. The reasons advanced varied from clients’ delay in awarding subcontracts and inability to effect payments promptly to architects’ instructions requesting variations to original plans. The architects recommended for 8 weeks extension on 2 August, subject to subsequent certificates being honoured promptly. In their response on 17 August, the clients accepted the architects’ recommendations. They further sought their advice on the provision of a transformer in order to test-run the electrical installations before handing over of the project.

There was a long period during which the level of communication was low. Then on 4 October 1993, the contractors informed the architects that they had completed construction within the scope of the contract. In this connection, they requested for a site inspection to enable the final account statement be prepared. The architects communicated this to the clients. In their response dated 19 October, the client informed the architects that commissioning was scheduled for 26 October as it was expected that by 25 October the transformer would have been installed.

There was a prompt response from the architects on 20 October in which they reminded the client of their several attempts to draw their attention to the implication of delaying the award of the contract for the transformer. It was impossible to carry out the necessary tests including final inspection within the time limit. In essence, they advised that the pre-handover inspection be scheduled for 2 November 1993 to be followed by the final inspection after which the building would be properly handed over.

Apparently in a desperate bid to settle the matter, the clients replied the architects' letter on the same day, highlighting three major points viz.

1. Commissioning was still scheduled for 26 October, 1993 because it coincided with their National Training Conference, and the Governor, the Secretary for

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Industries and other dignitaries had agreed to honour their invitation. In any case they would still go on even if the project was not handed over.

2. The architects should process labour fluctuation claims and advice on the figure.
3. Fluctuation claims not covered by the advance payment should also be computed.

On the same day again, the architects agreed to compute labour fluctuation but that any payment with respect to material fluctuation would be a violation of the contract. The project was commissioned as proposed by the clients although it was not officially handed over.

After the commissioning, there was partial inactivity until December 9, 1993 when the client informed the architects that the contractors had personally approached them on the issue of labour and material fluctuations. They believed that the contractors' performance was commendable (better than most contractors in their projects elsewhere). In view of this therefore, they wanted to give some consideration. Once again the agency requested the architects to examine and advice. There was no response from the architects, which prompted Messrs Sanfroid to again complain to the client on the "lackadaisical attitude of the consultants" on 23 December 1993. For the same reason, the contractors submitted their final valuation directly to the clients.

On 30 December 1993, the clients implored the consultants “to kindly respond to the contractors’ complaints so that the case could be laid to rest”. In their response dated 11 January 1994, the architects forwarded labour fluctuation claims but advised the client to disregard the contractors’ accusations because they were unfounded as the issues raised had been addressed in previous communications. Finally, they suggested that a meeting of all parties be convened in order to clarify issues. There was no indication that this meeting was convened.

A pre-handover meeting was held on 18 January, 1994 during which it was observed that the major outstanding issue was the installation of a Private Automatic Branch Exchange (P.A.B.X.) The contractor was directed to treat it as a matter of priority. However, by 8 February, the architects informed the clients of the contractors’ inability to install the P.A.B.X. and consequently suggested the removal of the item from the services subcontract so that the contractors could be issued with a certificate of practical completion. Nevertheless, the clients wrote the architects that they had confirmed that a lot of work had been done on the P.A.B.X. although it had not been completed. And that the contractor had assured them that the remaining jobs would be completed as soon as they were paid. The agency therefore directed the architects to prepare and issue the contractors with a certificate of practical completion. On 22 February, the architects responded and informed the client that since it had been

confirmed that the installation of the P.A.B.X. had not been done, they were unable to value and recommend payment of any work on installation for same. And that in this regard, they had reached an agreement with the contractors to delete the item from the contract, which was reflected in the final accounts. Consequently, a certificate of practical completion was raised based on that understanding. The certificate was issued on 25 February 1994.

After an unusually long period without communication, the client contacted the architects on the contractors' materials fluctuation claims on 31 May. They stated that due to the contractors' persistence on the matter, the governing council of the agency believed that since labour fluctuation had been paid, the contract agreement seemed to have been compromised. In view of this the council directed that the material fluctuation claims should also be examined. In addition, the client also stated that the contractors had finally completed the installation of P.A.B.X., the valuation for which should be included in the next certificate. In the architects' reply dated 23 June 1994, they wrote that:

1. In accordance with the clients' directive to waive relevant contract conditions, the material fluctuation claims were being examined.
2. Consultancy fees would be reviewed appropriately to reflect the new project cost.

3. Statement of final accounts would be updated in line with the outcome of fluctuation claims.

The last record worthy of note on this project before the expiration of the defects liability period was the schedule of defects, which was sent to the contractors on 24 June 1994. The contractors informed the architects that some of the defects had already been made good while others would be attended to immediately. The summary of final accounts is shown in Table-4.12.

TABLE-4.12: Summary of Final Accounts for the I.T.F. Project

Original Contract Sum	₦ 6,928,400:96
Final Account Figure	₦ 6,576,034:84
Certificate Issued to Date	₦ 5,845,634:73
Amount Outstanding	₦ 730,400:11
Nature of Contract	Fixed
Completion Period	42 Weeks
Commencement Date	19 August, 1992
Completed Date	25 February, 1994

Notes on the Final Account

1. A net saving of ₦ 4,800:00 was realised from the expenditure of provisional sums. This resulted from the elimination of a steel ladder from the contract.

2. Architects' instructions resulted in an additional expenditure of N 66,287:48 as a result of specifications and the introduction of additional items.
3. A net saving of N 539,250:00 was achieved as a result of remeasurements. This was due to the use of ordinary steel windows and the omission of luxalon sun breakers from the contract.

CHAPTER FIVE

ASSESSMENT OF VARIABLES ON LIFE PROJECTS.

The variables of the study have been discussed in chapter three. In this chapter an assessment of the variables on the life projects (completed) discussed in chapter four is presented. Emphasis is however laid on factors of important analytical significance.

The projects were numbered as follows: Project 1- the Teaching Hospital Project; Project 2- the Bank Branch Development Project; Project 3- the Residential Development Project; Project 4- the University Guest House Project and Project5- the Area Office Development Project.

5.1 ECONOMIC AND FINANCIAL PLANNING.

Project 1

There were no documents to suggest that a financial feasibility for the purpose of undertaking the project was conducted. However, it can be assumed that the value of the project was important enough to justify the investment. The absence of a feasibility from which the financial plan would have been developed manifested in the inadequacy of the funds initially allocated to the project.

Project 2

An initial feasibility study was not undertaken but it can reasonably be assumed that the clients had considered the potential benefits of establishing the new branch.

Project 3

Feasibility and financial planning were not undertaken perhaps because it is a private residential building. Traditionally, clients of residential developments do not undertake this exercise in this country.

Project 4

There were no records to suggest that feasibility was undertaken. However, it can be assumed, as in some of the other cases that the University had considered the value and the costs of the Guest House before embarking on the project.

Project 5

The clients of this project had considered the benefits they would derive by building a permanent office of their own. It is also obvious that they were conscious of the budget of the project right from inception. This is obvious from their response with respect to the initial bill of quantities prepared by the consultants. The clients also tried to avoid financial risks by the payment of advance to the contractors.

5.2 PROJECT CONTROL.

Project 1

A standard project control procedure was not adopted. It therefore suggests that project status collection and assessment were not deployed. Monthly meetings were not held regularly (if meetings are well conducted they could be useful in projects control). Contingency planning was not deployed. This is evident considering the inability of subcontractors to deliver their contracts as a result of which the consultants recommended stringent action. Incidentally, taking corrective action (stringent in this case) to get the project back on course is a form of control. But this is an extreme position.

Project 2

At least attempts were made to control the projects through written communications and site meetings. The numerous communications between the participants attest to this. However, in spite of these attempts, the measures were not effective. It is noteworthy that the ineffectiveness of the control measures was occasioned not only by the contractors, but also by other external factors such as force majeure. Specific examples include the temporary suspension of work due to the geographical migration of the workforce sequel to the political instability.

Project 3

Control measures were not instituted, resulting in both time and cost overruns. The initial project schedule prepared by the contractor could not be used for reporting on the project's status due to the clients' inability to take decisions.

Project 4

Control measures were thought out right at the inception of the project. Prudent management of resources was advocated ab initio and the programme of work that covered the contract period was prepared.

Project 5

Control was exercised with regards to costs right from inception. An example of this is evident from the design of floor slab, which substantially reduced the overall costs. The preparation of a programme of execution by the consultants and its subsequent approval by the client was a clear attempt at keeping track of events. However, lack of adherence to the programme, which was mostly caused by the indecision of the client, derailed it.

5.3 PROJECT STRATEGY

Project 1

The main contractor did not have an overall strategy to accomplish the project. However, two aspects of project strategy were at least adopted. These were the contracting strategy and project schedule.

The contracting strategy adopted was replete with problems, such as the issue of the relationship among the main contractors and Subcontractors/Taskforce.

The project schedule was prepared without due regard to the attention it required. For instance, a work breakdown structure was not prepared for a realistic schedule to result. At best the projects schedule could be considered as an estimate.

Project 2

The contracting strategy was the only aspect of project strategy that was adopted. A facilities plan was not prepared and neither was an external map obtained. At best the project schedule was an estimate of the duration of the project.

Project 3

Contracting strategy was the only aspect of project strategy that was adopted. However it appeared that the contracting strategy was not comprehensive. This is evident from the events that transpired during the implementation phase, such as the issue of the window subcontractor.

Project 4

The contract strategy adopted did not present any complications. Some aspects of project schedule were prepared. However, the facilities plan was not prepared and the external map was not obtained.

Project 5

The contracting strategy adopted (non-fluctuating) was not realistic, as initially observed by the consultants. It was in fact the cause of many problems such as the thorny issue of material fluctuations. The other constituents of project strategy were not given consideration except for the project schedule. At least some aspects of it were addressed e.g. the programme of execution and the materials purchased with the advance payment.

5.4 LEADERSHIP AND SUPERVISION.

Project 1

Judging from the events that occurred during the implementation of the project, the Task Force did not provide effective leadership. This is because the composition of members of the task force was rather political. For instance, the chairman, who had executive powers was a medical doctor and was absolutely incompetent to undertake such an assignment of a highly technical nature, which contributed to the inability of the subcontractors to deliver their contracts.

The organisational structure and reporting relationships were not clearly delineated, as a result of which supervision was not effective. This is evident from the relationship of the main contractors and consultants. This situation affected the project negatively.

Project 2

The roles and responsibilities of participants of the project were fairly delineated. However, the client interfered with normal procedures in the award of the contract. As a result, it became difficult for the consultant to perform their functions effectively. Although the progress of the project was severely impaired, the consultants carried out the supervision with enthusiasm.

Project 3

The Leadership of the project was clear ab initio. There was an express statement by the client appointing the architects as the project leaders. It is noteworthy that they exercised the leadership role and supervised the work effectively. On the other hand the clients were not consistent in their commitment to the project e.g. their inability to settle claims promptly.

Project 4

Generally, the Task Force provided good leadership on the project. The commendation letter written to the contractor by the Task Force was a good step towards enhancing the performance of the contractors.

Project 5

The leadership in this project was well defined. The architects gave direction, and offered good supervision of the project. However, the clients' consistent failure to take appropriate decisions at the appropriate times affected the project negatively. For instance, the delay in the award of building services subcontracts forestalled progress for some time.

5.5 PROJECT TEAM STAFFING.

Project 1

The selection and appointment of the prime consultants/architects was based on merit. It can reasonably be assumed that the appointment of the other consultants was similarly done although there were no documents that suggested it. The selection and appointment of the main contractor was also based on merit and due process. However in the appointment of subcontractors/suppliers the processes were not followed. Inevitably, their performance affected the project negatively.

Project 2

The conduct of the consultants was enough an indication that they had the requisite knowledge and experience to undertake the work. However the same cannot be said of the contractors. The manner in which the contract was awarded to the contractors was faulty. They could not perform to the desired expectation. There existed strained relationships between the members of the project team, e.g. between the consultants themselves, between the consultants and the contractor and between the contractors and the client.

Project 3

The consultants exhibited a high level of professionalism except for the civil/structural engineering team. For instance, the structural design details had not been completed more than sixteen weeks after the commencement of the project. The main contractor also displayed competence and willingness to complete the project. However, some subcontractors' conduct affected the course of the project e.g. the roofing subcontractor.

Project 4

The project team consisted of the right mix of participants. The relationship between them was cordial. They also discharged their responsibilities completely.

Project 5

The conduct of the consultant shows that they were diligent in the discharge of their duties (design and supervision). To a reasonable extent the contractors also performed satisfactorily. Most of the problems associated with the contractors were direct consequences of the action or inaction of the client such as delay in effecting payment due to valuations.

5.6 INFORMATION AND COMMUNICATION.

Project 1

Communication channels were not clearly established at the beginning of the project, as a result of which information flow was erratic. An instance of poor communication manifested in the length of time it took for the prime consultants to be informed of the appointment of the other consultants. Another example was the waiver offered a subcontractor by the Task Force, which was not communicated to the consultants. Also, some subcontracts were awarded without the knowledge of the consultants, which made supervision difficult.

Project 2

The channels of communication were established at the commencement of the project, but gaps existed in the information flow. An instance of this was where some members of the team would be at the venue of monthly site meetings only to meet the absence of others.

Project 3

Information flow was generally adequate. However in some specific cases there were communication gaps such as the appointment of a subcontractor (for windows) with no communication to the main contractor, although it did not affect progress adversely.

Project 4

Information flow was adequate.

Project 5

Information flow was adequate, especially between the consultant and contractors.

5.7 TECHNOLOGY.

Project 1

The impact of technology was reasonably considered right from the inception of the project. This is evident from the detail and concise brief that was prepared, which took cognizance of technological factors such as the recommendation for low-rise buildings. The experience of the project manager on other similar projects was useful in this respect.

Projects 2,3 and 4

The impact of technology did not feature prominently on these projects.

Project 5

Of major concern about technology was the issue of hollow pot clay floor slab, which was a source of conflict. It was a relatively new technology and the material was not readily available.

5.8 PLANNING.

Project 1

There were documents that suggested that the planning function was to some extent undertaken. It has been mentioned in section 5.3 that a schedule was prepared although the method of preparation might have been faulty. Resource allocation by the main contractor could be said to have been carried out rationally. This is because they executed their contract effectively.

Project 2

There were no documents or any evidence to suggest that planning procedures were instituted. This is also evident from the record of tenders where the contractors tendered for a completion period of 40 weeks as against the recommendations of 26 weeks. Surprisingly, the contractors accepted to deliver the project in a period of 28 weeks. All these were indications that detail plans were not prepared. As a consequence, the project could not be kept on course.

Project 3

Only some aspects of the planning function were undertaken such as the purchase of materials to be used on the project. But judging from the conduct of the client, even if there was comprehensive and detail planning, it might not have been adhered to.

Project 4

Planning was undertaken and the plans were effectively executed.

Project 5

Planning was not given serious consideration, otherwise some problems could have been avoided such as the unavailability of hollow pot clay in the locality.

5.9 INFLATION AND CONSTRUCTION SPEED

Project 1

It is noteworthy that although the initial contract sum was exceeded, it was not as a result of the speed of construction. Rather it was caused by the variations that were introduced during the execution of the contract.

Project 2

This factor was brought to bear on this project. The delay in the award of subcontracts, according to the contractor (and accepted by consultants) contributed to slowing down progress, which necessitated an extension of the contract period. As a result of the delay a substantial amount (N1, 600,000.00) was incurred as labour fluctuation claim.

Project 3

The speed of implementation on this project was slow but it was largely due to the inability of the structural engineers and the attitude of the client to the project. As a result, inflation affected the final cost of the Project.

Project 4

The prolonged indecision of the client with regards to the take-off of the project occasioned the revision of the initial contract sum upwards.

Project 5

This was a major factor in this project. The speed of execution of the project was very slow, mostly due to the indecision of the clients. For instance more than six months after the first award of the main contract the clients did nothing to facilitate the take off of the project, which necessitated an upward review of the contract figure. Also the delay in the execution caused a corresponding increase in labour rates due to government policy.

The indecision of the client regarding the award of services subcontractors also affected the progress and also the cost.

5.10 PROJECTS' PERFORMANCE

i. Efficiency of Project Execution

Project 1

With respect to the efficiency of project execution the final account figures show that the initial contract sum was overrun by over 90%. The contract duration was also overrun by more than 100%

Project 2

The initial contract sum was overrun by over 40%. The contract duration was also overrun by about 16 weeks or 61%

Project 3

The initial contract sum was overrun by about 20% while contract duration was overrun by more than 100%

Project 4

The initial contract period of 26 weeks was overrun by five weeks (about 19%). But the contract sum was not exceeded.

Project 5

The initial completion period was overrun by more than 100%. The initial contract sum was also overrun as a result of the clients' acceptance to settle all fluctuation claims. However, at the time that this report was compiled, the final figure was not available.

ii. Client Satisfaction

Project 1

During the course of the execution of this project, the client representatives (the Task Force) expressed some discontent although largely due to their own conduct. On the other hand it can be assumed that the built facility to a reasonable extent satisfies the needs and objectives of the clients.

Project 2

During the execution phase, there was dissatisfaction on the part of the client about the conduct of the contractors. However Banking services commenced after the commissioning of the project which is an indication that the client objective had been realised.

Project 3

The client was deeply involved in the project right from inception to completion. Variations were introduced by the client. Other major decisions were made by the

client. Here also, it can be assumed that the building has satisfied the objectives of the client.

Project 4

The client/representative was clearly satisfied with the performance of the contractors. It was only on this project that the client sent a written letter of commendation to the contractors.

Project 5

The contract administration was replete with irregularities. The clients unduly interfered with procedures, with some actions bordering on breach of the contract. Examples are the issue of fluctuation claims and insistence of the client that the contractors be issued with a certificate of practical completion while there were still outstanding works to be completed. Nevertheless it appeared that the clients were satisfied with the performance of the contractors.

iii. Participants Satisfaction

Project 1

With respect to the participants, there were strained relationships between the consultants and the client representative (Task Force), and also between the main contractors and the client representatives. The client representatives interfered with

normal procedures in the award of subcontracts, which caused rancour among the participants. The Task Force often ignored the advice of the consultants, which was certain to affect their professional pride.

Project 2

The clients interfered with procedures in the award of the contract. They often ignored the advice of the consultants. Some level of disagreement about procedure was also evident among the consultants, which indicates some dissatisfaction.

Meetings were severally postponed, as a result of which information dissemination was erratic. The level of interaction of the project participants was low, which might have influenced their perception of each other.

Project 3

There was no evidence of dissatisfaction on the part of the consultants. However, the contractors were irked by some actions of the client such as the issue of nominated suppliers.

Project 4

A cordial relationship existed among the participants of the project. The relationship between the consultant and the client was also cordial, which suggests that they were satisfied with each other's conducts.

Project 5

It is obvious from their communications that the participants' expectations were not met. This resulted from the clients' persistent interference with the consultants' professional work. In other words the consultant were not satisfied with the conduct of the client and the contractor.

CHAPTER SIX

ASSESSMENT OF THE SUCCESS CRITERIA ON MEMBERS OF THE PROJECT TEAM (PARTICIPANTS)

6.1 RESPONSE DATA

The administration of the questionnaire has been discussed in chapter 1. The response rates for the various categories of respondents is shown in table 6.1.

TABLE- 6.1: Returns of Questionnaires

	No Administered	No Returned	% Returned
Engineers	65	30	46.15
Builders	55	30	54.54
Quantity Surveyors	60	30	50
Architects	55	30	54.54
Contractors	70	30	43

6.2 EXPERIENCE OF RESPONDENTS

The preliminary analysis showed that 81 respondents representing 54% had at least ten years post qualification experience, whilst 57 respondents, representing 38% had more than five years working experience. Only 12 respondents (8%) had between one and five years working experience. On the whole, 141 (or 94%) respondents had

participated in projects worth N10 million and above. Thus it is considered that in general, the respondents had the requisite experience for them to comprehend the contents of the questionnaire. The aggregate scores for the research variables in respect of each category of respondents are shown in appendix E.

6.3 ANALYSIS OF VARIANCE FOR THE VARIOUS FACTORS

Analysis of variance (ANOVA) procedure was carried out in order to test the degree of agreement among the different groups of respondents with respect to their perception of the various factors and determinants with the following hypothesis.

Null Hypothesis H_0 : There is general agreement in the perception of the factors among the respondents.

Alternative Hypothesis H_1 : There is general disagreement in the perception of the factors among the respondents.

The F-distribution shown in appendix F is used to compare the value of computed value of F and F_α as mentioned in Chapter 1, where $\alpha = 0.05$. The value of F_α depends on the degrees of freedom $k-1$ and $n-1$ (also mentioned in Chapter 1). $k-1 = 5-1=4$, $n-k = 30 - 5 = 25$. Therefore the value of $F_{0.05 (4,25)} = 2.76$. This implies that wherever $2.76 > F$, then the null hypothesis is accepted. That is that there is general agreement among the respondents. The results of the ANOVA are presented in table 6.2

TABLE- 6.2: Results of ANOVA for the Factors

Factors	Description	F _{0.05}	F _{cal}
1	Economic and financial planing	2.76	1.18
2	Project control	2.76	0.92
3	Project Strategy	2.76	1.01
4	Management and leadership	2.76	0.32
5	Project team staffing	2.76	1.19
6	Information and communication	2.76	0.35
7	Technology	2.76	4.09
8	Planning	2.76	0.08
9	Inflation and construction	2.76	0.91

Discussion

All the respondents concur in their perception of all the factors but one, which is factor 7. The spread of the means, shown in appendix G generally corroborates this.

It is worth noting that for factor 1 the highest mean score was recorded for contractors. This is quite acceptable since contractors' cash flow, depends, at least to some extent on this factor. However, the lowest mean score, recorded for Quantity Surveyors is not expected because of their traditional role as cost advisers. One plausible explanation that may be given is that Quantity Surveyors are not normally involved at the inception of projects.

For factor 2, all the respondents hold identical views. However, the means are higher than for factor 1. This indicates that the views held are stronger. Appendix G shows that contractors recorded the highest mean score. This is not surprising as they contend more with the control of costs, time and the workforce on site. In general however, the means are fairly evenly distributed.

The result for factor 3, project strategy, shows that there is agreement among the respondents. The mean values of the scores are also fairly evenly distributed, with the highest mean recorded for Engineers, followed by the Builders and Contractors. This is slightly surprising because it is expected that contractors would have expressed the strongest feelings about this factor. This is because by definition all the major considerations for project strategy are more directly related to the activities of the contractors to a greater degree than those of the other respondents.

For factor 4, leadership and supervision, it should be noted that the level of agreement of the respondents is very high because the value of F is very small. As in the case of the other factors thus far, the mean scores of the respondents are fairly evenly distributed, with the highest mean recorded for the engineers, while the lowest was for the contractors. It is expected that Architects would express the strongest feelings about this factor because of their traditional role as team leaders. However, project

management approach for executing construction projects that has been adopted might have accounted for this. In the project management approach, any category of construction professional could be appointed as a project manager to provide leadership and general coordination. The most prominent incidence of the application of project management was in the Petroleum Trust Fund (PTF) project where the Engineers (mostly) were appointed as project management consultants.

Most of the respondents (for all categories) were not familiar with the partnering process. The few affirmative responses on partnering indicated that they had never been involved in the process.

With respect to factor 5 (project team staffing), there is also agreement among the respondents. The mean scores for Architects, Builders and Contractors are approximately the same. This is not surprising as all of them have a direct relationship with the staffing of the projects for effective delivery.

There is a remarkable degree of agreement in the case of information and communication (factor 6) among the respondents. The means are approximately the same for all categories of respondents. This is not surprising because this factor is equally important to all the respondents, as any delay in the dissemination of information or break in communication could affect all of them.

There is a high degree of disagreement among the respondents in case of technology (factor 7). However, it would appear that design and technology, from the point of view of Engineers, should be based on safety while a Builder may consider technology from the point of view of buildability. On the other hand, an Architect's first consideration may be the sophistry of architectural design. The highest mean score was recorded for builders, which confirms that builders are very conscious of suitable technology for construction operations.

With respect to factor 8, there is agreement among the respondents with the highest mean score recorded by architects. It was expected that contractors or builders would have recorded the highest score because they are directly concerned with aspects of planning. Quantity surveyors recorded the lowest mean score. This is not surprising because they do not have direct influence on planning.

There is general agreement among the respondents with respect to inflation and construction speed (factor 9). The means are fairly evenly distributed. This is probably because the effect of this factor in any project environment is likely to be perceived in the same way by each of the categories of the respondents.

6.4 ANALYSIS OF VARIANCE FOR THE DETERMINANTS

The results of the ANOVA for the determinants is presented in table 6.3.

TABLE- 6.3: Result of ANOVA for Determinants

Determinants	Description	F _{0.05}	F
1	Efficiency of project execution	2.76	0.69
2	Client satisfaction	2.76	0.27
3	Participant satisfaction	2.76	0.45

It can be seen that the respondents are in agreement for all the three determinants. The means are fairly evenly distributed for all of them.

6.5 REGRESSION OF THE DETERMINANTS ON THE PREDICTORS (FACTORS) FOR THE RESPONDENTS

Stepwise regression analysis was also performed on the data for all the nine factors (predictors) in turn. The object of this was to identify the predictors that may influence each of the determinants for each category of respondents. The result for engineers is presented in the table 6.4

TABLE- 6.4: Regression of Determinants on the Nine Predictors for the Engineers

Determinants	Predictors	Combined Influence %
Efficiency of project execution	F9, F5	28.92
Client satisfaction	None	-
Participant satisfaction	F9, F4	29.55

F9 and F5 were picked in case of efficiency of project execution (D1). This is an acceptable outcome. It is obvious that the two factors will have influence on the efficiency of the project execution. Their combined influence is however small. This means that there are some hidden questions. None of the predictors was picked in the case of client satisfaction. This is unexpected. However, F9 and F4 were picked in case of participant satisfaction. This result is also favourable as the two factors are certain to influence the satisfaction of the participants, but their combined influence, as in the case of D1, is low. It also means that some research questions are hidden.

The result of the regression analysis for builders is shown in table 6.5

TABLE- 6.5: Regression of Determinants on Nine Predictors for Builders

Determinants	Predictors	Combined Influence %
Efficiency of project execution	F2, F4	45.77
Client satisfaction	F8, F1, F4	56.76
Participant satisfaction	F8	15.23

From table 6.5, it can be seen that the factors F2 and F4 were picked in respect of the efficiency of project execution. This result is also favourable. It is quite obvious that the two factors will influence the determinants. Their combined influence is slightly higher than in the previous cases.

For determinant 2, client satisfaction, F8, F1, and F4, were picked. Their combined influence is considered fairly satisfactory as it is more than 50%. Only F8 was picked for participant satisfaction with an influence of 15% which is less than satisfactory, because it is obvious that adequate planning will enhance the satisfaction of participants on any project

The result of the regression for Quantity Surveyors is shown in table 6.6

TABLE -6.6: Regression of Determinants on Nine Predictors for Quantity Surveyors

Determinants	Predictors	Combined Influence %
Efficiency of project execution	-	-
Client satisfaction	-	-
Participant satisfaction	F9, F4	19.54

None of the predictor variables was picked for both determinants 1 and 2. But F9 and F4 were picked for determinant 3 with an influence of nearly 20%. This result is

acceptable for it is believed that technology by our definition will influence the satisfaction of members of the project team. The low level of influence may be attributable to the fact that Quantity surveyors are not directly concerned with the construction process.

For architects table 6.7 represents the regression of the determinants on the nine predictors.

TABLE- 6.7: Regression of Determinant on 9 Predictors for Architects

Determinants	Predictors	Combined Influence %
Efficiency of project execution	F4, F3, F8	55.9
Client satisfaction	F8	45.23
Participant satisfaction	F3	21.7

The factors that were identified in respect of the efficiency of project execution have a combined influence of about 56%, which is not surprising. The result is also fairly satisfactory; in other words, it is expected that planning, strategy and effective management will impact positively on the efficiency of project execution. Planning was again picked in respect of determinant 2 (client satisfaction). Here also, it is expected that well prepared and executed plans will enhance the smooth execution of the project, which will influence the client's satisfaction. The rating of this factor alone is about 45%, which is quite significant. It is fairly satisfactory.

With respect to participants' satisfaction, (determinant 3), only project strategy (F3) was identified, with an influence rating of about 22%. This result is also anticipated because it is believed that project strategy will have a profound influence on the determinant. However, 22% is less than satisfactory.

The regression analysis for contractors is shown in table 6.8

TABLE- 6.8: Regression for Determinants on 9 Predictors for Contractors

Determinants	Predictors	Combined Influence %
Efficiency of project execution	F5	24.04
Client satisfaction	F9, F8	64.14
Participant satisfaction	F9, F4	36.68

For determinant 1 (efficiency of project execution) only F5 (project team staffing) was picked, with a rating of 24%. This result is acceptable because the quality of personnel will, to a large extent affect the determinant 1. It is also revealing in the sense that contractors' works gain input from all other members of the team. Perhaps that is why this result emerged. However, the rating (24%) is low.

With respect to determinant 2, (client satisfaction) F9 and F8 were picked, with an influence rating of about 37% Construction speed is likely to influence the satisfaction of project participants. So also is management and supervision. Effective management

system will ensure that participants bring out their best in order to carry the project to successful completion.

6.6 CORRELATION ANALYSES

The correlation analyses performed for each category of respondents are presented in this section.

6.6.1 Engineers

The statistically significant relationships within the 5% level respect of engineers are shown in table 6.9

TABLE- 6.9: Correlation of Success Criteria and Determinants for Engineers

Determinants (D)	Correlated factors (F)
1. Efficiency of project execution	F9(0.39)
2. Client satisfaction	-
3. Participant satisfaction	F9(0.43), F4(0.42)

The implication of the result shown in table 6.9 is that determinant 1 for instance will improve with improvement in factor nine (F9). This particularly corroborates the result of the stepwise regression as only F9 showed a significant relationship. In this case also the strength of the relationship is low.

For determinant 2, it has no significant correlation with any of the factors. This is similar to the result of the regression analysis.

The result for determinant 3 also corroborates the results of the regression. F9 and F4 exhibited significant relationships with this determinant. But in this case also, the strength of the relationship is low.

6.6.2 Builders

The statistically significant relationship within the 5% level for builders is shown in Table 6.10

TABLE-6.10: Correlation of Success Factors and Determinants for Builders

Determinants (D)	Correlated factors (F)
1. Efficiency of project execution	F2(0.56), F5(0.46), F6(0.43)
2. Client satisfaction	F6(0.38), F8(0.59)
3. Participant satisfaction	F8(0.39)

In case of the efficiency of project execution three variables showed significant correlation. F2 was also picked as a predictor of D1 in the regression analysis. However, in case of F5, and F6 it is believed that both can influence the efficiency of the project execution.

For client satisfaction F6 and F8 were found to be correlated. The importance of information dissemination in the smooth and speedy execution of projects cannot be overemphasised, which consequently influences the client's satisfaction.

A good plan if well executed will enhance the achievement of the client's objective, which will consequently influence his satisfaction. Planning was found to be correlated to participant satisfaction, which corroborates the result of the regression analysis although as in the case of the regression, the strength of the relationship is low.

6.6.3 Quantity Surveyors

The result of the correlation analysis for Quantity Surveyors is shown in table 6.11.

TABLE-6.11: Correlation of Success Factors and Determinants for Quantity Surveyors

Determinants (D)	Correlated factors (F)
1. Efficiency of project execution	-
2. Client satisfaction	-
3. Participant satisfaction	F7(0.44)

The result corroborates the regression analysis. It is in fact the exact replica of table 6.5, which has been previously discussed.

6.6.4 Architects

For architects the relationships are presented in table 6.12

TABLE- 6.12: Correlation of Success Factors and Determinants for Architects

Determinants (D)	Correlated factors (F)
1. Efficiency of project execution	F4(0.43)
2. Client satisfaction	F3,(0.41) F4(0.47), F7(0.41), F9(0.36)
3. Participant satisfaction	F1(0.41), F3(0.47)

The results presented in table 6.12 are different from the regression presented in table 6.6. One explanation could be that these are some of the hidden factors that were not picked. A good management style, along with effective supervision (F4) will influence the efficiency of project execution.

Four different factors were found to be correlated to client satisfaction, which have been discussed in previous sections except F7. All these factors will improve the performance of a project. In other words, the client's objectives will be positively enhanced.

For determinant 3, two factors F1 and F3 showed significant correlation, which partially corroborate the result of the regression in table 6.6. F1 is likely to affect the

participants' satisfaction. This is more so for contractors whose work solely depends on a good financial plan for the project.

6.6.5 Contractors

Table 6.13 shows the significant relationships between the factors and determinants in case of contractors.

TABLE-6.13: Correlation of Success Factors and Determinants for Contractors

Determinants (D)	Correlated factors (F)
1 Efficiency of project execution	F1(0.31), F5(0.49), F6(0.48), F9(0.39)
2 Client satisfaction	F1(0.51), F2(0.48), F3(0.41), F4(0.54), F5(0.55), F6(0.52), F7(0.39), F8(0.59), F9(0.67)
3 Participant satisfaction	F5,(0.42) F9(0.50)

The table shows that three factors are correlated to the efficiency of project execution, out of which only one of them (F5) was picked as the predictor of D1. However, as discussed earlier, both F6 and F9 will influence D1. Good financial planning will also enhance the efficiency of project execution.

For determinant 2, all the factors showed significant correlation, which is acceptable. But it is not certain why contractors think that all the factors will influence determinants 2. This result is largely different from that of the regression shown in table

For determinants 3, the result of the correlation partially corroborates the regression shown in table 6.7. Factor 5 also exhibited a significant relationship with the determinant. The contractors' perception that project team staffing will also influence participant satisfaction is quite agreeable, because it is through a dedicated and competent team that the project can be realised.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

- (a) The case studies showed that the interactive approach at the design interface of projects is usually not adopted, and as such the relevant inputs of the various members of the building are not integrated in the design.

- (b) The basic principles of building project development and management as discussed in chapter two are usually violated (as in the case of the Bank Branch Project). In some cases, this is accompanied by misunderstanding and the nature of the relationship between the parties to a project. As a result, adversarial relations do occur which affect the smooth execution of building projects. Most building projects are not efficiently executed.

- (c) In each of the cases studied the client commitment is paramount importance in achieving successful projects. However, it is also clear that there indeed exists a distinction between a successful project and successful project management. Clients are more disposed to achieving a successful project rather than successful project management.

- (d) Economic and financial planning of building project undertakings is usually not conducted, sometimes accompanied by unsavoury consequences. These consequences impinge on the successful delivery of building projects. The effect of this outcome is different for the multiple stakeholders such as the clients, consultants and contractors.

- (e) Project control is not accorded the importance it deserves, which affects projects negatively. Where projects control procedure exists, problems occur during implementation.

- (f) The design and implementation of project strategy as defined receive little attention. Normally, a contracting strategy (mostly the traditional system) is adopted without considering its shortcomings. Project schedules are usually prepared, although there was no evidence to suggest that the schedules are systematically prepared. In other words contractors do not prepare work breakdown structures, which renders the schedule ineffective.

- (g) The traditional system of building project procurement, which is the commonest in use, establishes a hierarchical relationship in the project environment. This influences the leadership style adopted by the project leader.

- (h) Project team staffing; the consultants exhibited a reasonable level of competence in the cases studied. This is not surprising because their professional associations regulate their conducts. However, the same cannot be said of the contractors, whose activities are not regulated as at present.
- (i) Information and communication are generally adequate in the project environments of the cases studied. However, in some instances such as the Teaching Hospital Project, the channels were not expressly established, which impaired the smooth execution of the project.
- (j) Technology may not always an important factor to consider. The decision would have to be made based on the size and complexity of the project at hand.
- (k) The planning function as defined herein is not performed in details, which resulted in the preparation of inadequate project schedules. The issue of inadequate schedules manifested in all the cases studied, although other reasons might have contributed to it.
- (l) The relationship between inflation and construction speed is an important one. It featured prominently in all the cases studied. Due to the rising inflation, building

construction costs are inevitably increased whenever the completion is delayed. It should be mentioned, however, that not all cases of cost escalation are directly attributable to the speed of construction.

- (m) The analyses of the survey results showed that the respondents agree that the variables identified can be used to assess building projects.
- (n) The correlation analyses showed that the different categories of respondents differ in the way that they perceive the parameters.
- (o) The regression analyses shows that the predictors of the determinants are different for all the members of the building team.
- (p) The low percentages of the (combined) influences of the predictor variables are an indication that some research questions are hidden, which implies that the subject matter is a potentially potent area for research.

7.2 SUMMARY OF FINDINGS

The results obtained are not unexpected. Firstly, the different groups of respondents came from different backgrounds and professional affiliations. Secondly people

participate in projects for a variety of reasons and expectations, as a result of which different people approach issues of mutual interest from different perspectives.

The multiplicity of inputs in any project undertaking coupled with the fact that projects are usually one-off events also present another vantagepoint. In the former sense, each participant has distinctly different inputs and objectives, which may be sources of conflict. In the latter sense, once a project is completed, the structure ceases to exist and since no two projects are exactly alike, the experience gained by different participants from different projects may come into play.

In order to mitigate or even completely prevent the incidence of conflicts, it should be ensured that project management strategies include adopting systems and procedures to the requirements of its most primary resource, which are people.

7.3 RECOMMENDATIONS

- a. The interactive approach to project development and management right from inception to completion is advocated. In this regard, the immediate adoption and inclusion of the partnering process as a milestone in the project development process is recommended. It is envisaged that this will enhance project management performance.

- b. It must always be ensured that only competent contractors are awarded building contracts. The Nigerian Institute of Building should be EMPOWERED to regulate the practice of building production.

- c. Every major building construction project should, as a necessity, be subjected to a thorough economic and financial analysis. This is especially relevant where government projects are involved. It is envisaged that in the long run, this will enhance the speed of construction and consequently curtail cost escalations due to inflation.

- d. Building procurement systems should be thoroughly reviewed bearing in mind their merits and demerits, prior to the selection of an option, depending on the project. The traditional system is more commonly used. However, it would be useful to fully explore other procurement systems such as the construction/project management systems.

- e. For any major building project, information and communication channels should be established early. Good interpersonal relationships between project participants should be ensured because it improves information flow.

- f. The planning of major building projects should be given considerable attention in line with the guidelines discussed in chapter two.

- g. The survey results showed that project success a potential area for research.

Therefore further research in this area is advocated especially with regards to the hidden research questions. By so doing, the predictability of the success parameters will be enhanced. Consequently, this will help in the partnering process.

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DEPARTMENT OF BUILDING
FACULTY OF ENVIRONMENTAL DESIGN
AHMADU BELLO UNIVERSITY
ZARIA - NIGERIA

INTRODUCTION

A research work is being undertaken to evaluate management of Building Construction projects in Nigeria. As a part of the overall strategy for achieving this goal, a questionnaire was designed and pretested among the participants in the Building Construction Industry. This (second) questionnaires is based on the results obtained from the analysis of the pretest.

You are kindly requested to go through the questionnaire and choose from the alternatives provided, the one you consider most appropriate for each item of the questionnaire, based on your experience.

While acknowledging that the questionnaire is fairly detailed and will certainly take some of your valuable time, I should hasten to mention that the sample of respondents is highly stratified due to the technical nature of the questionnaire. Consequently, your (EARLIEST) response will not only prevent non-respondent bias, but will also contribute immensely towards finding solutions to the research issues.

I look forward for your earliest response.

Respondent's Profession

Architect () Engineer() Builder() Quantity Surveyor()
Contractor ()

Respondent's Post Qualification Experience

Up to 5 Years () 5 – 10 () 10 Years and Above ()

Highest Value of Projects that Respondent has participated in (N '000)

- i. Up to N 100 ()
- ii. N 100 - N 1,000 ()
- iii. N 1,000 - N 5,000 ()
- iv. N 5,000 - N 10,000 ()
- v. N 10,000 and above ()

PROJECT SUCCESS PARAMETERS/CRITERIA (INPUTS)**FACTOR-1: Economic and Financial Planning**

- (a) How precise is the definition of projects before they are embarked upon?
Imprecise () Fairly Precise () Very Precise ()
- (b) Indicate the level of clarity of project objectives when they are started.
Not Clear () Fairly Clear () Very Clear ()
- (c) Justification for projects (Explanation of why projects are undertaken) are normally stated.
Disagree () Agree () Strongly Agree ()
- (d) Financing options are normally considered and a best alternative adopted.
Not True () Fairly True () True ()
- (e) Budget limits and cash flow forecasts are normally set.
Not True () Fairly True () Always True ()

- (f) A preliminary assessment of the cost/value of the project (facility) is usually undertaken.
Not True () Fairly True () Always True ()
- (g) Land acquisition agreements and conditions are usually drawn.
Disagree () Agree () Strongly Agree ()
- (h) Statutory approvals and legal requirements are normally taken care of.
Disagree () Agree () Strongly Agree ()
- (i) Decisions about project viability are reached based on feasibility report and recommendations.
Disagree () Agree () Strongly Agree ()

FACTOR-2: Control (Budget and Schedule)

- (a) Scheduling (time-phasing) of projects is normally done
Seldom () Often () Always ()
- (b) It is normally ensured that project schedules are realistically achievable.
Seldom () Often () Always ()
- (c) Total float is used as a measure of project status.
True () False ()
- (d) The project schedule is normally based on a thorough task analysis.
Disagree () Agree () Strongly Agree ()
- (e) Change orders are usually communicated appropriately for schedule analysis.
Disagree () Agree () Strongly Agree ()
- (f) Actual costs incurred on a project are compared with budgeted cost on a regular basis.
False () Fairly True () True ()

- (g) Is the cash flow curve is a useful monitoring aid for (f) above?
Yes () No ()
- (h) Adjustments to original plans are made by repeating appropriate planning procedures.
Disagree () Agree () Strongly Agree ()
- (i) Implementation and monitoring of safety programmes and regulations is written into contract documents.
Seldom () Often () Always ()
- (j) Level of measurement of project deliverables and activities to assess whether quality objectives are being met during site inspection and meetings.
Low () Medium () High ()
- (k) Is design to cost approach employed at the design interface (project trade-offs)?
Not at all () Sometime () Always ()

FACTOR-3: Project Strategy

- (a) Indicate the level of delineation of functions of project participants.
Not Delineated () Fairly Delineated () Highly Delineated ()
- (b) Potential sources of services and means of obtaining them (acquisition plan) are clearly identified.
True () False () Not Always True ()
- (c) Are the public utilities (the National Electric Power Authority – N.E.P.A., Water Board, etc.) mains always located?
Yes () No ()

- (d) Work locations are usually decided before full site occupation.
False () Fairly True () Always True ()
- (e) Provision of temporary facilities is always taken care of.
Disagree () Agree () Strongly Agree ()
- (f) Communication channels are normally established.
True () False ()
- (g) Time is phased carefully, between engineering, procurement and construction for each 'system' on the project (project schedule).
Disagree () Agree () Strongly Agree ()
- (h) The logistics of procurement and construction are given due consideration.
Seldom () Often () Always ()
- (i) the project schedule (g) above, gains input from all significant parties, i.e., client, consultants, contractor and major sub-contractors.
False () Fairly True () Always True ()
- (j) An external map of the site is usually obtained.
Seldom () Often () Always ()
- (k) Risk sharing is a common feature of project management.
Disagree () Agree () Strongly Agree ()
- (l) Contractors are always required to buy an insurance policy to cover any project undertaking.
Disagree () Agree () Strongly Agree ()
- (m) Method statement is an important tool in project implementation.
Disagree () Agree () Strongly Agree ()

FACTOR-4: Management Leadership and Supervision

- (a) Indicate the degree to which clients neutralize the effects of project size and complexity.
Minimal () Moderate () Optimal ()
- (b) Degree to which Project Managers are committed to meeting costs, schedule, safety and quality.
Low () Medium () High ()
- (c) Involvement of Project Team members (early and continued) is the norm.
Disagree () Agree () Strongly Agree ()
- (d) Proximity of the Project Manager to client and sites is given due consideration.
Seldom () Often () Always ()
- (e) Leadership and leaders in Project Teams are distinct.
Seldom True () Often True () Always True ()
- (f) The leaderships are able to neutralize the effects of uncertain interfaces (external or internal).
Seldom () Often () Always ()
- (g) To what degree are needed facilities made available to projects?
Minimal () Moderate () Optimal ()
- (h) Type of organisational structures adopted represent a balance between functional and project structures.
Disagree () Agree () Strongly Agree ()
- (i) Spirit of camaraderie among team members is important.
Disagree () Agree () Strongly Agree ()

- (j) Degree of effectiveness of solutions proffered to problems that arise during execution of projects.
Ineffective () Effective () Highly Effective ()
- (k) Level of incentives for workers is adequate.
Disagree () Agree () Strongly Agree ()
- (l) Are you familiar with a management approach referred to as partnering?
Yes () No ()
- (m) If your answer to (l) is 'Yes', have you been involved in a partnering process?
Yes () No ()
- (n) If your answer to (m) is 'Yes', could you kindly rate the effectiveness of the approach?
Ineffective () Fairly Effective () Very Effective ()
- (o) Would you recommend partnering for other projects?
Yes () No ()

FACTOR-5: Staffing (Project Team Personnel)

- (a) Adequately staffed teams are usually ensured.
Disagree () Agree () Strongly Agree ()
- (b) Consistency of project team members is always adhered to.
Disagree () Agree () Strongly Agree ()
- (c) To what degree are personnel experienced in the required functional disciplines?
Low () Medium () High ()
- (d) Engagement of competent contractors is a norm.
Disagree () Agree () Strongly Agree ()

- (e) Experience and qualification of professional project team members is given due consideration.
Seldom () Often () Always ()
- (f) General level of appreciation of client or client representatives on projects.
Poor () Fair () Good ()
- (g) Level of productivity of project teams.
Poor () Fair () Good ()
- (h) Experience of sub-Contractors.
Inadequate () Fair () Adequate ()
- (i) Deciding on participants (professional team and contractors) to engage and the basis for their appointment is painstakingly done.
Disagree () Agree () Strongly Disagree ()
- (j) Training is usually given to personnel where construction team is deficient in a particular trade.
Disagree () Agree () Strongly Disagree ()

FACTOR-6: Information and Communication

- (a) Extent of participation of Project Team members in decision making especially with regards to cost, schedule safety and quality.
Low () Medium () High ()
- (b) Progress information is normally disseminated to Project Team members.
Seldom () Often () Always ()
- (c) Schedule progress is normally entered into the project plan on a daily basis.
Seldom () Often () Always ()

- (d) How well are project requirements communicated to participants?
Not at All () Fairly Well () Very Well ()
- (e) Are risk parameters critical to projects success normally delineated?
Yes () No ()
- (f) How often are meetings held to review progress?
Not Often () Often () Very Often ()
- (g) Is it true that monthly progress reports are usually prepared?
Seldom True () Often True () Always True ()
- (h) Does Project Managers' geographical distance from clients and project sites present constraints to successful project manager?
Seldom () Often () Always ()
- (i) Level of formal and informal interaction developed by key principal members of the Project Team.
Not Cordial () Cordial () Highly Cordial ()

FACTOR-7: Technology

- (a) Indicate the extent of design completion of projects (generally) that you have participated in.
Partially Complete () Complete ()
- (b) How well are functional requirements specified?
Not Specified () Partially Specified () Fully Specified ()
- (c) Make an assessment of the buildability of most of the projects you have participated in.
Not Easily Buildable () Highly Buildable ()
- (d) Degree of constructability analysis before commencement of construction.
Average () Outstanding ()

- (e) Degree of interface management (design) with particular reference to different design disciplines.
 Poor () Fair () Good ()
- (f) Degree of application of available technologies.
 Low () Medium () High ()
- (g) What is the level of importance attached to the knowledge of personnel in plant, services, operating principles, etc.
 Low () Medium () High ()
- (h) Ability to apply previous technology by construction teams.
 Fair () Good () Excellent ()
- (i) Is implementation of standards a good fit to the size, type, complexity and criticality of projects?
 Yes () No ()
- (j) General attitude to innovations.
 Indifferent () Unfriendly () Friendly ()
- (k) Complexity of architectural design affects buildability.
 Disagree () Agree () Strongly Agree ()

FACTOR-8: Planning

- (a) How well are project scopes (project justification, major deliverables and project objectives) written, if at all?
 Not at All () Fairly Well () Very Well ()
- (b) Degree of project definition (decomposition of major deliverables into smaller work packages).
 Fair () Average () Outstanding ()

- (c) Degree of task identification and definition.
Fair () Average () Outstanding ()
- (d) Degree of task sequencing.
Fair () Average () Outstanding ()
- (e) How well are schedules developed?
Not at All () Fairly Well () Very Well ()
- (f) Level of development of detail cost estimates (budget) of individual tasks.
Fair () Good () Excellent ()
- (g) How well are procurement plans documented?
Not at All () Fairly Well () Very Well ()
- (h) What is your general assessment of the confidence in planning and planning related activities among project team?
Indifferent () Enthusiastic () Highly Enthusiastic ()
- (i) Level of organisation planning (deciding how the project will be organised, establishing reporting relationships).
Low () Average () Outstanding ()
- (j) Level of communication planning (determining who needs what information, when they will need it and how it will be given to them).
Low () Average () Outstanding ()

FACTOR-9: Inflation and Construction Speed

- (a) Level of commitment to project plan by clients.
Low () Average () Outstanding ()
- (b) How often does inflation affect project's progress.
Seldom () Often () Always ()

- (c) Speed with which responses are made to changes or problems affecting objectives after starting project.
 Low () Average () Outstanding ()
- (d) How well are responsibilities specified in contracts.
 Not at All () Fairly Well () Very Well ()
- (e) Degree of provision of detail data analysis methods during project.
 Low () Average () High ()
- (f) Degree of control of sub-Contractors during projects.
 Poor () Fair () Good ()
- (g) Frequency of making late changes to the projects' design or implementation programme.
 Low () Moderate () High ()
- (h) Speed with which externally supplied elements are validated (expedited).
 Low () Moderate () High ()
- (i) To what degree are need facilities made available/supplied to projects at the initial stages?
 Poor () Reasonable () Outstanding ()

DETERMINANTS/MEASURES OF SUCCESS (OUTPUTS)

FACTOR-1: Efficiency of Project Execution

- (a) Indicate the degree to which targets of cost are met.
 Not Met () Sometimes Met () Always Met ()
- (b) What is the frequency of variations to original plans?
 Low () Medium () High ()

- (c) How are budgets (costs) affected by variation generally?
Not Affected () Fairly Affected () Well Affected ()
- (d) What is the level of deviation of budget changes to original targets?
Low () Medium () High ()
- (e) How adequate are targets of time provided for projects?
Inadequate () Fairly Adequate () Highly Adequate ()
- (f) How well are targets of time met?
Not at All () Met on Average () Always Met ()
- (g) Indicate the degree of focus on schedule control.
Low () Moderate () High ()
- (h) How well are technical requirements specified at the commencement of projects met?
Low () Moderate () High ()
- (i) Level of workmanship achieved.
Inadequate () Fairly Adequate () Adequate ()
- (j) Rate of occurrence of accidents on project sites.
Low () Intermediate () High ()

FACTOR-2: End User and Client Satisfaction

- (a) To what degree do users participate in formal designs and reviews?
Seldom () Often () Always ()
- (b) To what degree are initial project plans implemented?
Low () Average () High ()
- (c) To what degree are there collaborative contacts between user/client/contractor?
Low () Average () High ()
- (d) Are user operational scenarios often specified?
Yes () No ()

- (e) Do clients conduct confidential performance rating (for future use) of the professional team and contractors?
 No () Not Aware () Yes ()
- (f) Are users usually represented on clients change control?
 No () Sometimes () Yes ()
- (g) Propensity of clients to use the same professional team and contractors on other projects.
 Low () Medium () High ()
- (h) Contract performance (degree to which provisions of contract are executed).
 Low () Medium () High ()
- (i) Degree to which clients neutralize the effects of potentially conflicting requirements for multiple users.
 Low () Medium () High ()
- (j) How well are needs of multiple users of building project reconciled?
 Not at All () Fairly Well () Very Well ()
- (k) Aesthetic contribution to environment of building projects (generally).

FACTOR-3: Participant Satisfaction (Contractors and Professional Project Team

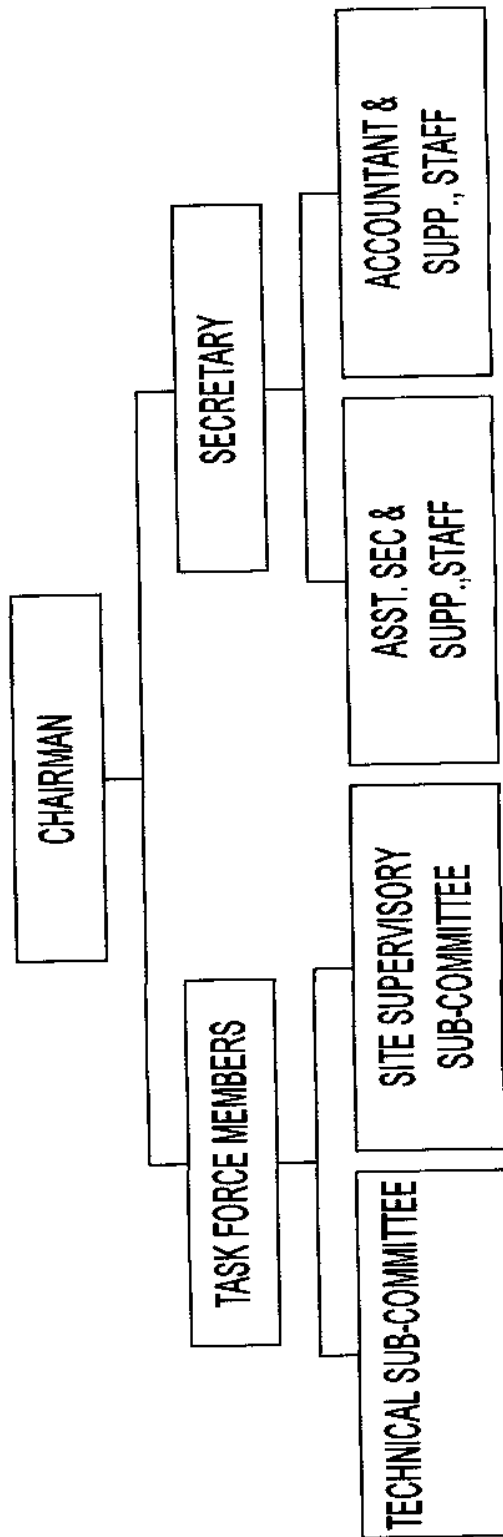
- (a) Degree of retention of personnel across project phases.
 Low () Medium () High ()
- (b) Frequency of occurrence of conflicts between project participants.
 Low () Average () High ()
- (c) Response of participants with respect to new challenges (professionals and contractor).
 Indifferent () Unfavourable () Favourable ()

- (d) Attitude of participants (professionals) to professional development.
Indifferent () Enthusiastic () Highly Enthusiastic ()
- (e) Frequency of litigation.
Nil () Average () High ()
- (f) Efficiency of project closeouts.
Poor () Fair () Good ()
- (g) How often is retention (money) paid fully to contractors?
Not Often () Often () Very Often ()
- (h) Ease with which retention (money) is released by clients.
Difficult () Fairly Easy () Easy ()
- (i) Degree of involvement of clients in decision-making in the execution stage of projects.
Low () Moderate () High ()
- (j) Project commissioning is often celebrated with fanfare.
Disagree () Agree () Strongly Agree ()

Thanks for your attention.

Kabir Bala.

ORGANISATION CHART

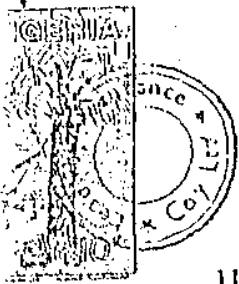


Stage in project management	Method	See chapter
0 Feasibility	A preliminary stage, before project management involvement, in which appraisals are carried out to ensure that the project will be viable technically and economically, and that funds can be made available	
1 Definition of objectives		
— scope	Solution or feasibility engineering by potential contractors, often in consultation with the client	8
— costs	Evaluation of the proposed engineering solution as accurately as possible (given the limited amount of design information available) to arrive at provisional cost estimates. The project may have to be sold against such preliminary estimates	10
— timescale	An assessment of the project duration and its key dates, based mainly upon past experience of similar projects rather than on detailed planning. A simple bar chart may be produced or a network, but there is insufficient information or time available at this pre-contract stage to allow detailed planning	17
2 Arrange funding	The client, having decided that he wants to proceed with a contract, has to ensure that funds are arranged or are available from his own resources. Preliminary cash flow forecasts are necessary.	9
3 Agree the objectives	The successful contractor, by entering into a contract with the client, has accepted his commitments and agreed to the project objectives	4 5 6
4 Work breakdown	The project is divided into a set of manageable tasks, known as work packages. Each work package is a mini project, with its own objectives of scope, cost and timescale. Work packages are chosen so that they fit together into hierarchical (or family tree) fashion to constitute the entire project.	10 26
5 Work schedule	Bar charts or network diagrams are used to show all project activities in a logical sequence. Network notation is best suited to this process, but bar charts are acceptable for very small jobs. The duration of each activity is estimated, and the overall project timescale is calculated, together with the identification of all critical activities. The logic is re-examined if the timescale is too long. The resources needed for the project are calculated and scheduled, using a computer for all but the very smallest projects.	17 18 19 20 21
6 Set the cost budgets	Re-estimate the project costs, in the detail afforded by the work breakdown and work schedule. Reconcile the new estimate with that used for the contract commitment, and take practical steps to limit the expenditure if this is initially estimated to exceed the total budget objective. Then set the work package budgets accordingly.	10 11
7 Work implementation	Set up the project organisation. Write and issue administrative procedures (unless standard). Issue an order authorising work to start. Issue detailed task lists and assign tasks to individuals. Set up purchasing arrangements. Identify and buy all long-lead purchased items.	3 22 13
8 Review the objectives	Reviewing the initial objectives is a continuous function of the project management team to ensure that any threat to them is acted upon promptly. Special attention must be paid to any proposals for project variations, to assess their likely effect on the overall scope, final costs and timescale.	8 11
9 Work follow-up	Expedite materials. Monitor, report and predict costs. Set up and carry out effective quality assurance procedures, to follow through until all work has been finished. Monitor work against key events or quantities, as appropriate. Ensure that personnel are well organised and motivated. Conduct progress meetings and report to the client and to the contractor's own management.	14 12 23 22 25 26
10 Close down	Assemble, summarise and archive a historical record of the project, showing final costs and scope of work, together with a technical description supported by as-built drawings. Include test certificates, calculations and copies of operating and maintenance manuals. This stage can be regarded as the final part of project definition, which started with the definition of objectives, continued as a constant review of these objectives, and (now) finishes with the objectives as they were actually achieved.	8

APPENDIX 'D'

LEADWAY ASSURANCE COMPANY LIMITED

(INCORPORATED IN NIGERIA RC 7588)



HEAD OFFICE: NN 28/29 CONSTITUTION ROAD, KADUNA.

CONTRACTORS' ALL RISKS POLICY

WHEREAS the Insured named in the Schedule by a proposal and declaration which shall be the basis of this contract and is deemed to be incorporated herein has applied to the LEADWAY ASSURANCE COMPANY LIMITED hereinafter called the "Company") for the insurance hereinafter contained and has paid or agree to pay the Premium as stated in the Schedule as consideration for such insurance.

THIS COMPANY HEREBY AGREE subject to the terms, excursions, provisions and conditions contained herein or endorsed hereon that if during the Period of Insurance or during any further period in respect of which the Insured shall have paid and the Company shall have accepted the premium required any part of the Property Insured shall be lost, destroyed or damaged as referred to in Section I hereof or the Insured shall incur legal liability as referred to in Section II hereof the Company will indemnify the Insured as provided hereinafter.

PERIOD OF COVER

(a) Construction Period:

The liability of the company shall commence, notwithstanding any date to the contrary specified in the Schedule, with the unloading of the property specified in the Schedule at the Contract Site and shall expire on the date specified in the Schedule.

The Company's liability expires also for parts of the Insured contract works taken over or put into service whichever shall be earlier by the Principal prior to the expiry date specified in the Schedule.

(b) Maintenance Period:

If a maintenance period is specified in the Schedule, the liability of the Company during this period shall be limited to any loss or damage caused by the Insured Contractor(s) in the course of the operations carried out for the purpose of complying with the obligations under the Maintenance Clause of the Contract.

APPENDIX 'D' (Contd.)

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SPECIFICATION ATTACHED TO AND FORMING PART OF
CONTRACTORS' ALL RISKS POLICY NO. CAR/91/0322/HQ

INSURED: M/S. Deanco (Nigeria) Limited

ADDRESS: --

OCCUPATION: Contractor

PRINCIPAL: Triad Associate

CONTRACT SITE:

TYPE OF CONTRACT: Main building of two storeys, Children's quarters - bungalow,
Boys-quarter, Mosque and Offices and Boundary walls, fences and gates

CONTRACT VALUE: N14,886,587.50

TEMPORARY BUILDING: N11

PLANT & EQUIPMENT: N11

THIRD PARTY LIABILITY: N500,000.00

CONSTRUCTION PERIOD: From: 1st June, 1991 To: 31st December, 1992

MAINTENANCE PERIOD: From: 1st January, 1993 To: 31st December, 1993

PREMIUM: N22,829.88

APPENDIX 'D' (Contd.)

<p>Section II</p> <p>Public Liability</p> <p>1. Limit of indemnity in respect of any one accident or series of accidents arising out of one event</p>	<p>to</p> <p>by</p> <p>by</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p>Excesses:</p> <p>In respect of each and every occurrence for loss of or damage to property</p>	<p>to</p> <p>the first <u>N1,000.00</u></p> <p>by</p>
<p>Period of Insurance</p> <p>(a) Construction Period: _____ From: _____ To: _____</p> <p>(b) Maintenance Period: _____ months thereafter</p> <p>Premium</p>	<p>to</p> <p>to</p> <p>to</p> <p>to</p> <p>to</p> <p>to</p> <p>to</p> <p>to</p> <p>to</p>

Dated in Kaduna the 11th day of June, 19 91

For: LEADWAY ASSURANCE COMPANY LTD.

Examined:

Entered:



ENDORSEMENTS: PPW, TPO.66, Maintenance clause, Cover on Public liability, Transit clause, Cross liability clause,

APPENDIX E
Average scores of Research Variables
Engineers

OBS	SNO	PROFESS	F1	F2	F3	F4	F5	F6	F7	F8	F9	D1	D2	D3
1	1	1	18	22	26	27	27	26	26	28	21	22	28	16
2	2	1	20	23	26	24	20	16	20	22	17	15	19	20
3	3	1	20	27	27	25	22	21	26	24	17	18	23	17
4	4	1	14	17	29	26	17	24	15	26	19	20	14	18
5	5	1	15	18	29	37	18	22	27	25	21	19	18	22
6	6	1	14	15	21	27	18	20	25	12	21	20	23	22
7	7	1	19	24	25	23	23	23	25	21	25	22	17	18
8	8	1	17	18	30	25	22	22	24	24	22	18	20	19
9	9	1	18	24	26	34	19	24	23	30	16	19	22	21
10	10	1	12	22	26	27	21	18	26	22	19	18	18	14
11	11	1	16	20	32	26	18	25	20	22	20	15	14	16
12	12	1	18	18	22	24	21	20	24	20	17	20	20	21
13	13	1	16	20	25	25	16	24	26	23	19	25	22	21
14	14	1	10	16	24	24	22	19	22	20	16	19	25	21
15	15	1	14	15	21	24	18	19	23	2	21	19	25	21
16	16	1	15	18	29	25	18	24	24	23	21	25	22	21
17	17	1	14	17	29	24	17	20	22	20	19	20	20	21
18	18	1	20	27	27	26	22	25	26	22	17	15	14	16
19	19	1	20	23	26	27	20	18	20	22	17	18	18	14
20	20	1	18	22	26	34	27	24	26	30	21	19	22	21
21	21	1	23	26	29	32	24	17	22	18	22	19	16	21
22	22	1	24	20	30	33	17	15	20	26	19	21	22	18
23	23	1	17	14	18	20	15	17	18	19	18	20	19	18
24	24	1	14	17	24	23	18	12	21	15	15	20	16	17
25	25	1	16	11	18	29	17	17	20	20	16	22	20	17
26	26	1	15	13	28	10	17	14	18	17	14	18	19	12
27	27	1	12	14	21	23	13	14	17	14	17	20	23	17
28	28	1	16	16	21	20	15	14	23	18	16	19	22	16
29	29	1	19	20	29	20	16	25	24	20	25	28	28	20
30	30	1	20	18	25	28	17	19	23	20	15	21	22	16

APPENDIX E (Continued)
Builders

OBS	SNO	PROFESS	F1	F2	F3	F4	F5	F6	F7	F8	F9	D1	D2	D3
1	1	2	13	25	31	36	23.0	28	19	28	24	23	27.0	18.0
2	2	2	13	17	22	23	17.0	19	24	21	15	21	21.0	22.0
3	3	2	19	24	30	20	23.0	23	25	26	11	24	26.0	21.0
4	4	2	14	11	20	23	16.0	18	13	11	20	18	13.0	15.0
5	5	2	18	20	21	25	12.0	20	15	28	19	21	24.0	26.0
6	6	2	19	24	23	31	19.0	17	27	17	23	24	20.0	12.0
7	7	2	14	12	26	20	23.0	22	17	23	25	18	23.0	17.0
8	8	2	14	25	25	18	24.0	27	20	21	23	26	21.0	23.0
9	9	2	16	14	32	36	18.0	24	21	15	17	15	20.0	19.0
10	10	2	18	25	27	26	24.0	22	25	16	21	28	19.0	16.0
11	11	2	20	17	28	20	25.0	26	20	24	20	27	22.0	19.0
12	12	2	14	21	20	37	16.0	22	18	20	24	18	23.0	18.0
13	13	2	14	16	30	28	16.0	20	24	18	18	17	24.0	14.0
14	14	2	12	20	20	22	20.0	19	15	30	21	23	27.0	20.0
15	15	2	17	18	32	17	21.0	23	21	24	16	20	17.0	25.0
16	16	2	14	16	19	22	17.0	19	20	14	16	19	19.0	18.0
17	17	2	12	17	24	23	20.0	22	19	20	16	19	18.0	16.0
18	18	2	13	16	25	26	20.5	22	18	22	15	20	23.5	17.5
19	19	2	17	21	21	30	21.0	21	21	25	21	18	22.0	19.0
20	20	2	25	23	29	27	25.0	20	23	20	23	20	20.0	19.0
21	21	2	19	17	26	25	17.0	22	20	26	21	20	15.0	17.0
22	22	2	27	15	32	29	21.0	22	26	26	18	22	20.0	21.0
23	23	2	24	24	24	26	23.0	24	26	21	19	23	17.0	23.0
24	24	2	18	16	21	24	17.0	16	22	16	15	19	16.0	21.0
25	25	2	25	24	25	29	18.0	21	25	22	18	17	18.0	18.0
26	26	2	19	15	17	21	15.0	13	18	14	17	18	15.0	16.0
27	27	2	18	16	23	22	19.0	17	20	18	19	18	17.0	22.0
28	28	2	17	17	25	26	33.0	15	21	16	16	20	20.0	22.0
29	29	2	17	21	23	20	21.0	19	26	21	20	20	17.0	14.0
30	30	2	17	17	20	29	17.0	15	17	17	16	17	21.0	16.0

APPENDIX E (Continued)
Quantity Surveyors

OBS	SNO	PROFESS	F1	F2	F3	F4	F5	F6	F7	F8	F9	D1	D2	D3
1	1	3	14	15	19	30	17	19	20	19	16	21	19	15
2	2	3	16	18	21	32	14	20	6	21	22	16	19	17
3	3	3	15	15	30	26	20	2	22	22	16	18	18	18
4	4	3	12	22	24	29	20	22	19	15	15	19	18	24
5	5	3	13	16	25	20	20	22	18	18	21	21	23	19
6	6	3	17	18	21	26	21	21	21	24	16	17	22	15
7	7	3	14	22	21	23	16	18	23	20	23	20	20	20
8	8	3	13	18	24	22	18	18	17	17	25	18	22	13
9	9	3	11	16	24	20	24	27	20	14	18	19	18	10
10	10	3	15	19	29	22	17	23	17	18	16	21	26	14
11	11	3	16	19	20	35	22	19	24	18	17	15	14	20
12	12	3	13	17	23	23	20	21	16	20	12	19	16	16
13	13	3	18	16	25	26	16	21	19	22	12	20	20	17
14	14	3	16	21	20	30	18	22	18	25	14	18	23	19
15	15	3	15	19	29	18	21	28	22	16	18	20	18	20
16	16	3	23	24	24	22	19	18	22	20	20	20	20	27
17	17	3	22	18	23	27	21	21	23	15	12	20	14	20
18	18	3	16	18	26	22	20	19	23	20	18	20	19	20
19	19	3	19	30	26	20	21	27	23	28	20	20	17	22
20	20	3	18	23	23	15	22	22	21	24	15	18	19	22
21	21	3	14	12	22	23	20	25	21	22	16	22	29	19
22	22	3	13	17	25	21	17	19	18	21	16	19	21	15
23	23	3	13	10	17	18	14	17	15	14	14	19	15	23
24	24	3	18	21	26	28	24	26	24	24	24	21	26	24
25	25	3	17	19	21	26	16	14	18	19	18	21	17	18
26	26	3	19	16	22	32	17	17	17	17	17	21	22	19
27	27	3	21	25	34	28	19	20	24	19	18	21	21	18
28	28	3	17	20	27	26	17	18	21	20	19	18	18	23
29	29	3	15	12	28	26	19	20	22	20	21	20	24	24
30	30	3	15	14	18	21	13	17	15	17	16	20	21	16

APPENDIX E (Continued)

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Architects

OBS	SNO	PROFESS	F1	F2	F3	F4	F5	F6	F7	F8	F9	D1	D2	D3
1	1	4	20	22	32	28	27	25	29	32	20	21	30	23
2	2	4	17	20	24	29	19	29	26	25	20	20	25	20
3	3	4	13	20	22	21	11	21	23	29	22	20	19	10
4	4	4	14	14	18	21	22	20	17	18	10	20	17	24
5	5	4	13	18	18	18	21	24	22	13	18	19	14	21
6	6	4	14	19	28	25	24	16	28	21	19	18	27	16
7	7	4	19	14	22	16	26	29	27	20	21	12	15	25
8	8	4	18	19	16	24	20	21	29	21	16	25	23	18
9	9	4	15	15	30	22	23	22	23	21	17	18	27	23
10	10	4	14	17	26	20	22	22	28	15	14	12	17	19
11	11	4	12	12	14	25	20	19	18	27	21	28	26	7
12	12	4	13	18	16	35	13	22	20	24	20	23	24	22
13	13	4	17	20	24	29	19	21	26	25	21	20	25	18
14	14	4	20	22	32	28	25	29	29	32	21	21	30	25
15	15	4	13	20	22	21	11	23	23	29	16	20	19	23
16	16	4	14	14	18	21	22	22	17	18	17	20	17	19
17	17	4	13	15	18	18	21	19	22	13	14	19	14	7
18	18	4	14	19	28	25	24	22	28	21	20	18	21	22
19	19	4	14	11	20	23	16	18	13	11	16	18	13	16
20	20	4	16	17	23	27	19	17	19	24	24	21	21	21
21	21	4	21	18	23	22	22	16	17	15	16	16	20	16
22	22	4	19	19	29	28	24	20	25	24	18	21	18	20
23	23	4	17	17	25	27	22	19	26	24	19	22	25	20
24	24	4	24	19	28	32	25	24	25	21	20	21	19	22
25	25	4	17	22	31	27	21	16	26	21	20	20	20	22
26	26	4	22	25	27	30	24	19	23	23	19	20	18	20
27	27	4	22	24	27	33	22	21	17	18	19	19	21	22
28	28	4	17	12	21	22	13	14	19	15	12	20	23	20
29	29	4	20	12	20	24	19	14	24	18	17	22	17	20
30	30	4	20	18	29	23	16	16	26	23	19	10	25	23

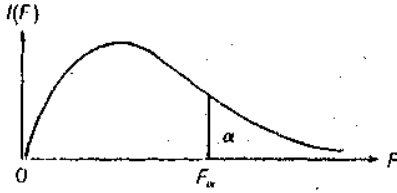
APPENDIX E (Continued)

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Contractors

OBS	SNO	PROFESS	F1	F2	F3	F4	F5	F6	F7	F8	F9	D1	D2	D3
1	1	5	13	17	21	24	22	17	19	14	21	19	20	23
2	2	5	19	25	23	22	20	27	22	29	17	20	23	22
3	3	5	13	20	30	21	18	19	15	21	16	19	15	15
4	4	5	18	14	18	16	26	26	20	24	25	21	24	24
5	5	5	14	18	24	21	14	25	25	22	11	22	19	19
6	6	5	18	10	17	818	14	22	15	24	14	18	15	22
7	7	5	14	30	26	20	21	24	23	18	20	19	17	19
8	8	5	15	17	25	21	17	23	18	22	16	18	21	22
9	9	5	18	21	26	28	24	25	24	22	24	20	26	22
10	10	5	17	12	22	23	20	22	21	25	16	23	24	18
11	11	5	15	23	23	15	22	20	21	24	15	19	19	23
12	12	5	18	25	31	36	23	28	19	28	24	23	27	18
13	13	5	19	24	30	20	23	23	25	26	21	24	26	21
14	14	5	23	22	29	37	26	21	28	26	21	22	27	19
15	15	5	21	22	27	37	20	19	22	26	22	18	19	21
16	16	5	19	24	27	26	17	13	21	21	21	17	25	18
17	17	5	23	26	23	34	23	20	23	24	18	16	27	17
18	18	5	18	14	26	22	18	16	22	15	18	19	19	17
19	19	5	21	15	25	19	19	18	19	14	16	19	19	19
20	20	5	18	18	17	18	13	12	21	17	13	21	13	18
21	21	5	19	17	27	23	18	17	19	18	11	17	12	11
22	22	5	28	24	29	31	29	26	28	20	28	30	23	28
23	23	5	19	18	24	26	21	15	13	18	20	18	22	20
24	24	5	18	19	21	19	17	13	24	18	19	20	16	17
25	25	5	20	17	24	20	22	16	17	18	19	24	19	16
26	26	5	20	20	28	25	20	15	25	20	22	16	22	22
27	27	5	8	15	24	22	22	16	17	17	14	21	10	17
28	28	5	18	24	26	30	19	19	23	20	21	22	25	19
29	29	5	12	12	18	26	17	12	20	12	17	16	15	15
30	30	5	18	26	29	35	23	28	19	28	24	23	27	17

Critical Values for the F Statistic: $F_{.05}$



$v_2 \backslash v_1$	NUMERATOR DEGREES OF FREEDOM								
	1	2	3	4	5	6	7	8	9
1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04
120	3.92	3.07	2.68	2.45	2.29	2.17	2.09	2.02	1.96
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88

Source: From M. Merrington and C. M. Thompson, "Tables of Percentage Points of the Inverted Beta (F)-Distribution." *Biometrika*, 1943, 33, pp. 73-88. Reproduced by permission of the *Biometrika* trustees.

(continued)

F_{α}		NUMERATOR DEGREES OF FREEDOM									
		10	12	15	20	24	30	40	60	120	∞
1		241.9	243.9	245.9	248.0	249.1	250.1	251.1	252.2	253.3	254.3
2		19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50
3		8.79	8.74	8.70	8.66	8.64	8.63	8.59	8.57	8.55	8.53
4		5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63
5		4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.36
6		4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67
7		3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23
8		3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93
9		3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71
10		2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54
11		2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40
12		2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30
13		2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21
14		2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13
15		2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07
16		2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01
17		2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96
18		2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92
19		2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88
20		2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84
21		2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81
22		2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.89	1.84	1.78
23		2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76
24		2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79	1.73
25		2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71
26		2.22	2.15	2.07	1.99	1.95	1.90	1.85	1.80	1.75	1.69
27		2.20	2.13	2.06	1.97	1.93	1.88	1.84	1.79	1.73	1.67
28		2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.77	1.71	1.65
29		2.18	2.10	2.03	1.94	1.90	1.85	1.81	1.75	1.70	1.64
30		2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62
40		2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51
60		1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39
120		1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25
∞		1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.22	1.00

DENOMINATOR DEGREES OF FREEDOM

APPENDIX G

Means of the Aggregate Scores of Respondents on the Research Variables

Factor F1	
Respondent	Mean Score
Engineers	16.800
Builders	17.233
Quantity Surveyors	15.933
Architects	16.733
Contractors	17.800

Factor F7	
Respondent	Mean Score
Engineers	22.533
Builders	20.867
Quantity Surveyors	19.967
Architects	23.167
Contractors	20.933

Factor F2	
Respondent	Mean Score
Engineers	19.167
Builders	18.800
Quantity Surveyors	18.333
Architects	17.733
Contractors	19.633

Factor F8	
Respondent	Mean Score
Engineers	21.433
Builders	20.667
Quantity Surveyors	19.633
Architects	21.367
Contractors	21.033

Factor F3	
Respondent	Mean Score
Engineers	25.633
Builders	24.700
Quantity Surveyors	23.900
Architects	23.700
Contractors	24.667

Factor F9	
Respondent	Mean Score
Engineers	18.767
Builders	18.900
Quantity Surveyors	17.500
Architects	18.200
Contractors	18.800

Factor F4	
Respondent	Mean Score
Engineers	25.733
Builders	25.367
Quantity Surveyors	24.567
Architects	24.800
Contractors	24.500

Determinant D1	
Respondent	Mean Score
Engineers	19.800
Builders	20.433
Quantity Surveyors	19.400
Architects	19.467
Contractors	20.133

Factor F5	
Respondent	Mean Score
Engineers	19.167
Builders	20.050
Quantity Surveyors	18.767
Architects	20.433
Contractors	20.267

Determinant D2	
Respondent	Mean Score
Engineers	20.367
Builders	20.183
Quantity Surveyors	19.967
Architects	21.000
Contractors	20.533

Factor F6	
Respondent	Mean Score
Engineers	12.933
Builders	20.600
Quantity Surveyors	20.800
Architects	20.667
Contractors	19.900

Determinant D3	
Respondent	Mean Score
Engineers	18.400
Builders	18.817
Quantity Surveyors	19.200
Architects	19.467
Contractors	19.300