



## Special Approach and Practices for Effective Planning, Coordination, Monitoring and Maintenance of Rural Infrastructural Projects in Nigeria

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**ABSTRACT:** Faulty approach, inadequate planning system, lack of coordination, erratic monitoring and poor maintenance are major contributors to rural infrastructural dilemma in Nigeria. Efficient supervision, monitoring and construction planning are very germane for effective management and execution of construction projects. Two sets of data were collected for this research namely primary and secondary. The study area for this research is Lagos state a metropolitan city in western Nigeria. The primary data which refers to field data were obtained through the use of well-structured questionnaires developed from the initial identification of likely factors affecting construction cost in Nigeria and solutions to minimizing this problem. These were analysed by SPSS (Statistical Package for Social Science) having carefully completed the variable view and imputed the extracted data. Seventy questionnaires were randomly administered (Twenty-two to Consultants, Thirty-two to Contractors and Sixteen to Clients). As at the time of compiling this report, a total of fifty-two usable responses were received, representing 74.29% effective response rate. Conclusively, the main factor affecting cost of construction is the cost of materials, fraudulent acts and incompetency of manpower. Contractors and Consultants should apply the proffered solutions to minimizing same so as to restore Client's confidence in consultants, contractors and to reduce investment risks and generally boost the viability and sustainability of rural infrastructures.

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### I. INTRODUCTION

Planning is germane for rural and urban infrastructures. Like the five blind men encountering different parts of an elephant, each of the numerous participants in the process of planning, designing, financing, constructing and operating physical facilities has a different perspective on efficient supervision and monitoring for construction. Specialized knowledge can be very beneficial, particularly in large and complicated projects, since experts in various specialties can provide valuable services. However, it is advantageous to understand how the different parts of the process fit together.

The majority of Nigerians is rural dwellers. Though inadequacies of statistics make knowledge of actual rural - urban population distribution inexact, unadjusted projections still shows that Nigerians predominantly live in rural areas. Rural areas in Nigeria are unquestionably characterized by debilitating material poverty and alarming decadence of infrastructure, arising from a long period of sad neglect by policy makers. The central place of infrastructure in development efforts need not be overemphasized. Pipe-borne water per capita for these states where data is available fall within the range of 0.01 liters Enugu/Anambra (formerly Anambra) and 39.10 liters in Oyo State. Even if we exercise caution in generalizing on the basis of these figures, it is incontrovertible fact that potable water is in short supply in our rural areas.

Rural roads form the basis for transportation and communication. Rural roads consist of federal, state and local government roads (major, feeder, tracks, footpaths, bridges and culverts) found in the rural areas. Rural roads, perhaps, constitute the most critical infrastructure in the rural, and by extension, national development drive. Contributions of rural roads to rural development include:

accelerated delivery of farm inputs and evacuation of produce; reduced costs in transportation in terms of human energy, costs of portorage and times loss in trekking long distances; and facilitating more efficient distribution of goods and services between the rural and urban sectors.

Rural water supply across the country remains deplorable. Various governments - past and present - recognize the rural water supply problem. According to Idachaba (1995), average supplies of Waste, excessive cost and delays can result from poor coordination and communication among specialists. It is particularly in the interest of owners to ensure that such problems do not occur. And it behoves all participants in the process to heed the interests of owners because, in the end, it is the owners who provide the resources and call the shots. It should be noted that for the phased ADPs, the burden of funding among the 3 principal actors is distributed in the ratio of 20 percent, 14 percent and 66 percent for the Federal Government, State Governments and the World Bank respectively (The Guardian. 25/11/86: 10-12). As far back as 1985, the ADPs had constructed some 6,787 kilometres of feeder roads - a figure, according to Obiukwu (1991), doubled by 1992. Reports, as at 1986, show that since inception the ADPs have between them provided rural infrastructures as table 1 shows.

**Table 1: Provision of rural infrastructures**

<b>Projects</b>	<b>Units/numbers</b>
Feeder roads (constructed and rehabilitated)	7.178 kilometers and 7.178 kilometers
Boreholes	23,632 (Nos.)
Wells	686 (Nos.)
Washbores	973 (Nos.)
Tube wells	518 (Nos.)
Farm service centres	601 (Nos.)
Development Training Centre	71 (Nos.)
Earth dams	101 (Nos.)

**Source: A decade of progress in integrate rural development: focus on ADPs in Nigeria, The Guardian (25 Nov.1986) Lagos, Nigeria.**

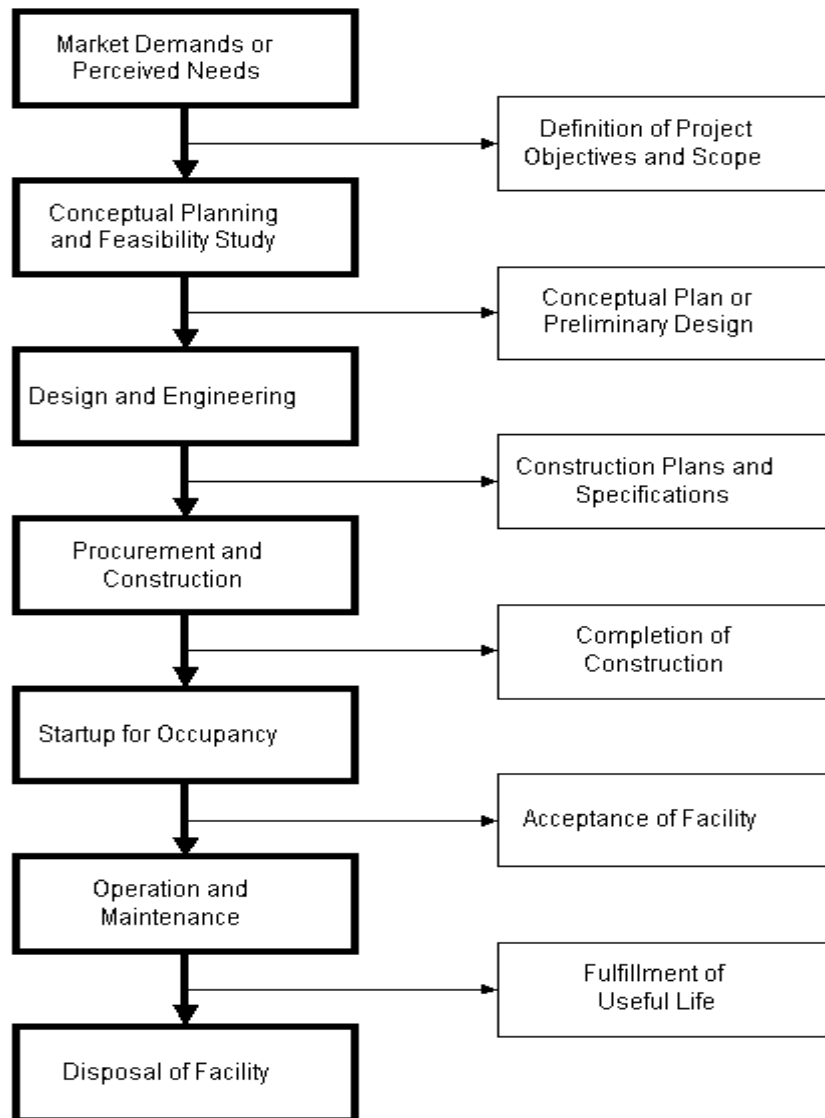
### 1.1 The Project Life Cycle

The acquisition of a constructed facility usually represents a major capital investment, whether its owner happens to be an individual, a private corporation or a public agency. Since the commitment of resources for such an investment is motivated by market demands or perceived needs, the facility is expected to satisfy certain objectives within the constraints specified by the owner and relevant regulations.

From the perspective of an owner, the project life cycle for a constructed facility may be illustrated schematically in Figure 1. Essentially, a project is conceived to meet market demands or needs in a timely fashion. Various possibilities may be considered in the conceptual planning stage, and the technological and economic feasibility of each alternative will be assessed and compared in order to select the best possible project. The financing schemes for the proposed alternatives must also be examined, and the project will be programmed with respect to the timing for its completion and for available cash flows. After the scope of the project is clearly defined, detailed engineering design will provide the blueprint for construction, and the definitive cost estimate will serve as the baseline for cost control. In the procurement and construction stage, the delivery of materials and the erection of the project on site must be carefully planned and controlled. After the construction is completed, there is usually a brief period of start-up or shake-down of the constructed facility when it is first occupied. Finally, the management of the facility is turned over to the owner for full occupancy until the facility lives out its useful life and is designated for demolition or conversion.

The stages of development in Figure 1 may not be strictly sequential. Some of the stages require iteration, and others may be carried out in parallel or with overlapping time frames, depending on the nature, size and urgency of the project. Furthermore, an owner may have in-house capacities to handle the work in every stage of the entire process, or it may seek professional advice and services

for the work in all stages. Understandably, most owners choose to handle some of the work in-house and to contract outside professional services for other components of the work as needed. By examining the project life cycle from an owner's perspective, we can focus on the proper roles of various activities and participants in all stages regardless of the contractual arrangements for different types of work.



**Figure 1: The Project Life Cycle of a Constructed Facility**

## **1.2 Financing of Constructed Facilities**

A major construction project requires an enormous amount of capital that is often supplied by lenders who want to be assured that the project will offer a fair return on the investment. The direct costs associated with a major construction project may be broadly classified into two categories: (1) the construction expenses paid to the general contractor for erecting the facility on site and (2) the expenses for land acquisition, legal fees, architect/engineer fees, construction management fees, interest on construction loans and the opportunity cost of carrying empty space in the facility until it is fully occupied. The direct construction costs in the first category represent approximately 60 to 80 percent of the total costs in most construction projects. Since the costs of construction are ultimately borne by the owner, careful financial planning for the facility must be made prior to construction.

### **1.2.1 Construction Financing**

Construction loans to contractors are usually provided by banks or savings and loan associations for construction financing. Upon the completion of the facility, construction loans will be terminated and the post-construction facility financing will be arranged by the owner. Construction loans provided for different types of construction vary. In the case of residential housing, construction loans and long-term mortgages can be obtained from savings and loans associations or commercial banks. For institutional and commercial buildings, construction loans are usually obtained from commercial banks. Since the value of specialized industrial buildings as collateral for loans is limited, construction loans in this domain are rare, and construction financing can be done from the pool of general corporate funds. For infrastructure construction owned by government, the property cannot be used as security for a private loan, but there are many possible ways to finance the construction, such as general appropriation from taxation or special bonds issued for the project.

### **1.2.2 Financing of Rural Infrastructural Facility**

Many private corporations maintain a pool of general funds resulting from retained earnings and long-term borrowing on the strength of corporate assets, which can be used for facility financing. Similarly, for public agencies, the long-term funding may be obtained from the commitment of general tax revenues from the federal, state and/or local governments. Both private corporations and public agencies may issue special bonds for the constructed facilities which may obtain lower interest rates than other forms of borrowing. Short-term borrowing may also be used for bridging the gaps in long-term financing. Some corporate bonds are convertible to stocks under circumstances specified in the bond agreement. For public facilities, the assessment of user fees to repay the bond funds merits consideration for certain types of facilities such as toll roads and sewage treatment plants. The use of mortgages is primarily confined to rental properties such as apartments and office buildings.

## **1.3 Legal and Regulatory Requirements**

Infrastructure assets such as rural roads, tracks, bridges, irrigation schemes, water supplies, schools, health centres and markets are needed in rural areas for the local population to fulfil their basic needs and live a social and economic productive life. The owners of facilities naturally want legal protection for all the activities involved in the construction. It is equally obvious that they should seek competent legal advice. However, there are certain principles that should be recognized by owners in order to avoid unnecessary pitfalls.

### **1.3.1 Legal Responsibilities**

Activities in construction often involve risks, both physical and financial. An owner generally tries to shift the risks to other parties to the degree possible when entering into contractual agreements with them. However, such action is not without cost or risk. For example, a contractor who is assigned the risks may either ask for a higher contract price to compensate for the higher risks, or end up in non-performance or bankruptcy as an act of desperation. Such consequences can be avoided if the owner is reasonable in risk allocation. When risks are allocated to different parties, the owner must understand the implications and spell them out clearly. Sometimes there are statutory limitations on the allocation of liabilities among various groups, such as prohibition against the allocation of negligence in design to the contractor. An owner must realize its superior power in bargaining and hence the responsibilities associated with this power in making contractual agreements.

### **1.3.2 Mitigation of Conflicts**

It is important for the owner to use legal counsellors as advisors to mitigate conflicts before they happen rather than to wield conflicts as weapons against other parties. There are enough problems in design and construction due to uncertainty rather than bad intentions. The owner should recognize the more enlightened approaches for mitigating conflicts, such as using owner-controlled wrap-up insurance which will provide protection for all parties involved in the construction process for unforeseen risks, or using arbitration, mediation and other extra-judicial solutions for disputes among various parties. However, these compromise solutions are not without pitfalls and should be adopted only on the merit of individual cases.

## **1.4 The Changing Environment of the Construction Industry**

The construction industry is a conglomeration of diverse fields and participants that have been loosely lumped together as a sector of the economy. The construction industry plays a central role in national welfare, including the development of residential housing, office buildings and industrial plants, and the restoration of the nation's infrastructure and other public facilities. The importance of

the construction industry lies in the function of its products which provide the foundation for industrial production, and its impacts on the national economy cannot be measured by the value of its output or the number of persons employed in its activities alone.

To be more specific, construction refers to all types of activities usually associated with the erection and repair of immobile facilities. Contract construction consists of a large number of firms that perform construction work for others, and is estimated to be approximately 85% of all construction activities. The remaining 15% of construction is performed by owners of the facilities, and is referred to as force-account construction. Although the number of contractors in the United States exceeds a million, over 60% of all contractor construction is performed by the top 400 contractors.

#### **1.4.1 Labour Productivity**

The term productivity is generally defined as a ratio of the production output volume to the input volume of resources. Since both output and input can be quantified in a number of ways, there is no single measure of productivity that is universally applicable, particularly in the construction industry where the products are often unique and there is no standard for specifying the levels for aggregation of data. However, since labour constitutes a large part of the cost of construction, labour productivity in terms of output volume (constant dollar value or functional units) per person-hour is a useful measure. Labour productivity measured in this way does not necessarily indicate the efficiency of labour alone but rather measures the combined effects of labour, equipment and other factors contributing to the output.

#### **1.5 The Role of Project Managers**

In the project life cycle, the most influential factors affecting the outcome of the project often reside at the early stages. At this point, decisions should be based on competent economic evaluation with due consideration for adequate financing, the prevalent social and regulatory environment, and technological considerations. Architects and engineers might specialize in planning, in construction field management, or in operation, but as project managers, they must have some familiarity with all such aspects in order to understand properly their role and be able to make competent decisions.

## **II. LITERATURE REVIEW**

Review of relevant literatures that give a background of the Nigerian construction industry is very important, the challenge of high construction cost, the factors affecting construction cost and the solutions on how to minimize construction cost.

### **2.1 The Nigerian Construction Industry**

In Nigeria, like most developing countries, the construction industry plays a dominant role in the economic activities of the country. According to Olowo – Okere (1988) the construction industry accounts for about 60 percent of the Nation's capital investment and 30 percent of the Gross Domestic Product (G.D.P)

Furthermore, the construction industry is said to have contributed about half of the total stock of fixed capital investment in the Nigeria economy (Olaloku, 1987). The industry also generates employment opportunities which place it second to the Government in the employment of labour (Husseini, 1991).

When the construction industry was booming in the 1970's, the country's economy experienced similar effects during that period. However, from early to mid-1980's, the industry experienced a jolt and its effect was felt in all spheres of national life (Isiadinso, 1988).

Buhari (1991) reported that the lull in construction of early 80's was not limited to Nigeria alone. The lull also occurred in Western Europe and America. But the parent companies of these big timers in our midst were not only able to stay afloat the stormy ocean but were able to expand their sales. They were able to do this by initiative, creativity and research.

Consequently, the Federal and State governments resorted to taking foreign loans as a quick solution to the problem. However, some of the measures taken by Government in order to revitalize the economy have further aggravated the situation. One obvious implication of this development is

that the cost of imported raw materials and subsequently of the finished products has substantially increased (Husseini, 1991).

These substantial increases as reported by Mbachu and Nkado (2004) have obvious negative implications for the major players and the industry; undermining the viability and sustainability of the industry.

## **2.2 The Roles of Construction Actors in Construction cost**

There are diverse interests in the construction industry. The principal interest or actors in the construction industry are the Client, the Consultant and the Contractor.

The Client is, by far, the single most important member of the construction team. He is the initiator and financier of all the projects. Omole (1986) noted that the major contribution the client can make to the successful operations of the construction industry lies in his skill in specifying his needs prior to the preparation of the design. It is also important for the client to set cost limits of the project at the briefing. He should also ensure that adequate financial provisions are made prior to the commencement of any project. Cost considerations are among the most important and basic considerations that Consultants must deal with. It is essential to see that projects are contained within the client's budget and cost forecasts. Cost has the final control over virtually every project. Accurate cost analysis and control is one of the necessary services the client requires from the consultants (Omole, 1986).

Omole (1986) further reveals that the major task of Contractors is to assemble and allocate the resources of labour, equipment and materials to the project in order to achieve completion at maximum efficiency in terms of time, quality and cost.

In a study of the Nigerian Construction Industry, Omoregie and Radfort (2005) sampled the opinions of Contractors, Consultants and Clients and they discovered 15 factors responsible for project delays and construction cost escalation in Nigeria. Their survey revealed price fluctuation as the most severe cause of project cost escalation which is attributed to the limitation in exchange rate which in turn affects construction material prices and general price level.

In another study, Elinwa and Silas (1992) identified 31 essential factors causing High Cost of Buildings with fraudulent practices and kickbacks ranking second (2nd) most important factor in Nigeria. Hussain (1999) noted that fraudulent practices and kickbacks occasioned by greed are perpetuated by some major players in the construction industry.

These factors are combined into one uniform list arranged alphabetically in the table 2.

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### **Table 2: Construction Cost Factors**

- **Construction Cost Factor**
- 1. Absence of construction cost data
- 2. Additional work
- 3. Bureaucy in tendering method
- 4. Contractor's cartel
- 5. Contract management
- 6. Contractual procedures
- 7. Cost of materials

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- Elinwa and Silas (1993)
- AL- Khaldi (1990)
- Elinwa and Silas (1993)

- 8.Currency exchange
- 9.Disputes on site
- 10.Duration of contract period
- 11.Economic stability
- 12.Fluctuation of prices of materials
- 13. Fraudulent practices and kickbacks
- 14.Frequent design changes
- 15. Government policies
- 16. High cost of labor
- 17. High cost of machinery
- 18. High cost of machinery maintenance
- 19.High cost of transportation
- 20. High interest rates charged by banks
- 21.Inadequate labor availability
- 22.Inadequate production of raw materials
- 23.Incorrect Planning
- 24. Insurance cost
- 25.Labour nationality
- 26.Lack of coordination between designers and contractors
- 27.Lack of productivity standard
- 28.Level of competitors
- 29.Long period between design and
- AL– Khaldi (1990)
- Aibinu and Jagboro (2002)
- Aibinu and Jagboro (2002)
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- AL– Khaldi (1990)
- AL– Khaldi (1990)
- AL– Khaldi (1990)
- Elinwa and Silas (1993)

### **2.3.1 Effects of weather**

Weather is the most uncontrollable factor amongst the other variables considered. Temperature and humidity affect productivity of workers. If the temperature and humidity are high, workers feel lethargic and lose physical coordination (Frimpong, Oluwoye and Crawford, 2003)

### **2.3.2. Inadequate production of raw materials by the country**

Ogunlana, Krit and Vithool (1996) noted that the reason for shortage of materials could be the defective supply of materials occasioned by general shortages in the industry, poor communication amidst sites and head office, poor purchasing planning and materials coordination. Nigeria still imports cement when her cement production potentials surpass any other African country except Egypt and that the 100 % raw materials required for cement production, is readily available in Nigeria (Eyo -Ita - Eyo, 2001)

In another development, Makoju (2000) observed that 90% of the aggregate components for production and delivery of electricity in the country still depends on other developed countries because of incessant supply of electricity.

### **2.3.3. Supplier manipulation**

The major reasons for this factor as observed by Manavazhi and Adhikari (2002) are monopoly control of the market by some suppliers, work stoppages in factories, lack of industrialized materials, fluctuating demands forcing suppliers to wait for accumulation of orders and difficulty in importing raw materials from other countries.

### **2.3.4. Government policies**

Aibinu and Jagboro (2002) revealed that Government deregulation policies aimed at liberalizing the economy since 1986 are responsible for the instability in prices. It is therefore not surprising that fluctuation claims during these periods contribute significantly to additional cost.

#### **2.3.5. Contractor's cartel**

According to Omole (1986), the major projects like heavy engineering, super highways and general infrastructure can only be undertaken in Nigeria by a few contractors. These contractors know themselves and therefore an indirect cartel is formed. The contractors on tendering are in a vantage position to decide amongst themselves who gets which contract and at what price. What appears on tendering to be the lowest tender may be over 20% - 30% above the actual value of the job.

#### **2.3.6. Incorrect planning**

Incorrect planning is one of the most important factors that affect cost of construction. Contractors must be aware of all resources that he might need for any project. The contractors, also, should utilize all resources in an efficient manner. Proper scheduling is the key to utilizing project resources, if not, the project cost will increase.

#### **2.3.7. Fraudulent practices and kick backs**

This factor was the second most important factor affecting construction cost in Nigeria as noted by Elinwa and Silas (1993). Hussein (1999) also noted that fraudulent practices and kickbacks occasioned by greed are perpetrated by some major players in the construction industry. The perpetrators of this act in the industry are predominantly found within the rank and file of contractors, consultants and public clients as evident from the report published by TELL (2002). TELL (2002) also revealed that there were verifiable cases of corruption in the execution of some of the contracts awarded by the Petroleum (Special) Trust Fund (PTF).

**2.3.8. Design Change**  
This problem arose from inadequate project planning and management of the design process. A quite distinctive example is the progress of West African Gas Pipeline (WAGP). Asamoah (2002) reported that WAGP project has suffered a number of setbacks, culminating in the escalation of its cost from an initial US \$500 million. One of the problems includes the changing of the initial plans to lay the pipeline offshore to an onshore configuration.

#### **2.3.9. Political Interference**

Omole (1986) reveals that 80 percent of the contractors in Nigeria are indigenous companies. The government agencies, in most cases are teleguided by the political heavy weight to award contract to party stalwarts at very high prices. The consultant's estimates are disregarded in most cases when awarding contracts and where possible manipulated. It is a general knowledge that governments and parastatals particularly during the last political era give a very short time to consultants to prepare contract document for tender purposes.

#### **2.3.10. Relationship between management and labour**

There is always a gap between the project management and labour. This gap should be kept as small as possible, so that the relationship between management and labour may be strengthened. They should work as a team to build a project with minimum cost. If the relationship between management and labour is bad the morale of the labourers will decrease and production will decrease leading to increased project cost.

#### **2.3.11. Contract Management**

Poor contract could be attributed to the manner in which contracts are awarded. In most cases projects are awarded to the lowest bidder (Mansfield, Ugwu and Doran, 1994). Some of these low bidders may lack management skills and have less regard for contract plans, cost control, over all site management and resource allocation. As we know in the case of Nigeria, contracts are usually awarded to politicians and well-connected individuals irrespective of the apparent deficiencies in their relevant delivery potentials. Accordingly, Frimpong et al (2003) observed that most contractors in Sub-Saharan Africa are entrepreneurs who are in the business of making money at the expense of good Management. Consequently, they pay low wages, submit very low bids and have very little, if any ability to plan and coordinate contracts.

#### **2.3.12. Lack of coordination between designers and contractors**

Contractors construct the project according to the project design. Normally, if the design has any mistakes, the contractors may apply the mistakes without knowing there are mistakes or without notifying and coordinating with the designer or the client. Implementing designs with mistakes



obviously costs a lot of money. Typical coordination of site was done in one of the project sites visited in Lagos state.



**Plate 1: Effective Site coordination with efficient man-power in Lagos State**

Omoriegbe and Radford (2005) surveyed contractors, consultants and public clients and revealed price fluctuation as the most severe cause of project cost escalation in Nigeria. This could be attributed to the limitation in exchange rate which in turn affects construction materials prices and the general price level. Another factor is the unstable inflationary trend in Nigeria which is a result of demand exceeding supply, creating a scarcity of goods which in turn leads to escalation of the goods.

Ogunlana et al (1996) reported that financing and payment of completed works is responsible for cost escalation in Nigeria. Generally, contractors are sometimes not paid in accordance with the contract conditions. There are cases where clients fail to honour Architect's certificate of payment for up to 6 months or more whereas the contract conditions, in most cases stipulates about 28 days.

Most contractors when preparing their tenders make allowance for partial financing of the project. They charge the clients for payments of interests and bank charges on moneys they anticipate to borrow from the banks to finance these projects (Omole, 1986)

The irregular financing of public projects is a major cause of liquidity problem for contractors: however, contractors can be paid in accordance with the contract agreement if clients can generate the availability of adequate funds before the project commences (Mansfield et al, 1994).

## **2.4 Ways of Minimizing Cost**

There are several ways in which cost of construction can be minimized. Fisk (1997) reveals two cost reduction measures. The first is the application of a value engineering concept, which aims at a careful analysis of each function and the elimination or modification of anything that adds to the project cost without adding to its functional capabilities. He argues that by carefully investigating costs, availability of materials, construction methods, procurement costs, planning and organizing, cost / benefit values and similar cost influencing items, an improvement in the overall cost of project can be realized. The second is to provide comprehensive and error free designs and specifications to avoid misinterpretations by the contractor or delay due to missing details.

According to Cooke and Williams (2003) recommended as cost reduction measures the elimination or minimization of design / specification, delivery and site wastes through the formulation and implementation of effective material policy and material management.

In addition, Ashworth (2000) observed that profitable firms may be generating their revenues from the elimination of waste at both professional and trade practice levels.

In summary, high construction costs have obvious negative implications for the major actors in particular, and the industry in general. Project abandonment, drop in building activities, bad reputation and inability to secure project finance are all implications of high construction cost. However, an application of the proffered solutions would restore clients' confidence in consultants, reduce investment risks and generally boost the viability and sustainability of the industry.

### **III. RESEARCH METHODOLOGY**

Sequel to the obvious problem of high cost of construction, the aim of this study is to strategize for efficient supervision and monitoring of construction projects in Nigeria and also to proffer solutions on how this can be minimized. In achieving the above, the following steps were followed identification of the problem, definition of the problem, delimitation of the problem, analysis of the problem and deduction of the problem.

#### **3.1 Restatement of the research objectives and hypothesis**

The objectives of this study are:

1. To identify the main factors affecting efficient supervision and monitoring of construction projects in Nigeria.
2. To determine the severity rank of the factors amongst clients, consultants and contractors.
3. To determine the agreement ranking factors between clients, consultants and contractors.
4. To proffer solutions on how to supervise and monitor efficient construction projects in Nigeria.

#### **3.2 Study Area**

The study area for this research is Lagos state a metropolitan city in western Nigeria. The choice of Lagos as the study area is because since the creation of the state in 1967 and in spite of the movement of the nation's capital to Abuja, it has never ceased to be the centre of the country's economy, commerce and 'power'; coupled with its highest population next to Kano, it naturally enjoys the benefits of being the fulcrum of the nation. Lagos is a relatively 'built – up' environment with many infrastructures like roads, bridges, skyscrapers, estates, government establishments, all kinds of private developments, schools, hospitals, theatres, cinemas, shopping malls to mention a few. All these infrastructures are the handiwork of construction. As such there cannot be a better place to obtain data for this study.

#### **3.4 Characteristics of the study population**

The population of the study consisted of clients, consultants and contractors in Lagos, western Nigeria.

#### **3.5 Sampling design and procedures**

Having identified clients, consultants and contractors as the target groups for the effective conduct of this research, seventy respondents comprising of sixteen clients, twenty – two consultants and thirty – two contractors were randomly selected using stratified random sampling technique as a type of probability sampling in order to give everyone that falls into any of these identified target groups equal and independent chance of being included in the sample.

#### **3.6 Data collection instrument**

Two sets of data were identified as being relevant to the effective conduct of this research namely primary and secondary. The primary data which refers to field data were obtained through the use of well-structured questionnaire developed from the initial identification of likely factors affecting construction cost in Nigeria and solutions to minimizing same.

The questionnaire was designed to elicit information on the following:

- (a) The respondent's role in construction
- (b) The respondent's professional background (for consultants and engineers only)
- (c) How long the respondent has been in construction
- (d) An assessment of the severity of likely factors affecting construction cost from not severe to extremely severe. See appendix for list of factors affecting construction cost.
- (e) An evaluation of the effectiveness of proffered solutions to minimizing construction cost from not effective to very effective. See appendix for list of proffered solutions to minimizing cost of construction. Secondary data through the review of various relevant literatures were also used in the course of carrying out the research.

Generally, the scales of the variables were nominal and ordinal scales.

The questionnaire was validated by my supervisor before its administration.

**3.7 Administration of the data collection instrument**

The questionnaires were delivered by hand to the various target groups.

**3.8 Statistical tools for data analysis**

The descriptive survey method was used, where seventy well-structured questionnaires were distributed among the principal actors in the construction industry namely: the client, the consultant and the contractor. Frequency and percentages were used for the descriptive data. Coded broad sheets were thereafter used for extracting data from the returned questionnaires. These were analysed by SPSS (Statistical Package for Social Science) having carefully completed the variable view and imputed the extracted data 27.

appropriately on the data view. Mean score, standard deviation and spearman rank order correlation was used to achieve the stated objectives.

**IV. RESULTS AND DISCUSSION**

This chapter focuses on the analysis of the various responses from the administered questionnaires and deductions made from the analysis.

**4.2 Analysis and presentation of descriptive data**

**4.2.1 Survey responses**

Seventy questionnaires were randomly administered (Twenty-two to Consultants, Thirty-two to Contractors and Sixteen to Clients). As at the time of compiling this report, a total of fifty-two usable responses were received, representing 74.29% effective response rate. The maximum responses from each sampling frame are shown in table 3.

**Table 3: Response Rate of Construction Key Players**

Clients	Consultants	Contractors	Total	
No. Distributed	16	22	32	70
No. Received	9	15	28	52
Percentage	56.25%	68.18%	87.5%	74.29%
N =	70	29		

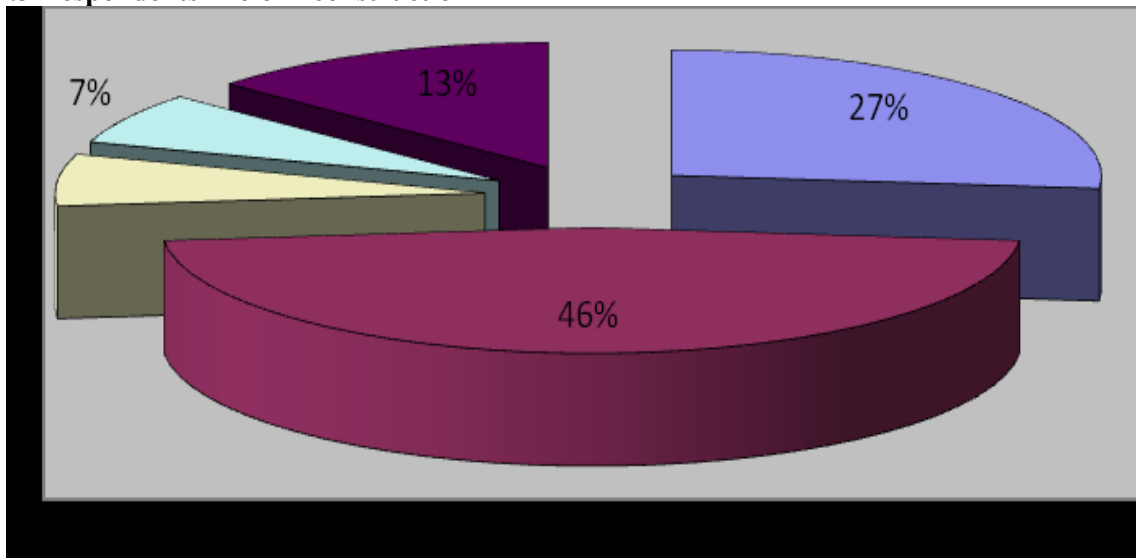
**4.2.2 Respondents' role in construction**

**Table 4**

Frequency	Percent	Cumulative Percent	
Client 9	17.3	9	17.3
Consultant 15	28.8	30	46.2
Contractor 28	53.8	50	100.0
N =	52		

The demographic profiles of the respondents in table 4.2.2 above show that 17.3% were in the Client category, 28.8% in the Consultant category and 58.8% in the Contractor category.

**4.2.3 Respondents' Role in construction**



**Fig. 2. Respondents' professional background**

It is obvious from the figure 4.2.3 above that Quantity surveyors make the largest chunk of consultants for this research with 46%. Architects are next with 27%, followed by Electrical Engineers accounting for 13%. Mechanical and Structural engineers both represent 7 %.

#### **4.3 Data presentation, analysis and discussion of findings in respect of stated objectives**

Table 4.1 Identification of some of the main factors affecting construction cost in Nigeria.

N Mean Rank

Cost of materials 52 3.90 1

Incorrect planning 52 3.73 2

Wrong method of estimation 52 3.23 3

Contract management 52 3.00 4

Fluctuation of prices of materials 52 2.75 5

#### **V. CONCLUSION**

Conclusively, the main factor affecting cost of rural infrastructural development as opined by the three key players in the construction industry is cost of materials. Since Quantity Surveyors are cost experts they are in the unique position to examine these factors and take care to estimate, include contingencies in the budget, plan for, and mitigate the adverse effects of these factors on the project cost. Clients, Contractors and Consultants should give an economic approach to construction work such that they would be able to identify the dominating factors leading to high cost of construction in Nigeria and apply the proffered solutions to minimizing same so as to restore client's confidence in consultants, reduce investment risks, and generally boost the viability and sustainability of the industry.

#### **5.2 RECOMMENDATION**

Evidence of unchanging rural stagnation and underdevelopment infrastructure proliferate, regardless of these procedures and approaches, the net being a steady slide on the living standards of the average rural dwellers. In terms of nominal and real income, urban-rural disparity continues to grow for reasons not unconnected with the general state of underdevelopment of infrastructure. It is pertinent to stress that nothing said in this essay denies whatever success achieved by these policies and strategies. The position of this paper is that, all in all, the policies and strategies produced outcomes which, at best remain a far cry from the expectations of its promoters and the people at large. The following recommendations are deduced from this study:

- i. Focus should be placed on the major factors affecting rural infrastructure construction cost in order to reduce the budget overrun, enhance construction performance and generate confidence within the construction industry.
- ii. Engineers, Quantity Surveyors and allied professionals should become more alive to their responsibilities as cost experts ensuring that they make use of correct estimation methods in rural and urban infrastructures.
- iii. There should be thorough crosschecking of estimates based on updated price information in order to avoid any wrong estimation.

A look at the underlying failure inducing factors of rural infrastructural development outlined offers us a cursory look at the policy consequences of uncritical adoption of policies and strategies for the benefit of our nation Nigeria.

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