

Causes of delay and cost overruns in Nigerian construction projects

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The subject of project management in developing countries is addressed, with a focus on Nigeria, one of the largest and most populated countries in Africa. The causes of delay and cost overruns are investigated by examining data relating to construction projects. After a brief introduction to the overall economy, an analysis is given of recently completed highway projects in the country. This points to substantial cost variations relative to the initial contract, and excessive project overruns, for neither of which is there much explanation in status reporting. A brief review then follows of contractual systems and project financing arrangements currently in operation. The results of a questionnaire survey carried out in 1992 with around 50 construction personnel from contractor, consultant and client organisations in Nigeria are then presented. The conclusions suggest that there could be better phasing of contracts, and a wider variety of contracts could be used. Overruns are attributed to finance and payment arrangements, poor contract management, materials shortages, inaccurate estimating, and overall price fluctuations. Recommendations are given on how project management could be improved in developing countries such as Nigeria by appropriate action being taken at both the conceptual and detailed planning stages of projects. Wider action is further called for at both government and international level.

Keywords: construction, Nigeria, overruns

Nigeria has an estimated population of 89M, and it is located in the sub-Saharan region of Africa. Its land area is 924 770 km², and it is made up of 30 states. The country exercises a significant socioeconomic and political influence in the African continent in general, and the Economic Community of West African States (ECOWAS) in particular.

The national revenue is mainly dependent on oil. As a result, the oil boom of the mid-1970s and the subsequent fall in oil prices and the global recession that followed in the early 1980s affected the country's economic activities. This was particularly reflected in the fluctuations in the volume of construction work undertaken over this period. However, the construction industry itself continues to occupy an important position in the structure of the Nigerian economy. In a study by Olaloku¹, it was observed 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.

This observation is further substantiated by the fact that the annual growth in the Nigerian construction industry in 1974 was 269%, and the gross domestic product grew by only 131%, but in 1984, construction declined by 27%, and the GDP declined by only 11%².

This highlights the fact that the construction industry continues to be a major stimulant in the country's economic growth. This strong interrelationship further strengthens the need to ensure that project planning and project management are cost-effective. However,

experience has shown that excessive project cost and time overruns have been all too evident, as illustrated below.

Analysis of completed highway projects

Before sounding out any participants within the industry, a study was made of available information on completed highway projects executed by the Nigerian Federal Ministry of Works and Housing (FMWH) in different parts of the country. This information was contained in project reports which listed the following sets of data. (*Tables 1 and 2* contain the salient features in summary):

- description of project;
- estimated contract sum in nairas (N);
- estimated contract period in months;
- work in progress at time of reporting:
 - percentage completion of works;
 - percentage lapse of contract period;
- financial progress:
 - value of permanent work to date;
 - variation in costs of labour;
 - variation in costs of materials and freight;
 - total expenditure to date in nairas.

After due consideration of these reports, it was possible to deduce the following:

- Substantial variations occur in the costs of materials and freight relative to contract costs.
- There are excessive project-time overruns; in some cases, these are as high as 342%. This is very significant, because of inflationary trends in the country, and the unstable value of the naira in the foreign-exchange market.
- The format for project-status reporting does not seem to reflect the excessive project-cost overruns that characterise the actual projects themselves. This appears to be a major deficiency in the project-cost accounting procedures, which further indicates the absence of efficient database management systems.

Table 1 Project status report showing financial progress

Contract code	Estimated contract sum, N × 10 ³	Value of permanent work to date, N × 10 ³	Variation in costs of materials and freight, N × 10 ³	Subtotal expenditure to date, N × 10 ³
1	12050	9386	633.0	9550
2	17632	10098	—	11628
3	16336	13835	268.0	14067
4	8843	7952	119.0	8015
5	54660	49097	3338.6	54509
6	69070	48691	9191.4	62888
7	52555	47217	1841.0	48809
8	11067	7700	531.4	8193
9	6357	4406	130.0	4874

[Data taken from various projects in Nigeria from 1988–91. Currency: naira (100 kobo = 1 naira). Currency exchange rate (1973–85): £1.00 = N1.20, exchange rate (early 1994): £1.00 = N64.00.]

Table 2 Project status report showing durations, expenditures and work progress at time of reporting

Contract code	Duration, months	Completion of projects (work to date), %	Lapse of contract period and freight, %	Expenditure to date, %
1	12	76.84	141.67	79.25
2	23	65.08	97.83	65.92
3	12	80.56	91.67	86.11
4	24	97.36	126.92	90.64
5	27	100.00	106.20	100.26
6	30	100.00	175.00	91.05
7	15	94.00	120.00	92.87
8	28	93.79	100.00	74.03
9	7	99.00	342.90	76.68

[Data taken from various projects in Nigeria from 1988–91.]

Contractual systems

The Nigerian construction industry is modelled after the British system, although, since independence in 1960, it has incorporated the styles of other Western countries, such as Italy, Germany and France. The country's contract system is also derived from British practice. The system has the following distinct features:

- Although standard forms of contract are used by the public clients, greater emphasis is still placed on fixed-price contracts.
- The Nigerian Federal Ministry of Works and Housing uses competitive tendering, as well as selective bidding for some specialist megaprojects. The criteria for selection of contractors includes the following:
 - competence and integrity;
 - the past performance of the contractor, and its reputation in terms of similar jobs (i.e. its track record);
 - the personnel strength of the contractor, its financial status, and its ability to cofinance projects;
 - the contractor's scheduled time of completion and final tender price.
- In the private sector, contracts are left open for negotiation. The corporate clients in the private sector include the multinational firms in the oil and petrochemical industries, banks, property developers and other business investors.
- A direct labour system is not as widely used as it has been in the past few years in the wake of the Nigerian Federal Government's rationalisation of the direct labour units of the public-works department.

Before the end of the second republic in Nigeria (1979–83), contractors were generally paid a mobilisation fee of 15–20%. However, Akande³ and Anekwe⁴ observe that this provision of a mobilisation fee was sometimes abused by contractors and some public officers, and it was subsequently abolished in 1984.

Project financing

The major financier of construction projects in Nigeria is the Nigerian Federal Government. The relatively high resource commitment by the government to the industry

has been highlighted by Olaloku¹, who observed the following trend in resource allocation:

In the second National Development Plan (1970–1974), of N570.4 million allocated to the transportation sector out of the total of N2050.7 million, some N332.6 million (or 16%) went to road building. This was 58% of the allocation to the transport sector. For the third National Development Plan (1975–1980), N9.6 billion or 22% of the total allocation of N43.3 billion went to the transport sector of which N5.3 billion was earmarked for road development. This represented 12% of total allocation and 55% of the allocation to the transport sector... In the fourth National Development Plan (1981–1985)... some N9.1 billion was allocated to housing and transportation out of a total of N70.5 billion...

This detailed analysis of the budgetary allocation explains some of its effects on the industry. Because of a distinct lack of adequate phasing of construction projects, the economy was 'overheated'. The net effect was hyperinflation, and the 'boom and bust' scenario so often experienced by the construction industry.

Another dominant source of project financing is the World Bank and other aid agencies. The records⁵ available in 1991 showed that numerous projects were being executed by the World Bank.

Within this period, 43 loans and credits were fully disbursed at a cost of US\$3 608M. The grand total of World Bank loans within the period was US\$6 303M. A substantial part of these loans was invested in infrastructural development, and hence was recycled into the construction industry. A closer analysis of these loan guarantees reveals the following features:

- The Nigerian Federal Government is required to provide a substantial part of the cost of projects for which the loan is intended in order to ensure the efficient commitment of the government. This amount could be as high as 80% of the total cost.
- The disbursement of the loan is an exclusive preserve of the World Bank. Before any project authorisation, there is a detailed financial appraisal and economic analysis.
- The World Bank exercises effective control of the project-management structure. Important issues such as the selection of consultants and contractors are influenced by the bank. Projects sponsored and/or supervised by the bank are known to be generally executed on schedule.

Analysis of questionnaire survey of causes of high cost of projects in Nigeria

Methodology

From existing literature on the construction industry in Nigeria and elsewhere⁶, it was possible to identify certain

major factors that could cause delays and cost overruns. In all, 16 variables were selected, with seven other variables that could result in an escalation of construction costs without necessarily causing delay.

A questionnaire was then drawn up which was sent to members of the professions in the Nigerian construction industry⁷. 80 questionnaires were distributed, and 37 replies were received, representing a response rate of 47% (see Table 3).

The contractors' and consultants' offices were located within Lagos state (the former capital of Nigeria), and all the contractors/consultants had a solid reputation in the execution of Nigerian Federal Government projects. The public clients (engineers) were selected from the FMWH headquarters in Lagos, and the field headquarters located in other states of the federation. All the staff selected occupied senior positions, and had substantial experience in the management of public-sector projects.

Presentation and analysis of results

The procedure used in analysing the results was aimed at establishing the relative importance of the various factors responsible for delay and cost overruns. The questionnaire gave each respondent an opportunity to identify any factor that was likely to make an important contribution by giving the response 'strongly agree' or 'agree'. For each variable, the percentage of respondents giving these responses was called the severity index⁸. These severity indices were then used to rank the items for each group.

On the basis of the ranking of the items by the various groups (see Tables 4–7) it was possible to identify the most important factors that influenced time and cost overruns. It was intended that the results obtained would generate some proposals on how to minimize delays and cost-overrun problems and thus improve efficiency in the Nigerian construction industry.

A summary of the most important factors causing delays and cost overruns, as identified by all groups, is shown in Table 7.

A closer look at the rankings of the variables indicates the following (see Tables 4–7):

- There was very good agreement between the various professionals on those factors that could cause delay and cost overruns. However, for those factors that could cause excessive costs without necessarily causing delays, there was closer agreement between the consultants and the public clients than between the consultants and the contractors. This was very noticeable when inaccurate estimates had an influence. Contractors ranked this second, with a severity index of 88%, while consultants and public clients ranked it fourth, at 76% and 66%, respectively.
- The four most important items, as agreed by the contractors, consultants and public clients (see Table 7) were
 - the financing of and payment for completed works;
 - poor contract management;
 - changes in site conditions;
 - shortages of materials.

Table 3 Questionnaire distribution and response

Description	Number distributed	Number of respondents	Percentage of number distributed	Percentage of number of responses
Contractors	35	15	43	41
Consultants	25	13	52	35
Public clients	20	9	45	24
Total	80	37		47

Table 4 Factors responsible for delays and cost overruns according to contractors

Rank	Delay and cost overrun variables	Strongly agree, %	Agree, %	Do not agree, %	Do not know, %	Severity index, %
1	Financing and payment of completed works	87	3	—	—	100
2	Poor contract management	47	33	20	—	80
3	Subcontractors and nominated suppliers	20	60	20	—	80
4	Shortages of materials	47	27	26	—	74
5	Changes in site conditions	40	34	26	—	74
6	Weather	27	40	33	—	67
7	Design changes	13	53	34	—	66
8	Mistakes and discrepancies in contract document	13	47	40	—	60
9	Imported materials and plant items	27	27	46	—	54
10	Preparation and approval of drawings	—	54	46	—	54
11	Nonadherence to contract conditions	—	47	53	—	47
12	Mistakes during construction	27	13	60	—	40
13	Negotiation and obtaining of contract	13	20	67	—	33
14	Labour and management relations	—	27	73	—	27
15	Inspection and testing of completed portions of work	—	13	87	—	13
16	Construction methods	—	13	87	—	13
<i>Cost-overrun variables (only):</i>						
1	Price fluctuations	100	—	—	—	100
2	Inaccurate estimates	73	13	14	—	86
3	Delays	27	46	27	—	73
4	Additional work	13	47	40	—	60
5	Fraudulent practices and kickbacks	—	54	—	46	54
6	Shortening of contract periods	—	40	60	—	40
7	Insurance	—	13	87	—	13

The financing of and payment for completed works was ranked first by contractors, and second by the consultants and public clients. This may be attributed to the dominant culture within the industry, since the government still bears the whole burden of project financing. At present, there is very little participation by private investors in primary public-sector projects. Also, contractors do not participate in cofinancing such projects, and, even in the few cases in which there is initial agreement to this effect, contractors have been known to back out once the project is under way.

However, this attitude may be linked to the prevailing economic and political environment, since investors have to pay attention to the security of their investments and the resources that they commit to such projects. Poor contract management was ranked first by both consultants and public clients (see *Tables 5 and 6*), while contractors ranked it second (see *Table 4*). However, the severity indices from all the groups (see *Table 7*) clearly indicated the importance of this, and they also demonstrated an increased awareness in the industry at large. Generally, poor contract

Table 5 Factors responsible for delays and cost overruns according to consultants

Rank	Delay and cost overrun variables	Strongly agree, %	Agree, %	Do not agree, %	Do not know, %	Severity index, %
1	Poor contract management	54	46	—	—	100
2	Financing and payment of completed works	61	31	8	—	92
3	Imported materials and plant items	31	53	16	—	84
4	Changes in site conditions	23	61	16	—	84
5	Shortages of materials	38	38	24	—	76
6	Design changes	15	53	32	—	68
7	Subcontractors and nominated suppliers	38	24	38	—	62
8	Nonadherence to contract conditions	—	62	38	—	62
9	Weather	—	62	38	—	62
10	Mistakes during construction	—	53	47	—	53
11	Mistakes and discrepancies in contract documents	—	46	31	23	46
12	Preparation and approval of drawings	—	46	54	—	46
13	Negotiation and obtaining of contracts	—	38	62	—	38
14	Labour and management relations	—	31	54	15	31
15	Construction methods	—	23	77	—	23
16	Inspection and testing of completed portions of work	—	15	85	—	15
<i>Cost overrun variables (only):</i>						
1	Price fluctuations	62	38	—	—	100
2	Delays	38	53	9	—	91
3	Additional work	31	46	23	—	77
4	Inaccurate estimates	30	46	24	—	76
5	Shortening of contract periods	15	45	40	—	60
6	Fraudulent practices and kickbacks	30	30	40	—	60
7	Insurance	—	15	85	—	15

Table 6 Factors responsible for delays and cost overruns according to public clients

Rank	Delay and cost overrun variables	Strongly agree, %	Agree, %	Do not agree, %	Do not know, %	Severity index, %
1	Poor contract management	55	45	—	—	100
2	Financing and payment of completed works	55	33	12	—	88
3	Imported materials and plant items	33	55	—	12	88
4	Changes in site conditions	44	33	33	—	77
5	Shortages of materials	22	55	33	—	77
6	Design changes	11	55	34	—	66
7	Nonadherence to contract conditions	—	66	34	—	66
8	Subcontractors and nominated suppliers	11	44	45	—	55
9	Weather	11	44	45	—	55
10	Preparation and approval of drawings	—	55	45	—	55
11	Mistakes and discrepancies in contract documents	—	55	45	—	55
12	Labour and management relations	—	55	45	—	55
13	Negotiation and obtaining of contracts	11	33	56	—	44
14	Inspection and testing of completed portions of work	—	33	67	—	33
15	Mistakes during construction	—	22	78	—	22
16	Construction methods	—	11	77	12	11

Cost overrun variables (only):

1	Price fluctuations	78	22	—	—	100
2	Delays	55	33	12	—	88
3	Additional work	33	44	23	—	77
4	Inaccurate estimates	11	55	34	—	66
5	Shortening of contract periods	11	44	33	12	55
6	Fraudulent practices and kickbacks	—	44	34	22	44
7	Insurance	—	22	78	—	22

management produces deficiencies in the contractor's plan, cost control, and overall site management. This can be because of any of the following:

- a lack of adequate experience and training at the senior management level, and inadequate technical manpower;
- a very low level of productivity;
- inadequate finances for short- and long-term purposes;
- an absence of specialisation.

Changes in site conditions were identified as another major factor (see *Table 7*); this must also be linked to inadequate technical feasibility studies before project authorisation. This is further explained in most

circumstances by projects being rushed at their commencement, and political sensitivities overriding the detailed preparation of project plans. Shortages of materials were also identified as being very important. This was not unexpected, as this invariably triggers off delays at the project site. This factor can result from any of the following:

- an absence of adequate statistics on materials availability;
- fluctuations in the availability of construction materials;
- very long average waiting times and uncertainty about the deliveries of ordered materials;
- shortages of funds to procure materials, and inadequacy in terms of transportation.

Table 7 Most important factors responsible for project delays and cost overruns according to contractors, consultants and public clients

Variables	Severity index, %		
	Contractors	Consultants	Public clients
Poor contract management	80	100	100
Financing and payment of completed works	100	92	88
Changes in site conditions	74	84	77
Shortages of materials	74	76	77
Imported materials and plant items	54	84	88
Design changes	66	68	66
Subcontractors and nominated suppliers	80	62	55
<i>Cost overrun variables (only):</i>			
Price fluctuations	100	100	100
Inaccurate estimates	86	76	66
Delays	73	91	88
Additional work	60	77	77

[N = 37; 15 contractors, 13 consultants, 9 public clients.]

Owing to a low level of manufacturing and extractive development in Nigeria, most construction materials are still imported. Even then, established bureaucratic structures seem to inhibit the easy flow of imported materials. Nonetheless, an abundance of local construction materials exists in the country; these should be identified, harnessed and suitably developed so as to ensure that there is a reliable and long-term supply at the local level. In any case, this aspect demonstrates a complete absence of effective materials management on the part of most contractors. Hence, there is a need for improved vendor appraisal of materials supplies. Other factors identified as important in causing delays and cost overruns included a lack of flow of imported materials and plant items, problems with subcontractors and nominated suppliers, design changes, weather, and nonadherence to conditions of contract.

- With regard to cost overruns not necessarily involving delay, price fluctuations were identified as the most important factor by all the groups (see *Table 7*). This

can be explained by spiralling inflationary trends in the country, and the absence of a unified price adjustment formula in the industry. It is self-evident that price fluctuations must affect the cost of materials of construction, labour, and other interdependent services. Any measures to stabilise the value of the local currency (naira) in the exchange market would significantly improve the situation. Clients and consultants ranked 'delay' second, while 'additional work' was ranked third (see *Tables 5 and 6*). However, contractors ranked 'inaccurate estimates' second, 'delay' third, and 'additional work' fourth (see *Table 4*). This shift in ranking may demonstrate a determination of the various parties in the industry to shift blame and responsibility between themselves. Nevertheless, it is clear that inaccurate estimates have an overriding influence on the cost-overrun rate. Delays are also associated with heavy costs, since contractors usually put forward claims in such circumstances. Additional work is related to design changes, and can be explained by a lack of detailed briefing on the functional and technical requirements of the project by the client. This again demonstrates the weakness of inadequate project planning, and also the problems encountered by not involving the contractor at the design stage of the project.

Conclusions

From the ranking of the above variables, and their severity indices, it can be seen that most of the problems in the construction industry are human and management problems. While a rapid solution to these nontechnical problems would minimize delay and cost overruns, it is evident that these problems will continue to occupy the attention of managers and other decision makers in the construction industry for some years to come.

An essential component of the project cycle begins with the identification of ideas that require the optimum use of resources in order to achieve the set objectives. The identification and preliminary screening of competing alternatives is a crucial part of the process, and decisions made at this stage can have far-reaching effects on the success of the project. At the preliminary stage of the project, it is essential that effective decisions on design specifications, project financing, contractual systems, and methods of construction are all taken at the right time.

In developing countries, the lack of proper phasing of construction projects can contribute to the economy becoming 'overheated'. This gives rise to project-cost overruns, with consequential effects on inflation and a decline in efficient activity in the industry. The continued adherence to traditional forms of contract, especially the fixed-price system, often precludes innovation in terms of certain construction-management techniques which are appropriate to developing countries.

The major variables that can lead to excessive project overruns in a developing country such as Nigeria are the financing of and payment for completed works, poor contract management, shortages of materials, price fluctuations, and inaccurate estimates leading to delays. (The latter were probably responsible for about half of

the uncompleted government projects in Nigeria during the second Nigerian republic).

Other factors which can be identified as usually being responsible for project delays and excessive costs are excessive bureaucratic checking and approval procedures, unclear definitions of contract terms by the client, and insufficient geotechnical investigations at the feasibility stage.

The efficiency of the Nigerian construction industry would be improved by addressing a number of issues in particular.

Greater attention must be paid to obtaining more accurate estimates from contractors. Clients and consultants must allow the various parties sufficient time and resources to produce these effectively.

A climate of confidence needs to be created in which the private sector can be encouraged to put funding into projects, and this sector has to include contractors. There is much that can be learned from other countries such as the UK, where private finance has been offered for some major bridge projects, and the returns could be assessed reasonably objectively.

To reduce the incidence of poor contract management, greater training is also needed. This has to take place at the senior- and middle-management levels. The practice of local contractors working alongside international contractors on Nigerian projects has to be encouraged, with some individual managers being selected for project-management courses.

Lack of availability of materials has to be addressed at government and state level across ministries. A higher priority has to be given to investing in improving the stock of local materials and their supply.

Recommendations

On the basis of the above findings, and with developing countries in mind, the following recommendations are made:

- More emphasis should be placed on thorough project analysis before authorisation. Clients should allow sufficient time to prepare project briefs and other feasibility studies. Moreover, construction programmes should be drawn up by qualified and experienced personnel and be sufficiently accurate and realistic. The programme should be seriously monitored and reviewed as often as necessary so that its performance can be evaluated and compared with the projected targets.
- Clients should ensure that adequate funds are available before projects are started, so that contractors can be paid in accordance with the contract agreement. There is also a need for comprehensive economic analysis and workable financial plans to be prepared before contracts are awarded. The private sector should be encouraged, in certain circumstances, to participate in financing public-sector projects. This could take place in the form of equity participation or with other credit-facility arrangements. Alternative contract methods, such as build-own-operate-transfer (BOOT) schemes could be introduced to encourage contractors to participate in financing new projects⁹. However, the Nigerian

Federal Government must create a climate of economic and political stability that is sufficient to rekindle confidence in investors, and enable them to achieve a reasonable return on their investment. The main thrust of government action should be to evolve a well defined functional structural system, which would enable financial resources to be generated from the private sector and injected back into the economy¹⁰. The strategic objective here should be to achieve an investment-led growth that is sustainable over time which would benefit the Nigerian construction industry.

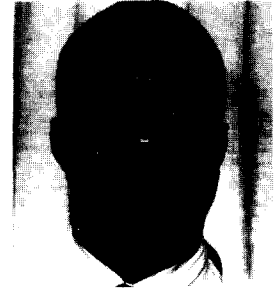
- Contractors and other construction personnel should establish an efficient materials management system for a given construction project. Concerted efforts should be directed towards research and development in the use of local construction materials. In order to encourage international contractors and investors to undertake greater foreign direct investment in such areas as materials development and production, it is necessary for the host government to relax 'interventionist monetary policies' and other strict economic measures. This incentive will enable the local currency to find its true stable value in the free market, and thereby curtail excessive price fluctuations associated with imported construction materials, equipment and other plant items.
- There is a continuing need for institutional strengthening and manpower development in the areas of project management, information and database management systems. Since present construction methods are predominantly capital-intensive, labour-intensive methods should be encouraged through the use of direct labour organisations. Aid agencies such as the World Bank should assist developing countries to research appropriate technology and construction-management techniques which are suited to their particular local environment^{11,12}. The host governments could also achieve this through well packaged technology-transfer agreements with international contractors operating in their countries. Pilot projects designed for this purpose are particularly recommended in such cases¹³.

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