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THE PERFORMANCE OF TRADITIONAL CONTRACT PROCUREMENT ON HOUSING PROJECTS IN NIGERIA

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ABSTRACT

The traditional contract procurement has been widely criticized as an ineffective procurement method because it often involves time and cost overrun on construction projects. Yet the method is still being widely used in Nigeria most especially for the procurement of housing projects. It is suspected that this procurement method may not be ineffective in all cost categories of housing projects. Therefore time and cost performances of the procurement method on 57 housing projects of varying cost categories initiated by the Nigerian government between 1993 and 1999 were studied. The category of one to five million naira (US$1.00 ≈ 92 Nigerian Naira in 1999) showed the least time overrun of 18.98% while the highest time overrun of 99.64 % was shown in the five to ten million naira. The over ten million naira category had the least cost overrun of 9.13% while the highest cost overrun of 34.55 % was shown in the less than one million naira. The one to five million naira cost category exhibited weak correlation between time and cost overruns but the five million naira and above categories showed strong correlation. It was concluded that one to five million naira cost category is quite suitable for traditional contract procurement on housing projects in Nigeria.

Keywords: Traditional contract performance, building projects, time and cost overrun, contract cost category.

INTRODUCTION

Shelter has been acknowledged as one of the basic needs of humanity. It was therefore not surprising when the United Nations launched an aggressive campaign through the government of Nations on the need to provide shelter for all. The slogan, housing for all by the year 2000 was carried far and wide in all countries of the world including Nigeria. Prior to the year 2000, precisely in 1991, the Nigerian government enacted into law the National Housing Policy in an effort to ensure that all Nigerians own a decent housing accommodation at affordable cost. The National Housing Policy [1], acknowledged that there is an acute housing shortage in Nigeria particularly in the urban areas. That also about five million new housing units would be required then to overcome this shortage.

To achieve this laudable objective of providing sufficient and decent housing accommodation for the populace, there was the need to manage the construction process through any of the existing contract procurement methods. Prominent among the many contract procurement methods used in construction is the traditional contract procurement.

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This method involves the appointment of an architect who recommends, sets up and leads the design team. The other members of the design team are the engineers, and the quantity surveyor. In this method, according to Rowlinson [2], the architect most of the times takes the client's brief and then develops it into architectural form. The engineers then come in for the structural, mechanical and electrical designs and detailed it up to a point where the various elements of the structure can be taken off and worked up into a bill of quantities by the quantity surveyor. After this stage, the builders or contractors are invited to tender for the construction aspect. Their tenders are examined, compared and the successful contractor is appointed to carry out only the construction aspect of the project under the guidance of the architect.

Traditional contract was the most prevalent procurement all over the world until the shortcomings of the method started to appear in literature around 1960s [3, 4, 5]. The major criticism of the traditional contract was that, construction works were getting more complex and hence there was need to integrate design and construction being treated as separate entities under the traditional contract arrangement. The fragmentation of building projects into two mutually exclusive entities it was noticed created room for ineffective communication and coordination, which often result in conflict between the

designers and the contractors. This fragmentation and project complexity according to Naoum and Langford [6], places serious burden on the traditional method of managing building projects. The National Economic Development Office (NEDO) [7], acknowledge the failure of the traditional contract on timely completion of projects in the United Kingdom and according to Mohsini and Botros [8], it was these limitations that led to the emergence of a number of alternative procurement systems such as the design-build, construction management, management contracting, project management and recently, build-own-operate-transfer (BOOT). These alternative procurement systems have been found to perform better than the traditional contract in terms of time and cost overruns due to the integration of design and construction.

In Nigeria, Osemenam [9] confirmed this assertion that "the traditional method leads to long delays in project conception and delivery thus invariably leading to high project cost." However, the construction industry practitioners in Nigeria, despite the known failure of the traditional contract, still use the method mostly for building project procurement [10]. In a study of 35 building projects in South-Western Nigeria, Ojo, et al. [11] concluded that the traditional procurement has the tendency to overrun in terms of cost and time by 53.50% and 160% respectively. Also, an analysis of the cost effectiveness of direct labour on 2,772 housing units in metropolitan Lagos by Adeyemi et al. [12] indicated that if the traditional contract procurement method had been used, it could have led to a cost overrun of 36.72% on these projects. However these analyses did not take into account the possible influence of contract cost categories on the performance of traditional contract. Despite the earlier criticisms of the performance of traditional contract for project execution in Nigeria, the use of this procurement method is on the increase most especially on residential building projects by public sector clients (the government establishments), which is the largest employer of the construction industry in Nigeria, and some uninformed private sector clients.

The method of organizing and managing construction projects in developing countries as noted by Chalabi and Camp [13] are essentially by the traditional method. This is true in the Nigerian context. During the colonial era through 1960s, construction projects in the country were executed primarily by the direct labour system. At the wake of oil boom, which coincided with the need for reconstruction and rehabilitation works after a fratricidal war, which ended in 1970, the traditional contract was introduced to cope with the rapid increase in infrastructural needs. Since then the traditional contract has dominated the Nigerian construction industry. The major benefits of the traditional contract according to Molenaar et al [14] is that it allows for checks and balances between the architect and the contractor as a result of separation of role and that it encourages quality work from each party. Further it allows a client to make needed changes during the design stage, which are less costly than during the construction stage. In the Nigerian situation, Wahab [15] even postulated that this system has the singular advantage of competitiveness, which often results in low tender markup.

The increasing popularity of the use of the method in preference to other procurement methods led to the critical inference that the traditional contract method is not ineffective for all categories of building projects. This study therefore was designed to investigate this inference in terms of time and cost overrun of the traditional contract procurement method on residential buildings with project cost ranging from one to one hundred million naira. The investigation is premised on three hypotheses stated as follows:

(1) there is no significant difference between time overruns of each paired groups of project cost categories.
(2) there is no significant difference between cost overruns of each paired groups of project cost categories.
(3) there is no causal relationship between time and cost overruns in each of the cost categories.

RESEARCH METHODOLOGY

This study was carried out through questionnaire survey and secondary data on some executed housing projects. The questionnaire elicited empirical data on the performance of traditional contract method on set construction parameters such as cost and time of residential buildings procured using the traditional method. Respondents were also asked to identify the factors responsible for cost and time overruns if there were any.

A total of fifty-five questionnaires were administered on the construction industry practitioners in Lagos State. The questionnaires were administered to organizations selected by stratified random sampling from three main sources:

1. Clients (Federal/State ministry of works, local government, government establishments and educational institutions).
2. Consultants (Architects, Engineers and Quantity surveyors)
3. Contractors (small, medium and large sized).

The number of questionnaires distributed to each class of respondents and the number returned are shown in Table 1. The table shows that a total of twenty-eight respondents completed and returned the questionnaire yielding a response rate of 50.9%.

Table 1. Number of questionnaires distributed and the return rate.

Class of Respondents	No of Questionnaires Distributed	No of Questionnaires Returned
Clients	25	13
Consultants	15	6
Contractors	15	9
Total	55	28

Valid information on fifty-seven housing projects initiated and completed between 1993 and 1999 were supplied. These were divided into cost categories for the purpose of analysis as follows:

a. Less than one million naira (Group 1)
b. Between one million and five million naira (Group 2)
c. Between five million and ten million naira (Group 3)
d. Between ten million and one hundred million naira (Group 4)

To determine the level of success achieved by the traditional contract method on the estimated time and cost of construction in each cost category, the time and cost overruns were calculated by finding the percentage difference between the estimated and the final values in each of the two variables as follows:

$$\text{Construction time overrun (t)} = \frac{t_2 - t_1}{t_1} \times 100\% \qquad (1)$$

$$\text{Construction cost overrun (c)} = \frac{c_2 - c_1}{c_1} \times 100\% \qquad (2)$$

where
t_1 is the estimated period of completion in months
t_2 is the final period of completion in months
c_1 is the estimated cost of completion
c_2 is the final cost of completion

The SPSS package of student t-statistic was used to prove the time and cost relationships between the paired groups of cost categories (hypothesis 1 and 2) while the product moment correlation coefficient was used to determine the relationship between the time overrun and cost overrun of each cost category (hypothesis 3). All the analyses were carried out at 5% level of significance.

RESULTS AND DISCUSSION

The objective of this analysis was to establish whether there exist a "real" difference between the mean time overruns and mean cost overruns of traditional contract residential projects of different cost category. This will enable the client to decide the cost category in which the traditional contract method is most effective.

CONSTRUCTION TIME OVERRUN

According to Naoum and Langford [16] there is no yardstick by which the construction duration of a project is measured. But it is common for contractors and consultants to use their expertise and experience on similar projects to estimate how long a particular construction project should last. In view of this, the numbers of cases studied were compared with their estimated construction duration.

The construction time overrun (t) calculated by applying equation 1 to each of the four cost categories is shown in Table 2.

Table 2. Mean time overrun of cost categories

Group	Cost category (million naira)	No. of valid residential projects	Mean time overrun %	Standard deviation %
1	0<1	15	32.34	33.25
2	1 ≤ 5	24	18.98	20.16
3	5≤10	7	99.64	201.77
4	10≤100	11	52.89	46.45

The table indicates that the least time overrun of 18.98% was recorded in cost group 2 (one to five million naira cost range) while the maximum time overrun of 99.64% occurred in group 3 (five to ten million naira cost category). The implication of these results is that, when the traditional contract methods is used to execute residential building projects divided into these cost categories, the order of time completion would be group 2 first, group 1 second, group 4 third and group 3 fourth. The mean time overrun for each cost category was compared with the other cost categories using the student t - statistics. This was done to test the hypothesis that:

H_0: there is no significant difference between the mean time overrun of the cost categories.
H_1: there is significant difference between the mean time overrun of the cost categories.

The results of the t–statistics for each of the six paired groups (cases A, B, C, D, E and F) are shown in Table 3.

The table shows that the null hypothesis can be accepted for cases A, B, C and F while it is rejected for cases D and E. The implication of this result is that the traditional contract method, performs far better in terms of time overrun in cost category 2 (One million to 5 million naira) than in cost categories 3 and 4 (i.e. five million naira to ten million naira and ten million naira and above). Although comparisons with other cost categories were not significant, cost category 2 has the least time overrun and this further justifies the suitability of the traditional contract for this cost category.

Table 3. Test of significance of mean time overrun between paired groups of cost categories

Combination of Groups (Cost Categories x 10^6 naira)		Number of projects	Mean time overrun (%)	Standard deviation	Pooled variance estimate			Inference from test
Case	Paired Groups (Cost categories)			%	t-value	Degrees of Freedom	2-tail Probability	
A	1 (0 < 1)	15	32.34	33.25	1.57	37	0.126	Not Significant
	2 (1 ≤ 5)	24	18.98	20.16				
B	1 (0 < 1)	15	32.34	32.25	-1.29	20	0.212	Not Significant
	3 (5 ≤ 10)	7	99.64	201.77				
C	1 (0 < 1)	15	32.34	33.25	-1.32	24	0.200	Not Significant
	4 (10 ≤ 100)	11	52.89	46.45				
D	2 (1 ≤ 5)	24	18.98	20.16	-2.01	29	0.054	Significant
	3 (5 ≤ 10)	7	99.64	207.77				
E	2 (1 ≤ 5)	24	18.98	20.16	-3.04	33	0.005	Significant
	4 (10 ≤ 100)	11	52.89	46.45				
F	3 (5 ≤ 10)	7	99.64	201.77	0.75	16	0.464	Not Significant
	4 (10 ≤ 100)	11	52.89	46.45				

COST OVERRUN

The amount, which a project would cost, is usually the responsibility of the quantity surveyor. The project cost is usually set at the beginning of the project and this is called the initial cost. Clients however are less worried by this initial cost but rather "interested" in an early prediction of the total amount that must be paid and the variance between this prediction and the actual final cost [17].

Table 4 shows the mean cost overrun for each cost category.

Table 4. The mean cost overrun for the cost categories

Group	Cost category (million naira)	No of valid residential projects	Mean cost overrun %	Standard deviation %
1	0<1	15	34.55	48.22
2	1≤5	24	11.59	13.91
3	5≤10	7	16.92	35.78
4	10≤100	11	9.13	18.03

The table indicates that the least cost overrun occurred in cost category 4. This performance could be explained by the possibility of strict enforcement of the terms of contract with the aim of reducing unnecessary claims by the contractors. Comparison was made between the mean cost overrun of all the cost categories using the student t-statistic at 0.05 level of significance to prove the second hypothesis that:

H_0: there is no significant difference between the mean cost overrun of the cost categories.

H_1: there is significant difference between the mean cost overrun of the cost categories.

The t-test statistic results (Table 5), revealed that there is a significant difference in the mean cost overrun of residential projects between cost categories 1 and 2 (case A). Therefore the null hypothesis is rejected in case A and the actual hypothesis accepted. The null hypothesis is however accepted in cases B, C, D, E and F.

Table 5. Test of significance of mean cost overrun between paired groups of cost categories

Combination of Groups (Cost Categories x 10^6 naira)		Number of projects	Mean cost overrun (%)	Standard deviation	Pooled variance estimate			Inference from test
Case	Paired Groups (cost categories)			%	t-value	Degrees of freedom	2-tail probability	
A	1 (0 < 1)	15	34.55	48.22	2.21	37	0.05	Significant
	2 (1 ≤ 5)	24	11.59	13.91				
B	1 (0 < 1)	15	34.55	48.22	0.86	20	0.4	Not Significant
	3 (5 ≤ 10)	7	16.92	35.78				
C	1 (0 < 1)	15	34.55	48.22	1.66	24	0.11	Not Significant
	4 (10 ≤ 100)	11	9.13	18.03				
D	2 (1 ≤ 5)	24	11.59	13.91	-0.61	29	0.55	Not Significant
	3 (5 ≤ 10)	7	16.92	35.78				
E	2 (1 ≤ 5)	24	11.59	13.91	0.44	33	0.66	Not Significant
	4 (10≤ 100)	11	9.13	18.03				
F	3 (5 ≤ 10)	7	16.92	35.78	0.62	16	0.55	Not Significant
	4 (10≤100)	11	9.13	18.03				

The implication is that when a client employs the same contractor for residential projects in cost categories 1 and 2, the extra cost incurred over and above the initial cost in cost category 1 will be more pronounced than that of cost category 2, whereas the difference in cost overrun between other cost categories will not be that pronounced when compared. For other comparisons, the extra cost incurred over and above initial costs will not be pronounced.

The product moment correlation coefficient was used to establish the relationship between cost and time overrun in each cost category and to test the third hypothesis that:

H_0: there is no relationship between the time and cost overruns in each cost categories.

H_1: there is relationship between the time and cost overruns in each cost categories.

Table 6 shows the correlation coefficient for all the categories.

Table 6. Correlation Coefficient between Cost and Time Overrun

Cost categories (million naira)	r – value	p – value	Inference
0<1	-0.013	0.482	Weak negative relationship
1≤5	+0.099	0.321	Weak positive relationship
5≤10	+0.99	0.000	Significantly strong relationship
10≤100	+0.672	0.012	Significantly strong relationship

The result of the correlation coefficient revealed that for a residential project in cost category 1, there is a negative correlation. This implies that cost and time overruns in this cost category change in opposite direction. For instance an increase in time leads to a

decrease in cost. This is contrary to economic theory, particularly for construction projects. The relationship however is weak and not significant; hence it can be safely assumed that there is no statistical relationship between the two variables in this cost category. In cost category 2 the relationship is positive i.e. an increase in time overruns leads to increase in cost. This relationship is also weak and not significant.

Cost category 3 (five to ten million naira) has a perfect positive correlation between time overrun and cost overrun. The relationship is significant and it can be concluded at 100% level of confidence that the time overrun led to the increase in the final cost of the project. Likewise for cost category 4 (ten million naira and above), there seems to be a perfect positive correlation between time overrun and cost overrun. The relationship is significant. It can also be concluded with 95% level of confidence that the time overrun caused the increase in cost of the projects within this cost category. In essence, the null hypothesis is accepted in the case of cost categories 1 and 2 and rejected in the case of cost categories 3 and 4.

CONCLUSIONS

The provision of adequate housing has been accepted by government of nations as basic. The traditional contract being the most widely used procurement method for housing delivery in Nigeria was evaluated for time and cost overruns on projects ranging from one million to one hundred million naira. Based on this study, the traditional contract method was found to perform better in terms of time when used to procure residential buildings of five million naira and below than the other higher cost categories. In the case of cost, the traditional contracting method on the other hand, least overran (9.13%) its initial cost when used to procure projects above ten million naira.

The time slippages of housing projects costing five million naira and above led to the cost slippages as revealed by the correlation coefficient. Hence every effort should be made to reduce time slippages of housing projects in this cost range in order to reduce cost overrun through strict enforcement of the contractual process and agreement.

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