SAMPLE ANALYSIS OF CORRELATION OF COST INPUTS OF TIMBER PRODUCTS IN ROOF CONSTRUCTION

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Abstract

Timber is widely used in the construction of buildings. It is a very visible component of roof structure and it forms the structure upon which the covering is laid. The cost of roofing is on the increase owing to the difficulties in sourcing timber in lumber forms nowadays. In Nigeria the construction of roof for residential buildings mostly in bungalows depend much on timber. A sample of thirty units of cost of timber roof structure from three (3) bedrooms flat under construction was collected from Contractors and Developers. Correlation was used to find out the cost input of timber in roof vs. the total cost of roof, the critical value of r =.195, cost input of roof in the total cost of building, r =.090, as well as cost input of timber in roof on the total cost of building, result shows r =-.063. Weak strength of relationship for the first two cases and negative was seen in the last case.

Keywords: Building, Construction, Cost, Roof, Timber.

Introduction

The Longman Dictionary Of Contemporary English (1995) defined timber as a wooden beam, especially one that forms part of the main structure of a house, while Barry (1996) agreed that timber is wood, which has been cut for house building. Krieger (1979), divided timber into hard wood and soft wood. The use of timber for housing construction is as old as man. With the advent of civilization however, many materials were developed and these have continually been integrated with timber to arrive at a finished house. Timber can be found in substructure as earth work supports and form work to footings and slab, it is present in block work as formwork to lintels and columns, it exists as doors and windows including frames and panels. Timber products have also made their way in finishes as skirting, dado, timber tiles and so on. Internal fittings and furniture of bungalow construction are also made up of timber. These are all wonderful components. Many materials used for building construction which are sourced locally have undergone one or two modifications or rated out-fashioned, but timber has remained unchanged, though some form of finishes are known to be applied either to improve its longevity or appearance, and the use of pre-stressed timber is also on the increase for special purposes. Whitney et al (1981) made mention that wood is the hard fibrous substance forming the truck, lumber is the product of the saw or planning mill, not processed beyond sawing. Timber is a lumber 5 inches or larger. They also reasoned that wood should be identified by their botanical name when specifying them for housing construction (Jakson, 1988).

The standard method of measurement recognized the importance of timber and allocated a special class to it as class 'N'. In this class, various forms which timber and associated components are found in buildings are detailed out (Fadamiro *et al*, 1996).

The use of timber as a building material is found in roof and almost all the building elements but the extent of its cost on these elements appears to be unknown. Ignorance on costs of timber in building could lead a client to embark on building construction only to

discover at a later date that his budget underestimated cost of timber in the project. This has lead too many projects being unduly modified and at sometimes abandoned. Moreover the cost of timber and labour costs have been on the increase and there is the need for cost planners to be provided with researched cases for proper planning in order to save the cost of explanation on project differences.

Using traditional method of bungalow construction for medium income earners, timber remains the only building component which appears to be used for roof construction than steel in most part of the world and particularly, Nigeria where this study was carried out.

Aim And Objectives

The aim of this work is to find out the cost input of timber products in a simple roof (bungalow) construction.
The objectives are:

i. To determine the relationship existing between total cost of timber in roof element and the total cost of roof in a simple bungalow.
ii. To determine the relationship existing between total cost of timber in roof and cost of building in a simple bungalow.

Literature Review

Timber For Roof

Today, the growing stock volume of timber worldwide is estimated to 490 billion m^3 (FAO, 2000a).The total world production of timber in 1999 was 3275 million m^3 (FAO, 2000b).Wood possesses the same fundamental composite structure as some of the best man made materials developed. Kreiger (1979) wrote that timber in the past was used extensively in any type of construction, such as non-standard scaffolding and concrete form. The advent of precast reinforced concrete and other progressive materials as well as more rational use of waste wood, has resulted in an increasingly more economical and efficient use of timber products in roof and housing construction. It is submitted that wood is one of the most valuable raw materials supplied by nature and that each kind of wood qualities suit it to a particular type of use, for instance, Douglas Fir is a strong, moderately heavy wood which is used for construction, lumber , plywood boxes and heavy timbers. Western Cedar is a light and rather weak wood; however it has natural preservation that protects it from decaying, so it is valuable for Shingles, Posts and Facings. Oak is heavy, hard and strong and long lasting, so it is used for flooring and furniture. There are more roofs constructed with wood than any other structural materials. The wide spread use of wood for construction of roof has both economic and aesthetic basis. Oyetola (2001) concluded that timber is known for its beauty, versatility, strength, durability and workability. There are few materials that cost less per kilogram than timber. He emphasized the need to get acquainted with timber designs (Feirer et al, 1976)

Roof Cost and Timber Products

Building costs in our contemporary society have been on the increase and this has drawn a point of concern to both private and public developers (Ashworth, 1991). Roof is one major component of building that has been improved with construction techniques for improvements, modifications and innovations on the materials of covering particularly with the advent of long-span aluminium. The rapid increase in building costs and particularly timber which is the core of roof structure has been a source of concern. Nigeria has been witnessing mass felling of trees in the bid to cope with the high demand for timber products in building construction. The last decade has witnessed more buildings

constructed compared with the previous ones. This is not unconnected with the democratic government that is now in place bringing about mass housing scheme both at the State, Federal and private development levels. The result is that the demand on building materials has increased being that the buildings constructed are done through the conventional and traditional processes involving the use of blocks, cement, stones, concrete, timber and other materials. Cost of wood for roof construction and other timber component of building are observed to be influenced by various variables among which is the rapid increase in population as well as the demand. Submissions in recent times at conferences seminars and workshops organized by professional bodies have been repeatedly calling on both State and Federal Government to encourage the use of local building materials and studying of new technologies on processing of timber, (Mabogunje, 1991).

Materials And Methods

Scope and Assumptions of Study

i. cost inputs of timber roof (bungalow) construction were carried out on a homogenous 30 units of 3 bedrooms flat constructed in Niger State, Nigeria.
ii. Cost of roof timber is exclusive of labour for the roof structure.
iii. Roof covering cost was arrived at with the use of .50mm gauge long span aluminium profile corrugated sheets.
iv. It is also limited to initial costs of timber construction
v. Tender figures forwarded by various contractors and Quantity Surveyors for the priced bills were accepted by various clients.

Data Instruments

Primary data from Bills of Quantities and Contractors quotations were used for the study
The statistical instrument employed in this study was correlation. This was to determine whether the variables are related and their degree of relationship if any.

Hypothesis

i. To determine the correlation coefficient between the cost of roof and its component cost of timber structure.

ii. The correlation co-efficient at 5%level of confidence using Ho: μ1=μ2=0, H1: μ1/ μ2

Discussion of Results

Roof Cost VS Timber Cost

Taking correlation as a good measure of the degree of relationship from the data of the result print out of the correlation matrix:

i r = .195, ii. α= .05 level of significance.

Based on the set of data used, the correlation coefficient calculated r =.195. The number of data pairs is 30 therefore n = 30, from the table, we use the critical value r =.305. Since this is a two tailed test r = .305*2=.610. For us to conclude on their relationship, the

calculated value for r must be more than .610. since we found r =.195 we reject the null hypothesis being that the coefficient of determination r is positive and also conclude that there is a very weak but positive correlation between the two variables of roof cost and the constituent cost of timber structure at the 5% level of significance.

Roof Cost VS Total Building Cost

Based on the set of data used, the correlation coefficient calculated r =.090. since we found r =.090 we reject the null hypothesis also and conclude that there is a very weak but positive correlation between the two variables of roof cost and the total building cost at the 5% level of significance.

Timber Cost VS Total Building Cost

Based on the set of data used, the correlation coefficient calculated r = -.063. since we found r = -.063 we accept the null hypothesis and conclude that there is a very weak and negative correlation between the two variables of timber cost vs. total building cost at the 5% level of significance.

Summary of Descriptive Analysis

The descriptive analysis of this research work was made up of three different charts, which explained the result and gave a general impression of the variable used.

In figure 1.0 - 3.0, it can be observed that the cost of timber in roof element vs. the cost of roof fluctuates. It is irregular, but it is not to say that it could be out of range. The same thing can be said of the cost of roof vs. the total cost of the building and the cost of timber vs. total cost of the building studied.

Conclusion

The essence of this study is to generate facts about the influences of the individual cost items in a simple roof cost.

i. the cost of timber in roof elements did not appear to put-forth or exert any strong effect on the total cost of the roof

ii. The correlation between cost of roof work and the total cost of the building was weak in their strength of relationship, meaning it does not exert much on the total cost of the building.

iii. Total cost of timber in roof of three bedroom bungalows has insignificant impact on the total cost of three bedroom bungalows.

Recommendations

Results show positive correlation but weak relationship in the first two instances. This study was based on the use of long-span aluminium roof covering which of course enjoys some level of dignity than the conventional zinc (iron) corrugated sheet roof covering. It is much likely that the correlation with the conventional roof covering will tend towards negative than this. However the cost of roofing in timber cannot be seen to be too burdensome as the correlation shows some measure of weakness in the timber vs. total roof and total roof vs. total building cost. In the case of cost of timber in roofing vs. the total cost of the building it was seen to be negative and very weak, meaning that the cost

was insignificant to the cost of building the studied three (3) bedrooms under construction. This may as well apply to other building forms in the same category employing similar materials and construction technique.

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Appendix

Table 1 : Cost of timber in Roof Element and total cost of the Element in the Building

s/no	cost of timber in roof (N)	Total cost of roof (N)	Total cost of building (N)
1	287845	930395	3926156
2	456224	1065985	4259883
3	243172	912407	4715208
4	417030	801750	3744707
5	571759	1120397	4433238
6	247920	838560	3956601
7	300979	866841	3647609
8	463476	1188972	4409227
9	372577	978825	4025699
10	413983	789658	3974051
11	700179	987465	4264995
12	328688	1217027	4283273
13	480254	840358	4190593
14	543210	903126	3575376
15	373591	910216	9070247
16	612255	1242662	4367150
17	534270	1314018	4718488
18	262998	1408427	5314316
19	280508	839654	3259193
20	391004	907728	3950791
21	481225	892103	4040379
22	450171	1026148	4126642
23	383910	921423	5912849
24	441936	900000	2942859
25	480000	932000	4422760
26	390000	835000	4875000
27	435000	910000	4970000
28	412000	895000	5865000
29	405000	905000	5250000
30	455000	890900	5380000

Table 2: Roof Cost Vs Timber Cost

Correlations

		TMBRF	TTR
TMBRF	Pearson Correlation	1.000	.195
	Sig. (2-tailed)	.	.302
	N	30	30
TTRF	Pearson Correlation	.195	1.000
	Sig. (2-tailed)	.302	.
	N	30	30

Table 3: Roof Cost Vs total building cost

Correlations

		TTRF	TTBLD
TTRF	Pearson Correlation	1.000	.090
	Sig. (2-tailed)	.	.637
	N	30	30
TTBLD	Pearson Correlation	.090	1.000
	Sig. (2-tailed)	.637	.
	N	30	30

Table 4: Timber Cost Vs total building cost

Correlations

		TMBRF	TTBLD
TMBRF	Pearson Correlation	1.000	-.063
	Sig. (2-tailed)	.	.741
	N	30	30
TTBLD	Pearson Correlation	-.063	1.000
	Sig. (2-tailed)	.741	.
	N	30	30

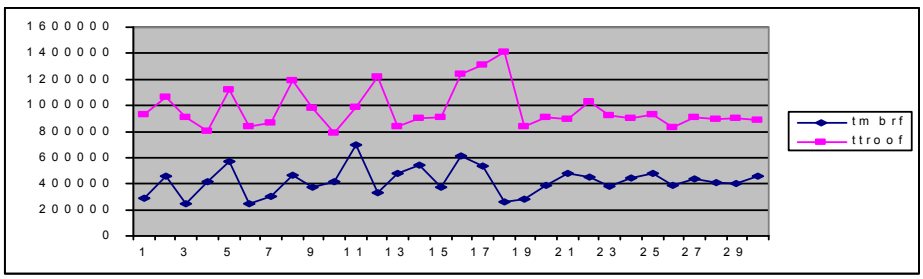

Figure 1: Roof Cost Vs Timber Cost

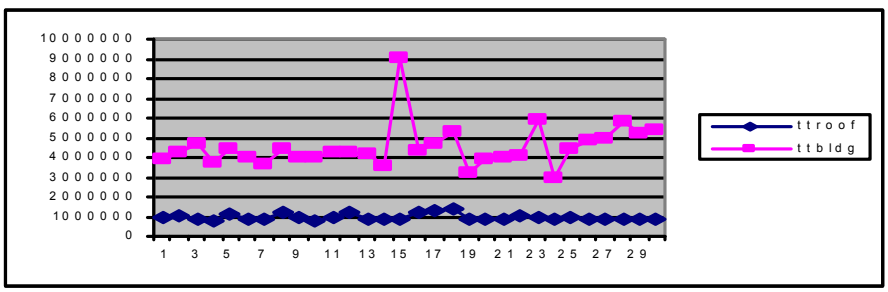

Figure 2: Roof Cost Vs total building cost

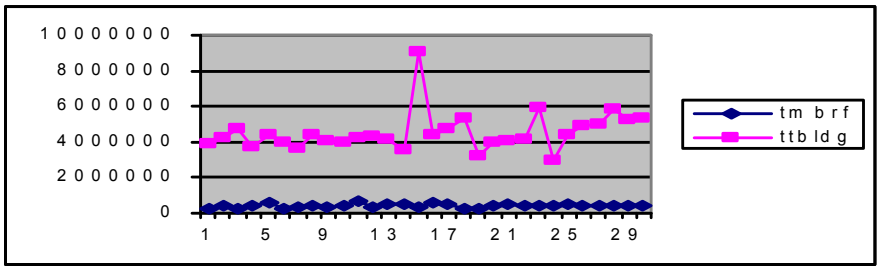

Fig 1.3 Timber Cost Vs total building cost

Legend:

TMBRF = Total timber cost, TTRF = Total roof cost, TTBLD = Total building cost