EMPIRICAL STUDY OF THE SEVERITY OF LOSS AND EXPENSE CLAIMS ON BUILDING CONTRACTS IN NIGERIA

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Abstract
Claims for loss and /or expense is characteristic of most building contracts in Nigeria irrespective of their size and scope; and often defeats project objectives of time, cost and functionality by leading to their time and cost overrun. This study aims at minimizing the negative effect of loss and /or expense claims by providing an information database on the severity of impact of individual claim clauses on building contracts administered with the Standard Conditions. The method of study was a descriptive survey research and the study population involved 120 construction industry professionals comprising Architects, Quantity Surveyors and Engineers with practice in Rivers, Abia and Imo states, all in Southern Nigeria. The research instrument involved a well structured questionnaire.. Data obtained were presented, analyzed and interpreted using the percentage and index methods, while test reliability and significance were conducted by means of Kendall's Correlation Coefficient and Pearson's Chi-Square statistic respectively. The result of the study shows that the higher a claim's percentage agreement factor, the higher the rank orders of claim and the greater the severity of impact on contract strategy. The study concludes that of the fourteen loss and/or expense clauses in the Standard Conditions, claim clauses 11(6), 1, 11(4), 12, 24, 31, 23 and 27 ranked most in descending order of severity. The study recommends a comprehensive pre-contract study by project participants in order to minimize loss and /or expense claims.

Keywords: Loss, Expense, Claims, Severity, Contract, Strategy

Introduction

Building Contracts are often executed under a variety of conditions involving many unknown, unexpected, frequently undesirable and often unpredictable factors in the course of project delivery.

Risks in construction projects manifest in numerous ways, varying over time and across activities. They essentially stem from uncertainty which, in turn is caused by a lack of information. The environment within which the decision making process takes place is often divided into three parts, namely - certainty, risk and uncertainty.

Certainty exits only when one can specify what will happen during the period of time covered by the decision. Unfortunately, this does not happen very often in the construction industry. An important source of bad decisions is fairly often illusions of certainty as most people who earn their living in the construction industry are optimists. There is a difference between risk and uncertainty. A decision is made under risk when the decision-maker assesses risk either intuitively or rationally. The probability of a particular event occurring is based upon historical data and experience.

Uncertainty, by contrast is a situation in which there are no historic data or record relating to the situation being considered.

The difference between risk and uncertainty are somewhat close, and for convenience, the construction industry uses the term risk to encompass both risk and uncertainty.

Risks and uncertainties threaten project performance in terms of time, cost and functionality and often lead to project overrun.

Many cost and time overruns are attributable to either unforeseen events or foreseen events which were not appropriately predicted, and as such, not truly accommodated by project parties.

Theoretical framework

The problem of overrun in construction projects is not locally situated. It is a global phenomenon that has assumed an international dimension. The domain of its seemingly ravaging effect cut across many countries and continents of the world.

Studies by Morris and Hough (1987) show a record of project overruns on a vast majority of projects including military installations, energy systems, information technology projects in various geographical entities, including the United States, United Kingdom and the third world countries. Their studies reveal a consistent and in some cases excessive overrun ranging from 40-500% over initial budget estimate. Other global construction research streams show a corroborating evidence of cost overruns in construction project delivery. A study by Slough Estates, London aimed at comparing the cost of providing buildings constructed for identical purposes for the same company in a variety of countries shows that Britain has a cost overrun index of 100; Belgium, 107; France 98; Australia, 94; Germany 87; USA 74; and Canada 59. Similarly, their construction time -overrun index for identical buildings (in weeks), were-Britain 57; France 30; USA 23; Canada 21.

Although, there is disparity of cost indices in different countries apparently due to various propensities of risks on projects; one thing that is fundamental is that risk of cost overrun pervades construction projects across the globe irrespective of geographical location, project scope and size. As, such, the management of cost overrun risks is not only of contemporary relevance but auspicious at this time of global recession and paucity of construction funds.

Studies by Charles and Andrew (1990) found that a cost overrun rate of 1-11% is more likely to occur in large projects than the small ones. Their studies also reveal that contracts with award less than the Government estimate are more likely to have overrun rates above 5% with a chi-square value of 2.80.
Also, research conducted by Akinwonmi (1991) on 10 selected Building Contracts in Nigeria reveals a cost overrun ranging from 8%-142%.

These streams of research in construction cost overrun clearly reveal the reality of this challenge and the growing need for proactive management-minimisation, or elimination of claim tendencies that lead to variability between Cost at award and Cost on Completion.

Also research by Elinwa and Buba, 1993; Akinwonmi, 1991; Jahren and Charles, 1990; Charles and Andrew, 1990; Okpala and Aniekwu, 1988; Zaki and James, 1987; Morris and Hough, 1987; Langford and Wong, 1979 reveal numerous risk factors responsible for construction cost overrun. The most common include viz:Scope and Quantity increases, Engineering and Design changes, faulty design and late project decisions leading to delays, Under-estimation, Mis-estimation, Unforeseen inflation, Inclement weather, Cash-flow problems, Project size and complexity,Unforeseen technical difficulties, Schedule changes, Tight schedules,Poor Project definition, Poor Contract administration, Labour Problems, Poor industrial relations, Government legislation, Statutory requirements and other external factors.

The effects of these risks give rise to claims for loss and /or expense. Jahren and Charles (1990) views cost overrun as the difference between final contract cost and the contract award amount. Considering the high propensity of these risk factors and their apparently devastating effects on the integrity of predetermined construction cost benchmarks, the need for a renewed awareness has become more discerning than before.

Perry and Hayes (1985) classify risks in projects according to the following primary sources: Physical, Environmental, Design, Logistics, Financial, Legal, Political,Construction, and Operational.

In spite of the above grouping of project risks according to their primary sources; risks responsible for project cost overrun are broadly classified into - ‘financial risks’ and ‘design risks’. On the basis of this postulate, a study conducted by Odeyinka (1987) on twenty (20) completed building projects in Nigeria indicates the following financial and design risks.

a) Identified financial risks expressed as a percentage of cost overrun.
   I. Fluctuation: 37.25 - 70.10%
   II. Prime Cost adjustment: 8.75 - 32.5%
   III. Provisional Sum:4 - 13.04%
b) Identified design risks expressed as a percentage of cost overrun.
   I. Variations: 10.78 - 28.19%
   II. Remeasurement of Provisional Quantities

The presence of these risks implies loss and /or expense claims in order to recoup their financial effects on the contract. The challenge before project parties is to have a database of their occurrence, their severity of impact, and pragmatically develop cost control mechanisms to checkmate or benchmark their impact on contract delivery.

Research methodology

Research design

A descriptive survey research was used in conducting this empirical study. The population of study includes 120 construction industry professionals comprising Architects, Quantity Surveyors and Engineers with practice in Rivers, Abia and Imo states, all in Southern Nigeria. The research instrument involved a well structured questionnaire for the purposes of primary data collection.

A pretest survey was conducted with a view to obtain a better and more realistic approach to the final questionnaire design. The final questionnaire achieved a connect with the inadequacies of the pretest design, and in a manner that facilitates data analysis.

Fourteen (14) claim clauses (variable factors) were identified and selected from the standard condition of building contracts in use in Nigeria. The claim factors were identified as common causes of time and cost overrun in construction projects.

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Data presentation and analysis

A total of 120 questionnaires were issued, while 93 questionnaires were returned, representing 78% response rate.

Table 1: Questionnaire Distribution and Response Rate

State	No. of questionnaires issued	No. of questionnaires returned	Percentage of total questionnaires issued	Percentage of total questionnaires returned
Rivers	37	28	30.83	30
Abia	40	30	33.33	32
Imo	43	35	35.84	38
Total	120	93	100	100

Table.2: Pattern of responses received from individual professional groups, namely- Architects, Quantity Surveyors, and Engineers in the three states surveyed.

	Architects			Quantity Surveyors			Engineers			Total Responses	%
State	No Distributed	Response Received	%	No Distributed	Response received	%	No Distributed	Response received	%		
Rivers	13	10	77	8	7	88	16	11	69	28	30
Abia	14	10	71	11	8	73	15	12	80	30	32
Imo	15	15	100	13	10	77	15	10	67	35	38
Total	42	35	248	32	25	238	46	33	216	93	100

The responses received show that 62% 0f the respondents work at senior management levels with a cognate work experience spanning over 5 years. The study revealed that 68% of the respondents work in Building and Civil engineering firms, 31% in Consulting, and 21% in Government work departments and parastatals. Over 75% of the respondents are involved in contracts over N25Million in value. The data collected also indicate that 78% of the respondents work in organizations with construction as principal activity for a period spanning over 7 years. The study also revealed that 84% of the respondents have worked on construction projects administered with the Standard Conditions of Building Contracts; while 81% have actively participated in construction projects involving claims.

If the organizational position of the respondents together with their years of experience in the construction industry, their direct involvement in contract works of immense value and administered with the Standard Conditions of Building Contract are anything to go by, the reliability of data collated from the respondents would be high and reasonable for a study of this nature to draw inference.

Method of data analysis employed:

The percentage and index methods of data analyses:
The data provided by individual professional groups were collated and further subjected to analysis involving both the percentage and index methods of data analyses. The Percentage method of data analysis was used to obtain the total number of responses in a modal category possessing characteristics of a measure of both central tendency and dispersion of each claim variable in a percentage form. On the other hand, the index method of data analysis is an analytical procedure for establishing the severity of attributes in a variable. The method used is similar to those of Okpala and Aniekwu (1988); Elinwa and Buba (1993).

Concepts and formulae used:

Severity index (SI):

This is denoted by F, and F = F5 + F4+ F3. Where, F5 = number of respondents that ranked a claim factor as 'Excellent Factor' (EF); F4= number of respondents that ranked a claim factor as 'Very Good Factor' (VGF), F3 = number of respondents that ranked a claim factor as 'Good Factor' (GF); F2= number of respondents that ranked a claim factor as 'Poor Factor' (PF); F1= number of respondents that ranked a claim factor as 'Not Applicable Factor'(NAF). Responses ranked either F2 or F1 were ignored in the analysis especially in the computation of the values of Severity Index (SI) and Percentage Severity Index (PSI)

Percentage severity index (PSI):

This is denoted by P; and P =F/N x 100; where F= Severity Index, and N=Total number of respondents.

Sum of ranking (SR):
This is the summation of total ranking by each professional grouping for respective claim variable factors:
SR =∑AQE
Where A: Architects total ranking for each claim variable.
Q: Quantity Surveyors total ranking for each claim variable.
E: Engineers total ranking for each claim variable.

Rank agreement factor (RAF):

This is the ratio of the sum of rankings to the number of listed variable factors.
The rank agreement factor is denoted by RAF.
RAF = ∑AQE/N
Where; ∑AQE = Sum of individual rankings by the professional groups namely:

N: Number of listed Claim variables

Percentage agreement factor (PAF):

This is the ratio of the difference between the maximum rank agreement factor for all the claim variables, and the rank agreement factor of a particular claim variable being considered to the maximum rank agreement factor.
This is denoted by PAF and

$$PAF = \frac{RAF_{max} - RAF_i}{RAF_{max}}$$

Where RAF_{max} = Maximum computed value of Rank Agreement Factors

Standard deviation (S):

This is the difference between the sum of Rankings of the various professionals (AQE) for a given claim variable and the corresponding rank agreement factor. The Standard deviation of individual claim factors (denoted by 'S') were obtained from the responses of the three professional groups-Architects, Quantity Surveyors, and Engineers.
$S = \sum AQE_i - \sum RAF$
Where, $\sum AQE_i$ = Sum of ranking of individual claim variable factors for all professionals combined. It was observed that the lower the standard deviation values(s), the higher the risk impact of the claim on contract strategy.

Squares of deviation$(S)^2$:

This is the square of the standard deviations of respective claim variables.
The square of deviation is denoted by S^2, and $S^2 = (S)^2 = (\sum AQE_i - \sum RAF)^2$, where S= standard deviation and $\sum AQE_i$ as well as $\sum RAF$ are earlier indicated.

Rank order of claims:

The Rank orders of Claims (ROC) indicate the extent or severity of impact of individual claims expressed in descending order of impact. The value of the Percentage Agreement Factor (PAF), determines the rank order of claims (ROC). Higher values of PAF indicate greater risk consequence of identified claim type on contract strategy. Thus, the higher the PAF value, the greater the threat posed by the claim on project objectives (contract strategy).

Table 3: Architects (N=35); Quantity Surveyors (25); Engineers (N=33) Claim Severity on Contract Strategy Response.

Clause No.	EF			VGF			GF			PF			NAF		
	A	Q	E	A	Q	E	A	Q	E	A	Q	E	A	Q	E
1	17	10	12	11	8	7	4	5	9	3	2	5	0	0	0
5	2	4	2	9	6	7	13	11	9	11	4	15	0	0	0
6	3	3	7	8	1	4	14	9	11	10	12	11	0	0	0
7	6	2	6	7	5	8	9	5	9	13	13	10	0	0	0
11(7)	13	11	16	9	7	12	7	5	3	6	2	2	0	0	0
11(6)	19	14	12	8	8	10	6	2	8	2	1	3	0	0	0
12	11	7	13	15	10	9	6	6	7	3	3	4	0	0	0
23	9	5	8	10	14	10	8	4	8	8	2	7	0	0	0
24	10	13	12	11	7	15	8	3	3	6	2	3	0	0	0
27	6	3	7	8	6	9	14	11	11	7	5	6	0	0	0
28	5	1	4	6	2	7	8	8	10	16	11	12	0	0	0
31	9	8	8	15	10	11	6	4	9	5	3	5	0	0	0
32	3	2	5	4	3	6	13	11	8	15	9	14	0	0	0
34	6	4	3	6	5	4	10	7	14	13	9	12	0	0	0

The computed values of severity indices with their corresponding percentage severity indices based on individual professional group responses are presented in table 4 below.

Table 4: Severity Indices (SI) and Percentage Severity Indices (PSI) of identified Contractual Claim Clauses, based on individual professional group rankings.

S/No. of Claim	Clause No. of Claim	Architects Responses		Quantity Surveyors		Engineers Responses		Combined Professional Groups studied	
		SI	PSI	SI	PSI	SI	PSI	Mean SI	Mean PSI
1	1	32	91	23	92	28	85	27.67	89.33
2	5	24	69	21	84	18	55	21.00	69.33
3	6	25	71	13	52	22	67	20.00	63.33
4	7	22	63	12	48	23	70	19.00	60.33
5	11(4)	29	83	23	92	31	94	27.67	89.66
6	11(6)	33	94	24	96	30	91	29.00	93.66
7	12	32	91	22	88	29	89	27.67	89.33
8	23	27	77	23	92	26	79	25.33	82.67

9	24	29	83	23	92	30	91	27.33	88.67
10	27	28	80	20	80	27	82	25.00	80.67
11	28	19	54	11	44	21	64	17.00	54.00
12	31	30	86	22	88	28	85	26.67	86.33
13	32	20	57	16	64	19	58	18.33	59.67
14	34	22	63	16	64	21	64	19.67	61.67

The computed values of Sum of Ranking (SR), Rank Agreement Factors (RAF's), Percentage Agreement Factors (PAF's), Standard Deviations(S), Squares of Standard Deviations (S^2), and Rank Order of Claims (ROC) are indicated in table 5 below.

Table 5: The computed values of Rank Agreement Factors (RAF's), Percentage Agreement Factors (PAF's), Standard Deviations(S), Squares of Standard Deviations (S^2), and Rank Order of Claims (ROC).

Clause No.	Arch's Ranking	QS's Ranking	Engr's. Ranking	SR	RAF	PAF	S	S^2	ROC
1	2	2	5	9	0.64	77	-13.49	181.98	2
5	10	8	14	32	2.29	18	9.51	90.44	10
6	9	12	10	31	2.21	21	8.51	72.42	9
7	11	13	9	33	2.36	15	10.51	110.46	11
11(4)	5	3	1	9	0.64	77	-13.49	181.98	2
11(6)	1	1	2	4	0.29	90`	-18.49	341.88	1
12	3	6	4	13	0.93	67	-9.49	90.06	4
23	8	4	8	20	1.42	49	-2.49	6.20	7
24	6	5	3	14	1.00	64	-8.49	72.05	5
27	7	9	7	23	1.64	41	0.51	0.26	8
28	14	14	11	39	2.79	0	16.51	272.58	14
31	4	7	6	17	1.21	57	-5.49	30.14	6
32	13	10	13	36	2.57	8	13.51	182.52	13
34	12	11	12	35	2.50	10	12.51	156.50	12

Reliability test using Kendall's correlation coefficient:

The computed values of the rank order of claims were subjected to further test using Kendall's Correlation Coefficient and Chi-Square Test of Significance in order to ascertain their reliability by ensuring that the rankings were not as a result of chance error.

$$\tau = \frac{\sum(S)^2}{\frac{K^2(n^3 - n)}{n}}$$

where, τ = Kendall's coefficient of rank correlation

S = Sum of squares of standard deviation

K = Total number of respondents that ranked the claim variables

n = Number of Claim variables

The determination of the value of 'S' led to the computation of the squares of the standard deviation S^2 for each of the listed claim variables as indicated in table 5 .The sum of the squares of standard deviation (also from table 5) =1,789.50.

Where, K =93, and n = 14

$$\tau = \frac{1789.50000000}{\frac{(93)^2(2744 - 14)}{14}}$$

$$= \frac{1,789.500000}{619.79(2730)}$$

$$\tau = 0.00106$$

Barnett (1983) posits that values of Kendall's Correlation Coefficient in the range

$0 \leq \tau \leq 1.0$ indicate good agreement; while values near -1, or in the range $0 \geq \tau \leq -1.0$ implies disagreement on the claim variables ranked by the professionals.

Furthermore, the Pearson's Chi-Square Statistic (χ^2) was employed in order to ascertain in significant difference exist between the rankings of the respondents.

$\chi^2 = K(n-1)\tau$

Where (n-1) = degree of freedom, with n, K, and τ defined above.

χ^2 = Chi-square value to be tested.

K = 93

n = 14

τ = 0.00106

Substituting these values in the above stated formular,

$\chi^2 = 93(14-1)0.00106$

$= 1.28$ (Approx.)

Thus, the values of Kendall's Coefficient (τ) and Chi-Square (χ^2) as computed were 0.00106 and 1.28 respectively. The computed value of Kendall's Coefficient (τ) =0.00106 lie in the range $0 \leq \tau \leq 1.0$, while $\chi^2 = 1.28$ is not significant when tested at both 0.01 and 0.05 levels of significance, thus, implying reliability and a perfect agreement between the respondents.

Result and discussion of findings

The result of the study revealed as follows:

Claim Clause 1- Claim for discrepancies and divergence between contract documents: The results show that this claim factor has a Sum of Rankings (SR) of 9, Rank Agreement Factor (RAF) of 0.64, Performance Agreement Factor (PAF) of 77, Standard Deviation (S) of -13.49, Square of Deviation (S^2) of 181.98, and a Rank order of Claim (ROC) of 2.

The results for the other Claim variables are as follows:

Claim Clause 5-Claim for inaccurate setting-out so far as the error do not arise from him or his agents: SR(32) , RAF (2.29), PAF (18), S (9.51), S^2 (90.44), and ROC (10).

Claim Clause 6-Claim for testing materials used upon the works including opening-up and making good all work disturbed provided the test proves compliance to specifications: SR(31) , RAF (2.21), PAF (21), S (8.51), S^2 (72.42), and ROC (9).

Claim Clause 7-Claim for payment of royalties, resulting from Architects instructions: SR (33), RAF (2.36), PAF (15), S (10.51), S^2 (110.46), and ROC (11).

Claim Clause 11(4)-Claim for variations arising from Architects instruction:
SR (9), RAF (0.64), PAF (77), S (-13.49), S^2 (181.98), and ROC (2).

Claim Clause 11(6)-Claim for proven extra cost incurred in carrying out variations instructions which cannot be fully accommodated in valuation of variations:
SR(4) , RAF (0.29), PAF (90), S (18.49), S^2 (341.88), and ROC (1).

Claim Clause 12-Claim for errors in the description or quantities or omission of work in the BOQ: SR (13) , RAF (0.93), PAF (67), S (-9.49), S^2 (90.06), and ROC (4).

Claim Clause 23-Claim for extension of time: SR (20), RAF (1.42), PAF (49), S (-2.49), S^2 (6.20), and ROC (7).

Claim Clause 24-Claim for direct loss and /or expense due to disturbance of work progress by client or his representatives: SR(14) , RAF (1.00), PAF (64), S (-8.49), S^2 (72.05), and ROC (5).

Claim Clause 27-Claim against nominated subcontractors for their default and /or delays: SR(23) , RAF (1.64), PAF (41), S (0.51), S^2 (0.26), and ROC (8).

Claim Clause 28-Claim against nominated suppliers for their default and /or delays SR(39) , RAF (2.79), PAF (0), S (16.51), S^2 (272.58), and ROC (14).

Claim Clause 31-Claim for fluctuations in the cost of labour and materials SR (17), RAF (1.21), PAF (57), S (-5.49), S^2 (30.14), and ROC (6).

Claim Clause 32-Claim for protective work ordered on the breakout of hostilities: SR(36) , RAF (2.57), PAF (8), S (13.51), S^2 (182.52), and ROC (13).

Claim Clause 34-Claim for loss and/ or expense in dealing with antiquities: SR (35), RAF (2.50, PAF (10), S (12.51), S^2 (156.50), and ROC (12).

Generally the results revealed that the higher the Sum of Rankings, the higher the Rank Agreement Factors, and the smaller the Percentage Agreement Factors.

Similarly, the higher the Percentage Agreement Factors, the smaller the standard deviations, and the higher the rank order of claims or severity of impact on predetermined project objectives (contract strategy).

Conclusion:

The study concludes that the following eight (8) claims clauses ranks the most of all other fourteen (14) claim clauses in terms of severity of impact on project objectives (contract strategy). Clause 11(6)-Claim for proven extra cost incurred in carrying out variations instructions which cannot be fully accommodated in valuation of variations; has the highest impact on project objectives. This is followed by Clause 1- Claim for discrepancies and divergence between contract documents. The rest of the claims in descending order of severity of impact on project objectives are:-

Clause 11(4)-Claim for variations arising from Architects instruction.

Clause 12- Claim for errors in the description or quantities or omission of work in the BOQ.

Clause 24- Claim for direct loss and /or expense due to disturbance of work progress by client or his representatives.

Clause 31- Claim for fluctuations in the cost of labour and materials .

Clause 23- Claim for extension of time.

and Clause 27-Claim against nominated subcontractors for their default and /or delays.

Recommendations:

I. Project participants need to know that every project is unique, and that no two projects are exactly the same.

II. Project participants need to know that individual contractual claims carry a threat potential.

III. Project participants need to evolve planning and implementation strategies that aim at minimizing the variation of project scope once cost limits have been established.

IV. The design and construction team have to comprehensive articulate the project in terms of conceptual planning, design, and documentation. All contract documents would have to be harmonized at pre-contract stages to avoid ambiguities,discrepancies and divergences at post –contract stages.

V. There is a need to conduct and conclude all preliminary studies and site investigations that affect project delivery in terms of design, cost and logistics.

VI. Project participants would need to establish permissible limit for variations at precontract stages in order to minimize the use of variation clauses and their attendant impact on contract cost and time.

VII. Adequate time should be given to the project consultants to prepare designs, specification notes, Bills of Quantities and other project details as most projects are poorly documented in a hurry, with attendant large claims tolerance at post contract stages.

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