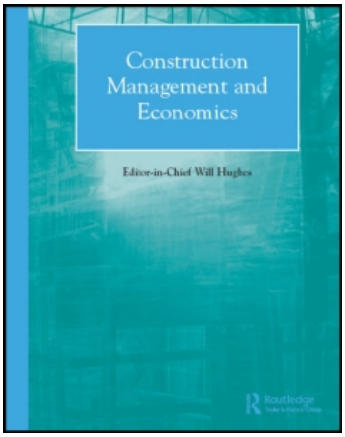

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An evaluation of the use of insurance in managing construction risks

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An evaluation of the use of insurance in managing construction risks

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One of the major methods of managing construction risks in the Nigerian construction industry is the insurance method. On the basis of data from some selected construction sites in Nigeria, this paper evaluates the effectiveness of the method. Also it identifies, through a questionnaire survey, the various insurable construction risks perceived to be encountered in the Nigerian construction industry and the types of insurance policy employed in managing them. High importance is placed by the construction industry on site security, construction risk, and health and welfare requirements, and the use of an all-risk insurance policy is the most prominent method for managing the identified risks. Finally it is concluded that there is a correlation between insured sum and actual replacement cost when there are losses or damages. However, the insurance claims settled could cater for only 61.1% of the replacement cost of on-going construction works studied.

Keywords: Insurance, construction risk, contractors, construction industry, Nigeria

Introduction

Risk is inherent in all human endeavours, including construction activities, and the risk elements involved are diverse and varied. The scope of building activities extends to risk management in planning, arranging and controlling activities and resources in order to minimise the impact of uncertain events. Risk in construction has been the object of attention because of time and cost over-runs associated with construction projects (Akintoye and MacLeod, 1997). McKim (1992), Healey (1982) and Perry and Hayes (1985) expressed risk as an exposure to economic loss or gain arising from involvement in the construction process, but Mason (1973) Moavenzadeh and Rossow (1976) regarded it as an exposure to loss only. According to McKim (1992), it is necessary to understand the nature of risk before any knowledgeable management of risk can occur. Risk comes in many forms, and often the very nature of risk depends on the situation. For example, health risks cannot generally be managed in the same manner as the risks associated with the transportation of toxic materials, and the risks associated with a space mission cannot be managed the same as construction risks.

Akintoye and Macleod (1997), Raftery (1994), Williams and Heims (1989) and Toakley and Ling (1991) identified the current usage or risk management techniques in the construction industry. These include risk premium, risk adjusted discount rate, subjective probability, decision analysis, sensitivity analysis, Monte Carlo simulation, stochastic dominance, Casper and intuition. However, in a study conducted by Odeyinka (1987) it was found that one of the major methods of managing construction risks in the Nigerian construction industry is through transfer to insurance companies. Until now the effectiveness of this method in managing construction risks in Nigeria has not been investigated. Therefore, the objectives of this paper are to identify the insurable construction risks perceived to be encountered in the Nigerian construction industry, examine how they are managed through insurance premiums and investigate the effectiveness of the use of insurance.

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Data collection and methodology

In order to achieve the objectives of identifying the insurable construction risks and examining how they are managed through the insurance method, the study focused on construction contractors as respondents. This is because they cope with the risk in construction, although the clients pay for it. A total of 100 questionnaires were issued to Nigerian construction contractors using a stratified random sampling technique. First the population of construction firms surveyed was divided into the strata of large, medium and small firms according to their registration categories under the Federal ministry of works' categorization (Table 1). For the purpose of this study, those that registered under categories A and B were regarded as small firms, those under category C as medium firms while those under category D were taken as large firms. The questionnaire survey was then issued to the strata in a random manner. Out of the 100 questionnaires, 72 were returned properly filled and fit for analysis. This represents a 72% response rate. Respondents to the survey were: large firms ($n = 12$), medium firms ($n = 25$) and small firms ($n = 35$).

The questionnaires were completed by top management in the firms surveyed (mainly company directors and contract managers). Tables 2, 3 and 4 show some of the characteristics of the respondents as regards academic and professional qualifications plus work experiences. On the basis of these it is inferred that the respondents have adequate knowledge of construction and its attendant risks, and the data obtained from them through questionnaire survey may be relied on. Data obtained from the questionnaire survey were analysed using the risk premium index (RPI) method (Akintoye and Macleod, 1997). In this study, this method is referred to as risk rating index (RRI), so as to avoid ambiguity of meaning with the use of premium in insurance.

In order to evaluate the effectiveness of the insurance method in managing construction risks, data were collected from on-going construction projects. A research pro-forma was prepared to collect project data regarding: contract sum, insured sum, premium paid, claims settled, and actual replacement cost. Being a period of economic depression, not many new construction activities were going on in Nigeria. However, some commercial buildings were under construction in some major cities. As such, efforts were directed at obtaining project data from them. Research pro-formas were issued to contract managers on 50 construction sites in some major cites within the same cost zone. However, 32 responses fit for analysis were received representing a 64% response rate. The majority of the respondent (96.9%) were small and medium sized firms (Table 1). Many contract managers claimed they were not prepared to divulge company 'secrets' and so did not complete their research pro-forma. Thus the study was based on the responses available. The projects surveyed are framed buildings of varying sizes but of comparable complexity and buildability. The data collected were analysed using simple linear regression in order to investigate statistical relationships.

Identification of sources of construction risks

Perry and Hayes (1985) and Mustafa and Al-Bahar (1991) have identified some risk sources central to construction activities. These are physical, environmental, design, logistics, financial, legal, political, construction and operation risks. McNulty (1980) and Carruth (1977) also identified some risk elements inherent in construction works. These include site security and health and welfare requirements.

Employing the above identified risk sources, the respondents were asked to indicate the importance they place on each, and their response is shown in Table 5. The importance placed by the contractors surveyed to perceived risk sources in construction is referred to as contractor's 'risk rating index' (RRI). This was defined by Akintoye and MacLeod (1997) as

$$\mathrm{RRI} = \sum_{i=1}^{i=5} E_i P_i \qquad (1)$$

where E_i is the ith extent of premium and P_i is the percentage of respondents. Table 5 shows that

Table 1 Contractor's registration category[a]

Category of registration	Range of project cost that can be tendered for
A	Up to ₦2 million
B	₦2 million–₦25million
C	₦25million–₦100million
D	Above ₦100million

[a] Exchange rate: £1.00 sterling = ₦ 130.00 (1999).

Table 2 Academic qualification of respondents

Academic qualification	No.	Percentage
HND	21	31
B.Sc.	18	25
HND + B.Sc.	10	14
HND + M.Sc. /MBA	14	19
HND +B.Sc. + M.Sc./MBA	8	11
Totals	72	100

Table 3 Professional qualification of respondents[a]

Designation	No.	%	ANIQS/ ARICS	FNIQS/ FRICS	MNIOB/ MCIOB	FNIOB/ FCIOB	MNSE/ C.ENG.	None
Company director	42	58	10	12	20	20	18	–
Contract manager	30	42	3	–	15	–	10	15
Totals	72	100	13	12	35	20	28	15

[a]ANIQS, Associate member, Nigerian Institute of Quantity Surveyors; ARICS, Associate member, Royal Institution of Chartered Surveyors; MNIOB, Member, Nigerian Institute of Building; MCIOB, Member, Chartered Institute of Building; MNSE, Member, Nigerian Society of Engineers; C.ENG, Chartered Engineers.

contractors place the greatest importance on site security. This was followed by construction risks and health and welfare requirements. These are not unexpected: site safety was of paramount importance to contractors because in big cities in Nigeria the security of construction resources is a big problem. Any occurrence of threat to the security of construction resources could have grave consequences. Construction risk is important to the contractor as it affects the feasibility of construction methods, climatic quality and the extent of variation orders. Health and welfare requirements affect everyone who has a reason to be on site, such as employees, sub-contractors, third parties and other personnel. Any omission or breach of such requirements can have a significant effect on claims, especially if prosecution is involved. Therefore it is not surprising that constructors place a high degree of importance on it.

Table 4 Working experience of respondents

Years of experience	No. of respondents	Percentage
0–5	6	8
6–10	16	22
11–15	20	28
16–20	16	22
over 20	14	20
	72	100

Table 5 Index of importance placed on perceived risk sources in construction works

Risk sources	Construction companies
Site security	4.6
Health and welfare requirements	4.0
Design (design information)	3.3
Logistics (ordering and transportation)	3.6
Construction (productivity, injury)	4.3
Physical (flooding, fire outbreak, layout error, etc.)	3.0
Financial (fluctuation, etc.)	3.3

Insurance policies for construction risk

According to clause 2.1 of JCT (1980), 'the contractor shall upon and subject to the conditions carry out and complete the Works in compliance with the Contract Documents, using materials and workmanship of the quality and standards therein specified'. Turner (1979) observed that if there is any damage to such work as described above, which must have been included in the work item rate calculation and/or contingency sum, the contractor will make it good at his own expense. This entails some risk-bearing responsibilities by the contractor. However, the standard form of building contract (JCT, 1980) in clauses 18,19,20,12 and 22 provided avenues whereby the risk-bearing responsibility can be transferred by the contractor to the insurance company.

Carruth (1977), Denenberg *et al.* (1974) and Turner (1979) have identified insurance employed in managing construction risks to include all-risk policies, road traffic act policies, multi-risk policies and specified peril policies. All-risk policies, according to Denenberg *et al.*(1974), cover all the risks in construction except those specified by exclusion clauses. According to him, multi-risk policies on the other hand specify a catalogue of an extensive number of perils such as fire, lightning, windstorm, explosion, death of workers, health, safety, welfare, and so on. Unlike all-risk policies, only specific risks stated under multi-risk policies are covered, whereas the unspecified ones are not. According to Carruth (1977), specified peril policies state the peril covered but the insured absorbs any losses incurred from unspecified perils. These differ from multi-risk policies in that the peril covered may be only one. Road Transport Act (RTA) policies, according to Carruth (1977), are meant to protect items of plant which normally are expected to be on site only but which may quite unintentionally end up in circumstances to which the RTA applies. For instance, a labourer who, deciding to learn to drive a dumper on site, may lose control and injure a passer-by.

Table 6 shows the index of importance placed by construction companies on the types of insurance policy they employ. Contractors who were asked to

indicate the extent of importance attached to the types of insurance policy employed in managing construction risks ranked the all-risk policy highest. This was followed by multi risk policy. An investigation of the reasons for the preference for an all-risk policy reveals the following: ease of settlement in cases of occurrence (2.60), specificity of the policy (3.20), coverage of broad risk (3.90) and convenience (4.10). Therefore it is obvious that the preference for all-risk policies is due largely to convenience and the coverage of broad risk factors. This confirms the submission of Denenberg *et al.*(1974) that all-risk policies are more effective in protecting the insured against all unplanned losses covered in construction works.

The effectiveness of the use of insurance in managing construction risks

In order to evaluate the effectiveness of the use of insurance in managing construction risks, data were sourced from 32 construction projects which were insured against all-risks and where the perils against which they were insured occurred. The contract sums for the projects studied ranged from ₦16 million to ₦115 million. The costs of insurance ranged from ₦245,000 to ₦2,600,000, with annual premium payment. Other project details are shown in Table 7 and the project characteristics were detailed in the section 'Data collection and methodology'.

Employing the secondary data obtained through the research pro-forma (Table 7), two variables were identified for evaluating the effectiveness of the use of insurance in managing construction risks. These are claim settled (as determined by the loss adjusters) and actual replacement cost in cases of loss. In order to establish statistical relationship between these variables, simple regression analysis of actual replacement cost (Y) on claim settled (X) was carried out. The regression result obtained by SPSS computer software is represented in Table 8. The research hypothesis employed is that actual replacement cost has no significant relationship with the claim settled. Using the F-statistic, X (claim settled) variable shows a positive sign significant at the 5% level. This indicates that the study hypothesis is rejected and the alternative accepted that actual replacement cost has a significant relationship with the claim settled. Therefore it means that the variation in actual replacement cost is explained by the claim settled. It may be inferred that, within the limitation of the data collected, the claim settled under the use of insurance in managing construction risk is adequate for the cost of replacement in cases of occurrence of an insured peril. Corroborating this is the t-statistic of the X variable, which also shows a positive sign significant at the 5% level, meaning that there is a significant correlation between the actual cost of replacement and the claim settled. This is not surprising as it conforms with the a priori expectation of the insurance principle of indemnity. Also it explains why the use of insurance in managing risk in construction still ranks very high in the study area. Moreover, the coefficient of the variable X is positive and fairly high, indicating from the regression equation that the greater is the amount of the claim settled, the greater is the amount available as replacement cost. This implies that, since the claim settlement cannot be more than the insured sum, adequate care should be taken in determining the insured sum as eventually this will affect the claim settled, which is expected to be used to defray the cost of replacement in cases of loss or damage.

Furthermore, Table 8 reveals that while the figures for the insured sums and claims settled are close enough, the differential between the claims settled and the actual replacement cost is considerable. This position is supported by the coefficient of determination R^2 of 0.6105, which indicates that only 61.05% of the actual replacement cost is accounted for by the claim settled. The remaining 38.96% would have to be borne by the insured. This situation is not surprising as most contracts of insurance have exclusion clauses. The cost of remedying the occurrence of the perils listed in the exclusion clauses would have to be borne by the insured; hence, the cost of replacement exceeds the claim settled in all the cases studied.

Table 6 Index of importance placed on insurance policies employed for construction works

Types of policy	Construction companies
All risk policy	4.80
Road Traffic Act (RTA) policy	2.90
Multi-risk policy	3:50
Special risk Policy	1.90

Conclusion

This study has examined the sources of insurable construction risks perceived to be encountered in the Nigerian construction industry, and the types of insurance policy employed in managing them. The study shows that, out of the myriad of insurable risks, great importance is placed on site security, construction risks, and health and welfare requirements. The Nigerian construction industry has various types of insurance policy available. However, the most favoured for managing construction risk is the all-risk policy.

Table 7 Insurance data of on-going construction projects studied[a]

Project No.	Contract sum (₦ million)	Insured sum (₦)	Claims settled (₦)	Actual replacement cost (₦ million)
1	26.16	392 400	375 200	1.225
2	28.80	432 000	398 500	0.930
3	30.70	460 500	450 710	0.983
4	24.90	373 500	297 850	0.757
5.	25.95	389 250	352 700	0.824
6	16.80	252 000	231 010	0.743
7	18.50	277 500	256 840	0.810
8	23.70	355 500	330.000	1.115
9	29.80	447 000	415 750	1.650
10	21.50	322 500	312 100	0.916
11	28.70	430 500	413 740	1.135
12	17.80	267 000	256 440	0.510
13	27.10	406 500	394 600	0.870
14	29.70	445 500	430 615	1.790
15	30.00	450 000	421 700	1.215
16	16.35	245 250	236 000	0.633
17	50.00	750 000	634 600	Not available
18	115.00	1 725 000	1 436 700	Not available
19	35.55	650 500	610 000	1.150
20	63.45	1 200 000	1 150 000	1.450
21	45.50	850 000	855 500	0.952
22	24.75	550 000	510 750	0.850
23	72.45	2 100 000	2 250 000	2.500
24	30.25	675 000	625 500	0.865
25	40.50	915 000	890 000	1.250
26	25.00	320 500	315 750	0.750
27	67.50	1 050 000	985 800	1.525
28	82.45	2 250 000	2 150 000	3.150
29	90.25	2 600 000	2 850 000	3.400
30	32.40	525 500	510 500	1.200
31	24.65	450 000	395 000	0.785
32	85.60	2 350 000	2 125 500	3.200

[a]Exchange rate: £ 1.00 sterling = ₦130.00 (1999).

This was due largely to convenience on the part of contractors.

On the basis of the projects studied, this study concludes that actual replacement cost has a significant relationship with the claim settled. It concludes also that there is a significant correlation between the actual cost of replacement and the claim settled. These suggest that, within the limitations of the data collected, the use of insurance is effective in managing construction risks in the study area.

In order that the use of insurance is effective in managing construction risks, it is recommended that considerable care should be taken in determining the insured sum. Also contractors should study the exclusion clauses carefully before entering into any contract of insurance. This will help ensure an awareness of uninsured risk exposure and will motivate contractors to seek avenues of protection other than insurance.

Table 8 Simple linear regression results[a]

Variable	Coefficient	*t*-value
Constant	0.521 315	3.892
X	0.789 317	7.041[b]
S.E	0.133 579	
R^2	0.623 02	
Adj. R^2	0.610 46	
F-statistic	49.580 10[b]	
t-calculated	7.041[b]	
R	0.789 3161	

[a] Regression equation $Y = 0.52 + 0.79X$.
[b] Significant at 5% level.

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