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AN IDIOGRAPHIC APPROACH TO ASSESSING RISK FACTORS IMPACTING ON CONSTRUCTION CONTRACTORS' CASH OUT FORECASTS

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ABSTRACT

Purpose: Research has shown that construction contractors face challenges when attempting to manage their present and future financial requirements via cash flow (CF) forecasting and/or the use of cash flow forecasting (CFF) models. Consideration for risk factors impacting on CF forecasts/CFF models has also been identified as a key issue affecting contractors' application of CFF models. This study assessed the risk factors prevalent in the idiographic setting ofrenovations of primary health care buildings in Kaduna state Nigeria.
Design/Methodology: A list of risk factors that impact on CF forecasts were identified through the review of existing literature. The identified risk factors were then investigated in relation to the likelihood of occurrence and the impact on CF forecasts, if they occur. Data was collected via a questionnaire survey of contractors who had been engaged in carrying works of renovating primary health care (PHC) buildings in Kaduna state Nigeria. The questionnaire survey focused on determining the likelihood of occurrence/impact of thirty-one (31) risk factors on cash-out forecasts. Contractors were asked to rank on a scale of 0 to 5 the likelihood of occurrence/impact of the risk factors. The responses obtained were subjected to analysis with the use of IBM SPSS (version 21) software. The mean, standard error and standard deviation were computed. The computed means were used to rank the likelihood of occurence/impact of the factors in decending order.
Findings: Nineteen (19) risk factors were found to significantly impact cash-out forecasts- "change in management", "non-inclusion of project in yearly budget", "increased duration of the project", "change in currency exchange rates", "high cost of materials", among others.
Research Implications: The findings from the research imply that several risk factors have different degree of occurrence on cash-out forecasts in, and different degree of impacts on cash-out forecasts in the Nigerian construction industry.
Originality/Value: Construction contractors carrying out renovation works in Kaduna state Nigeria should expect positive variations to their "cash-out" forecasts during the execution of projects. Major recommendations include; contractors should carefully consider the nineteen (19) risk factors affecting "cash-out" before embarking on any construction renovation project.
Keywords: Forecast, Cash-out, Risk, Factors, Construction, Kaduna state.

1. INTRODUCTION

The management of cash out forecasts is an essential component of financial management in construction. Cash out in construction contracts is concerned with the timing of payments, receipts of payments and the consequent balance of cash remaining due to these transactions. Construction Contractors know that there can be a significant

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lapse in time from the point at which they are granted a project, incur labour, material and other costs, to the time they are actually paid for completed work. Consequently, an inability to properly plan for the outflow of cash during the life span of a project may well result in the abandonment of the project (Kenley, 2003).

Factors that contribute to cash out Forecasts in construction projects include (i) duration of the project (ii) retention conditions (iii) times for receiving payments from employers (iv) credit arrangement with suppliers, equipment rentals etc. and (v) times of payment to subcontractors (Park, Han &Russel, 2005). Other factors affecting cash out forecasting include the type of client, size of the project, the procurement route, type of the project etc. (Kaka and Khosrowshahi, 1996). Thus, the need for forecasting the cash out requirement of a project at the right time, in order to determine when and where to borrow or redirect funds cannot be over emphasised.

Researches have shown that there are two basic approaches to dealing with cash flow management and risks assessment in the construction industry. The nomothetic approach and the idiographic approach. The nomothetic approach aggregates groups of projects in order to develop a single standard model. The nomothetic approach failed to clearly address issues concerning the uniqueness of construction projects in relation to factors affecting their cash flows- grouping of projects was done without consideration for differences in these factors. Consequently, researchers changed their focus to the idiographic approach, which seeks to, as much as possible, address the problem of uniqueness of projects by studying individual projects having similar characteristics. A major consideration of the idiographic approach is the choice of a single client/financier as a major factor to consider in developing a model. It is pertinent to note that the attitude of particular client(s) has considerable diffusing effect on other factors that affect cash flow to a contractor (Kaka and Price, 1991; Kaka and Khosrowshahi, 1996; Boussabaine and Elhag, 1999).

Authors (Ogunsemi, 2000; Ogunsemi and Jagboro, 2006; Aibinu and Jagboro, 2002; Olawale and Ming, 2009) have linked project abandonment to cash out management problems. According to these authors, factors like availability of credit facilities, interest rates, retention rates, project type, and type of client (public or private) etc., contribute to project failures. Abdulrazaq, Ibrahim and Ibrahim (2017) drew up a list of thirty-one risk factors that influence cash-out forecasts for projects executed in Nigeria.

However, cash out risk assessment studies that are available for Nigeria did not consider aggregating the factors towards the attainment of the idiographic argument. The studies failed to group projects according to unique characteristics that have been shown to affect cash out forecasts crucial to projects. The purpose of this study is to assess the risk factors impacting on renovation works carried out in Kaduna state, Nigeria.

2. LITERATURE REVIEW

2.1. Idiographic approach to cash-out forecasts

The idiographic approach seeks to aggregate projects with similar characteristics in order to study and bring out generalisable conclusions based on the similarities they possess. Attempts by researchers to follow the idiographic argument have yielded the desired results as the accuracies of models developed to predict cash flow forecasts using the approach have been found to be more accurate than the homothetic approach (Honoabu, 2005; Odeyinka, 2003; Ojo, 2010). Mishkawi (1989) developed a

mathematical model based on practices in the petrochemical industry. The curves derived from Miskawi's formula were found to be unlikely to be of much use in the construction industry as no consideration for models in existence in the construction industry. Betts and Gunner (1993) performed a polynomial regression on sets of data for 73 projects that they classified into different categories. They introduced and rejected previous models either because they were not "favourable to the data gathered in the region under study" or "were evaluated and found to be inappropriate". According to Kaka (1996), previous models did not incorporate enough variables to predict cash flows with enough flexibility. Kaka's study developed a model which incorporated over fifty variables including risk factors associated with cash flow forecasting based on individual contracts with a consideration for their separate cost categories. Hence, emphasizing the individuality and uniqueness of projects.

A follow up on Kaka's argument as to individuality of projects was made by Evans and Kaka (1998). Evans and Kaka (1998) collected historical data on construction of twenty (20) food retail stores to analyse the accuracy of standard/average value curves. The samples were chosen for their consistency in Architectural design and specification. Data collected were associated with costs and contract durations. The result of the analysis suggested the use of cost commitment curves rather than value curves to generate accurate s-curves.

Boussabaine and Elhag (1999) developed a model targeted at the idiographic (project-specific) nature of construction project cash-flow curves, by introducing the fuzzy theory and applying it to cash flow profiles. Boussabaine *et al*. (1998) developed a cost flow forecasting model based on Artificial Neural Network (ANN). The researchers collected data from 50 projects with 100% completion, with duration ranging between 1 and 2 years and carried out under the Institution of Civil Engineers Standard Conditions of contract. Forty cases were used to train the ANN while the remaining 10 were used to test and validate the model developed. The results obtained showed consistency and more accuracy than previous models developed with less consideration for similarities.

More emphasis was laid on collecting data on projects of similar characteristics when Kirkham et al. (2002) collected data on the consumption of electricity in a National Health Services (NHS) acute care hospital building in the UK. Their aim was to demonstrate a methodology for forecasting the cost of electricity in an NHS building. They found that by using expert judgement alongside statistical tests, an increase in accuracy of projection was achieved. The researchers also found that the underlying distribution of electricity costs were mostly that of the Weibull distribution. The Authors concluded that the result could be used in whole life cycle cost model for forecasting electricity cost. Blyth and Kaka (2006) developed a multiple linear regression model for forecasting S-curves at the pre-tender stage of a project. They collected and standardised activities for 50 construction projects. The projects were classified into various criteria based upon project function. Logit transformation and linear regression was then used to develop the proposed model. The research was able to define its idiographic approach (emphasis on individual rather than grouped projects), the classification of the projects using 20 criteria emphasised the need for more specific classification of projects for the purpose of obtaining more accurate forecasts.

2.2. Risks in Cash Flow Forecasts

While the emphasis in aggregating projects of similar projects in order to attain high level of accuracy in forecasting costs continued to grow, the problem associated with defining and capturing risk factors in the proposed prediction models began to manifest.

Researchers in the construction industry have attempted to define risk and suggest management strategies for containing risks. Healey (1982) defined risk as "an exposure to economic loss or gain arising from involvement in the construction process". However, Moavanzadeh and Rossow (1976) regarded risk as "an exposure to loss" only. Perry and Hayes (1985) defined risk as "the chance of exposure to the adverse consequences of future events". It is generally recognised that participants within the construction industry are continually faced with a variety of situations involving many unknown, unexpected, frequently undesirable, and often unpredictable factors (Fong, 1987). Flanagan and Norman (1993) asserted that risks are associated with uncertainties but uncertainties, in contrast to risks, might be defined as situations in which there are no historic data or previous history relating to the situation being considered by the person making a decision. The more the thought that is given to risks and uncertainties, the more the inclination to accept risk as the more important term in the building industry (Flanagan and Norman ,1993). The aim of a construction firm should be to identify, analyse, evaluate, and operate on risks. Risk, if contained properly in businesses, can be used as an instrument for gaining advantages (Khosrowshahi, 2000).

In forecasting cash flows, the major problem that construction managers face involves both the risk and ambiguity surrounding cash flows expected on projects. Factors that are responsible for variation in project cash flows can be grouped under five main headings- contractual, programming, pricing, valuation and economic factors (Lowe, 1987). In spite of the several attempts at modelling construction cash flow curves, accurate forecasts have been a difficult thing to achieve due to risks inherent in construction projects (Odeyinka, Lowe & Kaka, 2008). Flanagan and Norman (1993) concluded that certainty, as opposed to risk, does not happen frequently in the construction business. Bennett and Ormedo (1984) also concluded that uncertainty is a major characteristic of construction and needs to be explicitly recognised by construction managers. Researchers' interest in risks associated with cash flow forecasts became more inherent when it became obvious that ignoring the risks associated with forecasting cash flows was a fundamental reason why inaccuracies were continuously obtained from cash flow forecasting models (Odeyinka, 2003). Thus, efforts have been made to investigate and report risk and associated factors that are responsible for variations between forecast and actual cash flow forecasts.

Buerteyet *al.* (2010) developed a model for predicting construction cash flow in Ghana through a case study of a group of flats under construction by the government. Analysis of data gathered through a questionnaire survey of consultants, contractors and client's representatives 18 frisk factors were identified as significantly affecting cash flow forecasts for contractors in Ghana. The factors include contractual specification for maximum amount valuation, availability of credit facility, advance payments, interval between two certificates, period of honouring certificates by client, rate of retention, interest rates, front/back end loading, accuracy of measurements etc.

Mbachu (2011) investigated the sources of contractors' payment risks and cash flow problems in the New Zealand construction industry. Data was collected from project teams as to their perception of the risks contributing to payments in New Zealand. The result identified payment delays, high interest rates, inflation, government regulations, complexity of projects and claims as significantly impacting on cash flows. An analysis of the impact of negative cash flow on construction performance in Dubai carried out by Al-Jabouri*et al.* (2012) showed that there were negative cash flows for up to 70% of project duration as a result of the presence of risk factors.

Odeyinka*et al.* (2013) identified eleven significant risk factors impacting on cash forecasts for contractors in the UK. By studying 26 risk factors via a questionnaire survey of contractors, the researchers were able to conclude that the eleven factors impacted cash flow forecast more in UK's "stable" economy. The study revealed a regional dimension to risks in cash flow forecast. Hoseini, Andalib and Gatmiri (2015) developed a stochastic, simulation-based framework for forecasting construction projects cash flow at the bidding stage, considering the effect of delay in payments, a major risk factor in most construction projects. The authors performed a Monte Carlo simulation to extract the cumulative probability distribution ns of maximum required finance and financial costs. Application of the model in a real-life highway contract proved its efficacy as there was variation between the model's performance and the contractor's initial forecast.

Abdulrazaq, Ibrahim and Ibrahim (2017) concluded that sixteen risk factors significantly impact cash-out forecasts for contractors in the Nigerian construction industry. These factors include "increased Duration of the Project", and "charging of land dues by locals (illegally)", among others. A close look at the significant risk factors can be classified thus: client-related, Environment–related, market-related and contractors-related. Omopariola and Windapo (2019), however concluded that in the South African construction industry, delay of release of advance payments was a major risk factor affecting cash out forecasts. Even as the practice of advance payments is not widespread in the country's construction industry.

Aris, Sokat and Sahari (2020) found that the net cash flow in investing activity of construction firms operating in Malaysia is significantly affected by Government ownership. They concluded that although Government has an authority to influence the economic activity in the market, its interference in their capital structure does not effectively affect the firms' performances.

Mahmoud, Ahmed and Behery (2021) argued that while there were models that aim to assess and forecast risks in the construction industry, none present a technique to include the impact of the risks on a project cash flow. The study thus uncovered 44 risk factors that have the tendency to impact construction cash flow. A consolidation of these factors via factor analysis and Delphi technique resulted in a cash flow risk index (CFRI) from an owner's perspective. The CFRI is able to measure the impact of different risk factors on a typical construction project's cash flow.

Liam, Ashuru and Li (2021) developed a new forecasting model which took cognisance of the Design-Build Procurement method. Major research finding is that even at the early procurement phase of a Design-Build project, when exact quantities and detailed cost estimates have not been fully developed, the combination of conceptual project information and local construction market indicators avails us the ability to predict the future.

3. MATERIALS AND METHODS

The thirty-one risk factors identified by Abdulrazaq, Ibrahim and Ibrahim (2017) were adopted for this study. The idiographic approach was adopted in the study. A deliberate attempt was made to identify contractors who executed projects that have as much similar characteristics as possible; renovation projects of Primary Health Care centres in Kaduna State, hence creating a homogeneity amongst the projects studied. A total number of ninety (90) contractors were found to have updated their registration with the ministry of works Kaduna state as at March 2020. In order to obtain reliable data for

the study, all the ninety registered contractors were approached for data collection as suggested by Cochran's (1977) for categorical data.

The questionnaire was divided into two parts (sections A and B). This was done to make the questionnaire easy to understand and very clear to the respondents. Section "A" requested general information from the respondents. These include mainly information about the respondents such as name of organisation, type of projects commonly executed, position of the respondent in the organisation, the average duration of projects executed, average value of project executed, the procurement route commonly adopted in projects executed, the annual turnover of the organisation and the nature of the client served. The provision of the 'other (please specify)' option was included to each category of the questions to reduce rigidity which may artificially constrain the responses (Fellows and Liu, 1997). These pieces of information were to enable the grouping of the responses provided by the respondents.

In section B of the questionnaire, 31 risk factors derived from literature as potentially affecting cash-out flow forecasts were listed. Respondents were then requested to provide opinions regarding the likelihood (i.e. probability) of each factor occurring and the likely impact should the factor occur. Respondents were asked to score their opinion on a 0-5 Likert type scale, zero being included so as to accommodate the instances where the risk factor was not applicable (Holton and Burnett, 1997). The highest likelihood of a risk factor occurring and maximum impact was each assigned a score of 5.

4. PRESENTATTION AND DISCUSSION OF RESULTS

Table 1 shows that majority of the respondents (37.23%) were Project Managers who were involved in their firm's projects. Twenty-one of the respondents, representing 15.33% were Directors in the firms. This was followed by 12 Administrative Managers (8.76%), 19 Quantity Surveyors (13.87%), 9 Project Engineers (6.57%), 6 Managing Directors (4.38%), 8 Architects (8.76%), 9 Project Suoervisors (6.57%) and 2 Project Directors (1.46%). The combination of respondents shows a participation of several management cader of the organisations with the requisite knowledge on cash flows into and out of the organisations.

Table 1: Position of the Respondents in their Respective Organisations

Position	Frequency	Percent
Administrative Managers	12	8.76
Architects	8	5.84
Directors	21	15.33
Managing Directors	6	4.38
Project Directors	2	1.46
Project Engineers	9	6.57
Project Managers	51	37.23
Project Supervisors	9	6.57
Quantity Surveyors	19	13.87
Total	**137**	**100**

Table 2 shows that majority of the repondents had experience of over thirty years. The mean experience of the respondents is 34 years. This suggests that the respondents have the requisite experience in building projects.

Seven factors involved in the study were considered to be statistically and significantly different by the respondents. These factors include :"Change in Management/Government", "Non inclusion of project in yearly budget", "increased duration of the project", "Poor communication amongst Parties", "Poor Design", "Shortage of Key Skilled Labour" and "Under Measurements". "Change in Management/Government"which ranked 1st overall, ranked very high for the two categories of client. This implies that the impact of the risk facator is very critical. "Non Inclusion of Project in Yearly Budget" and "increased Duration of the Project" also ranked 1stoverall . This suggests thatthe impact of the factors is highly critical. "Variations" ranked 4th overall, This gives a picture of consistency of the risk factor as highly impacting of cash-out forecasts. The "shortage of key plant items" ranked 5thfor renovation works in Kaduna state, implying that the risk factor has very high impact on cash-out forecasts when it occurs.

Table 2: Construction Experience of respondents

Years	Frequency	Percent
1-10	18	13.14
11-20	17	12.41
21-30	39	28.47
Over 30	63	45.99
Total	**137**	**100**

4.1. Discussion of Results

Several risk factors that can be associated with a client or client organisation have been discussed by previous researchers (Odeyinka *et al.*, 2013; Shehu *et al.*, 2014; Zayed and Liu, 2014), however, non-inclusion of a project in a yearly budget is not one of them. This implies that the risk factor is unique to the present client which empasises the idiographic argument of previous reaeearchers. Non-inclusion of a project sounds lke an intentional attempt by the client to refrain from considering payment(s) to the contractor on the project. Perhaps due to non vailability of funds and /or prioritisation of projects to be considered for payment as a result of dearth of government funds. Other departure from previos studies include that from the study by Odeyinka *et al.* (2013) where identified "changes to initial design", "inclement weather", and "variation to works" as the 3 top-most risk factors occurring. The same factors ranked 12th, 10th, and 16th, in the present study. Incidentally, "Client's insolvency", "Labour Strikes", and "Civil Disturbance" ranked very low in both studies. This implies that the civil unrests and labour strikes rarely impacts on the cash-out forecasts by contractors in both the UK and Kaduna state. A similar survey carried out by Shehu *et al.* (2014) revealed that in Malaysia "late payment from contractor to subcontractors and suppliers", "dispute between contractor and subcontractor', "late payment from client to contractor" and "bureaucracy in government agencies" are crucial factors affecting contractor's forecasts. The present study has some similarities with that carried out in Malaysia. "Delay in payment from client" and "increase in the duration of the project" also ranked very high as in the study in Malaysia.

Table 3: Likelihood of Occurence of Risk Factors Affecting cash out Forecasts

Risk Factor	Mean	Rank
Change in Management/Government	4.51	1
Non-inclusion of project in yearly budget	4.51	1
Increased Duration of the Project	4.51	1
Variations	3.87	4
Shortage of Key Plant Items	3.77	5
Replacement of Defective Works	3.73	6
Delay in Payment from Client	3.68	7
Delay in Settling Claims	3.60	8
Poor communication Amongst Parties	3.24	9
Inclement Weather	3.21	10
Inflation	3.17	11
Changes to Initial Design	3.15	12
Under-estimating Project complexity	3.13	13
Charging of "Land Dues" by Locals (illegally)	3.10	14
Over Measurements	3.10	14
Delay in Agreeing Variation/Day Works	3.05	16
Contractor/Owner Dispute	3.05	16
Shortage of Key Skilled Labour	2.85	18
Long Period of Honouring Certificates by Client	2.64	19
Bad Relationship Between Main and Sub Contractor	2.45	20
Strikes, Internal and External Military Actions	2.41	21
Under Measurements	2.36	22
Civil Disturbance	2.20	23
Change Orders	1.82	24
Poor Design	1.43	25
Problem with Foundation	1.36	26
Client's Insolvency	1.22	27
Compliance With New Regulations	1.17	28
Failure of Subcontractors	0.91	29
Geotechnical Issues	0.82	30
Archaeological Remains	0.17	31

Field Survey (2020)

None of the factors highlighted by Zayed and Liu (2014) was found to be significant in the present study. Zayed and Liu (2014) emphasised on the impact of location on factors affecting cash flow forecasts. Data for the study was collected from North

America and China. Result from the survey showed a significant difference in the impact of the following risk factors in the two locations- "contractor's personal relation with the consultant team", "contractor's personal relation with the owner", "lack of skilled labour", "change of progress payment duration", "change of labour and staff wages", "delay of making payments to suppliers", and "number of claims".

Table 4: Impact of Risk Factors on cash-out Forecastsfor Primary Health Care Projects

Risk Factors	Mean	Rank	**F** F STAT	**Sig.** (P.Values)
1. Change in Management/Government	4.15	1	3.340	.021*
2. Non-inclusion of project in yearly budget	4.51	1	3.733	.013*
3. Increased duration of the Project	4.51	1	5.006	.002*
4. Poor communication Amongst Parties	3.24	9	4.608	.004*
5. Poor Design	1.43	25	4.883	.003*
6. Shortage of Key Skilled Labour	2.85	18	9.432	.000*
7. Under Measurements	2.36	22	4.599	.004*

Source: field survey, 2020. Note- *= significant at 5% Level of significance.

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

This paper contributed to cash flow management in the construction industry by identifying risk factors significantly impacting on the cash out forecasts of contractors operating in Kaduna state, Nigeria. It can be concluded that seventeen risk factors significantly impact cash out forecasts for contractors carrying out renovation works within Kaduna state of Nigeria.

"Change in Management/Government" has the highest impact for both types of projects. A new risk factor "non-inclusion of project in 'current' budget'" has impact on projects executed for the state Government. Majority of the factors contributing to the risks of forecasting cash flow by contractors carrying out weorks in Kaduna state are client-related.

5.2. Recommendations

i. Construction contractors involved in renovation works for Kaduna stategovernment should plan considerably against positive variations to their "cash-out" forecasts arising from non inclusion of project in budgets subsequent to the base year.

ii. Construction contractors in Kaduna state should carefully consider the seventeen (17) significant risk factors affecting cash-out before embarking on any renovation project in Kaduna state.

iii. Further studies should be carried out to determine the effect of procurement route on the risk factors impacting on cash flow forecasts for renovation works.

6. LIMITATIONS OF THE STUDY

The model developed in this research can only be used to forecast risk impacts on cash flows for projects that are governed by payment conditions, retention agreement, procurement route, duration of contract, and other conditions applicable to renovation works of Primary Health Care Projects in Kaduna state, Nigeria. The research was conducted through the administration of questionnaires to contractors in the Nigerian construction industry. The accuracy of the information obtained depends largely on the accuracy of the judgement of the contractors.

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