

# An Assessment of Cash Flow Factors on Cost Performance of Construction Projects within Kaduna Metropolis

<sup>1</sup>Anas Muhammad, <sup>2</sup>Rebecca Kingsley Madaki & <sup>3</sup>Patience Felix

<sup>1,2 & 3</sup>Department of Quantity Surveying,  
Kaduna Polytechnic, Kaduna, Kaduna State, Nigeria

---

## Abstract

The challenge of poor cost performance has suppressed the performance of local construction firms in Nigeria and brought about substantial increase in cost of construction projects. This substantial increase has brought about lack of clients confident in consultants, investment risks, and inability to deliver value to the client. This study assesses cash flow factors on cost performance of construction projects in Kaduna metropolis. which was achieved through; Identification of the cash flow factors that affect cost performance of construction projects, determination of severity of these cash flow factors on cost performance of construction projects in Kaduna metropolis and determination of effective methods by which cash flow factors can be mitigated. A total of 150 questionnaires were administered to respondents (clients, consultants and contractors) at construction projects and construction and consultancy firms within Kaduna metropolis. Out of the 150 questionnaire distributed, seventy-eight (78) were completed and returned representing 52% valid response rate. Data collected were analyzed using descriptive analytical tool with the aid of Soft Package for Social Sciences (SPSS). It was found that the “degree of variation, fluctuation of prices of materials, changes in initial design and estimating errors” as factors that have more severe effect on the cost performance of construction projects in Kaduna metropolis with “government policy” as the least factor. The most effective method of ensuring effective cost performance found in this study is “adequate site supervision to minimize poor quality workmanship and idle times. It was discovered that, the most effective method in mitigating cash flow factors is effective site management and supervision. Finally, attention should be focus more on the major cash flow factors affect in construction cost performance in order to enhance effective cost performance and generate confidence within the industry. The study also suggests that it is necessary for all construction actors in charge of construction cost to improve on the methods of cost determination, forecasting and management. They should also be kept aware of the government policy and how it affects cost.

**Keywords:** *Construction industry, Construction work, Cash flow, Clients, Consultants and contractors.*

*Corresponding Author:* Anas Muhammad

## **Background to the Study**

Construction industry in Nigeria has been a major source of employment, it accounts for about 70% of labour force in the country (Amusan, 2015) and 50% of the Nigerian government expenditure (Ogunsemi and Jagboro, 2006). Kumaraswamy (2008) stated that cost has been identified to be one of the main criteria for measuring the performance of construction project. Balogun (2005) also reported that ultimate goal of any construction project is to be delivered at the lowest possible cost. He further affirmed that the Nigeria construction industry is been faced with the challenge of poor cost performance. Cost performance which is measured by comparing the final cost against budget or initial cost is posited as a major criteria of building success (Adeola 2011), hence improving construction efficiency by means of effective cost performance would certainly contribute to the Nigeria construction industry.

Al-issa and Zayeed (2007) reported that cash flow factors are the major problem causing construction project failure. To buttress this fact, Yagiong, Tarek, and Shujing (2009) stated that many project have failed in Nigeria construction industry due to factors that affected its cash flow.

In addition, Azhar, Farooqui and Ahmed (2008) stated that it is uncommon to see construction project completed within the estimated cost and this can be attributed to the fact that lot of factors affect its cash flow. Ranging from agreed interim valuation, change in progress payment duration, loan repayment conditions, under measurement, government policy, interest rate amongst others. Joseph and Theophilus (2012) reported that cash flow factors is one of the major factors affecting cost performance of construction project. Adeola (2011) also asserted that most projects in Nigeria face a lot of challenges ranging from delay in payment, delay in honoring certificate by client, delay in agreeing valuation and others. These factors, consequently, have led to delay in completion period because contractors cannot continue the pace of project with their own finances and as a result projects are being completed at a higher cost, been delayed or abandoned. Hence this study is focused on assessing the cash flow factors that affect cost performance of construction projects in Nigeria specifically within Kaduna metropolis.

What informed the decision to embarked on this study is the concerned raised by a number of authors on cost performance of construction projects. Ogunsemi and Jagboro (2006) reported that the most serious problem facing Nigeria construction industry is poor cost performance of projects. Bala, Bello, Kolo and Bustani (2009) noted that the challenge of poor cost performance has suppressed the performance of local construction firms in Nigeria and brought about substantial increase in cost of construction projects. This substantial increase has brought about lack of clients confident in consultants, investment risks, and inability to deliver value to the client. (Bala *et al.*, 2009). Studies have attributed the problem of poor cost performance in construction projects in Nigeria to some factors that affect the project cash flow (Azar, Farooqui and Ahmed, 2008). Based on the foregoing, it can be observed that there is a serious concern on cost performance of construction projects which is attributed to severity of some cash flow factors. And previous studies have done little in addressing this problem.

To this end, this study seeks to assess cash flow factors on cost performance of construction project in Kaduna metropolis. which was achieved through; Identification of the cash flow factors that affect cost performance of construction projects, determination of severity of these cash flow factors on cost performance of construction projects in Kaduna metropolis and determination of effective methods by which cash flow factors can be mitigated.

### **Research Questions**

- i. What are the factors that affect cost performance of construction projects?
- ii. What is the severity of these factors on cost performance of construction projects?
- iii. What are the effective methods by which cash flow factors can be mitigated?

### **Literature Review**

#### **Definition of Cash Flow**

Thompson (1976) defines cash flow as the difference between income and expenditure in any period of time. The cumulative cash flow is the sum of the period cash flows and therefore represents the investor's account balance for the particular project or contract at any point in time. Control of cash flow may itself be the dominant criteria influencing management by Client or Contractor or it may be a secondary consideration. In either case it is necessary to relate time and money in order to predict the demand for and return on capital invested.

Ali and Kamaruzzaman (2010) also define cash flow as the flow of cash into the firm and the flow of cash out of the firm during day to day trading activities. It is concerned in particular with timing of payments, receipts and consequent balance of cash remaining after the transaction. A review of literature reveals that there are several cash flow factors affecting cost performance of construction projects in Nigeria.

#### **Cash Flow Factors**

Several studies have identified some factors affecting cash flow of construction projects delivery which causes cost escalation, abandonment and other undesirable development (Al-Issa and Zayed, 2007; Omoregie and Radfort, 2005; Joseph and Theophilus, 2012; Mohammed, Hosam and Ahmed, 2014; Oladipo, Fatuki and Aluko 2015; Nuru and Illias 2014). Table 1 depicts some cash flow factors identified by various researchers.

**Table 1: Cash flow factors**

| S/N | Factors   | Source                           |
|-----|---|----------------------------------|
| 1.  | Agreed interim valuation on site                        | Mohammed, Hosam and Ahmed (2014) |
| 2.  | Accident and theft                                      | Mohammed, Hosam and Ahmed (2014) |
| 3.  | Errors during construction                              | Aje, Omoroka and ariyo (2015)    |
| 4.  | Quality of accuracy in valuation                        | Joseph and Theophilus (2012)     |
| 5.  | Over measurement and Under measurement                  | Joseph and Theophilus (2012)     |
| 6.  | Materials delay   | Amusan (2015).                   |
| 7.  | Delay in settling claims                                | Mohammed, Hosam and Ahmed (2014) |
| 8.  | Delay in interim certification                          | Odeyinka, Kaka and lowe(2008)    |
| 9.  | Bank overdraft  | Joseph and Theophilus (2012)     |
| 10. | Fluctuation of prices of material                       | Omoriegie and Radford (2006)     |
| 11. | Degree of Variation                                     | Mohammed, Hosam and Ahmed (2014) |
| 12. | Company's cash flow                                     | Al-lssa and zayeed (2007)        |
| 13. | Improper planning and management                        | Al-lssa and zayeed (2007)        |
| 14. | Government policies                                     | Aje, Omoroka and ariyo (2015)    |
| 15. | Economic Instability                                    | Joseph and Theophilus (2012)     |
| 16. | Estimating error  | Mohammed, Hosam and Ahmed (2014) |
| 17. | Disputes between contractors and owners.                | Al-lssa and zayeed (2007)        |
| 18. | Cost overruns   | Joseph and Theophilus (2012)     |
| 19. | Delay in payment from client                            | Mohammed, Hosam and Ahmed (2014) |
| 20. | Inflation   | Amusan (2015).                   |
| 21. | Interest rate   |                                  |
| 22. | Pricing strategy (front end loading/ back end loading). | Joseph and Theophilus (2012)     |
| 23. | Delay in paying creditor                                | Al-lssa and zayeed (2007)        |
| 24. | Limit of retention                                      | Joseph and Theophilus (2012)     |
| 25. | Weather inclement                                       | Aje, Omoroka and ariyo (2015)    |

### Methods Used in Mitigating Cash Flow Factors

Due to the severe effect of cash flow factors on construction projects delivery as highlighted in table 1, researchers have suggested the use of some methods and measures that can mitigate these cash flow factors (Oladipo, Futuki and Aluko, 2015 in Fisk, 1997; Ashworth and Hogg, 2002; Williams and Cooke, 2003; Isaac, Alexander and Ibironke, 2015). In furtherance, if these methods and measures are used, they can reduce cash flow factors that inhibit cost performance of construction projects.

Table 2 shows some methods mitigating cash flow factors inhibiting cost performance of construction projects identified by some authors.

**Table 2: Methods Mitigating Cash Flow Factors Inhibiting Cost Performance of Construction Projects**

| <b>S/No</b> | <b>Methods</b>  |
|-------------|---|
| 1.          | Effective site management and supervision   |
| 2.          | Effective strategic planning  |
| 3.          | Proper project planning and scheduling  |
| 4.          | Use of appropriate construction methods   |
| 5.          | Clear information and communication channels  |
| 6.          | Engagement of experienced sub-contractors and suppliers   |
| 7.          | Frequent progress meetings  |
| 8.          | Comprehensive contract administration   |
| 9.          | Systematic control mechanism  |
| 10.         | Improving contract award procedures by giving less weight to pricing and more weight to capabilities and past performance of contractor |
| 11.         | Frequent coordination between parties   |
| 12.         | Use up to date technology   |
| 13.         | Preconstruction planning of project tasks and resources needs   |

**Source:** (Oladipo, Futuki and Aluko, 2015 in Fisk, 1997; Ashworth and Hogg, 2002; Williams and Cooke, 2003; Isaac, Alexander and Ibrinke, 2015).

### **Summary**

In general, most of the literature reviewed in this study focus attention on identifying cash flow factors which has affected the cost performance of construction projects, and these have negative implications for the major actors in particular, and the industry in general. Project abandonment, drop in building activities, bad reputation and inability to secure project finance are all implications of ineffective cost performance of construction projects. In furtherance, some studies have also worked on proffering possible solution by which these negative cash flow factors can be mitigated. However, an application of the proffered solutions would restore clients confidence, reduce investment risks and generally boost the viability and sustainability of the industry.

### **Outstanding Issue**

Several researches focus more on identifying and assessing the cash flow factors that affect cost performance of construction projects, both in Nigeria and in other countries. Studies have also worked on proffering possible solution by which these factors can be mitigated. It can be observed that there is a serious concern on cost performance of construction projects which is attributed to severity of some cash flow factors. And previous studies have done little in addressing this problem particularly within Kaduna metropolis.

### **Methodology**

An extensive literature review was conducted in order to get relevant information on Cash Flow factors and Methods used for minimizing Cash Flow Factors. The Cash Flow factors and Methods used for minimizing Cash Flow Factors were used as basis for structuring

questions in the questionnaire. Naom (1998), Enshassiet *al.* (2010) stated that the questionnaire is a widely used approach for descriptive and analytical surveys to find out the facts, opinions and views of respondents. The questionnaire is divided into two parts. Part 'A' contained the respondents' personal information which deals with their status, professions, qualifications and experience. Part 'B' is based on that relevant information that were used to achieve the research aim.

### Sample Size

The determination of sample size is a common task for many empirical researchers. Inappropriate, inadequate, or excessive sample sizes continue to influence the quality and accuracy of research. A formula for selecting the sample size for a research problem based on a level of significance and a chosen margin of error was proposed by Cochran (1977) and Levy and Lemeshow (2008). In order to obtain the most efficient, representative sample, for our research, we use the following Cochran's formula for sample size determination.

$$n = \left( \frac{Z_{\alpha/2}}{2\delta} \right)^2$$

Where;  $n$  = Sample size to be determined

$\delta = 0.08$  (The chosen margin of error for the survey)

The value of the standard normal ordinate at  $\alpha/2$  level of significance is  $Z_{\alpha/2}$ . At the 5% level of significance  $Z_{\alpha/2} = Z_{0.025} = 1.96$ . The sample size is finally determined as follows:

$$n = \left( \frac{Z_{\alpha/2}}{2\delta} \right)^2 = \left( \frac{1.96}{2 \times 0.08} \right)^2 = 150$$

That is, we need a sample size of at least 150 to arrive at a sample with a sampling error of at most 8%.

### Stratified Random Sampling

Since the total number of targeted respondents for this study is not known, a survey sampling was used. In survey sampling, it may be desirable or even necessary to divide the population into several subpopulations or strata in order to estimate population parameters. In stratified random sampling, the population units are divided into a number of strata. Samples of predetermined sizes are drawn independently from each stratum by simple random sampling.

In this research work, the necessity of stratification is due to administrative convenience, field operations and increase in precision of survey results. Thus for administrative convenience, three categories of respondents: Clients, Consultants and Contractors are treated as a stratum. Then to assess cash flow factors influence on cost performance of construction projects in Kaduna metropolis, the research selects samples from each stratum. Since a stratified sample consists of units selected separately from each stratum,

such a sample is expected to be better representation of the population than a simple random sample selected from the entire population (Levy and Lemeshow, 2008). The following table summarizes the sample size allocation in this stratified random sampling

**Table 3: Sample sizes in each stratum**

| Strata (Type of Respondents) | Sample size |
|------------------------------|-------------|
| Clients                      | 50          |
| Consultants                  | 50          |
| Contractors                  | 50          |
| Total                        | 150         |

### Sampling Strategy

An effective strategy reduced non response, response error and respondents' bias to the barest minimum. In this strategy, the questionnaires not returned or not properly filled are replaced with new ones in order to maintain an *effective sample size* of 150. This is a strategy of minimizing non response. This is because a respondent must respond to all the questions in the questionnaires for his response to be validly analyzed. An *effective sample size* of at least 150 must also be maintained in order to control the sampling variability. In the data collection process, non-response could be minimized with adequate follow-up as much as possible. In spite of the follow-up, some non-response cases might still be recorded which could only be overcome by extending the sample size sequentially until the desired number of respondents was covered.

### Questionnaire

A total of 150 questionnaires were administered to respondents (clients, consultants and contractors) at construction projects and construction and consultancy firms within Kaduna metropolis. Some construction projects, construction and consultancy firms within Kaduna metropolis were considered because they serve as platform for easy access to most of the respondents. As it was not possible to cover the whole of Nigeria in the study, the study was restricted to construction projects, construction and consultancy firms within Kaduna metropolis, Nigeria. Since it is possible to use the most represent table sample size in research (Abdullahi, 2014). Out of the 150 questionnaire distributed, seventy-eight (78) were completed and returned representing 52% valid response rate. Data collected were analyzed using descriptive analytical tool with the aid of Soft Package for Social Sciences (SPSS).

### Data Presentation and Data Analysis

#### Survey on Respondents' Status

The responses from the survey as follows: twenty-one (21) represents the response from clients, thirty-five (35) forms the response from consultants, and twenty-two (22) form responses from contractors. The responses on the respondents' status in the construction industry can be presented in the following percentages: clients' constitute 26.92%, consultants' forms 44.87% and contractors' constitutes 28.21% The distribution of data collection by respondents' status shows that there was wider coverage in capturing respondents' views and opinions.

### Survey on Respondents' Years of Experience

The distribution of data collection by respondents' experience in the construction industry shows that, respondents who have 1-5 years forms 20.8%, 6-10years forms 37.7%. 11-15years constitutes 22%, 16years and above form 19.5%. On average, it can be concluded that majority of the respondents are highly experienced in the construction industry. That has also helped the validity and reliability of data obtained in this study.

### Survey on Respondents Professions

The data collection on respondents' profession shows that Quantity surveyors' constitutes 41.5%, Architects' forms 22.6%, Builders' forms 3.8%, Civil/Structural engineers' constitutes 18.9% Mechanical and Electrical engineers' forms 7% and others constitutes 6.2%. It can be concluded that, professionals of the construction industry form the highest percentage of respondents in this research. For that reason, that has also helped the reliability and validity of the research result.

### Data Analysis

Below are tables showing the weighted mean of the factors in descending order of importance.

The rating of all the factors for degree of severity was based on the value of their respective Relative Importance Index (RII). The guide for the rating is given in Table 5 below:

**Table 4: Guide to Degree of Severity**

| Guide to Degree of Severity | Rating     |
|-----------------------------|------------|
| Very Severe                 | 0.71 above |
| Severe                      | 0.65-0.70  |
| Fairly Severe               | 0.60-0.64  |
| Not Severe                  | 0.59 below |

### Test for Hypotheses

Spearman rank correlation was used to test the level of agreement on the severity ranking on the cash flow factors affecting cost performance between the actors in the construction industry.

Using the formular below:

$$R_s = 1 - \frac{6 \sum d^2}{n(n^2 - 1)}$$

Where

- Rs= Spearman rank order
- D= Difference between the two variables
- N = Number of respondents.

The data must be ordinal, interval or ratio spearman's returns a value from -1 to 1 (Clef, 2013)



Where

-1 = a perfect negative correlation

1 = a perfect positive correlation

0 = no correlation

**Table 5: Test of Hypotheses**

| Stakeholders              | RS   | Accept Hypotheses |
|---------------------------|------|-------------------|
| Client/Consultant         | 0.94 | Yes               |
| Client/Contractor         | 0.95 | Yes               |
| Consultant/<br>Contractor | 0.96 | Yes               |

The hypotheses were setup to testify there is any agreement on the severity rank of the factors affecting construction cost performance in Kaduna metropolis as opined by the different groups.

**Table 6: Overall Ranking on the Level of Severity of the Cash Flow Factors**

| Cash flow factors                                       | N  | Std. Deviation | Weighted mean | RII  | Overall Ranking | Clients Ranking | Consultants Ranking | Contractors Ranking |
|---|----|----------------|---------------|------|-----------------|-----------------|---------------------|---------------------|
| Fluctuation of prices of material                       | 78 | 1.203          | 3.81          | 0.76 | 1               | 2               | 2                   | 2                   |
| Degree of Variation                                     | 78 | 1.120          | 3.79          | 0.76 | 2               | 1               | 5                   | 8                   |
| Company's cash flow                                     | 78 | 1.173          | 3.74          | 0.75 | 3               | 5               | 7                   | 2                   |
| Improper planning and management                        | 78 | 1.221          | 3.68          | 0.74 | 4               | 13              | 1                   | 7                   |
| Government policies                                     | 78 | 1.094          | 3.66          | 0.73 | 5               | 10              | 2                   | 6                   |
| Economic Instability                                    | 78 | .982           | 3.64          | 0.73 | 6               | 5               | 4                   | 1                   |
| Estimating error  | 78 | .987           | 3.64          | 0.73 | 6               | 2               | 19                  | 3                   |
| Disputes between contractors an owners.                 | 78 | 1.285          | 3.60          | 0.72 | 8               | 16              | 5                   | 16                  |
| Cost overruns   | 78 | 1.234          | 3.55          | 0.71 | 9               | 13              | 18                  | 3                   |
| Delay in payment from client                            | 78 | 1.171          | 3.51          | 0.70 | 10              | 8               | 13                  | 8                   |
| Inflation   | 78 | 1.049          | 3.49          | 0.70 | 11              | 13              | 7                   | 12                  |
| Interest rate   | 78 | 1.147          | 3.47          | 0.69 | 12              | 10              | 15                  | 8                   |
| Pricing strategy (front end loading/ back end loading). | 78 | .952           | 3.45          | 0.69 | 13              | 8               | 19                  | 8                   |
| Agreed interim valuation on site                        | 78 | .889           | 3.42          | 0.68 | 14              | 16              | 15                  | 12                  |
| Accident and theft                                      | 78 | 1.242          | 3.36          | 0.67 | 15              | 5               | 13                  | 18                  |
| Errors during construction                              | 78 | .998           | 3.36          | 0.67 | 15              | 5               | 22                  | 21                  |
| Quality of accuracy in valuation                        | 78 | .999           | 3.34          | 0.67 | 17              | 22              | 10                  | 14                  |

|  |    |       |      |      |    |    |    |    |
|--|----|-------|------|------|----|----|----|----|
| Over measurement and Under measurement | 78 | .956  | 3.32 | 0.66 | 18 | 10 | 7  | 22 |
| Materials delay                        | 78 | .956  | 3.30 | 0.66 | 19 | 16 | 15 | 19 |
| Delay in settling claims               | 78 | 1.150 | 3.28 | 0.66 | 20 | 20 | 10 | 16 |
| Delay in interim certification         | 78 | 1.108 | 3.25 | 0.65 | 21 | 23 | 10 | 15 |
| Bank overdraft                         | 78 | 1.079 | 3.11 | 0.62 | 22 | 20 | 19 | 24 |
| Delay in paying creditor               | 78 | 1.053 | 3.08 | 0.52 | 23 | 23 | 22 | 19 |
| Limit of retention                     | 78 | 1.079 | 2.89 | 0.58 | 24 | 16 | 24 | 25 |
| Weather inclement                      | 78 | .993  | 2.81 | 0.56 | 25 | 25 | 25 | 22 |

Table 6 shows the result of the computation of Spearman's rank correlation coefficient, and the decision rule of rejection no null hypotheses for the severity rank of the cash flow factor affecting construction cost performance by the different groups in the construction industry. It can be concluded that there is a general agreement between the different groups i.e. clients, consultants and contractors with respect to the imperceptions so the severity ranking of the cash flow factors affecting construction cost performance in Kaduna metropolis. However, in the ranking of the important factors there were minor differences; clients rated the three most important factors in the following order of severity: degree of variation, company's cash flow and fluctuation of prices of materials. Consultants opinion were in the following order improper planning and management, government policies and fluctuation of prices of materials while contractors' perception were in this order: economic instability, fluctuation of prices of materials and cost overrun.

#### Table 7: Methods for Minimizing Cash Flow Factors

From the analysis methods with relative importance index of 0.85 above are most effective, 0.80-0.84 are more effective, 0.70-0.79 are effective, 0.61-0.69 are less effective and those below 0.60 are not effective.

| Methods   | N  | 5  | 4  | 3  | 2 | 1 | $\Sigma fx/\Sigma f$ | Weighted mean | RII  | Ranking |
|---|----|----|----|----|---|---|----------------------|---------------|------|---------|
| Effective site management and supervision                     | 53 | 34 | 15 | 3  | 1 |   | 241/53               | 4.55          | 0.91 | 1       |
| Proper project planning and scheduling                        | 53 | 27 | 19 | 6  | 1 |   | 230/53               | 4.34          | 0.89 | 2       |
| Effective strategic planning                                  | 53 | 21 | 27 | 4  | 1 |   | 226/53               | 4.26          | 0.85 | 3       |
| Use of appropriate construction methods                       | 53 | 21 | 20 | 10 | 2 |   | 217/53               | 4.09          | 0.82 | 4       |
| Engagement of experienced subcontractors and suppliers        | 53 | 23 | 9  | 15 | 6 |   | 208/53               | 3.92          | 0.78 | 5       |
| Clear information and communication channels                  | 53 | 20 | 11 | 18 | 2 | 2 | 204/53               | 3.85          | 0.77 | 6       |
| Comprehensive contract administration                         | 53 | 17 | 17 | 13 | 6 |   | 204/53               | 3.85          | 0.77 | 6       |
| Preconstruction planning of project tasks and resources needs | 53 | 13 | 20 | 16 | 3 | 1 | 200/53               | 3.77          | 0.75 | 8       |
| Frequent coordination between parties                         | 53 | 10 | 18 | 20 | 5 |   | 192/53               | 3.62          | 0.72 | 9       |

|   |    |    |    |    |   |   |        |      |      |    |
|---|----|----|----|----|---|---|--------|------|------|----|
| Frequent progress meetings  | 53 | 16 | 10 | 18 | 8 | 1 | 191/53 | 3.60 | 0.72 | 10 |
| Improving contract award procedures by giving less weight to pricing and more weight to capabilities and past performance of contractor | 53 | 14 | 13 | 19 | 5 | 2 | 191/53 | 3.60 | 0.72 | 10 |
| Use up to date technology   | 53 | 12 | 15 | 20 | 3 | 3 | 189/53 | 3.57 | 0.71 | 12 |
| Systematic control mechanism  | 53 | 5  | 14 | 28 | 5 | 1 | 176/53 | 3.32 | 0.66 | 13 |
| Developing human resources in the construction industry.  | 53 | 8  | 17 | 15 | 8 | 5 | 174/53 | 3.28 | 0.66 | 14 |

Table 7 reveals a general view of all the three parties on the most effective ways of reducing cash flow factors. The five most effective measure of minimizing cash flow factors are:

- i. Effective site management and supervision
- ii. Proper project planning and scheduling
- iii. Effective strategic planning
- iv. Use of appropriate construction methods
- v. Engagement of experienced sub-contractors and suppliers

The following are recommended methods by which cash flow factors can be mitigated:

- i. Minimize propensity for late changes in design by ensuring a holistic assessment of client real and stated needs
- ii. Aim at the economy in design by exploring alternatives and doing detailed investigations and analyses.
- iii. Minimize conflicts with subcontractors, which could undermine on site productivity and progress of work.
- iv. Ensure realistic estimates through proper cost studies.
- v. Provide comprehensive information required for easier interpretation of drawings
- vi. Companies should have good understanding of their current cash flow level, and the likely source of income and expenditures throughout the project duration.

### Discussion and Findings

The results show that the “degree of variation, fluctuation of prices of materials, changes in initial design and estimating errors” as factors that have more severe effect on the cost performance of construction projects in Kaduna metropolis. And that can be linked to assertion made by (Omorie and Radfort, 2006; Odeyinka, Kaka and Lowe, 2008).

But results also show “government policy” as the least factor inhibiting project cost performance in Kaduna metropolis which is in agreement with (Isaac, Alexander and Ibronke, 2015) The results show that all three categories of respondents do not generally agree on the severity ranking of all the factors, there is however a more agreement between contractors and consultants than between the clients.

The most effective methods of minimizing cost of construction in Nigeria as perceived by the three categories of respondents is ensuring effective site management and supervision. This

is similar to the findings of Oladipo, Fatuki and Aluko (2015) where they stated that the most effective method of ensuring effective cost performance is to ensure adequate site supervision to minimize poor quality workmanship and idle times. Other methods found to be effective are includes hiring and motivating experienced and qualified workforce to improve productivity, allowing sufficient time for feasibility studies and providing comprehensive information required for easier interpretation of drawings and setting out of the works.

### **Summary of Findings**

Literature reviewed helps in identifying some cash-flow factors affecting cost performance of construction projects which include; fluctuation of prices of materials, degree of variation, company's cash flow, improper planning and management, government policies amongst others. Literature review also helps in identifying methods for mitigated cash flow factors to include; effective site management and supervision, effective strategic planning, proper project planning and scheduling, use of appropriate construction methods amongst others.

The results show that the “degree of variation, fluctuation of prices of materials, changes in initial design and estimating errors” are factors that have more severe effect on the cost performance of construction projects in Kaduna metropolis. The result also shows “government policy” as the least factor inhibiting project cost performance in Kaduna metropolis. On the severity ranking of all the factors, the result indicates that all three categories of respondents do not generally agree on the severity ranking of all the factors, there is however a more agreement between contractors and consultants than between the clients.

The most effective methods of minimizing cost of construction in Nigeria as perceived by the three categories of respondents is ensuring effective site management and supervision. The most effective method of ensuring effective cost performance found in this study is “adequate site supervision to minimize poor quality workmanship and idle times. Other methods found to be effective include: hiring and motivating experienced and qualified workforce to improve productivity, allowing sufficient time for feasibility studies and providing comprehensive information required for easier interpretation of drawings and setting out of the works.

### **Conclusion**

In conclusion, the most effective method of mitigating the effect of cash flow factors is effective site management and supervision. This will enable the construction actors give an economic approach to construction work such that they would be able to identify the dominating factors leading to high cost of construction in Kaduna metropolis and apply the proffered solutions to minimizing same so as to restore client's confidence in consultants, reduce investment risks, an generally boost the viability and sustainability of the industry.

### **Recommendations**

- I. Attention should be focused on the major cash flow factors affect in construction cost performance in order to enhance effective cost performance and generate confidence within the construction industry.

- ii. Quantity Surveyors as the cost experts of the industry should ensure that they examine these factors and take care of them while preparing estimate, include contingencies in the budget, plan for, and mitigate the adverse effects of these factors on the project cost
- iii. It is necessary for all construction actors in charge of construction cost to improve on the methods of cost determination, forecasting and management. They should also be kept aware of the government policy and how it affects cost.
- iv. Clients should clearly identify the requirements and needs, whether they are able to achieve them with their financial capability in order to reduce payment problems.
- v. There should be proper coordination and communication among various parties working on the project in order to improve management, control problems and reduce any avoidable delay.
- vi. All parties should take responsibility to make use of the proffered solutions to minimizing cost of construction projects.

## References

- Ademola, A. (2014). Overview of building and construction sector in Nigeria economy, *The Nigeria Institute of Social and Economic Research*, Pp. 4-9, Ibadan
- Adeola, J. O. (2011). *Relationship between contractors' financial capability and cost performance of construction project in southwestern Nigeria*. Unpublished B. Tech thesis, Federal University of Technology, Akure
- Aibinu, A. A, & Jagboro, G.O. (2002). The effects of construction delays on project delivery in the Nigerian construction industry. *International Journal of Project Management*, 20, 593-599
- Ali, A. S & Kamaruzzaman, S. N. (2010). Cost performance for building construction project in Klang valley. *Journal of Building Performance*, 1, 113
- Al-issa, A. & Zayed, T. (2007). *Project Cash flow factors contractors perspective*. Construction Research Congress (CRC) Conference, ASCE, Bahamas, May 5-8.
- Amusan, L. M. (2013). *Study of factors affecting construction cost performance in Nigeria*, Building Technology Dept, College of Science and Tech, Covenant University, Pp. 1-9
- Azhar, N., Farooqui, R. U. & Ahmed, S. M (2008). *Cost overrun factors in construction industry of Pakistan*. Advancing and Integrating Construction Education, Research & Practice, Pp. 499-508
- Babalola, I. H, Oluwatoyi. E. O, & Akinloye, I, (2015). Factors influencing the performance of construction project In Akure Nigeria, *International Journal of Civil Engineering, Construction and Estate Management*, 3, 57-60

- Bala, K., Bello, A., Kolo, B. A, & Bustani, S. A. (2009). *Factors inhibiting the growth of local construction firms in Nigeria*. 25<sup>th</sup> Annual ARCOM Conference Nottingham, UK, Association of Researchers in Construction Management.
- Balogun, O.M. (2005). Clients' perception on measure of indigenous contractors performance in the construction industry, The Professional Builders. *Journal of Nigerian Institute of Building*, 42-48.
- Clef, T. (2013). *Exploratory data analysis in business and economics: An introduction using SPSS STATA and Excel*. (Springer Science and Business Media), 10-13
- Cooke, B. & Williams, P. (2003). *Construction planning, programming and control*, 2<sup>nd</sup> edition, New York: Palgrave
- Dornyei, Z. (2007). *Research methods in applied linguistics; Quantitative, qualitative and mixed methodologies 1st edition*. London: Oxford Unity Press
- Isaac, O. A., Alexander, E. O & Ibronke E. E. (2015). Assessment of factors inhibiting cost performance of construction project in Nigeria, *Nigeria institute of Quantity Surveyors Journal*, 12-19
- Joseph, I.T.B., & Theophilus A, K, (2012). Cash flow forecasting in construction industry case study of Ghana *Pentvars Business Journal*, 6.
- Kumanaswamy, M. (2008). Compressing construction duration: Issues learned from Hong Kong building projects. *International Journal of Construction Management*, 20 (1), 23-35
- Kimata, N.M., Juma, M., Stanslaus, K. N. & Musa, I.M. (2017). Risk factors causing variation on forecasted construction cash flow of building projects, *International Journal of Construction Engineering & Management*, 6, 46-55
- Mohamed, A. E., Hosam, E. D. & Ahmed, E. B. (2014). Time- Cost model for building project in Nigeria, *International Journal of Computer Science*, 199-209
- Nuru, G. & Ilias, S. (2014). Assessment of the impacts of cost factors influencing performance of small scale local government in Nigeria, *International Journal of Engineering Research and Technology*, 1052-1059.
- Odeyinka, H., Lowe, J. & Kaka, A. (2008). An evaluation of risk factors impacting construction cash flow forecast, *Journal of Financial management and Property Construction*, 2-13.

- Oladipo, F.O., Fatuki, A. M, & Aluko, A. T. (2015). Factors affecting construction project cost, *International Journal of Science Basic and Applied research (IJSBAR)*, 308-318
- Omorie, A. & Radford, D.(2006). Infrastructure delay and cost escalations: Causes and effects in Nigeria, School of Architecture, *Demon ford University, Leicester, LE19 BH* England.
- Ogunsemi, D. R. & Jagboro, G. O. (2006). Risk Factors in Construction Project Cash-Flow Analysis, *Journal of Construction Management and Economics*, 24, 87-90
- Thompson, P.A. (1976). Prediction and control of cash flow for construction projects. *Engineering and project Economics Journal*, (1), 265-271
- Sitsabo, U. (2013). Relationship of construction sector to economic growth, *School of Construction Management and Engineering*, 15
- Yaqiong, L, Tarek, Z, & Shujing, L. (2009). 25 *Cash flow analysis of construction project*, 2<sup>nd</sup> international/8<sup>th</sup> construction specialty conference, St John Newfoundland and Labrador,