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Evaluating Sources of Cash Flow and Its Implications on Construction Projects

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Abstract Proper cash flow management has long been recognized as vital management tool which ensure survival of construction projects as cash is an important corporate resource for its day-to-day construction activities. This study surveyed construction clients in order to evaluate sources of cash flow and its implications on construction projects in Nigeria. A total of fifty-four questionnaires were administered to the respondents with a response rate of 92%. The data obtained were analyzed using frequency distribution and mean item score. The findings indicate that major source of cash inflows is payments received from clients/customers for services rendered and goods supplied while major source of cash outflows is payment for stock and raw materials as well as payments for wages and workers' salaries. Also, the main reasons for cash flow problems are; delayed payments and difficulty in obtaining financial aid. The lines of credit used by the parties to augment cash flow problems are; Bank loan/Bank draft and retained profit. The major implication of adverse cash flow includes; capital lock-up and delay in completion. Cash flow management can be improved through regular submission of valuations, taking full advantage of credit facilities and insisting on accuracy in valuations and certificate. The study concluded that; clients should timely honour interim certificates, avoid too much of variations and contractors are advised to raise finance from bank to solve the immediate cash flow problem and make repayment of such loans as soon as they receive payment from the clients.

Keywords Cash flow, Construction, Clients, Projects, Payments

1. Introduction

Cash flow is concerned with the movement of money in and out of a business and which determines a business solvency. Lack of adequate control over cash flow is a contributing factor to alarming high rate of insolvencies in the industry [1]. Thus, cash flow management should be taken seriously by all parties to construction projects. The need to forecast cash requirements is important in order to make provision for the difficult times of inadequate cash resources before they arrive [2]. They further posited that cash flow forecasting provides a good warning system to predict possible insolvency which enables preventive measures to be considered and taken in good time. The rate at which construction projects are being abandoned over the years within the construction industries due to contractor's bankruptcy has been on steady increase, this attendant problem has made it necessary to examine the various ways adopted by these contractors for forecasting their cash flows and controls of their fund. It can thus be argued that symptoms of such crisis become obvious when inconsistencies appear in the cash flow. Quinn [3] stated that any organisation's operational strategies to improve performance involve adequate cash flow management. The sequence of cash inflows and outflows regulate the business solvency. Noor, Nour, Musa and Zorqanet [4] affirmed that cash flow analysis aids to maintain adequate cash flow for the business and enables for proper cash flow management.

Previous studies observe that organisations can enhance better liquidity and edging competitive position by adequate management of their cash flows [5-6]. Uremadu [7] reported that cash flows of a firm are funds that are committed to its fixed assets, inventories, account receivables and marketable securities which ultimately lead to firm profit. The cash flow governance will invariably be determined by ability of the company to

successfully select adequate source of funds to finance its operations [8]. A better understanding of money as a resource and means to acquiring other resources needs to be appreciated at every level within the industry. It important for construction firms to understand the importance of cash flow planning and financial management and the effects it will have on the expected profit margin. Cash is the most important of the construction company resources, because failure of cash management is more than inadequate management of other resources [9].

Russell [10] lamented those failures of major construction contractors are owned to economic factors. As a result, there is the need to understand future conditions in the present, and resolve them in anticipation for the future, in order to ensure future successes and continuity of operations. Therefore, there is the need for proper cash flow planning, financial management and control on any construction projects which provides a good warning system to predict insolvency and enables preventive measures to be considered and taken in good time.

2. Statement of the Problem

Cash flow is the lifeblood of the construction industry and it is highly considered as the most significant resource of any construction organisation. However, the manner in which cash flow is being managed has posed a major challenge in construction industry. Inappropriate cash flow management has resulted into poor project performance and operational performance of most businesses which usually lead to construction delay, increased costs, stakeholders' dissatisfaction, litigation and often financial collapse of the construction organisations. Therefore, this study has been conducted in order to evaluate the sources of cash flow and its implications on construction projects in Nigeria. The outcomes of this study could assist in identifying areas of possible cash flow problems and increasing more efforts towards improving cash flow to enhance better performance of construction projects.

3. Objectives of the Study

This study was conducted with the attempt to achieve the following objectives;

- Identifying sources of cash inflows and outflows in construction industry.
- Assessing and evaluating causes of cash flow problems in construction industry and ways to augment cash flow problems during construction projects.
- Evaluating implications of cash flow problems on construction projects performance.
- Suggesting effective methods of improving cash flow management in construction industry.

3. Research Hypotheses

The statement of hypothesis was formulated for the purpose of this study:

H_0: Implications of cash flow problem on construction project performance do not depend on causes of cash flow problem during construction projects.

4. Literature Review

Overview of Cash Flow Concept

Cash is of a great importance, because liabilities can only be paid in cash and cash is the basic input needed to keep one's business running on a continuous basis. Malekela, Mohamed, Ntiyakunze and Mgwatu [11] described cash flow as the movement of money in and out of a business including construction business. Themoney coming into a business is called the positive cash flow while monies paid out are referred to as negative cash flow, while the difference between the positive and negative cash flows is termed net cash flow [12]. Onukwube [13] argued that too little cash will place a company in an illiquid state which could eventually result in insolvency and too much cash will result in funds lying idle and the overall returns on capital employed falling below an acceptable level. It can thus be affirmed that cash is the oxygen that enables construction firms to survive and prosper and it is the primary indicator of business health. Adjei, Fugar, Adinyira, Edwards and Parn [14] observed that early and consistent payments are precondition for the successful delivery of construction projects and the success of construction organisations.

Sources of Cash Inflows and Cash Outflows

Ideally, during construction process, the excess of cash inflows (outflows) over outflows (inflows) result in an increase (decrease) in the construction firm's cash account. The sources of cash inflows in construction industry are: payment for goods or services from customers, receipt of a bank loan, interest on savings and investments, shareholder investment, and increased bank overdrafts, proceeds from the sale of stock, cash receipts from borrowing, cash receipts from contributions and investment income that donors restricted for endowments or for buying, improving, or constructing long-term assets [15-16]. On the other hand, the sources of cash outflows include: purchase of stock/ raw materials, payment of wages, salaries, rent and daily operating expenses, purchase of fixed asset-machinery, office furniture, dividend payments, loan repayments, income tax/VAT, reduced overdraft facilities, cash disbursed to repay principal on long and short-term debt, cash paid to reacquire common and preferred equity instruments, dividends paid to common and preferred stockholders [15-16]. Odeyinka *et al*. [12]posited that positive cash flow (cash inflow) is derived from the monies or payment received by a firm during a period of time and negative cash flow (cash outflow) is the monies expended on a contract for the procurements of materials, plant, equipment, services, wages and salaries and other overhead cost.

Causes of Cash Flow Problems in Construction Industry

Onukwube [13] stated that cash flow problems arise when there is an irregular flow of cash through a company which may result into capital lock-up or temporary insolvency, and these problems may disrupt the planned project programme. Gambo, Said and Ismail [17] reported that cash flow problem in construction arise when a contractor does not have sufficient cash resources to be set-off the firm's liabilities. Gavin [1] and Onukwube [13] indicated reasons for cash flow problems to include; inadequate cash flow analysis, delay in payments, difficulty in obtaining financial aid, labour-intensive work, time lags between billing and collection of receivables (slow payers), inadequate budgetary control, overstock of inventory, poor credit control, and inadequate supplier management. Several authors posited that cash flow problem arise as a result of low profits, underpayment for approved valued works, client insolvency and delays in payment [12,18]. Other factors causing cash flow problems include delay in settling claims and agreeing on variations/day works, under valuation of performed works, clients' insolvency and delays in payments of approved valued works [12, 17-19].

Implications of Cash Flow Problems on Construction Projects

Gavin [1] posited that cash flow problem resulted in increased interest expense, increased investment of owners' capital, diminished credit ratings, inability to take advantage of new opportunities and ultimately, failure of the business. Several studies have also documented numerous implications of arising from adverse cash flow to include; delay in completion time, reduction in profit margin, additional (increased) cost, capital lock-up, and abandonment of projects, litigation/arbitration, bankruptcy, negatively influence site productivity and affect the quality of delivery [20-21].

In a further study by Hazir, Haouari and Erel [22], time delays and poor quality of products can be attributed to negative cash flow. Liang and Gan [23] opined that poor cash flow policy can result to poor technical performance of many small-sized projects. They furthered argued that small construction firmstend to have little fund to finance projects, their business usually depends on the valuation payments to run its daily activities. Therefore, any little delay in payment will invariably affects daily running of the business which leads to poor performance of the projects.

Methods of Improving Cash Flow

Addo [24] warned that when cash flow problem is not timely controlled, its effects are devastating on the performance of projects particularly where it is difficult to access bank loans, overdrafts and invoice financing. In the same vein, Gavin [1] affirmed that cash flow problem can lead to failure of the business if not timely controlled. It can thus be inferred that it is important for a contractor to know what amount of capital he will require for executing a project and when he will require it, and the principle involves, *speed up receipts and slow down payment.* Never attempt to improve cash flow by not paying materials, suppliers, sub-contractors, plants firm etc. These can suspend credit, discontinue quantity rebates and withhold supplies. Loss of worthiness can prove to be very damaging and cash flow problems can bring serious increases in administration expenses.

In an attempt to control cash flow problems, Shogo [25] reported that adverse cash flow can be improved through the submission of valuation regularly, insist on accuracy in valuation and certificates, pursue valid claims, measuring and agreeing value of work promptly and price, agreeing final account, carrying out maintenance promptly, variation to the contract accurately assessed and included in valuations, discount and retention monies should be properly claimed against the contractor own nominated sub-contractor and suppliers, taking full advantage of credit facilities, and reduce or abolish altogether stock of materials. Moskowitz [26] posited that cash flow problems can be improved by t*raining the project manager on cash flow management, process change orders quickly, shop for the best prices* and p*roject future cash flow.* In the same vein, Gavin [1] stated that proper project planning and monitoring can be taken to improve cash flow by boosting cash reserves and strengthen borrowing capacity.

5. Methodology

Population and Sampling

The target population for the study comprised construction clients involved in an on-going construction works in Lagos state, Nigeria. Lagos state was chosen for the study because of its characteristic as the major hub of construction activities in Nigeria. The study focused on clients in order to get the required information on their cash flow management. The construction clients surveyed were both public and private clients. This study combined both convenience and purposive sampling techniques. Convenience sampling was used in this study due to the submission of Teddlie and Yu [27] that convenience sampling involves drawing samples that are both easily accessible and willing to participate in a study. The locations of on-gong projects in Lagos state makes case for the adoption of convenience sampling. Thus, construction firms carrying out construction projects that were accessible and willing to respond were sampled. This study involved construction clients being the financiers of the construction projects procured by the firms and therefore demands the use of purposive sampling. The adoption of purposive sampling technique guaranteed that responses were obtained from appropriate respondents in a firm in order to satisfy the findings on cash flow management. Fifty-nine (59) construction clients were identified and located which formed the sample frame and subsequently formed the sample size since it falls within a manageable size.

Data Collection Method

This study adopted questionnaire method, which is considered as most appropriate method in order to obtain standardized feedbacks from respondents. The first section of the questionnaire used for the study, was used to elicit information on the profile of the respondents. The other sections of the questionnaire elicit information on sources of cash inflows and outflows in construction industry, causes of cash flow problems during construction projects, ways to augment cash flow problems during construction projects, implications of cash flow problems on construction projects performance and effective methods of improving cash flow management in construction industry. The questionnaire designed for the study were tested for validation by sending copies of the questionnaire to experts (senior lecturers) for revision. During the pilot test, some corrections were done to improve the questionnaire structure and finally a total of fifty-nine (59) questionnaires were administered to the targeted respondents.

Method of Data Analysis

For the purpose of this study, data processing was done using statistical software called SPSS (version 25). This statistical tool is commonly used for data analysis by most researchers [28]. The data obtained from the respondents on sources of cash inflows and outflows in construction industry, causes of cash flow problems during construction projects, implications of cash flow problems on construction projects performance and effective methods of improving cash flow management in construction industry were analyzed using mean item score (MIS).Percentile method was used to analyze responses on ways to augment cash flow problems during construction projects. The test of hypothesis formulated for the study that ‘implications of cash flow problem on construction project performance do not depend on causes of cash flow problem during construction projects’ was carried out using Chi-square test.

The 5-point scale for questions on identification of sources of cash inflows and outflows in construction industry was ranged from '1= Never', '2=Not frequent', '3=Frequent', '4=More frequent', and '5= Most frequent'. Causes of cash flow problems during construction projects were measured on a 5-point scale that ranged from '1= Strongly Disagree', '2= Disagree', '3= Neutral', '4= Agree', and '5= Strongly Agree' while, implications of cash flow problems on construction projects performance were also measured on a 5-point scale that ranged from '1= No Impact', '2= Mild Impact', '3= Moderate Impact', '4= Serious Impact', and '5= Very Serious Impact'. The questions on effective methods of improving cash flow management in construction industry was on 5-point scale ranging from '1=Not Effective', '2=Fairly Effective', '3= Effective', '4= More Effective', '5= Most Effective'.

6. Data Analysis

Profile of Respondents

Fifty-four (54) valid responses were received, representing 92% response rate. From Table 1, Private clients represented 51.9% of the targeted respondents while the public clients accounted for 48.1% of the total respondents. The result indicates that both the private and public clients were adequately represented in the survey. In terms of previous projects executed by the respondents, 66.7% had executed 1-10 projects in the last five years, 20.4% had executed 11- 20 projects in the last five years, while only 12.9% of the total respondents had executed 21 projects and above in the last five years. It was further confirmed that 53.7% of the respondents were into building projects; 22.2% accounted for respondents into civil works; while 24.1% involved in both building and civil works. The adequate representation of the respondents under all the variables gave a good indicator that data provided by the respondents can be relied upon for the purpose of analysis.

Table 1: Profile of the Respondents

Variables	Frequency	Percentage (%)
Questionnaire Response		
Number returned	54	91.5
Number not returned	5	8.5
Total	**59**	**100**
Type of Clients		
Public	26	48.1
Private	28	51.9
Total	**54**	**100**
Number of Projects Executed		
1 – 10 projects	36	66.7
11 – 20 projects	11	20.4
21 projects and above	7	12.9
Total	**54**	**100**
Type of Projects		
Building	29	53.7
Civil	12	22.2
Both	13	24.1
Total	**54**	**100**

Sources of Cash Inflows and Outflows in Nigerian Construction Industry

The sources of cash inflows and outflows in Nigerian construction industry were identified by requesting the respondents to indicate and rate on a Likert scale. Table 2 showed the ranking by the respondents on sources of cash inflows into construction industry, it was revealed that more cash come into the construction firms through payment for goods and services from clients/customers which was ranked first with mean item score (MIS) of 4.61; other sources of cash inflows are; interest on savings and investments ranked as second with mean item score of 4.41, while increased bank draft was ranked least with mean item score of 2.88. On the other hand, the result on the sources of cash outflows in construction industry indicated that cash usually move out of the firms

through purchase of stock and raw materials which was ranked first with mean item score (MIS) of 4.62, Payment of wages and salaries was ranked second with mean item score of 4.42, Income tax, Vat and other taxes ranked third with mean item score of 4.35, Reduced overdraft facilities was ranked least among all with mean item score of 3.00.

Table 2: Sources of Cash Inflows and Outflows in Nigerian Construction Industry

Sources	MIS	Rank
Sources of Cash Inflows		
Payment for goods & services from clients/customers	4.61	1
Interest on savings and investments	4.41	2
Receipt of Bank loan	4.23	3
Shareholder investments	3.84	4
Increased bank overdraft	2.88	5
Sources of Cash Outflows		
Purchase of stock and raw materials	4.62	1
Payment of wages and salaries	4.42	2
Income tax, Vat and other taxes	4.35	3
Purchase of fixed asset & office furniture	4.02	4
Loan repayment	3.83	5
Dividend repayment	3.20	6
Reduced overdraft facilities	3.00	7

Causes of Cash Flow Problems during Construction Projects

This section attempted to answer one of the research objectives, which is to assess the causes of cash flow problems during construction projects. To answer the question, respondents were given a Likert Scale, from 1 to 5 ("Strongly Disagree", "Disagree", "Neutral", "Agree", and "Strongly Agree") and they are required to respond according to the scale given. From Table 3, delay in payment to contractors was rated highest as the main cause of cash flow problem with mean item score of 4.72, difficulty in obtaining financial aid was ranked second with mean item score of 4.61, poor credit control and inadequate supplier management were ranked fourth and fifth with mean item scores of 3.94 and 3.81 respectively.

Table 3: Causes of Cash Flow Problems during Construction Projects

Causes	MIS	Rank
Delay in payments to contractors	4.72	1
Difficulty in obtaining financial aid	4.61	2
Inadequate budgetary control	4.54	3
Poor credit control	3.94	4
Inadequate supplier management	3.81	5

Source of Capital to Augment Cash Flow Problems during Construction Projects

It is evident from Table 4 that most of the firms augment their cash flow problems by obtaining Bank loan/Overdraft which carried 75.9% of the respondents, while 24.1% of the respondents ploughed back their Retained profit in order to augment the cash flow problems. None of the respondents indicated Credit purchase as their source of capital.

Table 4: Source of Capital to Augment Cash Flow Problems

Option	Frequency	Percentage (%)
Bank loan/Overdraft	41	75.9
Retained profit	13	24.1
Credit purchase	-	0
Total	**54**	**100**

Implications of Cash Flow Problems on Construction Projects Performance

The table 5 presented the results of implications of cash flow problems on construction projects performance. The ranking by respondents of the implications of cash flow problems on construction project performance showed that capital lock-up was ranked highest as most adverse impact of cash flow on project performance with mean item score of 4.62. This is followed by delay in completion time which was ranked second with mean item score of 4.52, litigation/arbitration and lack of incentive was ranked sixth and seventh with mean item scores of 3.94 and 3.78 respectively.

Table 5: Implications of Cash Flow Problems on Construction Projects Performance

Implications	MIS	Rank
Capital lock-up	4.62	1
Delay in completion time	4.52	2
Abandoning of project	4.19	3
Reduction in profit margin	4.14	4
Additional (increased) cost	4.07	5
Litigation/Arbitration	3.94	6
Lack of incentive	3.78	7

Test of Hypothesis

This section presents the analysis of Chi-square test carried out to confirm whether the null hypothesis should be rejected or accepted. Hypothesis Statement**:** H_0: Implications of cash flow problem on Construction project performance do not depend on causes of cash flow problem during construction projects. From Table 6, the result of Chi-square test shows the values of 55.042 and 23.052 with a P-value 0.000 at 5% level of significance. This implies that the Chi-square critical value is less than Chi-square computed value. Since p-value 0.000 is less than the level of significance (0.05), therefore, null hypothesis is rejected, which means that there is strong evidence against H_0. Therefore, the implications of cash flow problem depend on causes of cash flow problem during construction projects

Table 6: Chi-square Test Statistics of Relationship between Causes and Implications of Cash Flow Problems

	Causes of Cash Flow Problem	Implications of Cash Flow Problem on Project Performance
Chi-Square	55.042[a]	52.250[b]
Difference (df)	9	11
Asymptotic Significance	.000	.000

Effective Methods of Improving Cash Flow on Construction Projects

Table 7 displays a list of identified methods of improving cash flow. It was revealed that regular submission of valuations was rated as most effective method of improving cash flow as it was ranked first with a mean item score of 4.61, taking full advantage of credit facilities was ranked second with a mean item score of 4.54, agreeing final account and carrying out maintenance promptly were ranked at low ebb with mean item scores of 3.76 and 3.47 respectively.

Table 7: Effective Methods of Improving Cash Flow

Methods	MIS	Rank
Regular submission of valuations	4.61	1
Taking full advantage of credit facilities	4.54	2
Insisting on accuracy in valuations and certificate	4.48	3
Reduction of altogether stock of materials	4.10	4
Adequate assessment and inclusion of variation	4.06	5
Pursuing valid claims	3.88	6
Discount and retention monies properly claimed against nominated subcontractor and suppliers	3.85	7
Agreeing final account	3.76	8
Carrying out maintenance promptly	3.47	9

7. Discussion of Findings

This study identified payments received from clients/customers for services rendered and interest on savings/investments as major sources of cash inflow while major sources of cash outflows from the analysis are payment for stock and raw materials and payments for wages and workers' salaries. These findings correlate with the studies of Kew *et al*. [16], Belobo and Pelser [15] where these are considered to be major sources of cash inflows and outflows. The results of the analysis showed that delay in payments to contractors and difficulty in obtaining financial aid are major causes of cash flow problem, which corroborates with the findings of Onkwube [13] and Gambo *et al*. [19] that these variables lead to cash flow problem and which in turns affects project performance. The finding of the result indicated that most construction firms used bank loans and retained profits to augment cash flow problems whenever such are experienced on construction projects. The implication is that they recognize the significant need to augment cash flow as most construction contractors are not financially buoyant which can adversely affect proper delivery of construction projects. The result of adverse implications of cash flow problem on project performance is consistent with the Onkwube [13] that cash flow problem results in capital lock up. Cash flow problem also lead to delay in completion time which is line with the study of Hazir *et al*. [22]. The result of the Chi-square test showed that the implications of cash flow problem on project performance depend on causes of cash flow problem during construction projects. This implies that as causes of cash flow problem during construction projects increases, the more the adverse implications of cash flow problem on project performance.

8. Conclusion

This study sought to evaluate sources of cash flow and its implications on construction projects in Nigeria. It is evidently clear that, the major sources of cash inflow are payments received from clients/customers for services rendered and goods, interest on savings/investment supplied and bank loans, while major sources of cash outflows are payment for stock and raw materials and payments for wages and workers' salaries.

The study shows that all the construction firms investigated experienced cash flow problems and the main causes of such problems are delayed payments and difficulty in obtaining financial aid. The lines of credit that are mostly used by construction firms are to borrow money to augment their cash flow problems. From the result of the study, is can be deduced that, among the major adverse implications of cash flow problem are capital lock-up and delay in completion time of projects. Cash flow on construction projects can be improved through regular submission of valuations, taking full advantage of credit facilities and agreeing final account. Hence, the study concludes that, irrespective of level of cash inflow and outflow on construction projects, once problems of cash flow set in, construction project performance begin to experience adverse implications.

Construction clients should honour interim certificates as at when due so as to prevent delayed payments. Also, contractors are advised to raise finance from bank to solve the immediate cash flow problem and make repayment of such loans as soon as they receive payment from the clients. There is the need for contractors to constantly monitor, check and review construction programme to enable detect any potential cash flow problems early while it is still possible to correct such problems.

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