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Cash-Flow Management in Building Construction Projects

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Abstract: *This study of cash flow management and its various aspects such as cash flow analysis, cash flow forecasting and cash flow statement is performed. A questionnaire is prepared to identify the most affecting factors. A total 56 responses is collected from contractors and desired results are obtained and conclusions are made.*

The results of the questionnaire indicated that the majority of the contractors who encountered failures in their annual project contracts, attributable to poor cash flow management and forecasting, are those contractors who did not perform cash flow analysis prior to submitting bids for projects. The survey showed that in construction industry, material management plays an important role in cash flow management followed by procurement and inventory. The survey also shows that the major sources of capital are the credit, the company assets, the advance payment and the progress payment. Inventory management is the best suited example for cash flow management in a construction project.

Keywords: *Cash, Cash Flow, Cash flow management, Capital, Credit, Contractor, Forecasting.*

I. INTRODUCTION

Cash flow is the difference between cash spent and cash received by a firm during a specific period of time. Cash flow management mandates the application of practices in managing project cash flow against a set baseline. Actually, the accurate estimation of cash flow in the early stages of a project is considered a vital factor that provides an indication of the project's financial significance.

Cash flow refers to the movement of money in and out of your business in terms of income and expenditure. Ideally, a positive cash flow is expected meaning that more money is coming in to the business than goes out. If there is a positive cash flow, the business will be able to settle its bills and invest in growth. A negative cash flow means there is a need to find an alternative source of income to be able to pay off debts.

It is defined as, "The cash receipts or net income from one or more assets for a given period, reckoned after taxes and other disbursements, and often used as a measure of corporate worth". It is also defined as, "the pattern of receipts and expenditures of a company, government, etc., resulting in the availability or non-availability of cash"

To work out the net cash flow, add up all of the cash payments over a set period (typically a month) and take that away from your cash receipts.

It's important not to get too hung up on one particular month, however. Your cash flow can be more accurately judged over a period of three months or more since most businesses will, naturally, have peaks and troughs.

While your turnover might be a nice big number that gives you confidence that your business is doing well, it's the cash flow that offers a better insight into how well your business is managing. As the old saying goes turnover is vanity, profit is sanity and cash flow is reality.

Cash is king when it comes to the financial management of a growing company. The lag between the time you have to pay your suppliers and employees and the time you collect from your customers is the problem, and the solution is cash flow management. At its simplest, cash flow management means delaying outlays of cash as long as possible while encouraging anyone who owes you money to pay it as rapidly as possible. Cash flow management is one of the most important determinants of the success of construction project management.

It is defined as, "The process of planning a company's schedule for paying bills and estimating when income is likely to be received". Cash flow management helps a company avoid damaging its relationship with creditors by not paying bills on time and being forced into bankruptcy. Careful cash flow management allows a company to estimate the amount of cash that it will have on hand at any one time, project trends in cash inflow and cash outflow, and evaluate whether a shortfall or surplus in cash could potentially occur.

II. LITERATURE REVIEW

Cash flow planning is the charting of cash movement into the production process, then into accounts receivable, and back into cash. Cash flow planning is a crucial step in making significant decisions concerning how to liquidate a project with the cash. Cash flow forecasting guides the contractor to the amount of cash needed for the project and to how to return this amount to the account from which it was borrowed. Halpin and Senior (2009) indicated that forecasting cash behaviour over a project's duration is a crucial key for controlling project cash effectively. In addition, performing a thorough cash flow analysis for a project is necessary to eliminate or to minimize the possibility of financial failure.

The internal earnings of a construction company and/or commercial banks' financial facilities are two main sources contractors use to finance the operations of a construction project (Halpin & Senior, 2009). Selecting the financing method depends mainly on the degree of accuracy with which a contractor can estimate cash flow during the duration of the project and the type of project delivery system and corresponding level of risk that may emerge from the use of the financing technique.

When it comes to financing a construction project, the contractor's goal will be to finance the negative gap between project expenses and project revenues with the aim of achieving the optimum possible amount to finance; thus, the contractor's loans cost will be the least (Halpin & Senior, 2009). Although the project's financial nature is that an owner pays a contractor periodic (progress) payments, the contractor may face various financial problems along the project's progress. The owner's progress payments may be delayed, which will affect the progress of the project, unless the contractor has the financial ability to temporarily cover this negative cash value. Project expenses that exceed the cumulative progress payments paid by the owner to the contractor cause this situation. This gap between revenues and expenses is referred to as working capital, which is a source of power for a contractor in commencing a project. The term defines the remaining amount of available cash that the contractor has after deducting the amount of current liabilities. This working capital is the figure that will guide the contractor in the decision to use available credit lines or look for new sources of capital by using corporate finance.

The construction industry is often considered a one of a kind industry and is unique for both small scale as well as large-scale industries, but in reality, it is a manufacturer of unit items, and the difficulty with unit item manufacture is the failure to learn from repeated work. Repeated work brings efficiency and improved productivity, construction uses the concepts of subcontractor and unique suppliers to provide a small step in the path to multiple unit manufacture, but the continual shuffling of the contract types, players, sites and clients means that the simple learning in multiple units has to be relearned, time after time.

If planned properly, company profits can provide an excellent return on investment, but this requires an effective cash flow control procedure. The company has to fund the work for the period from start until the first payment and so:

- 1) Assuming invoices submitted monthly at the end of the month
- 2) The average cost item is not billed for 15 days
- 3) Assuming a 30-day account settlement
- 4) The average payment period is 45 days
- 5) Assuming a ten percent reduction on the amount as withholding
- 6) The amount settled is 90%
- 7) The remaining ten percent is not obtained until the end of the contract payments.

If the company operates on a ten percent profit, then the company is in a neutral at best cash flow from the first payments. The best method to fund this type of contract is to delay payments to sub-contractors for as long as possible, which often leads to the contract terms requiring settlement of all subcontractor accounts prior to invoice settlement. This is in reality a game of cat and mouse involving the movement of money, and it is the velocity of money that is an important indicator of economic vitality. Research shows that only ten percent of companies that earn \$10 million or less forecast their cash flow, which contributes to the excessive failure rates (Strugs, 2015). Complexity and construction projects go hand in hand. Even the most profitable company in the construction industry can collapse if cash flow management is not effective (Central Computer and Telecommunication Agency., 1993; Liu, Zayed, & Li, 2009).

A. Cash Flow Management

Cash management is the corporate process of collecting and managing cash, as well as using it for short-term investing. It is a key component of a company's financial stability and solvency. Corporate treasurers or business managers are frequently responsible for overall cash management and related responsibilities to remain solvent.

The financial management strategy and the cash flow are the two interrelated items of the project affecting and determining each other. Since cash flow is the plan of predicting the future cash requirement of the project, all attitudes about the prospect of the project should take into account while developing flow. For instance, for the same project, the final cash flow curve will change considerably if the contractor planning to apply the front-loading strategy. Besides, if cash shortage foreseen by the cash flow analysis of the project, the company should prepare financial management strategies to cover the cash deficit and complete the project. Therefore, it is important to determine possible strategies analysis.

B. Cash Flow Analysis

An examination of a company's cash inflows and outflows during a specific period. The analysis begins with a starting balance and generates an ending balance after accounting for all cash receipts and paid expenses during the period. The cash flow analysis is often used for financial reporting purposes. See also cash flow projection, cash flow forecast.

Cash flow analysis is an important financial activity for a project and entails listing money flows into and out of a project. Cash flow analysis enables a contractor to project future flows of cash to determine the necessary budget for a project. Cash flow analysis is not concerned with the amount of the cash flow alone, but also the timing of these cash flows. Most cash flow in the construction industry is analyzed with monthly time periods. Cash flow analysis projects the cash balance at the end of each month.

C. Cash Flow Statement

Given the importance of good cash flow management, it might well help to produce a statement that demonstrates this. A cash flow statement looks a lot like a profit and loss statement and the balance sheet. It should aim to look at how cash moves in and out of the business. This in turn, allows you to:

- 1) Consider how funds move through the business
- 2) What impact cash flow has on the running of the business.
- 3) How payments reconcile with cash balances and values

A cash flow statement should be made up of three categories: operating, investing and financing.

- a) *Operating*: This is a net income, plus or minus increases or decreases in current assets and liabilities and expenses.
- b) *Investing*: This figure reflects any increases or decreases in long or fixed term assets (independent of accumulated depreciation).
- c) *Financing*: This reflects any increases or decreases in long term liabilities/debt, owners' capital or dividends.

We have these three figures; either add or take them away from the beginning cash balance to get overall net cash balance.

This statement is a way of ensuring the ability to pay all of the bills. It also indicates when there is a need to get an alternative source of finance. Seasonal businesses can use this to track what happens during peak season and quieter times.

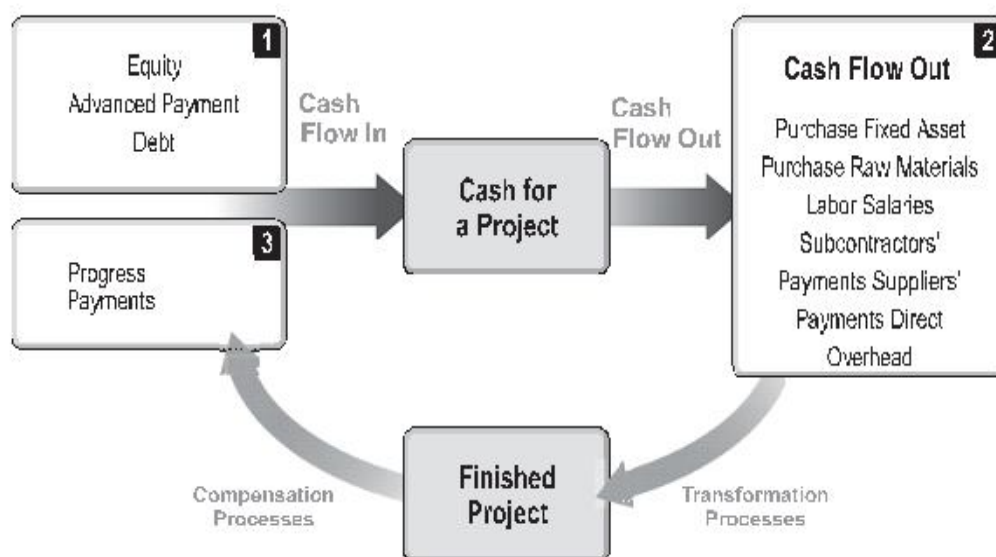


Fig. 1: Cash Flow Process

D. Types Of Cash Flow

- 1) **Terminal Cash Flow:** At the end of the economic life of a capital asset i.e. the last year when the asset is terminated, there is usually, some value in the asset left. The asset may be sold at that point of time as scrap or it may fetch some salvage value. This inflow to a firm in the last (terminal) year is called terminal cash flow. Similarly, in the case of a replacement decision where an old existing asset is replaced with a new asset, the reduction in cost of the new asset, i.e. the sales value of the old asset, is the terminal cash flow of the asset replaced. In addition to the salvage value of the asset, the firm may also recover the increased net working capital that was tied up in the initial year. Thus, this release of working capital should also be added to the salvage value of the asset to determine the terminal cash flows.
- 2) **Client Cash Flow:** In construction, the term 'cash flow' typically refers to an analysis of when costs will be incurred and how much they will amount to during the life of a project. Predicting cash flow is important in order to ensure that an appropriate level of funding is in place and that suitable draw-down facilities are available. Until the main contractor has been appointed, cash flow projections are likely to be based only on agreed fee payment schedules for consultants and a simple division of the construction cost over the likely construction period. It is only when the main contractor is appointed, a master program prepared and some form of payment schedule agreed that cash flow projections become reliable. Cash flow projections may be affected by the need for the early purchase of long-lead time items or by items that the client may wish to purchase that are outside of the main contract (such as furniture or equipment).
- 3) **Contractor Cash Flow:** Contractors have to have money coming in to pay suppliers and subcontractors and for the day-to-day running of the business. At the start of any contract, a payment scheme or table is drawn and agreed with the client or their quantity surveyor.
- 4) **Positive Cash Flow:** Positive cash flow indicates that a company's liquid assets are increasing, enabling it to settle debts, reinvest in its business, return money to shareholders, pay expenses and provide a buffer against future financial challenges. Companies with strong financial flexibility can take advantage of profitable investments. They also fare better in downturns, by avoiding the costs of financial distress. This occurs when your outflow of cash is greater than your incoming cash. This generally spells trouble for a business, but there are steps you can take to remedy the situation and generate or collect more cash while maintaining or cutting expenses.
- 5) **Negative Cash Flow:** Cash flow is the movement of income into and expenditure out of a business over time. If there is more money going out than in, this is negative cash flow. Many property developers have been forced into bankruptcy due to negative cash flow for extended periods of time. This occurs when your outflow of cash is greater than your incoming cash. This generally spells trouble for a business, but there are steps you can take to remedy the situation and generate or collect more cash while maintaining or cutting expenses. A negative cash flow means there is need to find an alternative source of income to be able to pay off debts.

III. DATA ANALYSIS AND FINDINGS

A. Primary Data Survey

The questionnaire is formulated for special categories of respondents, mainly the contractors. The questionnaire is based on the various opinions stated by the contractors, on the questions posed and also highlighting other financial aspects of cash flow and its management. The questionnaire majorly focused on the acceptance of cash flow management in the construction sector.

The questionnaire helped us to make a few observations by which we could discuss about the use of cash flow analysis in the construction industry, and identifying the major factors and sources affecting a cash inflow and outflow in such type of projects.

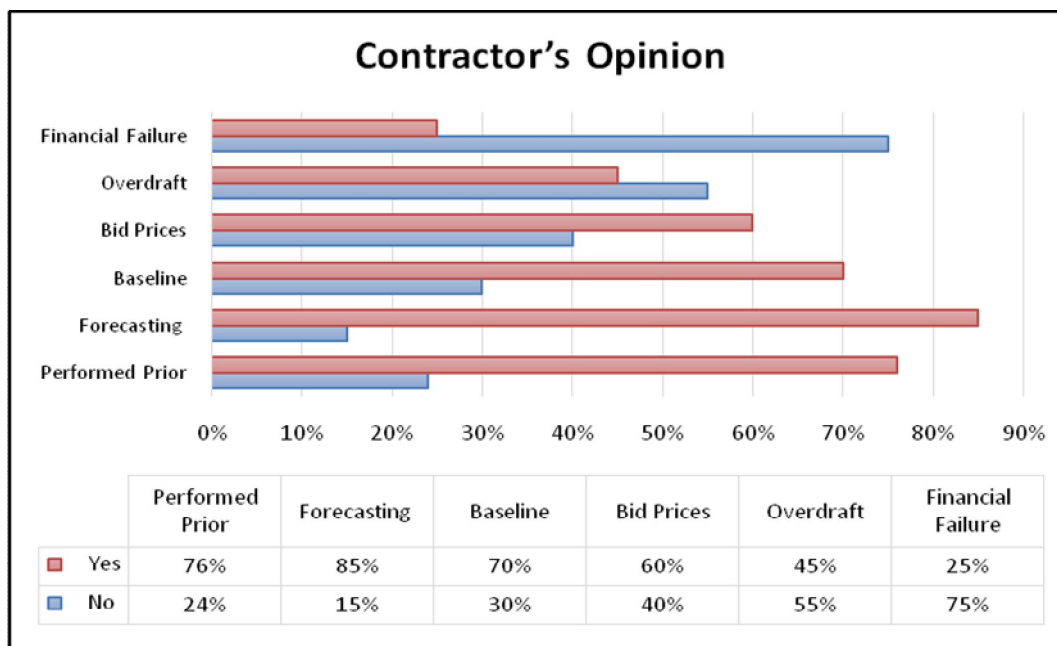
A set of 20 questions is prepared and desired results are obtained. The questions are such that will help us understand the mindset of the contractor and accepting cash flow analysis. It gives us an idea about the success of cash flow forecasting and its importance in a project. A brief study is conducted on a building construction project and observations are made as to what amount (percentage) of total cost of project is utilised at which stage in such a projects.

B. Observations from the Primary Data Survey

- 1) **Polar Questions:** The question 9 states that the maximum no. of contractors performs cash flow analysis or forecasting prior to bidding for a project. The contractors as one of the benefits they gain from cash flow analysis. It seems that contractors are successful in setting cash flow plans, which they monitor and control over the life of a project. Calculating the overdraft amount plays a vital role in determining a suitable financing method and it is observed that less than 50% of contractors conduct cash flow analysis to determine the amount of the overdraft.

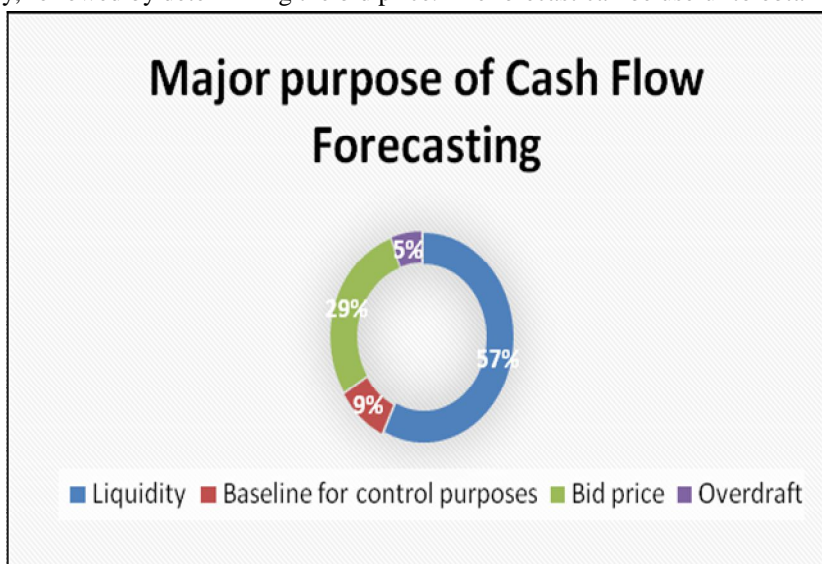
It has been observed that round 75% contractors agree that financial failure is not the consequence of poor implementation of cash flow analysis but there are other factors responsible for the failure.

Contractor's Opinion



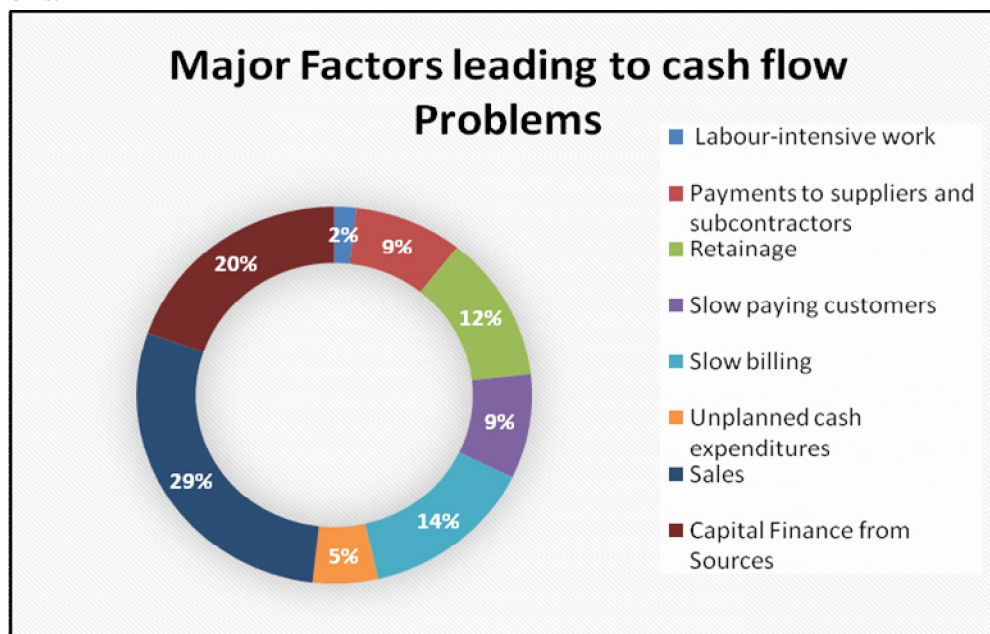
Graph:1 Contractor's Opinion
(Refer Questionnaire, Questions 9-15)

- 2) *Content Questions:* The question 16 states the major purpose of cash flow forecasting. Cash flow forecasting is a very beneficial tool for the analysis of a cash flow. The company cash flow can be projected by the help of a cash flow forecast. The various reasons stated are, to determine the liquidity of the company, to set a baseline for cost control, amount of money cost to include in the bid price or to determine the amount of overdraft. The contractors expressed that the major reason is to determine the liquidity of a company, followed by determining the bid price. The forecast can be useful to obtain a positive cash flow.



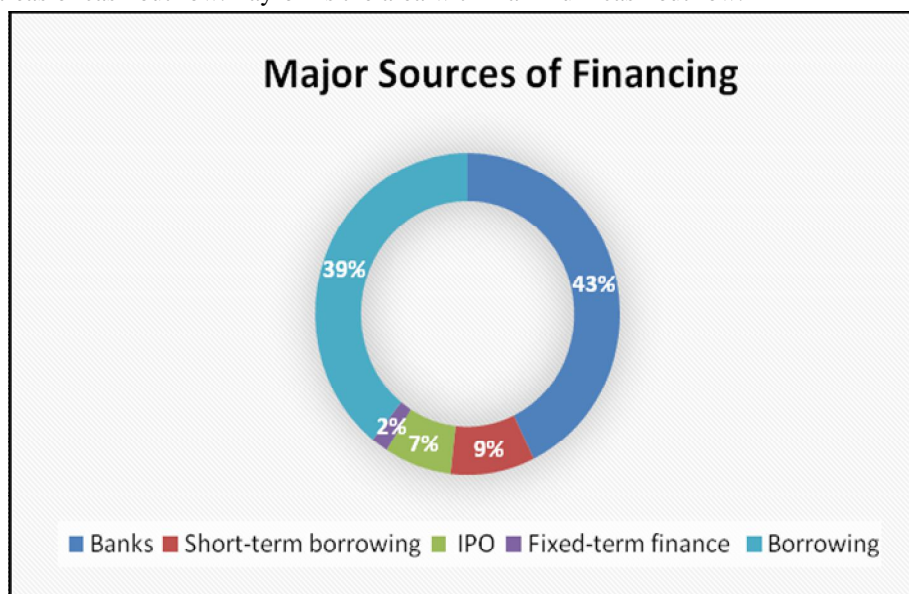
Graph 2: Major purpose of Cash Flow Forecasting
(Refer Appendix, Questionnaire Questions 16)

The question 17 states the major factors leading to cash flow problems. The various reasons mentioned are the factors that affect the cash flow causing various problems such as delays. The factor such as sales of the building unit has a major impact on the cash inflow. The cash inflow is also majorly affected by the sources of capital finance and also by slow project billings. The lower cash inflow and higher cash outflow can lead to a negative cash flow. Payment to suppliers, contractors, sub-contractors etc. and unplanned expenditures can cause discrepancies in the cash flow. Identifying major factors and managing them may help in mitigating the problems.

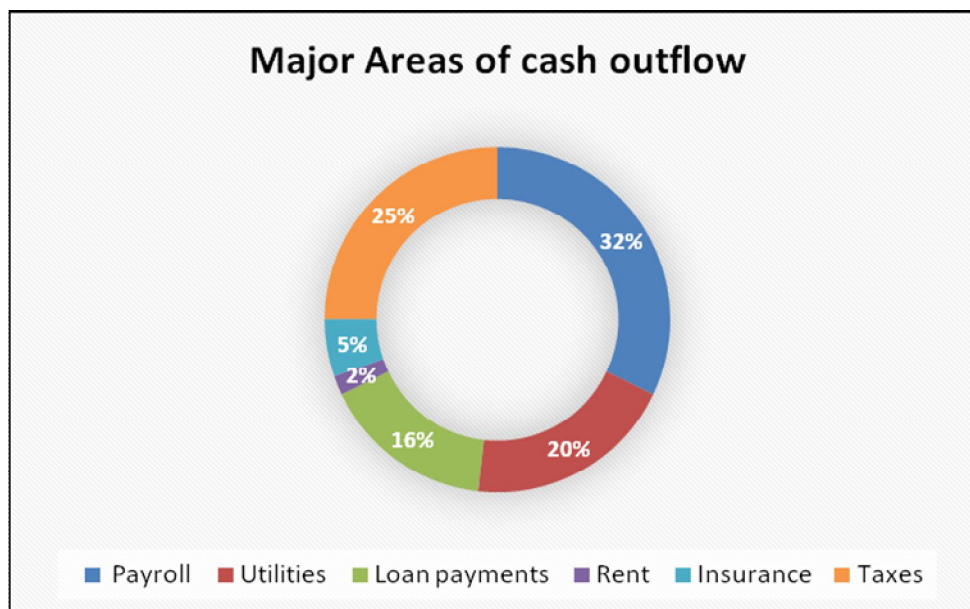


Graph3: Major Factors leading to cash flow Problems
(Refer Appendix, Questionnaire, Questions 17)

The question 18 states the major sources of project financing. The most important source is the loan from banks. Forecast helps in obtaining bank loans. The other sources are borrowings long term and short term, helpful as start-up cost of the project. The question 19 states the areas of cash outflow. Payroll is the area with maximum cash outflow.

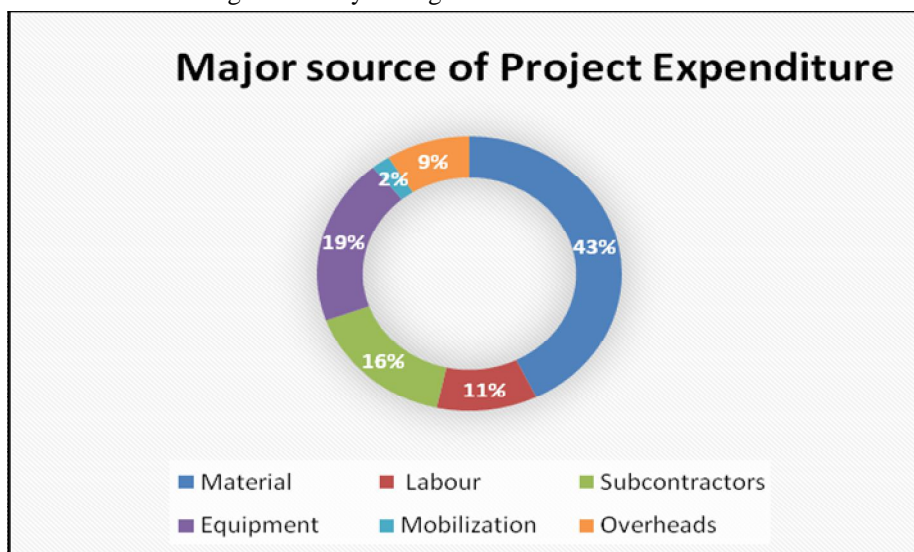


Graph 4: Major Sources of Financing
(Refer Appendix, Questionnaire, Questions 18)



Graph 5: Major areas of cash outflow
(Refer Appendix, Questionnaire, Questions 19)

The question 20 states that the major source of project expenditure is mainly classified as direct cost and indirect cost. Direct costs consist of materials, equipment, labour, subcontractors, suppliers, and job overhead costs that are traced back directly to the project. The indirect cost category, includes cost items, such as office overhead, which are not directly traced back to a particular project. Office overhead includes costs that are generated by management and administrative activities.



Graph 6: Major source of Project Expenditure
(Refer Appendix, Questionnaire, Questions 20)

IV. CONCLUSION

Cash flow is important to any business. Total 56 responses are collected from the contractors. The results of the questionnaire indicate that the majority of the contractors who encounter failures in their annual project contracts, attributable to poor cash flow management and forecasting, are those contractors who do not perform cash flow analysis prior to submitting bids for projects. The survey shows that the major sources of capital are the credit, the company assets, the advance payment and the progress payment. Finally, in construction industry, material cost comprises of almost 60% of the total project and thus, managing the material is beneficial for a positive cash flow.

V. QUESTIONNAIRE

A. Questionnaire for Contractors

This questionnaire aims at the contractor's perspective towards the concept cash flow management. This questionnaire is designed to identify the major factors affecting the cash flow in a construction industry and to analyse the contractor's perspective about the cash flow analysis, its forecasting and its effects on the construction projects.

1) Personal Details

- a) Name: _____
- b) DOB: _____
- c) Gender: ☐ Male ☐ Female
- d) Address: _____
- e) Occupation: _____
- f) Type of Projects: _____
- g) Contact No.: _____
- h) Income: _____

2) Contractor's Opinion

- a) Have you been performing cash flow analysis or forecasting prior to bidding for a project?
☐ Yes
☐ No
- b) Do you agree that performing cash flow analysis or forecasting prior to bidding is beneficial?
☐ Yes
☐ No
- c) Do you agree that Setting a cash flow baseline for control purposes is beneficial?
☐ Yes
☐ No
- d) Do you agree that cash flow analysis assists in determining and including the cost of financing in bid prices?
☐ Yes
☐ No
- e) Do you agree that calculating the overdraft amount plays a vital role in determining a suitable financing method?
☐ Yes
☐ No
- f) Do you believe cash flow management benefits the project and gives more profit?
☐ Yes
☐ No
- g) Do you agree that financial failure is most likely as a consequence of poor implementation of cash flow analysis and projections?
☐ Yes
☐ No

3) Finances

- a) What is the major purpose of Cash Flow Forecasting?
☐ Determine the liquidity of the company



- ☐ Set cash flow baseline for control purposes
- ☐ Determine the amount of money cost to include in the bid price
- ☐ Determine the amount of overdraft
- b) What are the major factors leading to cash flow problems in a construction project?
 - ☐ Labour-intensive work
 - ☐ Payments to suppliers and subcontractors
 - ☐ Retainage
 - ☐ Slow paying customers
 - ☐ Slow billing
 - ☐ Unplanned cash expenditures
 - ☐ Sales
 - ☐ Capital Finance from sources
- c) What are the major sources of financing a building construction project?
 - ☐ Banks
 - ☐ Short-term borrowing
 - ☐ IPO
 - ☐ Fixed-term finance from the bank or other institutions
 - ☐ Borrowing

Any other answer: _____
- d) What are the major areas for cash outflow for building construction projects?
 - ☐ Payroll
 - ☐ Utilities
 - ☐ Loan payments
 - ☐ Rent
 - ☐ Insurance
 - ☐ Taxes

Any other answer: _____
- e) What are the major sources of Project Expenditures in a project?
 - ☐ Material
 - ☐ Labour
 - ☐ Subcontractors
 - ☐ Equipment
 - ☐ Mobilization
 - ☐ Overheads



Any other answer: _____

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