

Study of Cash Flow in Construction Project Management and Its Control

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Abstract-A key component of managing construction projects is cash flow analysis, which helps to maintain liquidity and enhance project success indicators. Traditional cash flow analysis techniques result in a laborious process of cost and schedule estimation. This causes problems for the contractor when selecting any job, regardless of profitability. Following a review of several journals, BIM construction schedules, and financial factors, cash flow is generated for a more precise project while meeting project restrictions and taking project financial scenarios into consideration. An organized method for analyzing project cash flows is established through the use of BIM and resource-integrated 3D simulation platforms. Additionally, it comes with an Excel-based project cash flow generation prototype that can be tested and contrasted with the simulation platform. Analyzing case studies and determine cash flow in construction projects and primary data was collected and analyzed. It is very helpful to get an idea of cash inflow and cash outflow and it also help us to control cash flow in construction industry. Accurate cash flow forecasting, Cash control and Budget Management, Payment Schedule Management and managing inventory helps to control cash flow in construction project. This report also explains how to evaluate and control generated cash flow alternatives in order to improve financial design making and minimize financial hurdles during project execution. This report offers a thorough and conventional overview of cash flow control in construction industry.

Key words: Cash flow control; Cash flow analysis; Case Studies on cash flow and its control

1) INTRODUCTION

The tremendous economic challenges faced by construction companies in recent years, particularly due to the severity of the financial crisis and the continued fall in public investment, have intensified the financial risks they face, making them extremely vulnerable. Construction businesses aim to provide the owner with a project that meets their expectations

in terms of quality, profit, and timeliness.

Contractors are encouraged to avoid any schedule or payment delays as a result of this, and proper financial planning for any project helps to avoid financial troubles throughout the execution phase. The likelihood of attaining project goals within the project's stated budget and time schedule is increased when project financials are well planned. Any financial troubles could result in project delays, higher interest rates or costs, statutory obstacles, and project financial failure, all of which could lead to the firm failing.

There are numerous incoming and outgoing payments in construction projects. The contractor receives revenues from the owner while also paying his obligations to his employees, suppliers, and subcontractors. These incoming and outgoing payments are usually represented by project cash flow. The dates and amounts of the project's received and spent money are represented in the cash flow diagram. Cash flow can be generated and examined before or during construction, and it can alter over time depending on project conditions. Without positive cash flow, construction companies must find ways to continue to operate, until they receive payments for finished projects.

Cash flow analysis is an important financial activity for a project and entails listing money flowing 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. Any change in those terms will lead to a variation in the cash flow analysis results. Cash flow control is the additional planning required to arrange for the cash to meet the demand for the funds.

2)LITERATURE SUMMARY

The journals mentioned above aid in our analysis of the cash flow in construction and its control. Every piece of literature cited in this research has gathered data from workplaces through surveys and interviews. These journals offer information on cash flow in construction projects and its control. By analyzing the data, we can able to understand that cash flow forecasting is the one of most important tools towards understanding the cash inflow and outflow of a project. The main purpose of literature survey is to give an idea about the work conducted all over the world over in the field of project work. Here these journals give the complete idea of a cash inflow and cash outflow of a project and its control.

3)METHODOLOGY

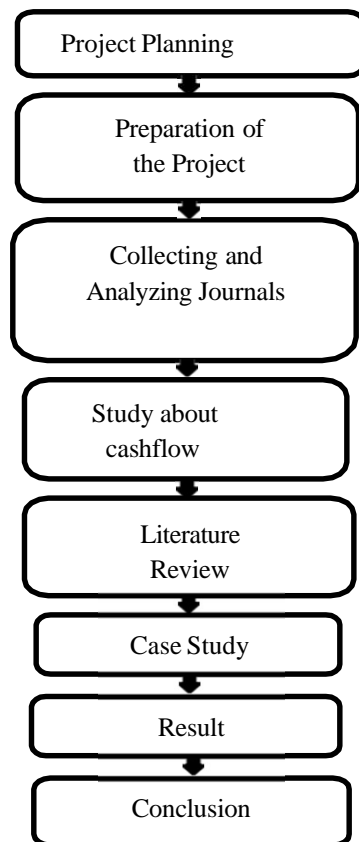


Fig.1 Methodology Chart

4)CASE STUDIES

This research has been implemented case studies methodology to recover cash flow in construction. In

order to collect data, case studies were carried out and reached the findings about the cash flow control in construction projects.

1. Dubai studio city

This is a mixed commercial project of a ground floor plus 5 floors 240 (G+5) located in Dubai Studio City. Its value is \$27,909,526, its duration, 18 months, from September 2007 to completion in February 2009. Total built area is approximately 10,550 m². The structural works consisted of RCC and the facade of the curtain wall. The building is shell and core, which means that the internal finishing of the office areas will be done by the tenants. The payment agreement was based on a 20% advance payment, 10% retention, and a 90-day payment cycle from the date of payment submission.

2. Commercial building

This is a commercial complex with two basements, ground floor and two buildings of eight typical floors each. It has two common basements with a common podium. The two buildings are built on the common podium, and the enabling works are excluded from the main contractor's work. The project carried an estimated cost of \$98,227,900, with a planned duration of 21 months, from March 2008 to January 2010. The payment agreement was 10% advance payment, 10% retention, and a client payment cycle of 60 days from the date of payment submission.

3. Residential villa

This project is two buildings of G+3 types, fully residential with the ground floor for shops, substation, and parking garage. Initial estimates were \$78,099,217 and a 23-month project period, from February 2008 to January 2010. The payment agreement was 10% advance payment, 10% retention, and a client payment cycle of 60 days from the date of payment submission.

4.Example:

Project: Construction of a new office building for ABC Company

Contract value: 10 million

Project Duration :12 months

Challenges:

1)Uneven cash flow: Construction projects typically receive payments in stages based on milestones achieved. This can lead to periods of tight cash flow, especially early in the project when expenses are high and payments are low.

2)Unexpected Costs: Construction projects are prone to unseen circumstances such as weather delays,

material shortages, or costly change orders. These events can disrupt the budget and put further strain on cash flow.

3)Delayed Payments: Clients may delay payments due to financial difficulties or disputes. This can further exacerbate cash flow problems.

Strategies implemented:

1)Detailed Cash Flow Forecasting: The project team created a detailed cash flow forecast that took into account all anticipated inflows and outflows. This forecast was updated regularly to reflect changes in the project schedule and budget.

2)Strict Cost Control: The team implemented a rigorous cost control program to minimize unnecessary expense Progress Billing: Negotiated a contract with the client that allowed for progress payments based on completed work rather than traditional milestones. This provided access to cash needed to cover ongoing expenses.

3)Factoring: Utilized factoring services to receive immediate payment for completed work invoices, albeit at a discount. This provided access to cash needed to cover unexpected expenses or delays in payments.

Results:

- The project was completed on time and within budget.
- Cash flow remained positive throughout the project, avoiding financial disruptions.
- Strong relationships were maintained with suppliers and subcontractors due to timely payments.
- The company gained valuable experience in cash flow management for future projects.

Lessons Learned:

- Proactive cash flow management is essential for the success of any construction project.
- Detailed forecasting and cost control are critical tools for maintaining financial stability.
- Alternative financing options such as progress billing and factoring options such as progress billing and factoring can be valuable resources.
- Building strong relationships with stakeholders is key to navigating cash flow challenges.

5)CASH FLOW ANALYSIS

Cash flow can be analyzed by various methods. By using software and specialized tools designed for

construction cash flow management and update our analysis regularly and communication are very important. Cash flow is generally calculated by subtracting cash out from cash in and which is also equal to subtracting expense from income.

$$\text{Cash flow} = \text{Cash In} - \text{Cash Out} = \text{Income} - \text{Expense}$$

6)DATA ANALYSIS AND FINDINGS

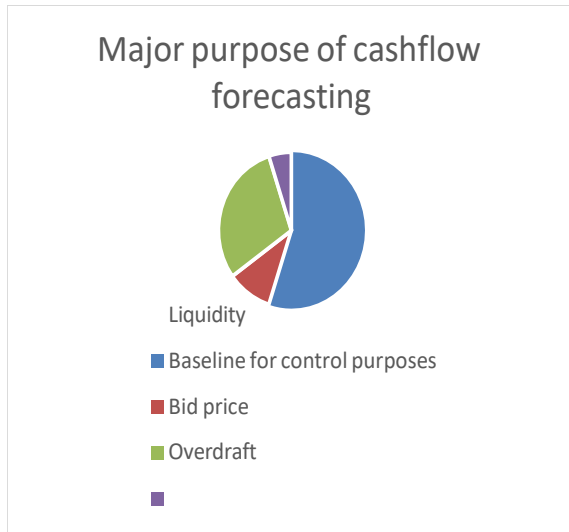
a) Primary data survey

A case study is formulated the various factors responsible to cash flow in construction projects. By analyzing different case studies and by analyzing the data from different journals, we can able identify the factors affecting cash flow in negative and positive ways. It also gives an idea about the success of cash flow forecasting and the importance of cash flow control in a building construction projects. A brief study is implemented on some building construction projects and observations are made as to identify total cost of project is utilized at which stage in such construction projects.

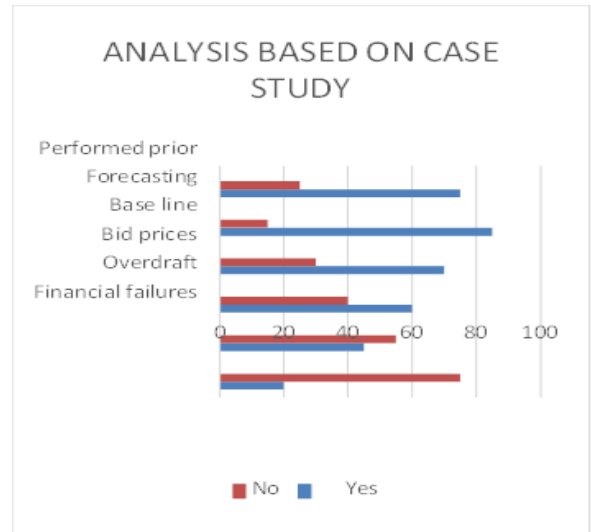
b) Observation from the primary data survey

By analyzing different case studies and journals, it seems that the projects are successful in setting a cash flow plans, which they must be monitor and control throughout the life of a project. The important role of calculation of overdraft amount which helps to determine a suitable method and it is observed that less than 50% of projects conduct cash flow analysis to determine the amount of the overdraft.

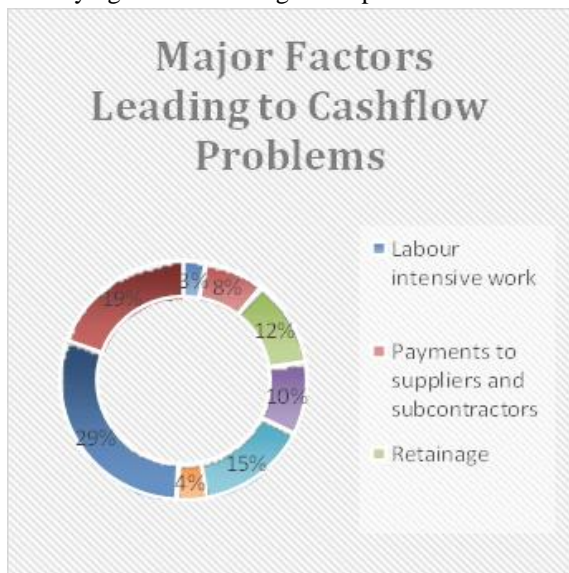
One highly useful technique for the analysis of cash flow is cash flow forecasting. A cash flow prediction can be used to project the company's cash flow. Determining the company's liquidity, establishing a baseline for cost control, figuring out how much to put in the bid price, or figuring out how much of an overdraft to take out are the several explanations given. According to the contractors, figuring out a company's liquidity is the main factor, followed by figuring out the bid price. Using the forecast can help you achieve positive cash flow. Cash flow forecasting method is adopted by majority of construction projects to achieve a positive cash flow. On the basis of analyzing using case studies, we can able to understand how the cash inflow and cash outflow of a construction projects are mainly affected.



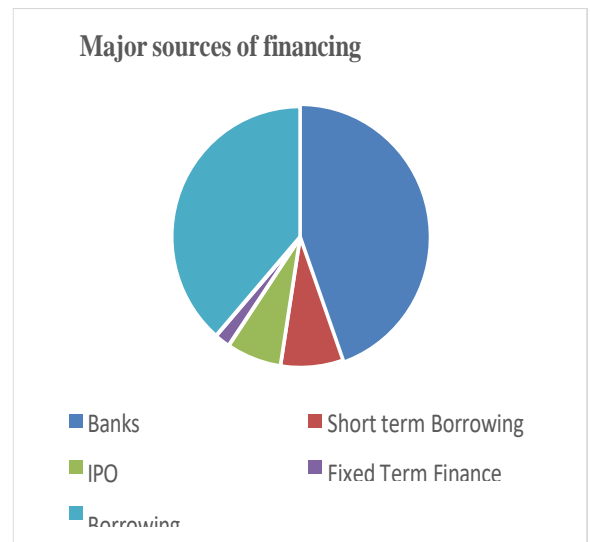
are one component that significantly affects cash inflow. Slow project billings and the sources of capital financing have a significant impact on the cash inflow. A negative cash flow might result from higher cash outflow and lower cash input. Variations in the cash flow might be brought on by unanticipated expenses as well as payments to suppliers, contractors, subcontractors, and other parties. It could be possible to lessen the issues by identifying and controlling the important elements.



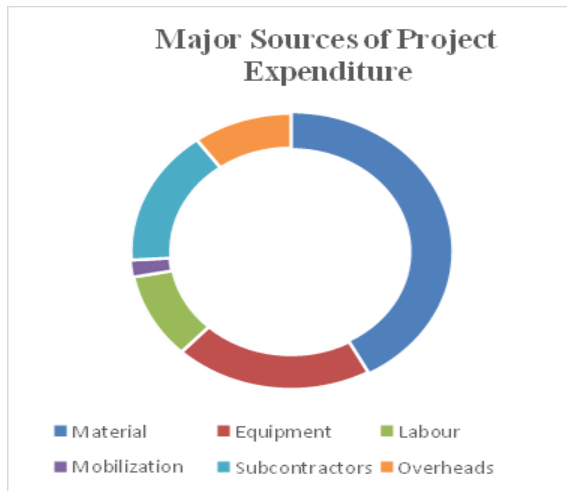
Direct and indirect costs make up the majority of a project's funding sources. Subcontractors, suppliers, labor, materials, equipment, and job overhead cost are all considered direct costs because they can be linked directly to project. Cost components that cannot be clearly linked to a specific project, such office expenses, are included in the indirect cost category. Expenses incurred by management and administrative tasks are included in office overhead.



The bank loan is the most significant source. Forecasting is useful when applying for bank loans. The other sources are long- and short-term loans, which are useful for the project's start-up costs. The area with the biggest financial outflow is payroll. Fixed term finance is comparatively less which is about 2%.



Cash flow control is the lifeblood of construction projects, and managing it effectively is crucial for success. By understanding the factors responsible cash flow, construction companies can ensure a steady flow of cash throughout the project lifecycle. This allows them to meet financial obligations, avoid delays, and achieve project success.



7) RESULTS & SUMMARY

The case studies are a component of large-scale, continuing research initiatives, the findings of which are analyzed and published in other scholarly journals. Interviews, site visits, design and production meetings, and design and production documentation have all been used to gather data for the five examples. Consulted the articles mentioned above for additional details on the case study techniques applied. Based on the analysis we could find the cash flow control in each and every projects. Cash flow control is lifeline of any construction projects. It also gives an idea of how can we control cash flow in construction projects. Construction requires a lot of upfront costs for materials, labor, and equipment. Without steady inflows, projects can stall, leading to delays and even failure. Construction contracts often involve progress payments tied to completed work stages. This means there can gaps between when you pay out and get paid

8) CONCLUSION

The various literatures were collected and studied during this project phase. By analyzing various case studies and referring different literature reviews related to cash flow in construction projects we can able to understand the cash control in a construction work. The cash flow control in construction projects can be done by accurate forecasting. Create a detailed cash flow forecast that predicts future inflows and outflows. This will be help to identify potential

shortfalls and make informed decisions. Implement rigorous cost control measures to keep project spending in check. This might involve tracking all expenditures closely and identifying areas where we can save. Negotiate favorable payment terms with clients or property owners. Try to secure some upfront payments to cover initial costs and aim for progress payments that align with your expenses. Manage subcontractors effectively and explore lines of credit or other financing options to bridge any cash flow gaps. By following these strategies, construction companies can take control of their finances and ensure a successful project.

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