Impact of Retention and Margin on Project Cash-flow

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Abstract

Now a days construction project faces more problems of uneconomical projects, this is because of their improper utilization of resources and funds available with project. So to overcome this problem one should have to give more importance to the proper utilization of sources of funds, because when construction projects are in progress, its cash flow is the most important that can affect the profitability. When a construction project is in progress, it would be beneficial to the contractor if prior knowledge on trend of cash flows in the project is available. The purpose of this paper is to study the various factors affecting project cash flow and to study their impact on project cash flow. The different factors are mobilization advance, the margin in the project, retention, credit arrangement of the contractor with labour, material, plant and equipment suppliers and other sub-contractors, delay, no delay in payment variation risk and material cost variances etc. This paper discusses impact of margin and retention on cash flow. According to cash flow calculations s-curve diagrams for respective retention and margin cases are drawn and then compared with each other which shows how factors affects the project cash flow.

Keyword: Cash flow; Cash flow diagram; S-curve diagrams; Capital lock-up.

I. INTRODUCTION

Cash flow at the project level comprises a complete history of all cash disbursements (cash outflow) and earnings (cash inflow) received from project execution *[8]*. When a construction project is in progress, its cash flow is the most important factor that can affect the profitability because time is the key element to control cost and is the function of production of consulting engineering firms *[2]*. It would be beneficial to the contractor if priorknowledge on trend of cash flows in a project is available. In the construction industry cost and schedule are two most important factors which are effective in achieving the goal in capital projects [5]. It is necessary to study various parameters whichaffect the project cash-flow [6]. Five risk factors which affects the project cash flow according to which a computer based model was developed to help forecast the project cash flow *[7]* provided methodology which helps highway agencies to create their own equations for better prediction of cash flows and trends. The purpose of this paper is to study the various factors affecting project cash flow and to study their impact on project cash flow. The different factors are mobilization advance, the margin in the project, retention, credit arrangement of the contractor with labour, material, plant and equipment suppliers and other sub-contractors, delay, no delay in payment variation risk and material cost variances etc. *[4]* developed a new concept of project control which measures actual project performance that appropriately considers the natural variability of construction costs and duration. This concept uses stochastic-S curve technique. For many years, the construction industry has suffered a proportionally high bankruptcy rate than other industries. One of the major causes of bankruptcy is inadequate cash resources and failure to convince creditors that this inadequacy is only temporary. Moreover,

profit margin in this fiercely competitive industry is usually very tight and is exposed to many uncertainties during the construction phase introduces more than fifty variables for enhancing the flexibility and reliability of cash flow profiles and then cash flow forecasting model has been developed and validated and which is more accurate than traditional models*[1]*. To achieve optimization of project resource-constrained issue is generally considered essential for contractors as means. Establishes a resource- constrained project scheduling model based on constraint programming, whose solution can be found by using combinatorial optimization algorithms. And which maximizes net project cash flow to optimize project profit from perspective of contractors *[9]*. It is necessary to study as the construction progresses, how cash flow will be affected, as the varying factors changes, can also be made known earlier to the project manager. It serves as a cost control tool during the construction phase the need for simple and fast techniques in cash flow forecasting.

A. Cash flow diagram:

Any organization involved in a project receives and spends different amounts of money at different points in time, and a cash-flow diagram is a visual representation of this inflow and outflow of funds [4]. Although in practice this inflow and outflow does not necessarily follow any pattern, it is sometimes assumed that all transaction (inwards or outwards) takes place either at the beginning or end of a particular period, which may be a week, a month, a quarter, or a year, simply to simplify the analysis. In other words, if it is decided that all transactions in a month will be recorded as having occurred on the last day of that month, or the first day of the next month [4].

In a cash-flow diagram, usually time is drawn on the horizontal (X) axis in an appropriate scale, in terms of week, months, years, etc.,whereas the Y-axis represents the amount involved in the transaction, with the receipts and disbursements being drawn on the positive and negative side, respectively, on the Y-axis.

In order to draw a project cash-flow diagram, the following details are required.

1. The gross bill value and its time of submission.
2. The measurement period. It is usual for contractors to be paid on a monthly basis. The payment can be made fortnightly or sometimes bimonthly as well. These conditions can be found under 'terms of payment' given in the tender document.
3. The certification time taken by the owner. In normal conditions, the owner takes about three to four weeks to process the bill and release the payment to the contractor.
4. The retention money deducted by the owner and the time to release the retention money.
5. The mobilization advance, the plant and equipment advance, and the material advance, and the terms of their recovery.
6. The details of cost incurred by the contractor for raising a particular bill value. This break- up of costs should be in terms of labour cost, plant and equipment cost, sub-contractors cost and project overheads.
7. The credit period (delay between incurring a cost and actual time at which the cost is reimbursed) [4].

II. DIFFERENT FACTORS

Following are the factors which impacts the project

cash flow-

1. Mobilization advance.
2. The margin in project.
3. Retention
4. Credit arrangement of the contractor with labour, material, plant and equipment suppliers and other sub-contractors.
5. Certification type such as over-measurement and under-measurement.
6. Extra claims.
7. Distribution of margin such as front loading and back loading
8. Certification period.

A. Margin:

The excess amount over the cost is the margin. Thus, the higher the margin in a project, the better it is for the contractor's cash flow. It can be clearly say that as the margin increases, there is betterment in the contractor's cash-flow position, keeping all the factors same.

B. Retention:

Retention tends to reduce the margin obtained from a project. In case of very low margins, the retention can even reduce the margin to zero or less. Thus, retention affects the contractor's cash flow in a negative manner. The higher the retention, the bigger is the cash flow problem. In order to address this issue, some contractors request the owner to get away with retention amount in lieu of bank guarantee. Thus, instead of cash retention, bank guarantee is in vogue these days [4].
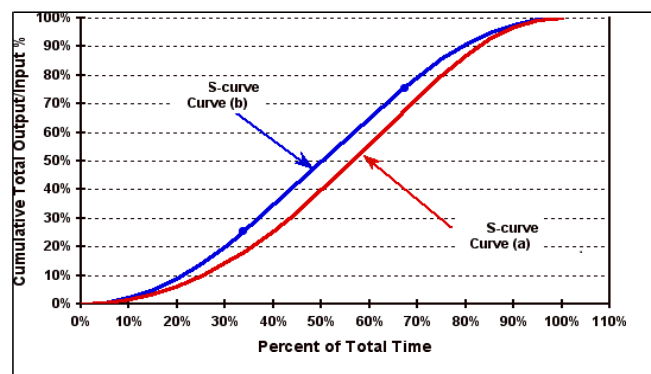
III.   S-CURVE DIAGRAM

Fig.1 S-Curve diagram

S-curve can be used to monitor the cost of a construction project. The s-curve very nearly depicts the progress profile of construction project, which is characterized by slow progress at the beginning and rapid progress towards the middle, followed by slow progress again towards the end. Standard S-curve diagrams which represent the running cumulative value of contracts are used to produce a running cumulative cost commitment curve by deducting the overall mark-up applied. These curves are then converted (using time delays and retention) into cash in and cash out. The net of these curves gives the predicted cash flows for the contracts *[4]*.

IV.   APPLICATION OF CASH-FLOW DIAGRAMS

298

A. Determining of cash requirement of a project:

With the knowledge of cumulative cash outflow and cumulative cash receipt, we can determine the maximum cash required for a project *[4].*

B. Determining of Capital lock-up:

While estimating the effect of margin and retention money on contractor's cash flow diagram, one can notice that the contracting company sometimes faces negative cash flow in the early stages of the project. This negative cash flow experienced in the early stages of projects represents locked-up capital that is either supplied from the contracting company's cash reserves or borrowed. A measure of the interest payable is obtained by calculating the area between the cash out and the cash-in.

The negative cash flow indicates that the contractor has to mobilize this much fund to execute the project. The area under the 'negative cash flow' period is used to calculate the financing charges for the project by the contractor. The total area would have a unit of Rs. * months and also known as captim, standing for capital*time. In order to calculate the interest charges for financing the project, we use the captim, in the following manner. Interest on the capital required for the project = (Captim in Rs. Month X interest charges per annum %) / (12 X 100) *[4].*

V. SAMPLE PROJECT

Name of the Project:
Construction of submersible bridge across Bhatsa river on Padgha Khadavali road
(M.D.R. 56) at Km. 2/740 Tal: Bhiwandi, Dist: Thane.
Division: Special Project (P.W.) Division, Thane. **Sub Division:** Special Project (P.W.) Sub Division, Kalyan.
Tender cost: Rs. 23121720.00
Accepted tender cost (18.8% gross): Rs. 27468603.00
Contractor's name: M/s Shree Datta Construction (J.V.) Kalyan

Before going for development of cash flow and s- curve diagrams some assumptions are made:

a) There is one month delay in payment to the contractor.
b) 50% release of security deposit is done after 1month completion of project and remaining 50% is done after 6 months.

VI. RESULTS

According to inflow and outflow calculations cumulative cash flow (s-curve) diagrams are drawn.

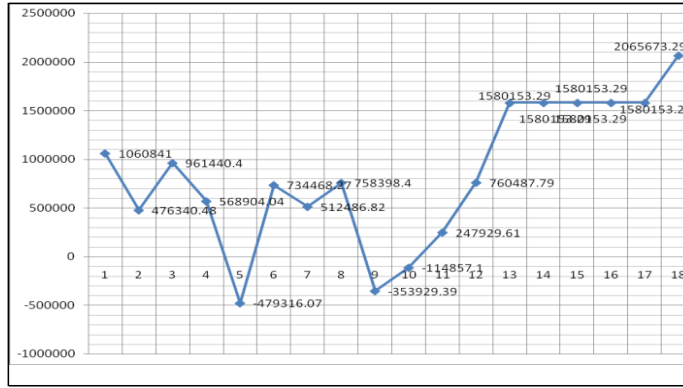1. Considering for constant retention (2%):

A. 8% margin:

Fig 2: Cashflow
for 8% margin and
2% retention
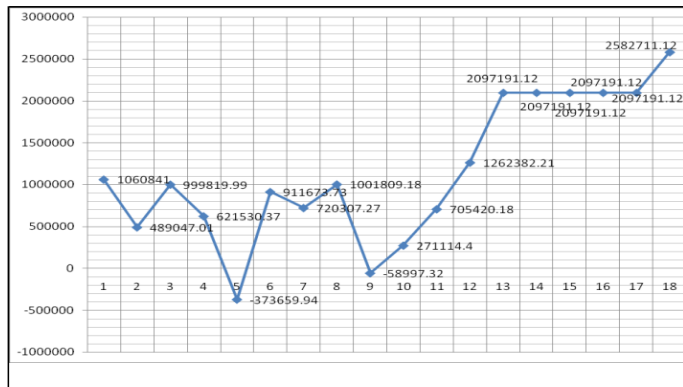
B. 10% margin:

Fig 3: Cashflow
for 10% margin
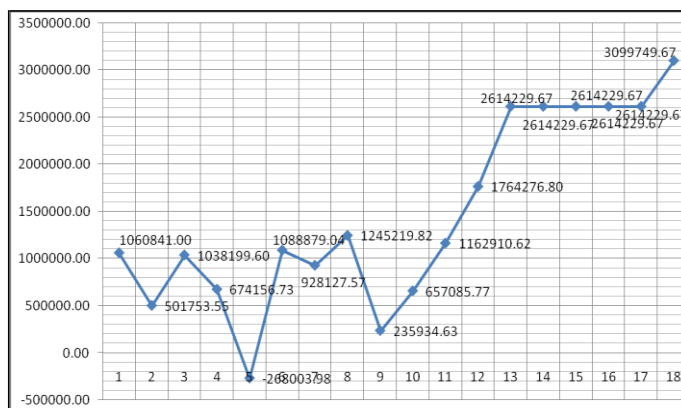and 2% retention

C. 12% margin:

Fig 4: Cashflow
for 12% margin
and 2% retention

2. Considering for constant margin (10%) and variable retention
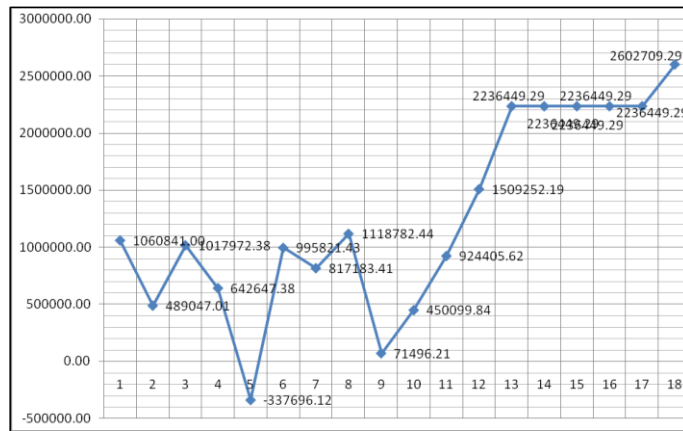
   A. *For 1% retention:*

Fig 5: Cashflow
for 1% retention
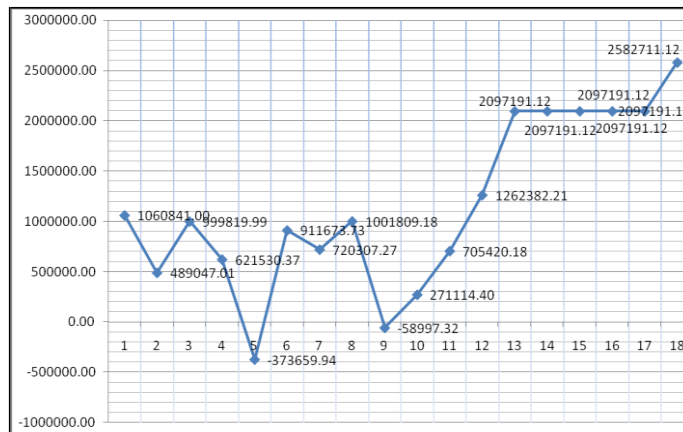and 10% margin

   B. *For 2% retention:*

Fig 6: Cashflow
for 2% retention
and 10% margin

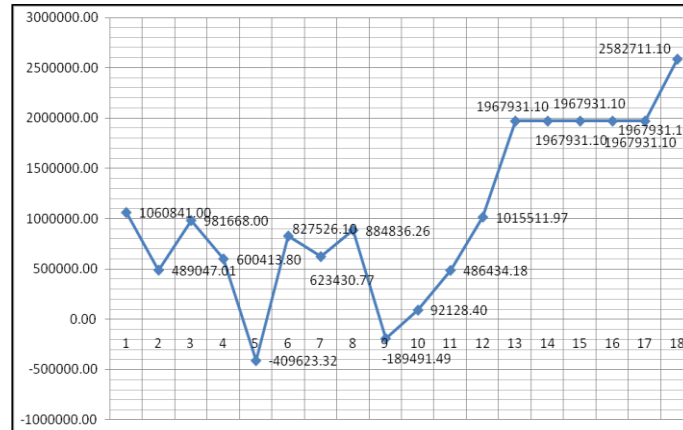   C. *For 3% retention:*

Fig 7: Cashflow
for 3% retention
and 10% margin

VII.   CONCLUSIONS

In margin factor: It is observed that increase in the margin, increases profitability level of contractor's cash flow.

In retention factor: It is observed that increase in the retention then profitability level of contractors cash flow goes on decreasing, means he faces more negative cash flow problem in particular stage of project.

By consideration of margin factor; it can be concluded that as contractor increases his margin the there will be betterment in contractor's cash flow position and vice versa.

By consideration of retention factor; it can be concluded that as there is increase in retention which affects contractor's cash flow position in negative manner.

If retention factor is more, then contractor may face problem of negative cash flow in very early stage of contract.

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