

**New Approach Towards Study And Estimation Of Cost Escalation  
In Construction Industry**<sup>1</sup>Saeel K.Bhosale, <sup>2</sup>A.P.Khatri<sup>1</sup>Department of Civil Engineering, TSSM'S Bhivarabai College Of Engineering and Research Pune, India<sup>2</sup>Department of Civil Engineering, TSSM'S Bhivarabai College Of Engineering and Research Pune, India.

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**Abstract :** *The construction industry is a vital sector in any economy and significantly contributes to socio-economic growth of a country. Cost escalations one of the consequential identified risks faced by construction industry. Current approach to accommodate price variation in India is unrealistic and non-compensating. With the advent of contracting practices in the construction industry and the risk faced by contractors, reviewing the existing methodology of price variation and suggesting changes in the working process is of utmost importance. This paper attempts to lay down two alternatives for the traditional cost escalation formula for the Indian construction industry. While the traditional formulae in India and many other countries rely on the use of Wholesale Price Index (WPI) and Consumer Price Index (CPI) to calculate cost variation, the new approaches lay stress on the establishment of new indices known as Construction Cost Indices, or using the market rate method for calculating escalation. This paper also tries to bring forth the various shortcomings in the existing methodology and suggests ways to avoid such inadequacies in the new approaches. The paper also emphasizes the use of these formulae in the international arena and provides a comparison of the methods to highlight the significance of new approaches.*

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**Keywords** – Construction industry; cost escalation; Road Project; WPI; CPI; CCI.

**I. INTRODUCTION**

Construction projects are usually of quite lengthy ranging from several months to several years. Also, such construction projects are performed according to a pre-confirmed contract amount and contract

agreement in principle. Therefore, there is a strong probability that the cost of labour and materials will rise and fall periodically, to a greater or lesser extent, during the life of the project. Thus, most contractors have to bear considerable damage at that time, due to the sudden rise of international raw materials or exchange rates under a lump sum or fixed-price contract. Therefore, the provisions regarding contract price escalation should be rearranged systemically to cope with the sudden price changes. “**Escalation**” is a term used in most countries, to indicate the extent of these changes from the commencement of a project through any point during its life. As equivalent terms, ‘fluctuations’, ‘rise and fall’ and ‘contract price adjustment’ are used interchangeably.

**Cost escalation** is defined as changes in the cost or price of specific goods or services in a given economy over a period of time. It refers to the increase in the amount of money required to construct a project over and above the original budgeted amount. Cost escalation occurs when actual costs exceed previously estimated values.

**II. OBJECTIVES**

- 1) To Study various procedures and techniques used for forecasting the escalation in prices.
- 2) To Study proposed new approaches and methods that can be implemented in India in the field of cost escalation.
- 3) To prove their authenticity with help of illustrative example (i.e case study) and worldwide evidences.

**III. METHODOLOGY**

- 1) To carry out Detailed literature review.
- 2) Study of important parameters like WPI, CPI used in calculation of cost escalation.

- 3) To study limitations and problems in existing formulae (CPI,WPI) and its application for forecasting cost escalation.
- 4) To check practical application of new approaches (CCI and market method) to be tested and justified by applying them to an actual case study for road construction project.

#### IV. LITERATURE REVIEW

##### A. Cost escalation

The term “Escalation” means an “increase that counteracts an unjust discrepancy between the price of a product and the cost of the materials”. It is the provision of “the adjustments of prices proportionally and usually periodically and automatically to an alteration (as a rise) in the cost of materials, or a similar adjustment of wages to an alteration in the cost of living”. In a works contract, it would mean an increase in the price of an item of work over and above the rate stipulated in the tender, during the period of the contract and according to the escalation clauses as well as the formulae therein.

The major inputs in a project such as Material, Labour, Plant & Equipment, Transportation and Energy are prone to escalation, as demonstrated by the figure below:

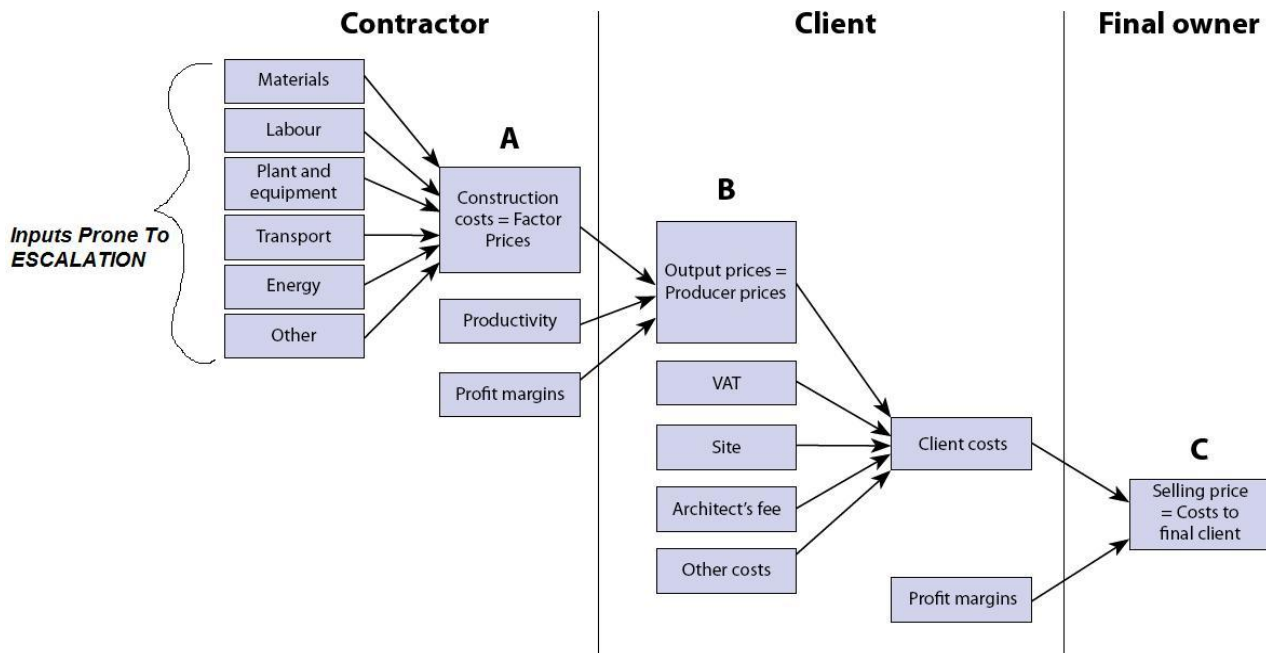


Fig.1 Typical structure of construction project

##### B. Causes of cost escalation

Cost Escalation is caused by many factors such as inflation, market conditions, risk allocation clauses in the contract, interest rate and taxes. A number of factors are responsible for the recent increases in the cost of construction.

The most immediate issues are currently:

- The recent major natural disasters
- Increases in material cost
- Bid market disruptions
- The high volume of construction work
- The regulatory climate

**C. Factors that lead to cost escalation** are said to include among others:

- The size of the project
- Project scope enlargement
- Inflation
- Length of time to complete the project

- Incompleteness of preliminary engineering and quantity
- Surveys
- Engineering uncertainties
- Exogenous delays
- Complexities of administrative structures
- Inexperience of administrative personnel

## V. CASE STUDY

The techniques and methods used are applied to an actual case study of a road construction project, “Rehabilitation and upgradation Bekaria-Gogunda section (km.29.00 TO km.73.00) OF NH-76 TO 4 Lane, (Contract Value = Rs. 415.76 Crores)

## VI. TECHNIQUES USED IN ANALYSING COST ESCALATION

### 1. Traditional Method (WPI/CPI)

WPI is the Index that is used to measure the change in the average Price level of goods traded in wholesale market. In India, a total of 676 commodities data on Price level is tracked through WPI which is an indicator of movement in prices of commodities in all trade and transactions. It is also the Price Index which is available on a weekly basis with the shortest possible time lag only two weeks. The Indian government has taken WPI as an indicator of the rate of inflation in the economy. WPI is a measure to monitor the movement of general level of prices in the economy. It is widely used by Government, banks, industry and business circles.

Items included in WPI:

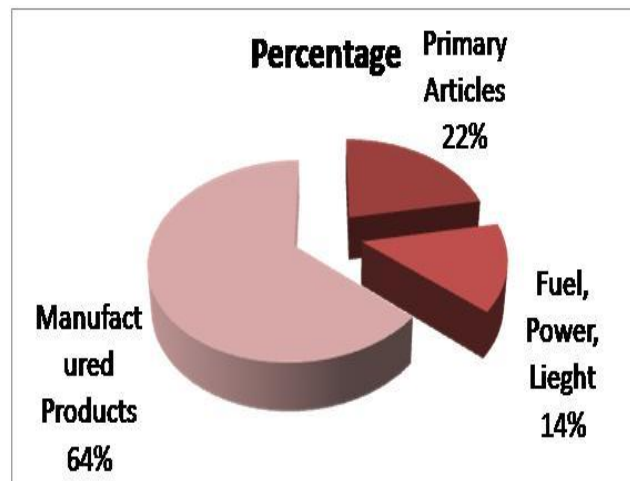


Fig.2 Items in WPI

CPI is a statistical time-series measure of a weighted average of prices of a specified set of goods and services purchased by consumers. It is a price index that tracks the prices of a specified basket of consumer goods and services, providing a measure of inflation. The Consumer Price Index (CPI) measures the average change in the prices paid for a market basket of goods and services.

There are four Consumer Price Indices (CPI) released at national level. These are:

- CPI for Urban Non-Manual Employees (UNME)
- CPI for Industrial Workers (IW)
- CPI for Agricultural Labourers (AL)
- CPI for Rural Labourers (RL).

The Formula(e) used for adjustment of various prices is:

$$V = 0.85 * \frac{P}{100} * R * \frac{(L1-L0)}{L0} \dots\dots\dots(i)$$

Where,

**V** = increase or decrease in cost of work during quarter under consideration due to changes in rates for various components.  
**L0** = Average consumer price index for various subgroups on the **date of agreement** as published on official government site.

**L1** = Average consumer price index for various subgroups for the **quarter** published on official government site.

**P** = Percentage of various components of the work.

**R** = Value of work done per quarter.

Using above formulae we have calculated price adjustment cost for various components like cement, steel, labour ,POL, Bitumen and other misc materials .

**Drawback of WPI**

- i) The Main problem with WPI calculation is that more than 100 out of the 676 commodities included in the Index have ceased to be important from consumption point of view.
- ii) India constituted the last WPI series of commodities in 2004-05, but has not updated and cannot be used as barometer to calculate escalation.
- iii) Many developed countries have already migrated to the other policy to decide the key rate and we are still stuck up with using WPI.
- iv) The WPI is based on collecting of almost 676 odd commodities and the latest collection of these items was done by 2003. It is indeed true that the Index still contains and weighs the items that are near obsolete and this doesn't make sense.

**2. Proposed Market Rate Method (MRM)**

There are many parameters involved in the calculation of any Price Index and due to so many drawbacks in calculation of indices, it is very difficult to develop indices which reflect the true picture of the variation in prices of different material. Due to various complications, it is not possible to obtain completely flawless values of the cost indices. Hence the objective of the study is to use a practical approach for calculation of cost escalation which eliminates the use of cost indices and still gives realistic results.

**Values To Be Considered**

- i) Use of actual market rates of the material to calculate difference in the cost instead of using the various cost indices.
- ii) The base price of material can be fixed on basis of date of release of tender document.
- iii) Current price should be taken for that quarter/month.

$$V = 0.85 * \frac{P}{100} * R * \frac{(L1-L0)}{L0} \dots\dots\dots(ii)$$

Where,

**V** = increase or decrease in cost of work during quarter under consideration due to changes in rates for various components.

**L0** = The **market rate** for material on the day 28 days prior to the date of opening of Bids .

**L1** = Market rate for the period under consideration.

**P** = Percentage of various components of the work.

Using above formulae we have calculated price adjustment cost for cement and steel.

**R** = Value of work done per quarter.

**Critical points of discussion**

- i) All the major and minor material used in project can be included under the same escalation clause. The conventional method of putting under generalised formula and placing it in other materials category is rejected. Therefore no scope for ambiguity but very minor material can be included in other category.
- ii) This method may sometimes seem troublesome as it is very difficult to come to an agreement on the various price rise of the material, as, at different vendors, the price rise in materials may be different of opinion. But with good management practices and coordination between the client and the contractor such a problem can be overcome.

**Advantages Of Market Rate Method**

- i) Adopting this methodology, all the areas of indistinctness are eliminated. The MRM for computing the cost escalation can result in a realistic result, if properly and thoughtfully adopted.
- ii) It purges all the uncertainty related to various cost indices.
- iii) By using the proposed Market Rate Method, more and more materials can be removed from this “other materials” category, since there is no want of indices in this method, which are otherwise unavailable for most of the materials subject to escalation terms.

**VI. RESULT**

1. Using Traditional method

Component	Escalation Amount
Labour	14,62,02,000
POL	4,19,01,900
P&M	1,88,10,709
Bitumen	22,37,57,587
Cement	4,58,11,005
Steel	1,15,02,112
Other Material	10,58,15,899
<b>Total Escalation</b>	<b>59,38,01,212</b>

2.Using MRM Method

<b>Component</b>	<b>Escalation Amount</b>
Labour	14,62,02,000
POL	4,19,01,900
P&M	1,88,10,709
Bitumen	22,37,57,587
Cement	6,53,13,008
Steel	1,91,92,390
Other Material	10,58,15,899
<b>Total Escalation</b>	<b>62,19,93,493</b>

Difference in escalation amount = 2,81,92,281

% Difference in Total escalation amount =  $(621993493-593801212)/593801212 * 100$   
= **4.74%**

### **VI. INTERPRETATION OF RESULT**

The above interpretation of results obtained by using the traditional Wholesale Price Index (WPI) and the proposed Market Rate Method (MRM). Based on the interpretation of results obtained it is observed that the traditional method do not yield a realistic value of escalation amount. The value obtained from traditional method is found to be much lower then the value incurred during the project. Hence, loss for the contractor, this action leads to unrealistic bid as the contractors add an extra lump sum amount of their own wish and apprehension, to their bid proposals during the bidding process for any construction project, in spite of the existence of escalations clauses in the tender documents. Hence, ambiguity for the client/bid evaluator as well as enhancement of the risk of loosing the bid for the bidding contractor is created, due to improbable and non-competent bid proposals.

### **VIII. CONCLUSION**

- i) From the case study, it can be inferred that the **Market Rate Method (MRM)** used yielded better results than the results obtained from Traditional **Wholesale Price Index (WPI)**Method .
- ii) If the escalation working were done using the Market Rate Method, the project would have probably quoted **62.19cr** and the percentage difference is about **4.74%** which is itself a huge difference. This is an enormous amount, which is entirely lost in the game of construction contractorship, just due to the existing impractical and vague techniques and traditional procedures.

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