

# Effective Cost Escalation Management in Construction Projects

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**Abstract**—The construction industry is an important sector in any economy and significantly contributes to the socio-economic development of a country. Cost escalation is one of the important identified risks faced by the construction industry. This can be accounted for a substantial part of construction cost especially in long term projects where the uncertainty is greater. Hence to overcome this problem there arises a need to assess the risk of cost escalation in construction program. Therefore the objective of the study is to propose new and modified theories so that the subject area inclines towards accuracy and perfection under the case study of a building construction project. The study throws light on the existing traditional method such as Whole Sale Price Index (WPI) along with their advantages and limitations that are being used in the computation of cost escalation. The study proposes new approaches and method such as the Market Rate Method (MRM) that can be implemented in the field of cost escalation, so that various errors, complexities and ambiguity in the still prevailing techniques could be removed. The proposed methods have been discussed with the help of case study that proves its authenticity. The result of the study indicates that this new approach yields better results than the traditional methods which are more widely used.

**Keywords:** Cost Escalation, Construction Industry, Whole Sale Price Index, Market Rate Method.

## 1. INTRODUCTION

### 1.1 General

In developing country such as India cost escalation is one of the major phenomenon faced by the construction industry which has led to delay of several other projects associated with it. Thus there is need for more realistic approach towards the management of cost associated with the projects. In general construction projects ranges from several months to several years. Therefore there is probability that the cost of labour and material increases hence increases the cost of project.

Escalation is a risk that can account for a substantial part of construction cost, especially in long term projects where the variability and uncertainty is greater. In multi-project

programs, the effect of escalation can be the prime concern. Cost escalation in construction project refers to anticipated increase in cost of constructing a project over a period. Cost increase usually occur as a result of fluctuation of market forces and reflect increases in the cost of material/ labour and higher levels of construction activity.

### 1.2 Literature Review

Escalation reflects change in productivity, technology, profit margins and market conditions such as high demand and so on. And complicating the situation price escalation varies by region and procurement strategy [1]. Cost escalation is directly proportional to increase in price of all the construction element of the original contract. Escalation in construction market has been extremely volatile and is expected to continue in the near future due to demand for resources, skilled workers and continuous strong growth [2]. Nine out of every ten construction projects experiences cost escalation and most occurs before construction begins. Escalation mainly attributes because of poor site management and supervision, low speed of decision making and client-initiated variations at the construction phase of the project [3]. Delay in projects are the universal phenomenon and construction projects are no exception. cost escalation can be categorized into two broad groups: uncontrollable and controllable factors [4].

Till now, many researchers have presented various risk management models and techniques to minimize risk of escalation. But the correlation among various risks associated with escalation and their interdependency is not yet reported. Therefore, the main objective of this study reflects methods by which participants in construction projects can both track the extent of escalation and work together to minimize the impact of cost escalation on the success of a project.

### 1.3 Case Study

"Academic cum library building for NITIE" at Powai, Mumbai is taken as case study. A tender document, bill of

quantities and abstract sheets provides necessary data for project cost and scheduling activities.

**2. TRADITIONAL METHOD (WPI)**

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.

**2.1 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 contain and weighs the items that are near obsolete and this doesn't make sense.

**3. PROPOSED METHOD 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.

**3.1 Values To Be Considered**

- i) The base price of cement (i.e.) Market rate of cement is taken 28 days prior to date of release of tender.
- ii) The current price should be taken as the price of the material in the month under consideration.

**3.2 Advantages Of Market Rate Method**

- i) Adopting this methodology, all the area of indistinctness are eliminated. The MRM for computing the cost escalation can result into realistic result, if properly and thought fully 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.

**3.3 Requirements of Market Rate Method**

If an owner intends to utilize an actual cost based escalation provision, it is suggested that the arrangement include at least the following essential pieces:

- i) Adequate documentation (e.g., supplier quotes and detailed bid breakdowns) establishing the base price for the application of the escalation provision.
- ii) Documentation (e.g., additional supplier quotes) establishing that the "base price" is, in fact, a reasonable price.
- iii) A contractual obligation that the contractor and subcontractors immediately (within a specified timeframe after contract award) place orders for any material items subject to escalation.
- iv) Sworn certification by the contractor of the accuracy of, and actual reliance on, the material price in the bid, and of the accuracy of contractor's representations regarding the actual material cost.
- v) Prompt notice requirements.
- vi) Exclusion of overhead and profit mark-up on the price escalation.
- vii) Adequate assurance that the contractor's price does not include a hidden escalation contingency.
- viii) A system for identifying, and tracking through the fabrication or delivery phases, the specific materials subject to escalation terms.

**4. DATA ANALYSIS FOR CASE STUDY**

The data analysis is done considering two major components used in the construction (i.e) Cement and Steel. Both the components are calculated by using the traditional method Wholesale Price Index (WPI) and Market Rate Method (MRM) and the result obtained by both these method are interpreted.

Table 4.1 shows the calculation of escalation using Wholesale Price Index (WPI) method usually practiced.

**Table 4.1: Calculation Of Escalation Using WPI (Wholesale Price Index)-Traditional Method**

QUARTER	MONTH & YEAR	CERTIFIED RATE	CEMENT Vc= (0.85*Pc*R*(Ci-Co))/(100*Co)		STEEL Vs= (0.85*Pc*R*(Si-So))/(100*So)	
			Pc	Co	Ps	So
		R (Rs)		=134.70		=147.40

			Ci	Y	Amount (Vc)	Si	Y	Amount (Vs)
First	Sep-2009 Oct-2009 Nov-2009	14353623	149.30	10	155577	144.50	16	-45184
Second	Dec-2009 Jan-2010 Feb-2010	31644723	148.27	10	318797	140.03	16	-253158
Third	March-2010 April-2010 May-2010	24513521	151.67	10	308830	134.63	16	-339797
Fourth	June-2010 July-2010 Aug-2010	25348953	151.67	10	319355	133.70	16	-376967
Fifth	Sep-2010 Oct-2010 Nov-2010	38083568	148.10	10	322028	132.43	16	-620085
Sixth	Dec-2010 Jan-2011 Feb-2011	16353268	148.10	10	162683	132.60	16	-269818
Seventh	March-2011 April-2011 May-2011	22528549	148.10	10	224115	132.80	16	-371706
Eighth	June-2011 July-2011 Aug-2011	3680718	148.10	10	36616	132.80	16	-60729
Ninth	Sep-2011 Oct-2011 Nov-2011	10004966	148.10	10	99530	132.80	16	-165075
Tenth	Dec-2012 Jan-2012 Feb-2012	6107683	148.10	10	60759	132.20	16	-100773
Total (Rs)		192619572			2008290			-2603292

Table 4.2 shows the calculation of escalation using Market Rate Method (MRM). In this approach, the escalation of the construction material has been obtained by applying the actual market rates (i.e. market prices) of purchase instead of the WPI and generalized indexes. In the case study, this new concept has been applied on the two major construction materials (cement and steel).

**Table 4.2: Calculation Of Escalation Using MRM (Market Rate Method)-Proposed Method**

QUARTER	MONTH & YEAR	CERTIFIED RATE	CEMENT Vc= (0.85*Pc*R*(Ci-Co))/(100*Co)			STEEL Vs= (0.85*Pc*R*(Si-So))/(100*So)		
			Market Rate/B ag in Rs.	Pc	Co =210	Market Rate/T on in Rs.	Ps =31270	So
		R (Rs)	Ci	Y	Amount (Vc)	Si	Y	Amount (Vs)
First	Sep-2009 Oct-2009 Nov-2009	14353623	240	10	174294	32180	16	56809
Second	Dec-2009 Jan-2010 Feb-2010	31644723	237	10	345832	31000	16	-37160
Third	March-2010 April-2010 May-2010	24513521	244	10	337535	31180	16	-9595
Fourth	June-2010 July-2010 Aug-2010	25348953	247	10	379631	32340	16	117965
Fifth	Sep-2010 Oct-2010 Nov-2010	38083568	240	10	462444	34700	16	568124
Sixth	Dec-2010 Jan-2011 Feb-2011	16353268	245	10	231672	33950	16	190612

Seventh	March-2011 April-2011 May-2011	22528549	265	10	501528	34500	16	316481
Eighth	June-2011 July-2011 Aug-2011	3680718	298	10	131104	35220	16	63233
Ninth	Sep-2011 Oct-2011 Nov-2011	10004966	282	10	291574	34700	16	149252
Tenth	Dec-2012 Jan-2012 Feb-2012	6107683	296	10	212605	37600	16	168148
Total (Rs)		192619572			3068037			1583868

**4.1 Interpretation Of Results**

Table 4.3 shows the 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 than 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 escalation 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.

**Table 4.3: Interpretation of Wholesale Price Index (WPI) and Market Rate Method (MRM) Results**

	CEMENT	STEEL
Escalation obtained by MRM (Market Rate Method)	3068037	1583868
Escalation claimed by WPI (Wholesale price index)	2008290	-2603292
Difference	1059747	4187160
Percentage Difference	52.77%	160.84%

**5. 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 the traditional Wholesale Price Index (WPI) method.

ii)If the escalation workings were done using the Market Rate Method, the project would have probably quoted 52.46 lakh and the percentage difference of cement is found to be 52.77% and whereas for steel it is found to be 160.84%. 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.

iii)The study, as a contribution to the development of the Indian construction industry, urges that it is high time for India to abscond the traditional hypothetical theories and adopt the pragmatic and pioneering new approaches of construction cost escalation workings.

iv)As a part of the research work the study has evolved ground-breaking concept and new revolutionary methodology related to this subject that would purge the snags and hitches associated with cost escalation in construction industry and inturn incline it towards perfection.

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