COMPARATIVE ASSESSMENT OF PRICE ADJUSTMENT PRACTICE FOR INFRASTRUCTURE PROJECTS IN FINANCIAL CAPITAL OF INDIA

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Abstract — Considering various aspects in development of nation, infrastructure development has very vibrant role. Infrastructure development has significant positive contribution towards Economy of India. The impact of such large-scale infra projects are very high due to big investment, highly technology driven and complexity in nature. However, with the implementation of the infra projects, there are always certain risk factors which needs to be considered in terms of Technical, Financial, External and Project Management which can be controlled by good contractual binding between owner and contractor. In this study only financial factor is highlighted with respect to price adjustment compensation to contractor for value of workdone. Purpose of this study is to identify the reasonable analysis and to know the payable price adjustment value from two different guidelines in similar region. This Study has explored and compared two different methods of functioning for "Price Adjustment" clause in Mumbai by two local Implementing Government Agencies such as Mumbai Metropolitan Region Development Authority (MMRDA) and Maharashtra State Road Development Corporation (MSRDC). Hence, detailed analysis has been carried out by considering a case study of Mumbai's one of prestigious project Santacruz Chembur Link Road Ph-I. Especially for three major components such as cement, steel and labor. Achieved results indicates that, the payable net escalated amount calculated by both the agencies for the same project are of different. As per the analysis it is concluded that, method adopted by MMRDA is more reasonable as compared to MSRDC. This analysis will be helpful to adopt reasonable price adjustment practice for large infra project.

Keyword — Infrastructure Development, Large Infra Projects, Contract Guidelines and Price Adjustment clause.

I. INTRODUCTION:

Economic Survey Report 2017-18 and Union Budget 2018-19 by Government of India shows that Infrastructure is indispensable to the fundamental physical structure of a nation, including the services and amenities necessary for our economy to function. Infrastructure systems include Transportation, Communication, water and electric systems amongst others. Infrastructure systems demand high monetary investments and play a crucial role in the growth and development of the nation. However, Infrastructure Development has significant positive contribution towards Economy of India. There have also been observations that the current economic situation and the impact of infrastructure development on the economy are very effective and positive influencers in the development of the nation. The impact of such large-scale infrastructure projects are very high due to their high investment, technology driven and complex in nature. Therefore, planning, monitoring and controlling are the main objectives of the Infrastructure Development.

Infra Projects are often subject to the various impacting or associated risk factors. Various studies have been carried so as to suggest means for improvements in infra projects. Some noteworthy local and international studies such as Nuru Gambo and Ilias (2014), Inuwa.I.I. I, Wanyona.G, Diang'a .S (2014) and Manoj Thorat and B.V. Birajdar have shed light on the factors that influence infra project specifically emphasising the importance of precise planning and necessity of precise contractual guidelines required for the project. However, minor it may seem, but it has maximal impacts of the project planning and preparation contract guidelines in its due course of time. Concerns relating to Project Management, Finances, Land Acquisitions and Political Interference are bound to occur during the project lifespan creating hindrances in the timelines, cost and quality involved in the project. Contractual guidelines serve as a framework for avoiding these instances and minimizing the impacting parameters. While the current practices as per these guidelines, in spite, deriving the same ideology is subjected to discrepancy within the proximate regions and in similar types of contractual foundations, due to the different style of functioning for a contract agreement, which results in cash flow issues due to variance in the price adjustments for main construction components such as Cement, Steel and Labour.

Generally, construction activities of large-scale infrastructure projects are a long-term process. Due to the long duration of construction work, the price of materials, machinery and manpower changes in the market over time. It is the standard and fair practice of the contractors and employers to adjust the price as per the current market rates. However, through numerous questionnaires and interactions with various contractors, consultants and government officers, it is observed that in Mumbai region, the practice for price adjustment for implementation of infra project adopted based on the contract guidelines of different bodies such as Mumbai Metro Politian Region Development Authority (MMRDA), Maharashtra State Road Development Corporation (MSRDC), Municipal Corporation of Greater Mumbai (MCGM), The International Federation of Consulting Engineers (commonly known as FIDIC) Guidelines lead to differences in calculation of the Price Adjustment Value. There has till date not been any such assessment and comparison carried specific to Mumbai local government agencies and their practice for price adjustment clause.

This study has analyzed and compared two practices of functioning for "Price Adjustment" clause in Mumbai adopted by two major local Implementing Agencies through their guidelines including Mumbai Metropolitan Region Development Authority and Maharashtra State Road Development Corporation. Price Adjustment analysis has been carried out by considering a case study of one of Mumbai's prestigious projects, Santacruz Chembur Link Road Ph-1. The study focussed on analysing price adjustment for three major components which include cement, steel and labour.

II. METHODOLOGY:

This study includes the comparative assessment of two different contract practices for price adjustment in Mumbai. Hence, as a part of this research study one of Mumbai's significant infra project- Santa Cruz Chembur Link Road (SCLR) Ph-I has been selected as a case study. This project is under implementation of Mumbai Metropolitan Region Development Authority (MMRDA) and funded by Government of Maharashtra, price adjustment clause has been applied on SCLR Ph-I project from the contract guidelines of MMRDA and MSRDC. The methodology of this study has been further outlined in detail in three sub-sections:

A. Data Collection
B. Price Adjustment Practice
C. Analysis

A. Data Collection:

The Santa Cruz Chembur Link Road (SCLR) Ph-I project has been considered as a case study for this research purpose. Requisite data for price adjustment analysis including but not limited to contract guidelines, summary of work done have been collected and reviewed through several interactions and questionnaires with contractors, consultants and government officers. As the project is implanting under MMRDA contract guidelines, it was further important to collect contract guidelines of MSRDC for the reasonable assessment of price adjustment clause.

Hence, through a formal request in MSRDC, all the relevant clauses for price adjustment for similar type of contract and for bridge works have been collected. Table 1 shows the salient features of SCLR Ph-I project.

Table 1 Salient Features of SCLR Ph-I

Length of Road (Design Length)	:	Part A: 3.8 Km (Kurla to Vakola Flyover at Vakola Junction) Part B: 1.18 Km (MTNL Junction, BKC to LBS Flyover at Kurla) Total: 5.0 Km
Estimated cost of project put to tender	:	Rs. 413.25 Crores
Type of Contract	:	Design & Build (EPC)
Accepted cost of Tender (date of acceptance)	:	Rs. 449.19 Crores (October 14, 2016)
Signing of Contract Agreement	:	October 24, 2016
Work order and notice to proceed issued to contractor	:	October 27, 2016
Construction Period	:	36 months including monsoon
Completion Date	:	October 26, 2019

B. Price Adjustment Practice

As a part of comparative assessment, in this section detailed practice adopted by MMRDA and MSRDC to calculate the price adjustment value is mentioned. All the relevant clauses and formulae are indicated below:

As per MMRDA

The payable value to contractor or adjustment of amount by employer to pay contractor for inflation in price of labour, steel and cement during execution of the project has been calculated by single formula. Addition or deduction from the Interim Payment Certificate (IPC) for change in price evaluated is as per following formula:

Vn = V1 + V2 + V3_____(1)

Where,

Vn = Value to be reduce or to be added in IPC

V1 = Price adjustment for labour, Value to be reduce or to be added in IPC

V2 = Price adjustment for Cement, Value to be reduce or to be added in IPC

V3 = Price adjustment for Steel, Value to be reduce or to be added in IPC

- Price Adjustment for Labour (V1)

V_1 = 0.85X(P–Cost of Base Material) X $\left\{\frac{K1}{100} + \frac{C1-Co}{Co}\right\}$ _____(2)

P = Work Done Cost of particular period (for which period bill has raised)

K1 = Labour Component in %

Co = Consumer Price Index (CPI) -Basic Rate, considered amount before 30 days of submission of Bid.

C1 = Average Current Consumer Price Index (CPI) of particular period (for which period bill has raised)

- Price Adjustment for Cement Component

V2 = Qc X (C1 -Co) _____(3)

Where,

Qc = Consumed Quantity of cement during particular period (for which period bill has raised)

C1 = Average rate during particular period (for which period bill has raised) of UltraTech, Ambuja & Birla-super of 43 / 53 grade, Mumbai as per economic times.

Steel Price adjustment shall be calculated based on their types, hence further equation (3) classified in V3a, V3b and V3c

- Price Adjustment for Steel [High Yield Strength Deformed (HYSD) /Thermo Mechanical Treatment (TMT)], Structural Steel and High tensile Strands Component (V3):

Where,

For HYSD/TMT Steel:

V3a = QYa X (S1a – Soa) _____(4)

V3a = Price adjustment for HYSD/TMT Steel, Value to be reduce or to be added in IPC

QYa = Steel Quantity consumed during particular period (for which period bill has raised).

Soa= Base rate of steel as described in tender agreement (Table-2).

S1a = Average rate of steel during particular period (for which period bill has raised) of Tata SAIL at stock yard at Kalamboli, as state in the table below including all taxes (Excise, Octroi, VAT & Sales tax etc.)

For Structural Steel:

V3b = QYb X (S1b – Sob) _____ (5)

V3b = Price adjustment for Structural Steel, Value to be reduce or to be added in IPC

QYb = Steel Quantity consumed during particular period (for which period bill has raised)

Sob = Base rate of steel as described in tender agreement (pl. refer Table-2).

S1b = Average rate of steel during particular period (for which period bill has raised) of Tata SAIL at stock yard at Kalamboli, as state in the table below including all taxes (Excise, Octroi, VAT & Sales tax etc.)

For HT Strand Steel:

V3c = QYc X (S1c – Soc) _____ (6)

V3c = Price adjustment for HT Strand Steel, Value to be reduce or to be added in IPC

QYc = Steel Quantity consumed during particular period (for which period bill has raised)

Sob = Base rate of steel as described in tender agreement (pl. refer Table-2).

S1b = Average rate HT Strand Steel during the period under consideration of Tata SAIL at stock yard at Kalamboli, as state in the table below including all taxes (Excise, Octroi, VAT & Sales tax etc.)

Table 2 has outlined percentage weightage of Labour, Steel and Cement and the cost of base material will be worked out by multiplying the quantity of materials with corresponding base rate given in the table 2 outlined below.

Table 2: Price adjustment for the entire contract percentage weightage as per MMRDA

Component	**Weightage in percentage**
Labour	22.5%
Materials	65%
Petroleum, Oil, Lubricants (POL)	12.5%
Total	100%
Material	**Base rate (Rs.) / Mt**
Cement	7000
HYSD/TMT	48500
High Tensile Strands	79592
Structural Steel	49000
Mild Steel	47000
Bitumen (60/70)	61758
Mastic Asphalt	63544
Consumer Price Index for Labour	Mumbai

As per MSRDC:
The payable value to contractor or adjustment of amount by Employer to pay contractor for inflation in price of labour, Steel and Cement during execution of the project by single formula. hence, addition or deduction from the Interim Payment Certificate (IPC) for change in price evaluated as per following formula:

VBR = 0.85BRx [PL x (LI – LO)/LO +PC x (CI – CO)/CO + PS x (SI – SO)/SO] _____(7)

Where,

BR = Work Done Cost of particular period (for which period bill has raised) of Major Bridges and Structures

VBR = Inflation in price for Major Bridges and Structures during particular period (for which period bill has raised)

PC, PL, and PS = % component of cement, labour, and steel (including strands and cables)

CO = Wholesale Price Index (WPI) for grey cement – Base Rate.

CI = Wholesale Price Index (WPI) for grey cement for the three months prior to the month to which the specific IPC.

LO= Consumer Price Index (CPI) labour of Mumbai, published by Labour Bureau, Ministry of Labour, Government of India as per base date.

LI = Consumer Price Index (CPI) for three months prior to the month to which the IPC issues.

SO = Wholesale Price Index (WPI) steel (re-bars) - Base Date.

SI = Wholesale Price Index (WPI) steel (re-bars) for three months prior to the month to which the IPC issues.

(e) Following percentages as shown in table 3 shall govern the price adjustment of the contract Price:

Table 3 Adjustment factor classification as per different category by MSRDC

Component	Item (Major Bridges and Structures)
Labour (PL)	15%
Cement (PC)	15%
Steel (PS)	20%

C. Analysis:

The Data has been collected from both implementing agencies MMRDA and MSRDC. Especially from MMRDA all the required information and documents pertaining to SCLR Ph-I is collected. For example, contract guidelines, value of construction workdone for the period from May 2018 to Feb 2019. The required price adjustment clause from MSRDC for design build contract has also been collected. However, based on the value of workdone, net escalable amount has been analysed by deducting cost of cement, steel and structural steel from the value of actual workdone as shown in Table 4. As per equations 1 & 7, all the required details to analyse price adjustment cost have incorporated in these equations and identified price adjustment value for labour, steel and cement as shown in result and discussion section.

Table 4 Details of SCLR Ph-I of duration May 2018 to Feb 2019

Period (May 2018 to Feb 2019)	VALUE OF WORK DONE	DEDUCTION OF COST OF			NET ESCALABLE AMOUNT (E)
		CEMENT	STEEL	STRUCTURAL STEEL	
	Rs.	Rs.	Rs.	Rs.	Rs.
	A	B	C	D	E=A-B-C-D
01.05.2018 to 30.06.2018	111,642,210	7,083,160	15,406,801	1,536,542	87,615,707
01.07.2018 to 31.08.2018	117,241,958	5,952,170	13,953,644	1,342,747	95,993,397
01.09.2018 to 25.10.2018	110,936,731	6,567,330	16,575,069	-	87,794,332
26.10.2018 to 31.12.2018	141,625,110	12,549,880	30,442,529	489,951	98,142,750
01.01.2019 to 20.02.2019	136,757,299	12,605,950	30,597,486	673,211	92,880,652

III. RESULT AND DISCUSSION:

This section shows the results of price adjustment values for the components such as labour, steel and cement for SCLR Ph-I project which is considered as case study. These values are based on calculation of two different formulae which are in current practice by Mumbai ‘s local implementing agencies such as MMRDA and MSRDC as both these agencies follow different method for price adjustment calculation. Hence, difference in price adjustment values are observed. According to MSRDC method, the net payable escalated amount to contractor for labor and steel are lower than MMRDA while it is higher value in case of cement. Fig-1 shows the clear assessment of Price adjustment values for labour steel and cement provided by MMRDA and MSRDC formulae.

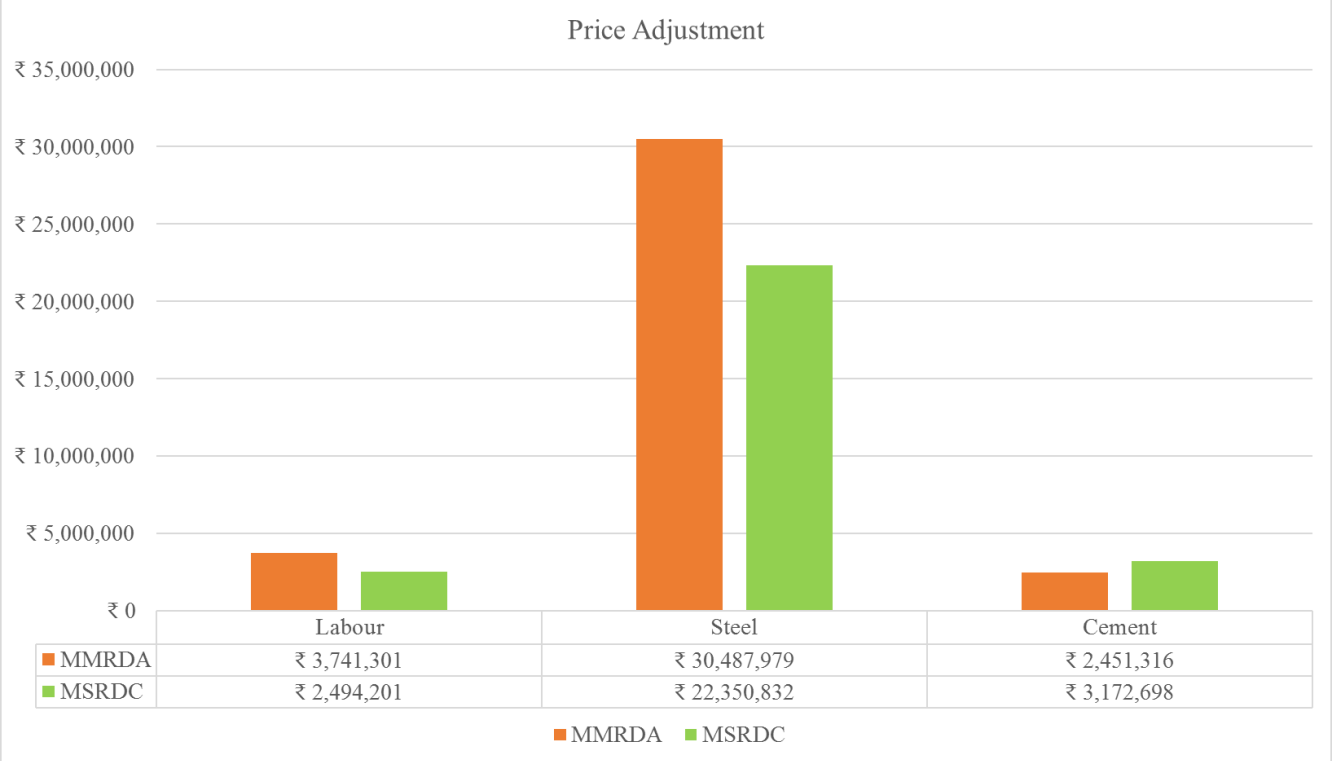

Fig 1 Result of MMRDA and MSRDC for Price Escalation amount of Labour Steel and Cement

IV. CONCLUSION

The detailed analysis for the price adjustment clause is presented in Fig 1. It is observed that, there is a difference in price adjustment values as both MSRDC as well as MMRDA follow different method for calculation. According to MSRDC method, it is observed that the net payable escalated amount to contractor for labor and steel are lower than MMRDA while it is higher value in case of cement. Hence, based on the detailed analysis, it is concluded that, the adopted method by MMRDA is more reasonable because major cost-effective coefficients of components such as cement and steel are considered locally i.e., in the vicinity of Mumbai, while in case of MSRDC it is taken from wholesale price index. However, coefficients considered locally will be reasonable from the contractor point of view as per the case study of SCLR Ph-I. As contractor is going to purchase all the required materials from in and around Mumbai during the construction period, hence they will get reasonable price adjustment.

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