Amendment of Saudi Arabia Public Works Contract from Fixed-Price to Price Adjustment Contract

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Abstract: The price adjustment contract is engineering contract that includes articles allow the adjustment of the contract price (either by increasing or decreasing) according to the terms agreed between the contract's parties. This contract type includes mathematical equation which called Contract Price Adjustment (CPA) that grants enough flexibility to adjust the contract's price in order to eliminate the risk of price fluctuation of contract's components. Federation International Des Ingeniers – Consells (FIDIC) presented a formula for price adjustment in which, both parties should agree on the variables of such formula and the limitations of applying it as well. In this paper, a questionnaire survey and several interviews with experts in the field of high way and road way construction projects are conducted in order to extract the data needed to formulate the price adjustment that could be applied in the contracts of such type of projects. The stated formula is presented in order to be utilized in amending the standard Saudi Arabia public works contract (which is considered as a fixed-price contract) to be more flexible in dealing with the variations in material prices faced by the contractors during the execution of the contract works.
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I- Introduction

The Contract is considered the most important legal document that governs the execution of the works relevant to that construction contract. According to the price stability, contracts are divided into two types: 1) Fixed-price contracts and 2)Price adjustment contracts.

Saudi contractor firms (whom dealing with the public sector in execution of the construction projects) suffered from the fixation of the contract prices during the execution period of the project, while it is well known that the cost of different material (such as cement, steel rebars, bricks, ….. etc), as well as other component of the direct cost of the contract (such as wages, transportation, equipment spare parts, …..etc) is subject to continues changes (either up or down). This cost fluctuation in the contract components represents a great risk on the contractors during the execution of the projects. Accordingly, there is a need to introduce an instrument that could minimize the negative impact of the stated risk in order to improve the performance of the contractors. In 1969, The National Economic Development Office (NEDO), recommended to modify the construction contracts to be more flexible in absorbing the price fluctuation of the material and goods used in projects' execution. First formula for contract price adjustment was presented in 1973 and been utilized in 1976.

II- Saudi Public Works Standard Contract:

The Saudi public works standard contract is a fixed-price contract. As per Article 11 of the stated contract "Sufficiency of Contract Amount", the contractor is supposed to use his knowledge and experience prior to submitting his bid in order to be sure about the prices listed in the offered bill of quantities. In addition, the same Article enforces the contractor to admit that the offered prices are sufficient for all expenses he may incurred till completing the contracted works.

After year 2008 of the economic crises, the prices of different materials that represent the core of the construction industry were subject to huge increase. For example, unit price of steel rebar's jumped from 2218.5 SR per ton before the crises to 5021 SR per ton after the crisis which represents 126% of the valid price before the crises. The stated jump in the material prices led to a complete stoppage in most of the running construction projects at that time due to the failure of the contractor to accommodate with these unaffordable prices jump. Stoppages of the construction projects led to more and more complications that badly impacted the Saudi's economy and the country development plans as well.

III- Study Problem:

As a matter of fact, the prices of construction material in Saudi Arabia are in a continuous increase from time to time. Ignoring the stated fact that during the preparation of the Saudi standard contract of the

public works forced the contractors to claim such increase of the prices, Saudi public sector (who is the owner of the public projects) usually rejects contractor claims in such regard. Accordingly, contractors found themselves are forced to complain the subject to the Saudi Court. The stated dispute consumes a lot of time and effort. Besides, in most of cases, it has a negative impact on the progress of the projects, leading also to a complete stoppage in such projects, which means a great loss to both contract parties.

IV- Study Limitation:

The present study is limited to the standard contract of Saudi public works relevant to road way and high way projects. The study was conducted during the year 2012. Experts and professionals who participated in the study (to introduce their opinion in improving the public standard contract form) represent employers, contractors and consultants firms.

V- Questionnaire Survey:

The methodology of the study relies on the questionnaire survey as one of the most important techniques to secure the knowledge need to conclude the problem and present the proposed solutions. The study questionnaire survey was carried out in two stages. In the first stage, the participants were asked about their opinion in modifying the terms of the standard contracts of public works. The asked question was *"Through your practice to public works contract in Saudi Arabia (as a contractor – an owner – a consulting engineer),do you see that the fixing of the contract prices along the duration of the project constitute an obstacle to the completion of the contract?"*The answer should be Yes or No.

The questionnaire has been distributed through the internet on "Survey Monkey website"; which is a kind of electronic distribution that depends on internet in the questionnaire survey forming and its analysis.

Since the number of engineers registered in Saudi Council of Engineers is 79803 engineers, hence the sample size of the questionnaire can be calculated as per the following equation:

$n = N / (1+N*(e)^2)$ ………………..(Eq-1)

Whereas

e: is the standard error for the community sample and was considered as 0.05

N: is the sample community equal to 79803 engineers.

n: is the Sample size

By applying equation (Eq-1), the sample size was calculated as 399 samples.

The questionnaire has been distributed to the whole number of the engineers registered in the Saudi Council of Engineers (i.e. 79803 engineers). The

number of respondents was 2361 which was much bigger than the requested sample size.

The questionnaire results were sorted and analyzed electronically by using special software designed by "Survey Monkey website". The collected results showed that 58% of the respondents had answered the question of the survey as "Yes", while 42% of them had answered it as "No", as shown in Fig-1 below.
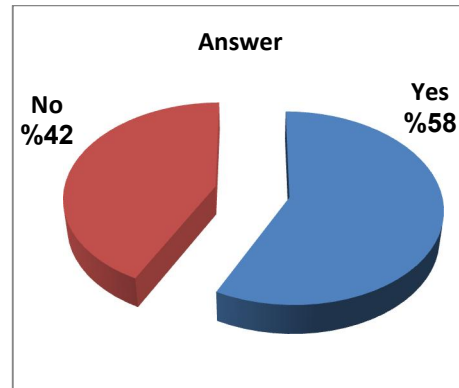

Fig-1: Participants Answers

The second stage of the questionnaire was conducted in order to extract the percentages of the elements constitute the components of the different activities of high way and road way construction projects. The main purpose of the second part of the questionnaire is to collect the different variables stated in the price adjustment formula indicated in the FIDIC forms of contracts (the new red book – Clause 13). The mentioned formula that been utilized by the present study is:

$Pn = a + b * (Ln/Lo) + c * (En/Eo) + d * (Mn/Mo) +$………(Eq-2)

Where:

"Pn" is the adjustment multiplier which is to be applied to the estimated contract value in the relevant currency of the work carried out in period "n", this period being a month unless otherwise stated in the Contract Data;

"a" is a fixed coefficient, stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments;

"b", "c", "d", … are coefficients representing the estimated proportion of each cost element related to the execution of the works, as stated in the relevant table of adjustment data; such tabulated cost elements may be indicative of resources such as labor, equipment and materials;

"Ln", "En", "Mn", … are the current cost indices or reference prices for period "n", expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the date 49 days prior to the last day of the period (to which the particular Payment Certificate relates); and

"Lo", "Eo", "Mo", … are the base cost indices or reference prices, expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the Base Date.

Accordingly, the participants were requested to feed their opinion regarding the above mentioned variables. The participants were requested to present numerical answers to the questions indicated in the questionnaire form.

For the high way and road way projects, it was found that the stated projects consist of 17 main activities as mentioned in the standard form of Saudi public works contract. Each activity is divided into a group of elements represent the total cost of that activity. The participants were requested to feed their opinions regarding the percentage of each element. The total percentage of all elements should be equal to 100%. The participants were also requested to present their opinions regarding the preferred cost reference of each element. Part of the stated questionnaire is presented in Tables 1 & 2

Table-1: Road Way Activities and Elements

No.	Project items	Element code	Elements	Weight element
1	Rock cut	B	Equipment	71.28
		C	Labor	13.78
		A	Fixed cost	14.94
			Total	100%
2	Normal cut	B	Equipment	71.77
		C	Labor	14.13
		A	Fixed cost	14.1
			Total	100%
3	Fill	B	Marital of Fill	28.71
		C	Equipment	40.88
		D	Labor	14.45
		A	Fixed cost	15.96
			Total	100%
4	Normal concrete	B	Cement	33.22
		C	Fine Aggregate	10.54
		D	Coarse Aggregate	9.17
		E	Equipment	17.51
		F	Labor	14.25
		A	Fixed cost	15.31
			Total	100%
5	Reinforcement Concrete type (A)	B	Steel	33.85
		C	Cement	16.18
		D	Fine Aggregate	4.62
		E	Coarse Aggregate	4.73
		F	Equipment	13.6
		G	Labor	12.83
		A	Fixed cost	14.19
			Total	100%
6	Reinforcement concrete type (B)	B	Steel	33.65
		C	Cement	16.1
		D	Fine Aggregate	4.84
		E	Coarse Aggregate	4.85
		F	Equipment	13.3
		G	Labor	13.2
		A	Fixed cost	14.06
			Total	100%
7	Reinforcement concrete type (C)	B	Steel	35.26
		C	Cement	14.33
		D	Fine Aggregate	4.75
		E	Coarse Aggregate	4.84
		F	Equipment	13.86
		G	Labor	12.8
		A	Fixed cost	14.16
			Total	100%
8	Sub	B	Marital of Fill	29.53

	base layer	C	Equipment	42.19
		D	Labor	11.77
		A	Fixed cost	16.51
			Total	100%
9	Base layer	B	Marital of Fill	34.33
		C	Equipment	39.46
		D	Labor	11.47
		A	Fixed cost	14.74
			Total	100%
10	Coating MC1	B	MC1	53.74
		C	Equipment	18.01
		D	Labor	8.73
		A	Fixed cost	19.52
			Total	100%
11	ASPHLT	B	Bitumen	20.97
		C	Fine Aggregate	9.33
		D	Coarse Aggregate	10.71
		E	Additions	7.1
		F	Equipment	23.54
		G	Labor	11.28
		A	Fixed cost	17.07
			Total	100%
12	Coating RC21	B	RC2	55.87
		C	Equipment	18.33
		D	Labor	11.67
		A	Fixed cost	14.13
			Total	100%
13	Asphalt surface	B	Bitumen	18.89
		C	Fine Aggregate	9.54
		D	Coarse Aggregate	8.9
		E	Additions	8.17
		F	Equipment	25.31
		G	Labor	11.39
		A	Fixed cost	17.8
			Total	100%
14	Pipe culverts	B	Pipe culverts	51.08
		C	Equipment	19.09
		D	Labor	13.72
		A	Fixed cost	16.11
			Total	100%
15	Paints	B	White Paints	26
		C	Yalow Paints	28.31
		D	Equipment	22.21
		E	Labor	10.72
		A	Fixed cost	12.76
			Total	100%
16	Reflectors (cats eyes)	B	cats eyes	56.05
		C	Equipment	12.6
		D	Labor	17.72
		A	Fixed cost	13.63
			Total	100%
17	Steel barriers	B	Steel barriers	51.34
		C	Equipment	20.61
		D	Labor	13.33
		A	Fixed cost	14.72
			Total	100%

Table-2: Elements Cost References

No.	Element	Bookmark favorite	Per.%	Repetition
1	Rock cut equipment	By the change in fuel prices	7.7	5
		By the change in oil price	0	0
		By the change in tire prices	0	0
		By the change in the prices of spare parts	0	0
		Average of the four items	86.1	56
		Other	6.2	4
2	Normal cut equipment	By the change in fuel prices	7.7	5
		By the change in oil price	0	0
		By the change in tire prices	0	0
		By the change in the prices of spare parts	0	0
		Average of the four items	86.1	56
		Other	6.2	4
3	Fill equipment	By the change in fuel prices	4.6	3
		By the change in oil price	3.1	2
		By the change in tire prices	1.5	1
		By the change in the prices of spare parts	0	0
		Average of the four items	87.7	57
		Other	3.1	2
4	Normal concrete equipment	By the change in fuel prices	9.3	6
		By the change in oil price	1.5	1
		By the change in tire prices	3.1	2
		By the change in the prices of spare part	0	0
		Average of the four items	84.6	55
		Other	1.5	1
5	Reinforcement Concrete equipment	By the change in fuel prices	9.3	6
		By the change in oil price	1.5	1
		By the change in tire prices	3.1	2
		By the change in the prices of spare parts	0	0
		Average of the four items	84.6	55
		Other	1.5	1
6	Sub -Base layer equipment	By the change in fuel prices	3.1	2
		By the change in oil price	1.5	1
		By the change in tire prices	0	0
		By the change in the prices of spare parts	6.2	4
		Average of the four items	89.2	58
		Other	0	0
7	Coating MC1 equipment	By the change in fuel prices	7.7	5
		By the change in oil price	1.5	1
		By the change in tire prices	0	0
		By the change in the prices of spare parts	0	0
		Average of the four items	89.3	58
		Other	1.5	1
8	Asphalt layer equipment	By the change in fuel prices	3.1	2
		By the change in oil price	1.5	1
		By the change in tire prices	0	0
		By the change in the prices of spare parts	6.1	4
		Average of the four items	89.3	58
		Other	0	0
9	Coating RC2 equipment	By the change in fuel prices	7.7	5
		By the change in oil price	1.5	1
		By the change in tire prices	0	0
		By the change in the prices of spare parts	0	0
		Average of the four items	89.3	58
		Other	1.5	1

No.	Element	Bookmark favorite	Per.%	Repetition
10	Asphalt surface layer equipment	By the change in fuel prices	4.6	3
		By the change in oil price	3.1	2
		By the change in tire prices	0	0
		By the change in the prices of spare parts	3.1	2
		Average of the four items	87.7	57
		Other	1.5	1
11	Pipe culverts equipment	By the change in fuel prices	1.5	1
		By the change in oil price	1.5	1
		By the change in tire prices	3.1	2
		By the change in the prices of spare parts	3.1	2
		Average of the four items	89.3	58
		Other	1.5	1
12	Paints equipment	By the change in fuel prices	3.1	2
		By the change in oil price	0	0
		By the change in tire prices	1.5	1
		By the change in the prices of spare parts	0	0
		Average of the four items	92.3	60
		Other	3.1	2
13	Reflectors (cats eyes) equipment	By the change in fuel prices	3.1	2
		By the change in oil price	0	0
		By the change in tire prices	1.5	1
		By the change in the prices of spare parts	0	0
		Average of the four items	95.4	62
		Other	0	0
14	Steel barriers equipment	By the change in fuel prices	3.1	2
		By the change in oil price	0	0
		By the change in tire prices	0	0
		By the change in the prices of spare parts	0	0
		Average of the four items	95.4	62
		Other	1.5	1
15	Labor	By the Annual inflation	100	65
		Other	0	0
16	Marital of Fill	Agreement on reference resource prices at the time of contracting	92.3	60
		Other	7.7	5
17	Fine Aggregate	Agreement on reference resource prices at the time of contracting	98.5	64
		Other	1.5	1
18	Coarse Aggregate	Agreement on reference resource prices at the time of contracting	98.5	64
		Other	1.5	1
19	Marital of Fill for sub base and base	Agreement on reference resource prices at the time of contracting	96.9	63
		Other	3.1	2
20	Mc1	By the Saudi Aramco price index	100	65
		Other	0	0
21	Bitumen	By the Saudi Aramco price index	100	65
		Other	0	0
22	Rc2	By the Saudi Aramco price index	100	65
		Other	0	0
23	Cats eyes	By the manufacturer	90.8	59
		Other	9.2	6
24	Steel barriers	By the manufacturer	90.8	59
		Other	9.2	6

Sample size was calculated based on equation (Eq-1). Sample community (N) was considered as 74 which represent the total number of the registered contractor in the first and second categories. By applying (Eq-1), it was found that sample size (n) is equal to 63 samples. The questionnaire form was distributed to the whole number of the

community (i.e. 74 forms). Only 65 answer on were received back which is more than the requested number of the sample size. The sample components are illustrated in Fig-2 below.
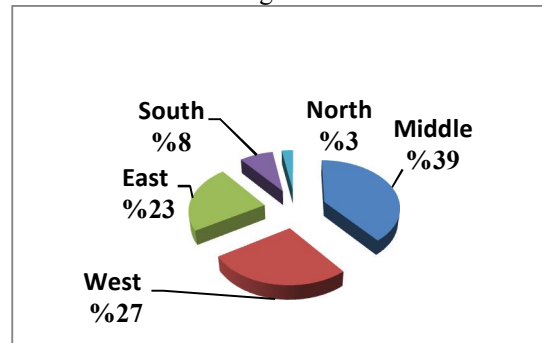

Fig-2 Sample Components

VI- Data analysis:

The received answers were analyzed in order to obtain the averages of the variables stated in Eq-2. Statistical software was utilized to analyze the received answers. The price adjustment equation was formulated as :

PR = {Qrcu*Prcu [14.94+71.28× (MPIR/MPIb) + 13.78× (LPIR/LPIb)] + Qncu*Pncu [14.1+ 71.77×(MPIR/MPIb)+ 14.13× (LPIR/LPIb)] + Qf*Pf [15.96+ 28.71× (FPIR/FPIb)+ 40.88× (MPIR/MPIb) + 14.45× (LPIR/LPIb)] + Qnc*Pnc [15.31+ 33.22× (CPIR/CPIb) + 10.54× (SPIR/SPIb) + 9.17× (APIR/APIb) + 17.51×(MPIR/MPIb) + 14.25× (LPIR/LPIb)] + Qrca*Prca [14.19+ 33.85× (IPIR/IPIb) + 16.18× (CPIR/CPIb) + 4.62× (SPIR/SPIb) + 4.73× (APIR/APIb) + 13.6× (MPIR/MPIb) + 12.83× (LPIR/LPIb)] + Qrcb*Prcb [14.06+ 33.65× (IPIR/IPIb) + 16.1× (CPIR/CPIb) + 4.84× (SPIR/SPIb) + 4.85× (APIR/APIb) + 13.3× (MPIR/MPIb)+ 13.2 × (LPIR/LPIb)] + Qrcc*Prcc [14.16+ 35.26× (IPIR/IPIb) + 14.33× (CPIR/CPIb)+ 4.75× (SPIR/SPIb) + 4.84× (APIR/APIb) + 13.86× (MPIR/MPIb) + 12.8× (LPIR/LPIb)] + Qsub*Psub [16.51+ 29.53× (LVPIR/LVPIb) +42.19× (MPIR/MPIb) + 11.77× (LPIR/LPIb)] + Qbas*Pbas [14.74+ 34.33× (LVPIR/LVPIb) +39.46× (MPIR/MPIb) +11.47× (LPIR/LPIb)] + Qmc1*Pmc1 [19.52+ 53.74× (MC1PIR/MC1PIb)+ 18.01× (MPIR/MPIb)+ 8.73× (LPIR/LPIb)] + Qasv*Pasv[17.07+ 20.97× (PPIR/PPIb) + 9.33× (SPIR/SPIb)+ 10.71× (APIR/APIb) + 7.1× (INPIR/INPIb) + 23.54× (MPIR/MPIb)+ 11.28× (LPIR/LPIb)] + Qrc2*Prc2 [14.13+ 55.87× (RC2PIR/RC2PIb)+ 18.33× (MPIR/MPIb)+ 11.67× (LPIR/LPIb)] + Qlasv*Plasv [17.8+ 18.89× (PPIR/PPIb) + 9.54× (SPIR/SPIb)+8.9× (APIR/APIb) + 8.17× (INPIR/INPIb) + 25.31× (MPIR/MPIb)+ 11.39× LPIR/LPIb)] +Qpip*Ppip [16.11 + 51.08 × (PIPIR/PIPIb) +19.09×(MPIR/MPIb) + 13.72× (LPIR/LPIb)] + Qpln*Ppln [12.76+ 26× (WPLPIR/WPLPIb) +28.31× (YPLPIR/YPLPIb) + 22.21× (MPIR/MPIb)+ 10.72× (LPIR/LPIb)] + Qcey*Pcey [13.63+ 56.05× (CEYPIR/CEYPIb) + 12.6× (MPIR/MPIb)+ 17.72× (LPIR / LPIb)] + Qirw * Pirw [14.72 + 51.34 × (IRWPIR / IRWPIb) + 20.61 × (MPIR / MPIb) + 13.33 × (LPIR/LPIb)]}

No.	Code	Explanation
1	P_R	contract price after adjustment
2	Q_{rcu}	quantities of rock cut
3	P_{rcu}	price of rock cut before the amendment
4	MPI_{R1}	Price Index of rock cut equipment at the time of the amendment
5	MPI_{b1}	Price Index of rock cut equipment at the time of contracting
6	LPI_R	labor index at the time of the amendment
7	LPI_b	labor index at the time of contracting
8	Q_{ncu}	quantities of normal cut
9	P_{ncu}	price of normal cut before the amendment
10	MPI_{R2}	Price Index of normal cut equipment at the time of the amendment
11	MPI_{b2}	Price Index of normal cut equipment at the time of contracting
12	Q_f	quantities of fill
13	P_f	price of fill before the amendment
14	FPI_R	price index of fill material at the time of the amendment
15	FPI_b	price index of fill material at the time of contracting
16	MPI_{R3}	Price Index of fill equipment at the time of the amendment
17	MPI_{b3}	Price Index of fill equipment at the time of contracting
18	Q_{nc}	quantities of normal concrete
19	P_{nc}	price of normal concrete before the amendment

20	CPI_R	price index of cement at the time of the amendment
21	CPI_b	price index of cement at the time of contracting
22	SPI_R	Price Index of fine aggregate at the time of the amendment
23	SPI_b	Price Index of fine aggregate at the time of contracting
24	API_R	price index of coarse aggregate at the time of the amendment
25	API_b	Price Index of coarse gravel at the time of contracting
26	MPI_{R4}	Price Index of normal concrete equipment at the time of the amendment
27	MPI_{b4}	Price Index of normal concrete equipment at the time of contracting
28	Q_{rca}	quantities of reinforced concrete type (A)
29	P_{rca}	price of reinforced concrete type (A) before the amendment
30	IPI_R	price index of iron at the time of the amendment
31	IPI_b	price index of iron at the time of contracting
32	MPI_{R5}	Price Index of reinforced concrete type (A) equipment at the time of the amendment
33	MPI_{b5}	Price Index of reinforced concrete type (A) equipment at the time of contracting
34	Q_{rcb}	quantities of reinforced concrete type (B)
35	P_{rcb}	price of reinforced concrete type (B) before the amendment
36	MPI_{R6}	Price Index of reinforced concrete type (B) equipment at the time of the amendment
37	MPI_{b6}	Price Index of reinforced concrete type (B) equipment at the time of contracting
38	Q_{rcc}	quantities of reinforced concrete type (C)
39	P_{rcc}	price of reinforced concrete type (C) before the amendment
40	MPI_{R7}	Price Index of reinforced concrete type (C) equipment at the time of the amendment
41	MPI_{b7}	Price Index of reinforced concrete type (C) equipment at the time of contracting
42	Q_{sub}	quantities of sub base layer
43	P_{sub}	price of sub base layer before the amendment
44	$LVPI_R$	price index of sub base materials at the time of the amendment settlement
45	$LVPI_b$	price index of sub base materials at the time of contracting
46	MPI_{R8}	Price Index of sub base layer equipment at the time of the amendment
47	MPI_{b8}	Price Index of sub base layer equipment at the time of contracting
48	Q_{bas}	quantities of base layer
49	P_{bas}	price of basis before the amendment
50	MPI_{R9}	Price Index of base layer equipment at the time of the amendment
51	MPI_{b9}	Price Index of base layer equipment at the time of contracting
52	Q_{mc1}	quantities of coating MC1
53	P_{mc1}	price of coating MC1 before the amendment
54	$MC1PI_R$	Price Index of coating MC1 at the time of the amendment
55	$MC1PI_b$	price index of coating MC1 at the time of contracting
56	MPI_{R10}	Price Index of coating MC1equipment at the time of the amendment
57	MPI_{b10}	Price Index of coating MC1equipment at the time of contracting
58	Q_{asv}	quantities of ASPHLT
59	P_{asv}	price of asphalt layer before the amendment
60	PPI_R	Price Index of bitumen at the time of the amendment
61	PPI_b	Price Index of bitumen at the time of contracting
62	$INPI_R$	Price Index of additions at the time of the amendment
63	$INPI_b$	price index of additions at the time of contracting
64	MPI_{R11}	Price Index of asphalt layer equipment at the time of the amendment
65	MPI_{b11}	Price Index of asphalt layer equipment at the time of contracting
66	Q_{rc2}	quantities of coating RC2
67	P_{rc2}	price of RC2 coating before the amendment
68	$RC2PI_R$	price index of coating RC2 at the time of the amendment
69	$RC2PI_b$	price index of coating RC2 at the time of contracting
70	MPI_{R12}	Price Index of coating RC2 equipment at the time of the amendment
71	MPI_{b12}	Price Index of coating RC2 equipment at the time of contracting
72	Q_{lasv}	quantities of asphalt surface layer
73	P_{lasv}	price of asphalt surface layer before the amendment
74	MPI_{R13}	Price Index of asphalt surface equipment at the time of the amendment
75	MPI_{b13}	Price Index of asphalt surface equipment at the time of contracting
76	Q_{pip}	quantities of pipe culverts
77	P_{pip}	price of pipe culverts before the amendment
78	$PIPI_R$	price index of pipe culverts at the time of the amendment

79	PIPI$_b$	price index of pipe culverts at the time of contracting
80	MPI$_{R14}$	Price Index of price index of pipe culverts equipment at the time of the amendment
81	MPI$_{b14}$	Price Index of price index of pipe culverts equipment at the time of contracting
82	Q$_{pln}$	quantities of paints
83	P$_{pln}$	price of paints before the amendment
84	WPLPI$_R$	price index of white paints at the time of the amendment
85	WPLPI$_b$	price index of white paints at the time of contracting
86	YPLPI$_R$	price index of yellow paints at the time of the amendment
87	YPLPI$_b$	price index of yellow paints at at the time of contracting
88	MPI$_{R15}$	Price Index of paints equipment at the time of the amendment
89	MPI$_{b15}$	Price Index of paints equipment at the time of contracting
90	Q$_{cey}$	quantities of reflectors (cats eyes)
91	P$_{cev}$	price of reflectors (cats eyes) before the amendment
92	CEYPI$_R$	Price Index of reflectors (cat eyes) at the time of the amendment
93	CEYPI$_b$	Price Index of reflectors (cats eyes) at the time of contracting
94	MPI$_{R16}$	Price Index of reflectors (cats eyes) equipment at the time of the amendment
95	MPI$_{b16}$	Price Index of reflectors (cats eyes)equipment at the time of contracting
96	Q$_{irw}$	quantities of steel barriers
97	P$_{irw}$	price of steel barriers before the amendment
98	IRWPI$_R$	price index ofsteel barriers at the time of the amendment
99	IRWPI$_b$	price index ofsteel barriers at the time of contracting
100	MPI$_{R17}$	Price Index of steel barriers equipment at the time of the amendment
101	MPI$_{b17}$	Price Index of steel barriers equipment at the time of contracting

VII- Summary and Conclusions

This paper is addressed to the engineers who registered in Saudi Syndicate of Engineers to present their opinions regarding obstacles they face during the execution of the highway and roadway public projects because of the terms of the fixed-price standard form of contract that govern the stated projects in Saudi Arabia.

The received responses reflect the desire of the participants in modifying the standard form terms in order to change the type of the standard contract from fixed-price to price-adjustment contract. The paper presented a numerical formula for adjusting the contract prices of highway and road way projects executed in Saudi Arabia through the applied standard form of contracts of the stated projects. Price adjustment equation that been mentioned in the FIDIC forms of contracts is considered the core of the present paper. In order to extract the values of the different variables of FIDIC equation, a questionnaire survey is carried out and the received information had been analyzed. In order to apply the stated formula, the cost references of different project components should be defined and agreed between contract parties. The presented formula is recommended to be used in amending the standard form of contracts applied in Saudi public projects of highway and road way from fixed-price contract to price-adjustment contract.

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