Jurnal Teknologi

Full paper

Assessment of Cost Escalation factors for Building and Civil Engineering Projects in Nigerian Construction Industry: a Multiple Regression Approach

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Article history

Received: 10 November 2014
Received in revised form:
23 January 2015
Accepted: 12 April 2015

Abstract

Estimation of cost for building and civil engineering projects with minimum error at the conceptual stage of project development is crucial for planning. This paper evaluated the most significant cost escalation causing factors in building and civil engineering projects. Questionnaires were administered to clients, consultants and contractors to elicit information regarding their opinions with regard to these factors. Mean score value for each factor was determined. Also level of agreement of ranking of such factors between groups was investigated. The results of the analysis show that the most significant causes were the "Fluctuation of price of material" and "Variations" with the highest mean score values of 3.9 and 3.73 respectively. Also there was agreement in the opinions between all the groups with regard to these factors. A linear multiple regression models for the prediction of final cost of construction of building and civil engineering projects were developed using Statistical Package for Social Sciences (SPSS).

Keywords: Cost escalation; factors; multiple regression models

1.0 INTRODUCTION

Manufacturing and other service industries are known to contribute more, yet construction industries also occupy significant position in the Nigerian economy [1]. Increase in the Nigerian population is accompanied with the growing need for infrastructure and other facilities. Critical areas in which construction industry plays a significant role for social needs are housing, education and industry. Increasing complexity of construction industry presents many challenges [2]. Dwindling economy which led to high inflation and delay related issues lead to construction cost overrun. These are the major problems affecting the construction industry in Nigeria as identified by previous researches [3-5]. These findings were supported by [6-9]. Some other nations in the sub-Saharan Africa faces similar challenge [10]. For example, in Ghana most of the projects executed between1970-1999 were completed at a cost more than the original budgeted amount [10]. And this has manifested in both large and small projects [4]. This poses fear to people aspiring to own shelter [11]. For example cost of a bag of cement has increased by 37% from 2006-2009[11]. However, an improved efficiency in the building processes could lead to saving in the construction cost [11].

Cost escalation is the increase in the amount of money required to construct a given project above the initially budgeted sum. It arises if the actual cost of construction is in excess of the originally estimated amount [12-13]. Though some studies have cited the main causes of the delay, the factors responsible for the causes have not been critically addressed [14].Thus, projects are being completed at a cost higher than the initial budget [15]. This indicated an unsuccessful project delivery, since cost is relatively more important than quality in terms of build ability at design stage [11].

Twenty (20) variables responsible for delays and cost overrun in southern part of Nigeria were reported [6]. He further identified seven (7) other factors that are likely to cause high cost of construction without necessary having any delay. Also inaccuracy in the prediction of the actual cost of projects at the conceptual stages have been reported [16-18].Thus, such other areas which lead to high escalation of construction cost needs to be further investigated and assessed.

2.0 LITERATURE REVIEW

Costs control is very critical issue in construction project management [19]. It is a phenomenon which is widely practiced by all construction stake holders. And needs to be carried out throughout the life of the project. Cost escalation has negative implications for both construction stakeholders and the industry in general [20]. To the client, it means less return on the investment. Since the project is now completed at a cost in excess of the earlier agreed sum. And to the end user, the added costs are passed on as higher rental/lease costs or prices. To the consultants, it means inability to deliver value-for-money and could tarnish their reputation. It may result in loss of confidence reposed in them by clients. To the contractor, it implies loss of profit through penalties for non- completion, and negative word of mouth that could jeopardize his/her chances of winning further jobs, if at fault. Therefore, projects successes affects all the construction stakeholders including government [21]. Factors responsible for the escalation of civil and building engineering projects were identified [6, 22-28]. They are: Fluctuation of price of materials, Variation, Government policies, Change of Government and political instability, Wrong method of estimation, Poor financial control on site, Long period between design and tendering time, Design errors, Lack of coordination between contractors and consultant, Poor supervision and lquidation Damages, Previous experience of contract, Inadequate production of raw materials, Effect of weather and Absence of of construction cost data Inaccurate projects cost estimation.

The choice the study area was based on the new government policy of mass infrastructure such as hospitals, schools, houses and road network. Geographical location coupled with high level of commercial activities and other regional local factors were known to cause cost differential [29] of the states were also considered.

The objectives of this study are to: (i) To carry out an in-depth investigation on the factors that contribute to the causes of cost escalation in the construction of building and civil engineering projects in of Nigeria. The research only considered such projects completed within the period 2003–2011 in Kano state. (ii) To rank the cost escalation factors according to their severity. (iii) To test the level of agreement in the perception of cost escalation factors between the various groups (principal participants)it is also the objective to develop a model, for predicting final cost of construction at the conceptual stage of project development.

3.1 Hypotheses Testing

Test of agreement between the various groups (Clients/Consultants, Clients/Contractors, Consultants/Contractors) on the severity of factors of cost escalation in building and civil engineering projects was established as follows:

HYPOTHESIS 1 (H1)

H_0: There is no significance difference between the perceptions of Clients and Consultants with regard to severity of factors responsible for cost escalation.

H_A: There is significance difference in the perception between Clients and Consultants with regard to severity of factors responsible for cost escalation.

HYPOTHESIS 2 (H2)

H_0: There is no significance difference between the perceptions of Clients and Contractors with regard to severity of factors responsible for cost escalation.

H_A: There is significance difference in the perception between Clients and Contractors with regard to severity of factors responsible for cost escalation.

HYPOTHESIS 3 (H3)

H_0: There is no significance difference between the perceptions of Clients and Consultant with regard to severity of factors responsible for cost escalation.

H_A: There is significance difference in the perception between Clients and Consultants with regard to severity of factors responsible for cost escalation.

3.0 METHOD

Descriptive survey method is adopted for this research it made use of qualitative data gathering through an in-depth literature review. Based on this, the study sought the opinion of respondents through questionnaire survey. The responses provided were subsequently analyzed. The research made use of stratified sampling technique. Respondents were randomly selected from the groups of clients, consultants and contractors. These three groups participated in the projects executed by Kano State government during the period 2003-2011. Thus, the unit of the analysis is a group of consultants, contactors and clients respectively.

The questionnaire consists of three parts. First part deals with the personal information regarding the respondents' characteristics such as academic qualifications, construction industry work experience and membership with Professional organization. Part two deals with such information as area of specialization, ages, and type of projects executed and services by each of the companies respectively. The last part of the questionnaire deals with such information on the factors responsible for the high cost of projects as perceived by respondents. The research made use of the 40 returned questionnaire out of the fifty seven administered. The respondents rated the variables which they perceived to be the likely contributing factors influencing cost of building and civil engineering projects by responding on a scale from 1 (most significant) to 6 (insignificant). The six-points Likert rating scale was 1 most significant, 2 more significant, 3 significant, 4 moderately significant, 5 fairly significant and 6 insignificant. This six point scale is used to calculate the mean score for each factor and element, which is then used to determine the relative ranking of each factor by assigning ranking to mean score, such mean score with low magnitude is assigned low ranks while those with the highest score is allocated the highest rank accordingly. The mean score (MS) for each factor, the level of agreement of ranking of such factors between contractors and clients, contractors and consultants and consultants and clients respectively and the multiple regression model were computed by using SPSS.

4.0 DATA DESCRIPTION AND ANALYSIS

Sixty two (62) civil engineering and building projects initiated by Kano State government and completed between the period 2003 and 2011 were considered.

The initial and final contract sums of public projects in Nigeria (in US Dollar) were presented in Tables 1 and 2 below respectively.

The data with respect to the costs of various building and civil engineering projects considered were obtained from the Archives of Kano State Ministry of Works housing and Transport (KMOWH&T) and Kano Urban Development Authority (KNUPDA.

Table 1 Initial and final contract sums of building projects (Us Dollar)

S/no	INITIAL SUMS	FINAL SUMS	INITIAL SUBS-TRACTURE	FINAL SUBS-TRACTURE	INITIAL FRAMES	FINAL FRAMES	INITIAL ROOFS	FINAL ROOFS	INITIAL WALLS	FINAL WALLS	INITIAL WINDOW/DOOR	FINAL WIN- DOW/ DOOR	INITIAL FINISHING	FINAL FINISHING	INITIAL FITTING	FINAL FITTING	INITIAL SERVICES	FINAL SERVICES
1	34905	4370	10328	03279	5629	5629	5195	5332	4696	4579	8211	9563	7252	7252	492	-	492	492
2	142719	172848	6741	9302	185826	28344	32060	29461	23303	29081	171565	23290	31093	36682	9864	13254	3920	3435
3	114663	123977	218446	238551	401316	470406	157355	162444	144906	154957	87227	87573	69588	65719	9361	8699	58435	60963
4	303087	308105	20018	20174	97370	106679	48065	50060	58486	56677	39345	39345	20503	18999	-	-	19300	16170
5	321397	329740	63618	62302	112765	126397	69804	152206	17681	13702	30645	35607	611700	550615	-	-	485581	49164
6	254981	280696	28543	39254	69488	87825	494420	53058	40400	37585	332083	34823	18329	10457	10995	13501	-	-
7	96810	99975	18438	20095	12560	16076	14067	15072	6029	7536	10048	13564	15072	15072	90429	10048	7536	8541
8	182460	190511	17435	18246	49544	5006	23267	28344	27589	28622	24277	26627	1707	1508	-	-	2327	2354
9	615708	837206	109444	118988	259555	186707	240297	250508	393618	489494	219451	212920	167202	166730	18246	10458	207896	269437
10	289964	312611	46930	49542	839565	85061	43414	45625	39419	49405	43880	51008	13994	13491	-	-	18350	18480
11	561601	546555	7484	13237	12870	17239	23284	25026	4555	5092	8533	10508	4957	3901	5113	6940	3976	3463
12	129386	178618	18176	200005	46806	58332	30231	69412	2446	1851	8215	11799	14978	12659	-	-	8533	4564
13	21683	22448	3520	3684	518195	5204	1858	2095	2761	2761	2292	2421	2316	2357	487	502	1508	1664
14	376020	378348	82349	83354	57429	54325	69537	63374	16035	11651	47809	40259	25675	20161	11304	19674	65870	75500
15	82254	80718	17419	20003	18547	19012	11815	12216	10256	9717	8518	8550	-	-	9513	7711	-	-
16	243587	250464	38601	38857	78189	80054	30452	29498	34370	35843	22564	22701	18496	19300	17240	17743	3675	3213
17	243492	264430	38590	41806	78792	820565	47132	39413	32411	33513	21811	24024	23015	20796	6589	5922	14744	14964
18	112980	129924	9717	13253	28299	36784	18251	19902	17491	150020	14225	14940	8954	10507	12870	15883	3172	3283
19	196636	204881	32208	33513	58514	60872	24322	26836	33818	34513	19298	18304	16732	17066	9709	11764	2018	2013
20	70318	85407	62136	72087	124696	124696	77188	80243	29810	29810	35525	40153	88350	515275	89860	90432	37576	37576
21	214722	225229	6815	8976	67630	70005	47131	47131	34069	37104	18295	19450	11964	13254	24292	34320	4526	4840
22	404748	419303	63618	62302	112759	76159	70025	152206	17971	13702	30645	35607	61170	55062	-	-	48558	24044
23	775086	978740	146273	165997	91273	88480	105926	104654	48301	41938	88586	80100	66121	64356	138725	317056	89882	116159
24	193989	208307	48522	57432	83554	90346	21712	19000	14242	10711	11799	13222	8213	11950	4913	3934	12869	11967
25	10701	11052	3014	3014	1256	1256	1507	1507	2010	2261	1005	1005	1507	1608	251	251	251	251
26	080942	096931	101680	130249	119889	119889	167728	167728	496552	496552	105407	108291	242451	389677	46262	52751	247871	229401
27	339938	348707	59345	60714	82097	81796	49161	51855	48146	491546	43114	46933	21812	22314	14225	14335	22039	21605
28	585485	664841	105479	106681	71978	66823	84610	76241	27498	21842	69595	65023	44068	31213	11304	20095	75500	96064
29	692463	749198	97253	95576	80453	97987	72259	77861	326830	38202	70411	82592	219757	190453	22607	22607	97192	143916
30	397630	417509	53663	54416	120029	127927	55683	60229	64484	62119	41615	40651	31608	34389	26618	34321	3936	3459
31	51677	61002	9216	11763	11963	1397	8457	9220	9720	13236	4192	4524	3836	4262	-	-	4294	4023
32	102100	103784	8458	11721	48422	4745	12382	13423	17666	18180	5343	6810	5894	6197	-	-	3936	3438
33	75187	79892	11963	12139	22017	26040	8229	8434	12377	11373	8197	8960	4675	5718	-	-	7728	7227
34	906682	995843	193080	257642	320729	322606	72265	75028	99671	113714	88640	90841	40911	44127	26871	26168	64516	65720
35	58042	58977	3014	3281	6534	7193	4399	44383	36848	36624	2515	2629	1803	1877	-	-	2929	2929
36	100341	106673	24115	24969	11555	12761	12382	13423	17666	18180	5343	6810	5894	6197	-	-	3936	3438

The construction elements considered here are: Substructure, Frames, Floors, Roofs, Walls, Windows and Doors, Finishing, Fittings, Services.
These elements are used as the variables X1, X_2, X_3, ……..X_9 in the multiple regression model. The model predicts the final cost of the project.

Table 2 Initial and final contract sums of road projects (Us Dollar)

S/no	INITIAL SUMS	FINAL SUMS	INITIAL EARTH WORK	FINAL EARTH WORK	INITIAL SURFACE DRESSING	FINAL SURFACE DRESSING	INITIAL DRAINGE& CULVERT	FINAL DRAINGE& CULVERT
1	3155794	4020588	746965	850711	1750295	2503473	658534	666404
2	366626	386241	68533	69587	130035	147692	168056	168961
3	245378	304949	29236	39504	97370	138084	118772	127361
4	3106358	3261332	508432	510662	1800649	1907398	797278	843272
5	369577	419364	63710	79032	85154	119620	220712	220712
6	314965	545624	76529	258010	81480	97768	156956	189846
7	1279181	1338012	419252	450302	520881	520881	339048	366830
8	2525183	2804930	118723	130076	2169788	2418478	236672	256376
9	1474036	1687862	369163	391054	627196	819560	477677	477248
10	1784247	2373794	401113	493849	839735	1350674	543399	529270
11	344895	370818	68735	70493	182725	197178	93435	103147
12	496175	559276	221704	248307	134097	163598	140353	147371
13	302405	480314	71506	202748	76456	92744	151932	184822
14	744042	871679	251193	289302	329067	380290	163782	202087
15	1243138	1522253	266308	394884	441193	467528	535637	659842

S/no	INITIAL SUMS	FINAL SUMS	INITIAL EARTH WORK	FINAL EARTH WORK	INITIAL SURFACE DRESSING	FINAL SURFACE DRESSING	INITIAL DRAINGE& CULVERT	FINAL DRAINGE& CULVERT
16	932155	9898165	115830	47874	410778	400839	405546	541405
17	1095631	1153094	256375	491675	320587	392434	518669	520178
18	550413	588881	113896	131733	135393	156059	301094	301094
19	1441066	1681846	369899	540860	580665	651487	490501	489499
20	725837	792672	138082	153311	320781	359624	266974	279736
21	648750	683471	149116	167384	282433	298057	217202	218029
22	1969607	2492846	472181	671398	820806	1023300	676621	798148
23	1564555	1692108	320430	378507	487625	540725	756500	772876
24	170811	196935	10048	11052	50239	65310	35167	40191
25	669160	726557	119777	128417	178414	198023	370970	400116
26	673505	833678	120030	159576	310694	421709	242781	252393

The construction elements considered here are: Earth work, Pavement work, Drainage and Culvert, Bridge. These are used as the variables X_1, X_2, X_3, ……..X_5 in the multiple regression model for the prediction of final cost of project.

5.0 RESULTS AND DISCUSSION

Paired t-test result for difference between the initial and final contract sum of individual building construction elements is presented in the Table 3 and 4 below. And it can be seen from the Tables 3 & 4 that almost all cases, there is significant difference between the initial and final cost of construction for both building and civil engineering projects. This serves as a justification, to investigate the causes.

The mean score value of these factors based on their severity, have been presented in Tables 5, 6 and 7 as perceived by individual group of respondents. They were also subsequently ranked accordingly. Also the aggregation of mean score values and rankings with regard to such factors as perceived by all groups of respondents are presented in Table 8.

Factors considered in the research.

i) Fluctuation of price of materials
ii) Variation
iii) Government policies
iv) Change of Government and political instability
v) Wrong method of estimation
vi) Poor financial control on site
vii) Long period between design and tendering time
viii) Design errors
ix) Lack of coordination between contractors and consultant
x) Poor supervision and lquidation Damages
xi) Previous experience of contract
xii) Inadequate production of raw materials
xiii) Effect of weather
xiv) Absence of construction cost data

Table 3 Paired t-test result for difference between the initial and final contract sum of individual Building construction elements

S/no	DF	$t$cal	t0.05	P-value	Remark
	All – 37	12.60	2.48	0.056	Significant
1	X1 – 36	11.59	2.18	0.043	Significant
2	X2 – 36	13.39	1.26	0.008	Significant
3	X3 – 36	16.20	1.73	0.013	Significant
4	X4 – 36	18.65	1.28	0.097	Significant
5	X5 – 36	12.23	2.43	0.085	Significant
6	X6 – 36	3.03	1.85	0.015	Significant
7	X7 – 36	12.67	2.37	0.052	Significant
8	8 – 36	14.12	1.76	0.028	Significant
9	X9 – 36	10.15	2.64	0.061	Significant

Table 4 Paired t-test value for road construction elements

S/no	DF	$t$cal	t0.05	P-value	Remark
1	Y1 – 26	14.465	1.158	0.258	Significant
2	Y2 – 26	25.693	0.016	0.987	Significant
3	Y3 – 26	28.611	0.298	0.768	Significant
4	Y4 – 26	-	-	-	-

Table 5 Respondents' ranking of factors for cost escalation icontractors' rating (N =14)

S/No	FACTORS	MEAN	RANK
1	Poor financial control on site	1.9	1
2	Fluctuation of price of materials	1.7	2
3	Variation	1.5	3
4	Design errors	1.3	4
5	Government policies	0.99	5
6	Wrong method of estimation	0.97	6
7	Change of Government and political instability	o.95	7
8	Long period between design and tendering time	0.93	8
9	Poor supervision and lquidation Damages	0.91	9
10	Previous experience of contract	0.88	10
11	Lack of coordination between contractors and consultant	0.87	11
12	Effect of weather	0.61	12
13	Absence of construction cost data	0.53	13
14	Inadequate production of raw materials	0.49	14

Table 6 Respondents' ranking of factors for cost escalation consultants' rating (n =13)

S/No	FACTORS	MEAN	RANK
1	Fluctuation of price of materials	1.09	1
2	Variation	1.05	2
3	Government policies	1.03	3
4	Change of Government and political instability	1.02	4
5	Wrong method of estimation	1.01	5
6	Poor financial control on site	0.98	6
7	Long period between design and tendering time	0.95	7
8	Design errors	0.92	8
9	Lack of coordination between contractors and consultant	0.91	9
10	Poor supervision and lquidation Damages	0.89	10
11	Previous experience of contract	0.77	11
12	Inadequate production of raw materials	0.75	12
13	Effect of weather	0.73	13
14	Absence of construction cost data	0.70	14

Table 7 Respondents' ranking of factors for cost escalation clients' opinion (N =13)

S/No	FACTORS	MEAN	RANK
1	Fluctuation of price of materials	1.07	1
2	Variation	1.06	2
3	Government policies	1.04	3
4	Change of Government and political instability	1.03	4
5	Long period between design and tendering time	1.00	5
6	Poor financial control on site	0.99	6
7	Design errors	0.97	7
8	Poor supervision and lquidation Damages	0.89	8
9	Wrong method of estimation	0.88	9
10	Lack of coordination between contractors and consultant	0.87	10
11	Inadequate production of raw materials	0.85	11
12	Effect of weather	0.80	12
13	Previous experience of contract	0.76	13
14	Absence of construction cost data	0.71	14

Table 8 Overall (aggregation) respondents' ranking of factors for cost escalation based on the opinions of clients, consultants and contractors(n =40)

S/No	FACTORS	MEAN	RANK
1	Fluctuation of price of materials	3.90	1
2	Variaton	3.73	2
3	Government policies	3.23	3
4	Change of Government and political instability	3.00	4
5	Poor financial control on site	2.75	5
6	Long period between design and tendering time	2.75	6
7	Wrong method of estimation	2.60	7
8	Design errors	2.56	8
9	Poor supervision and lquidation Damages	2.54	9
10	Lack of coordination between contractors and consultant	2.52	10
11	Inadequate production of raw materials	2.50	11
12	Effect of weather	2.44	12
13	Previous experience of contract	2.44	13
14	Absence of construction cost data	2.42	14

Table 9 Test of agreement on the ranking between the various groups on the severity index with regard to factors of cost escalation in building and civil engineering project

Groups	Rs	t - cal	t- tab	Accept Ho	P value
Clients / Consultants	0.27	1.30	1.13	Yes	< 0.05
Contractors / Clients	0.35	1.80	1.13	Yes	< 0.05
Consultants / Contractors	0.41	2.10	1.13	Yes	< 0.05

Thus, further analysis of factors from the Contactors' opinion in the Table 5 shows that "poor financial control on site'', "fluctuation of price of material'' and "variation" Were the most significant factors responsible for cost escalation. This is based on their mean score values of 1.9, 1.7, and 1.5 respectively. They were then ranked accordingly as 1st, 2nd and 3rd. Table 6 shows that from consultants' rating "Fluctuation of price of material: "variation" and ''government policy'' were the major causes of cost escalation. Each with the mean score value of 1.09, 1.05and 1.03. Consequently they were ranked as 1st 2nd and 3rd most significant factors responsible for cost escalation in both Road and Building projects. As can be seen from Table 7 Clients' have rated "Fluctuation of price of material", "Variation" and ''Government policy 'are the top most important factors responsible for escalation of construction cost. Each with the mean score value of 1.07, 1.06 and 1.04. Therefore, they were ranked as 1st, 2ndand 3rd important factors.

In the final analysis, the aggregation in the overall perception of all the three groups (Clients, Consultants, and Contractors) from Table 8 shows that "Fluctuation of price of material" and "Variation" each with the mean score of 3.9 and 3.73 were the key factors responsible for cost escalation. They are therefore, ranked as 1st and 2nd most important factors

Table 9 shows that there is no significant difference in the perception of Clients/Consultant, Clients/Contractors and Consultants/Contractors with regard to factors responsible for escalation of construction projects costs respectively.

Also the linear multiple regression models for prediction of final cost of construction for both building and road projects from the conceptual stage of projects were developed and presented in equations (4.1) and (4.2).

5.1 Linear Multiple Regression Model

Here SPSS was used to establish the relationship between the initial and final sums of building and civil engineering projects. Consequently multiple regression equation models were developed.

$Y_i=b_0 + b_1X_1 + b_2X_2+ \ldots\ldots b_nX_n$

Where;

Y_1 = Final contract sum per square meter of floor area excluding preliminaries and

Contingencies;

Y_2 = Final contract sum per kilo meter of road excluding preliminaries and

Contingencies;

b_0 = Regression constant

b_1 = Regression coefficient for the construction element (Regression estimates)

$x_{(1-9)}$ = initial contract sum of all the building construction elements (Independent variables)

$X_{(1-4)}$ = initial contract sum of all road construction elements (Independent variables)

Allowing for preliminaries and contingencies, the overall final contract sum becomes

F=Y+P+C

Where;

F= Overall final contract sum

The result of multiple regression analysis, using initial cost per square meter of floor area for building construction element as independent variables and final contract sum per square meter of floor area as dependent variables was established as follows;

$$Y= b_0 + b_1x_1 + b_2x_2 + - - - b_nx_n$$
$$Y= 5.212E7 + 1.641x_1 + 3.319x_2 + 0.891x_3 + 0.949x_4 – 0.364x_5 + 0.819x_6 + 0.949x_7 – 2.134x_8 \quad \text{..... (4.1)}$$

The result of multiple regression analysis, using initial cost per kilometer for road construction element as independent variables and final contract sum per kilometer as dependent variables was also established as follows;

$$Y= b_0 + b_1x_1 + b_2x_2 + - - - b_nx_n$$
$$Y = 2.32E6 + 1.178x_1 + 1.068x_2 + 3.189x_3 \quad \text{..... (4.2)}$$

Hence;

F = Y + P + C

Where; F.Y.P.C and x-values were as earlier defined.

6.0 CONCLUSION

Factors responsible for the cost escalation of building and civil engineering have been identified. These factors are: Fluctuation of price of materials, Variation, Government policies, Change of Government and political instability, Wrong method of estimation, Poor financial control on site, Long period between design and tendering time, Design errors, Lack of coordination between contractors and consultant, Poor supervision and liquidation Damages, Previous experience of contract, Inadequate production of raw materials, Effect of weather and Absence of of construction cost data Inaccurate projects cost estimation. The mean score values of these factors were determined and subsequently ranked accordingly. According to contractors' rating "poor financial control on site'', "fluctuation of price of material'' and "variation" Were the most significant factors responsible for cost escalation each with mean score value of 1.9, 1.7 and 1.5 respectively. Consultants have rated "Fluctuation of price of material: "variation" and government policy as the major causes of cost escalation. Each with the mean score value of 1.09, 1.05 and 1.03.

From the opinions of the individual group and also aggregation in the opinions of all the three groups, it could be concluded that ''Fluctuation of price of material'' and variation were the major causes of cost escalation in the construction of building and civil engineering projects. Each with the mean score value of 3.9 and 3.73 respectively.

The result of the hypotheses test shows that there was no significant difference between the perceptions of Clients/Consultants, Clients/Contractors and that of Consultants/Contractors with regard to factors responsible for cost escalation.

Acknowledgement

The authors would like to thank Research Management Center (RMC) at Universiti Teknologi Malaysia. Furthermore, special thanks to the Ministry of Science, Technology, and Innovation (MOSTI) for funding this research projects with vote no. 4S055, and PAS grants (vote no. Q.J130000.2709.01K40, and Q.J130000.2709.01K41).

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