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Inhibiting Factors of Cost Performance in UAE Construction Projects

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Abstract: UAE construction industry frequently faces poor cost performance which commonly known as cost overrun problem. This problem is resulted from several factors and it is important to identify these cost overrun factors in order to avoid and minimize it. Hence, this paper focused on determined the relevancy of factors affecting cost performance in construction projects of UAE. Through a review of past research works conducted globally, 27 factors of cost overrun were listed and used for developing a structured questionnaire. A survey was conducted with 33 practitioners from client, consultant and contractors organizations involved in handling construction projects in UAE. The respondents were requested to state their perception regarding the relevancy of each of the factors that was perceived in context with cost overrun issue using 5-points Likert scale. The responses were analysed using average index method and the results found that all the 27 factors are relevant with construction industry of UAE in causing cost overrun. These factors can be used for further investigation to uncover critical problems of cost overrun.

Keywords: Cost overrun, construction industry, inhibiting factors, UAE

1. Introduction

Construction projects are important assets to economic development and deploying human resource. Globally, huge amount is invested in construction activities to facilitate the society with several types of the projects and provide facilities for comfortable life such as infrastructural works, hospital buildings and others. Hence, a number of advanced techniques and methods have been devised to achieve construction projects within shortest possible time to deliver to the public. Also, it is intended that the construction projects be executed as cheaper as possible so that more project can be carried out with less investment. Unfortunately this construction industry is experiencing unsatisfactory cost performance issue and many of the projects face cost overrun. This overrun of the cost is the burden over the government as well as the public as this monetary loss can never be recovered back. This problem of cost overrun is common in both developing as well as developed nations since long. Flyvbjerg, Holm, & Buhl (2003) highlighted that the problem of cost overrun has not improved since last 70 years. The authors conducted a research work in 20 nations including both developed and developing areas on 258 projects and summarized that 90% of the projects are overrun

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with average overrun of 28% of the project cost. Recent studies revealed that this issue of cost overrun is still of serious nature (Memon, Memon, Soomro, & Rahman, 2019, Rahman, Foo, Memon, & Nagapan, 2019).

All the stakeholders involved in construction projects should rethink the traditional way cost estimation to bring out a distinction between cost underestimation and final cost overruns (Ahiaga-Dagbui & Smith, 2014). In order to monitor the costs incurred in a construction project, it is paramount that the budgeted or estimated costs are compared to the actual costs incurred for various activities in the project. Furthermore, cost overruns need a comprehensive analysis for the costs once the project is completed (Allahaim & Liu, 2015). Personnel involved in project management of UAE construction industry intends to mitigate cost overruns in construction projects through project governance (Cardenas, Voordijk, & Dewulf, 2017). Since construction projects have a significant effect on the economy, it is important that the costs incurred in undertaking such projects be monitored and controlled closely. Hence, it is essential that cost overrun issue must be addressed carefully. This problem of cost overrun in major issue in UAE construction also, thus this research work is focusing on studying the problems causing cost overrun in construction projects of UAE.

2. Literature Review

2.1 Construction Industry in UAE

United Arab Emirate (UAE) is considered as one of the most rapid developing economies in the Middle East, managers have always been viewed in terms of development for the people and the state there has been basic investment in the construction field in the last four decades. The construction industry in the UAE has enhanced as compared to the rest of the Middle East. Even if there was a commercial crunch in 2008 the construction industry reached high growth rate during the year 2007 till 2009 where GDP was recorded 8%. The construction industry is associated to increase revenues from the Gas & Oil industry. The basic expansion of the industry occurred during the economic development period which started from 1990. Due to the present economic situation of UAE they are still in the process of getting included with mega projects from residential, infrastructure and commercial project most of the project execution is made by national and international contractors which includes various types of contracts and requirements complained to various principles, contractors require to be created and more importantly must contain good (Motaleb & Kishk, 2015)

UAE has experienced a construction boom during the past three decades, attracting construction professionals from all over the world. According to the UAE Ministry of Infrastructure Development, the construction industry contributed between 30% to 40% of the non-oil productive sectors at the end of each National Development Plan from 1980 to 2000 (Mahamid, Al-Ghonamy, & Aichouni, 2013). Assaf & Al-Hejji (2006) found that only 30% of construction projects are completed within the specified cost and schedule. Faridi & Al-Sayegh (2006) highlighted that poor cost performance is considered as one of the most serious and frequent problems in the UAE construction industry

Many construction projects being undertaken currently have been found to take longer than they are expected to. This means that more resources than was actually planned have to be allocated to the projects and probably for longer than anticipated. Many factors would contribute to this predicament including inflation and the increasing cost of production. However, construction projects can be managed in a manner that would see them be completed as scheduled and the cost incurred remain within the budgeted figures.

2.2 Reasons of Cost Overrun in Construction Projects

This problem of cost overrun is results of several factors and it is important to identify factors that contribute to cost overruns to avoid and minimize problems (Azhar, Farooqui, & Ahmed, 2008). Hence, it is very essential to study cost overrun problem in depth to avoid overrun and achieve successful projects. Previous studies have revealed that there is a lack of investigation of factors of cost overrun and their relative occurrence throughout the construction project life cycle. Also, assessment of causal relationships is lacked in prevailing literature available. Therefore, it is very necessary to identify the main contributors to cost overrun in construction projects in UAE in order to overcome this critical challenge. Hence this study intends to uncover the factors affecting cost overrun in building construction projects in UAE.

Jackson & Steven (2001) examined the causes of cost overrun in building projects of Ilorin through questionnaire survey and found that major factors of cost overruns were fluctuation in the prices of materials/labour, variation orders, delay in honouring certificates, lack of proper analysis of tenders, selection of incompetent contractors, lack of proper appraisal of projects and unrealistic representation of client's needs. Jackson (2002) studied reasons of budget overrun in UK through questionnaire survey and found that major reasons of overrun were design changes, design development factors, information availability, method of estimation, performance of design team and project management.

Koushki, Al-Rashid, & Kartam (2005) studying problem of cost increase in the private residential projects of Kuwait mentioned that three main contributors to cost overruns were contractor-related problems, material-related problems and owners' financial constraints. Omoregie & Radford (2006) study found out the major factors causing cost overrun in infrastructure projects of Nigeria were price fluctuations, financing & payments of completed works, poor contract management, schedule delay, changes in site conditions, inaccurate estimates, shortage of material, imported

materials & plant items, additional works, design changes, subcontractors & nominated suppliers, weather, non-adherence to contract conditions, mistakes & discrepancies in contract conditions and fraudulent practices.

Enshassi, Al-Najjar, & Kumaraswamy (2009) conducted questionnaire survey to identify major causes of cost overrun in construction projects of Gaza by investigating 42 factors amongst contractors, consultants and owners. Results indicated that top ten factors that cause cost overruns as perceived by the three parties include increment of materials prices due to continuous border closures, delay in construction, supply of raw materials and equipment by contractors, fluctuations in the cost of building materials, unsettlement of the local currency in relation to dollar value, project materials monopoly by some suppliers, resources constraint: funds and associated auxiliaries not ready, lack of cost planning/monitoring during pre and post-contract stages, improvements to standard drawings during construction stage, design changes, and inaccurate quantity take-off.

Niazi & Painting (2017) studied significant factors leading to construction cost overruns in Afghanistan through questionnaire survey and highlighted that critical causes that potentially result in construction cost overruns are corruption, delay in progress payment by owner, difficulties in financing project by contractors, security, change the order by the owner during construction and market inflation. Asiedu & Adaku (2019) reported that four major causes of cost overruns are poor contract planning and supervision; change orders; weak institutional & economic environment of projects and lack of effective coordination among the contracting parties while Andric, Mahamadu, Wang, Zou, & Zhong (2019) highlighted that the most frequent causes of cost overruns are resources (construction material, equipment and labour), construction works, changes in design, land acquisition and resettlement and changes in currency exchange rate. Johnson & Babu (2020) studied cost performance in construction projects of UAE through questionnaire survey and reported that major causes of cost overrun include Design variation from client and consultant, Poor cost estimation of the project, Delay in client's decision-making process, Financial constraints of client, Inappropriate procurement method, Lack of risk management during the execution phase of the project, Poor initial planning, Lack of client's experience, Lack of flexibility in design, Inefficient contractor performance Lack of understanding the contract conditions by the project participants. Phama, Luub, Kimc, & Vien (2020) investigated construction industry of Vietnam and found that risks, resources, incompetence of parties, and components, transportation and machinery cost are the four significant factors that cause cost overrun in construction projects.

3. Research Method

Quantitative mode of research is structured for the data collection and the scope of findings is delimited by that structure. The chances of overlooking or misinterpreting are effectively absent (Blumberg, Cooper, & Schindler, 2008). The quantitative approach is associated with the positivism paradigm, where research is conducted to test theory or hypotheses. From a positivist approach it is possible for the researcher to use either qualitative of quantitative procedure to formulate a hypothesis but must seek to prove that hypothesis by quantitative methods (Saunders et. al. 2009). The positivist researcher observes the social world by collecting objective data, that is, by performing empirical research (Blumberg et. al. 2008). Positivist theory evolves essentially from the findings of empirical research. But existing theory can be (and is) developed non-empirically by means of logical calculations that seek to accommodate new hypotheses, and thereby, expand existing theory (Saunders, Lewis, & Thornhill, 2009). Blumberg, Cooper, & Schindler (2008) explained that positivist researchers observe the same social phenomenon work with the same facts that describe the social world, but they construe them differently when they work with different theoretical models.

Research method adopted for this study was quantitative. A survey was conducted with 33 practitioners from client, consultant and contractors organizations involved in handling construction projects in UAE. The main content of the questionnaire is the list of 27 factors causing cost overrun uncovered from literature review of previous researcher works. The respondents were requested to state their perception regarding the relevancy of each of the factors that was perceived in context with cost overrun issue using 5-points likert scale.

4. Data Collection and Analysis

This research work focused on collecting sampling data through questionnaire form. This involved the selected practitioners from client, consultant and contractor's organizations involved in planning and execution process of the construction projects. The participants were provided a list of 27 common factors of cost overrun identified from literature review previous research work conducted globally. These participants were asked to validate the contents of the questionnaire and indicate the level of relevant of the factors with construction industry of UAE by using 5-point Likert scale as Extremely Relevant (ER), Very Relevant (VR), Moderate Relevant (MR), Slightly Relevant (SR) and Not Relevant (NR). In order to analyse quantitative data gathered from the questionnaires, Statistical Package for Social Sciences (SPSS) was used. This software has largely been used and accepted by researchers as a data analysis technique (Stevens, 2012; Adeyemi, Martin & Kasim, 2015). Based on frequency calculation Average Index (AI) value of each factor was computed with the help of Microsoft Excel program using following equation.

$$AI = \frac{1X_1 + 2X_2 + 3X_3 + 4X_4 + 5X_5}{X_1 + X_2 + X_3 + X_4 + X_5} \quad (1)$$

Where,
X_1 = No of respondents for "Not Significant"
X_2 = No of respondents for "Slightly Significant"
X_3 = No of respondents for "Moderately Significant"
X_4= No of respondents for "Very Significant"
X_5= No of respondents for "Extremely Significant"

5. Results and Discussions

In the process of data collection, a total of 33 respondents participated. These respondents were familiar with engineering knowledge and had sound experience in handling construction projects. Demographic details of the participants in shown in Table 1.

Table 1 - Characteristics of the respondents

Category	Items	Percentage of respondents
Organization type	Contractor	39.4%
	Consultant	36.4%
	Client	24.2%
Working sector	Public/Governmental	36.4%
	Private	63.6%
Academic qualifications	Bachelor degree	35.7%
	Postgraduate	21.4%
	Diploma	28.6%
Working experience in construction industry	5 to 10 years	28.6%
	11 to 15 years	14.3%
	More than 15 years	17.9%
	Less than 5 years	39.3%
Position in the construction company	Engineer	48.5%
	Executive management /supervisor	27.3%
	Senior manager	24.2%
	Technical worker	9.1%
Type of construction that you currently involved	Infrastructure	48.5%
	Buildings	42.4%
	Management office	9.1%

From Table 1, it is indicated that all the major stakeholders involved in construction process were participating in this pilot study process. A significant number of participants with 39.4% represented contractors as contractors are key stakeholder in converting designed project into physical state. This is followed by consultant with 36.4% while there were 24.2% participants representing client organizations. These participants represented both public and private sector where 63.6% of the participants belong to private sector organization and 36.4% of the respondents are working in public/government sector projects. Among the participants 35.7% of the respondents have obtained engineering degree and 21.4% respondents have completed education up to post graduate level and remaining 28.6% of the respondents are diploma holders. These respondents are working in construction industry for several years. Statistical analysis reveals

that 32.2% of the respondents have more than 10 years' experience of handling construction activities. A significant number of participants representing 48.5% are working as project engineers while 27.3% respondents are involved in management and 24.2% of the respondents are working as senior managers on project. The respondents have experience of handling infrastructure and building projects representing 90.9% of the participant while 9.1% of the respondents are engaged in management office in planning section. Perception of the respondents regarding relevancy of the factors with construction industry of UAE was analysed with AI formula and the results are presented in Table 2.

Table 2 - Relevancy of factors causing cost overrun

No	Causative factors to cost overrun	Likert scale					AI
		NR	SR	MR	VR	ER	
1	Shortage of technical personnel (skilled labour)	1	3	7	16	6	3.7
2	Poor supervision and timely instruction from contractor	0	2	13	12	6	3.7
3	Skills Shortage	0	5	7	15	6	3.7
4	Poor supervision and poor site management	3	4	5	10	11	3.7
5	Poor site management and supervision	1	4	8	14	6	3.6
6	Lack of coordination at design phase	2	5	7	15	4	3.4
7	Construction's Design Errors	2	8	4	13	6	3.4
8	Owner's financial constraints	1	8	7	12	5	3.4
9	Lack of skilled sub-contractors/labours and technical staffs	1	10	6	10	6	3.3
10	High Material Costs	4	3	10	11	5	3.3
11	Lack of experience	4	6	6	12	5	3.2
12	Contractual claims (ex. extension of time with cost claims)	4	5	8	11	5	3.2
13	Uncompleted Design on the tender's time	2	10	8	6	7	3.2
14	Incomplete drawings and construction's documentations provided by contractor	2	10	4	15	2	3.2
15	Project Scope Variations	5	4	10	9	5	3.2
16	Contractor's financial constraints	3	7	10	8	5	3.2
17	Unsuitable leadership style of construction/project manager	3	8	7	11	4	3.2
18	Imprecise quantity take-off	5	7	7	7	7	3.1
19	Poor labour productivity and resource deficiency	4	6	10	9	4	3.1
20	Inadequate planning and scheduling	6	6	8	6	7	3.1
21	lack of coordination between designer and contractors	2	8	12	8	3	3.1
22	Frequent design changes	4	8	9	8	4	3.0
23	Owner's Payment Delays	3	11	6	9	4	3.0
24	Incompetent subcontractors	6	6	8	9	4	3.0
25	fluctuation of material's prices	7	4	11	7	4	2.9
26	Slowness of the owner's decision making process	6	7	9	6	5	2.9
27	Inaccurate and poor initial time and Cost Estimations	8	7	5	7	6	2.9

#note: Extremely Relevant (ER); Very Relevant (VR); Moderate Relevant (MR); Slightly Relevant (SR); Not Relevant (NR).

Table 2 indicates that all the causes for all groups have mean score range from 2.8 up to 3.7. Based on the scale used for data collection, it is seen that the factors having mean value ≥ 2.00 has relevancy with construction industry of UAE. However, level of the relevancy varies which might exert different level of effect. Thus all the 27 causes investigated are considered relevant to cost overrun problem in construction industry of UAE and can be used for further investigation.

6. Conclusion

This research works assessed the relevancy of the common factors of cost overrun occurring in different countries of the world with construction works of UAE. This was done through survey amongst 33 practitioners representing client, consultant and contractors' organizations. This investigation included 27 factors of cost overrun and the perception of the practitioners regarding relevancy of each was measured with 5 point Likert scale and analysed with average index formula. Analysis results indicated that all the 27 factors investigated have relevancy with construction industry of UAE in causing cost overrun. These findings will be used further detailed investigation to assess the effect of the factors on cost overrun and develop controlling mechanism of the factors in achieving project completion with budget.

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