Major Factors Of Cost Overrun In Construction Projects: Critical Review

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Abstract
Budget is one of main pillars of project management and meeting its target is a priority for project managers. This paper reviews the budget performance in those projects around the world. It is found that cost overrun has occurred in more than 60 % of projects in majority of the developing countries. “Design Changes” found to be common among different countries in different continents as a top cost overrun factor. Moreover, the industry type of a project sometimes dictates the highest ranked factors causing an excess in budget. In addition, it is concluded that there is a real necessity to conduct more studies in budget performance in oil and gas projects.

Key words: Project Performance, Cost overrun, Construction Projects.

Introduction
The preferred goal of project managers is to have a project executed efficiently, meeting targets of time, cost and quality.

Cost overrun has been evident in projects, in Malaysia there is 55% deficit in budget of projects (Shehu, et al., 2014) while in Jordan 65 % of Public Projects were experiencing budget Overrun (Sweis, et al., 2013)

There have been immediate consequences of time and Cost overrun in projects, like Major Dispute which sometimes leads to arbitration between the client and the main contractor. A third-party agency would have to interfere and settle such dispute in order for both parties to win their claims (Memon, et al., 2011). The worst could occur as well, some projects get abandoned because of cost over run (Shehu, et al., 2014).
Literature Review

Cost overrun takes place when the main objectives of the project are not met within the budget and cost, that is allocated and estimated (Dlakwa & Culpin, 1990). (Derakhshanalavijeh & Teixeira, 2014) studied this theme in the oil and gas project, defined cost overrun as “Project cost overrun is defined as the positive difference between the actual cost upon project completion and the agreed estimation of the project budget”. While (Harisaweni, 2007) has associated the cost overrun with project/construction contracts. He defined this over run when the estimated value has surpassed the agreed one that written in the contract. (Christensen & Gordon, 1998) and (Le-Hoai, et al., 2008)seem to agree with the (Derakhshanalavijeh & Teixeira, 2014) in the definition when they used the word “difference” in the definition, that is the difference between the initial and final figure of the budget, however (Christensen & Gordon, 1998) called cost overrun “cost growth”. (Memon, et al., 2011) has a simpler definition, Cost overrun is “excess of actual cost over budget”. He added that phenomena is feared by both the owner and the main construction contractor. The main contractor has a lot in his plate that is considered risky, when he is the responsible to deliver the project on time while the owner must bear the claims that might be raised by the main contractor. In addition, (Memon, et al., 2011)revealed that the owner is potentially facing a cost overrun in case the running construction contract got void and there is a necessity to sign a new one.

Cost overrun occurs in all cycles of the project however, it is more likely to take its toll more in the construction stage according to (Sweis, et al., 2013) which is similar the likelihood of time over occurrence. (Shehu, et al., 2014) found that when the contract strategy is Design and Build (DB) there is chance that the cost overrun is reduced.

Finding

Correlation of Time and Cost Overrun

Studies shows that cost overrun and time overrun are correlated, studies by (Flyvbjerg, 2014) done on large projects revealed that when an execution phase of project delayed by one year the cost overrun increases by approximate 4.64 %.

(Sambasivan & Soon, 2006), (Motaleb & kishk, 2010) and (Memon, et al., 2011) studied effects of delays, they found the top two effects are: time overrun and cost overrun. This suggests highly of correlation between time and cost overrun. In other words, the moment a project is delayed, the budget of the projects increases.

In addition, (Memon, et al., 2011) stated the following:

“It is observed that the time overrun is closely associated with cost overrun. Most of the time, as the delay involves the extension of time to the project life and this may lead to cost overrun, as expenditure increases due to increase of time”.

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And, also stated:

“Time overrun is closely related to cost overrun and most of the time leads to cost overrun”.

Beside the explicit stating, (Memon, et al., 2011) used Spearman’s Rank Order Correlation by which they found that time overrun are “highly” correlated with cost overrun.

The factor of late payment to the main construction contractor mentioned in Ghana and Uganda articles, has been listed as one of top factor in time overrun as well in several studies before (M.Jarkas & Younes., 2014); (A.Assaf & Al-Hejji, 2005); (Sambasivan & Soon, 2006); (Frimpong, et al., 2002); (Alkaabi et al., 2019); (A.Omoregie & D.Radford, 2006); (Alinaitwe, et al., 2013). “Design changes” found in the top cost overrun root initiator, is another factor that is frequently found in time overrun top causes in the reviewed literature by the researcher (S.Alnuaimi & Almohsin, 2013); (Emam, et al., 2015); (Elawi, et al., 2015); (Le-Hoai, et al., 2008); (Hwang, et al., 2012); (A.Omoregie & D.Radford, 2006). This shows there is some significant correlations between time and cost overrun root causes.

**Major Cost Overrun Causes:**

In Africa, Ghana and Uganda, there are similarities in the top factor that causes cost overrun especially the factor of late payment to the main construction contractor. Another similar factor is the inflation of the economy in these countries that contributes to a budget to exceed its limits. What made those two studies to have similar top ranked cost overrun causes as well besides being developing countries and in the same region, in the researcher opinion, is that they were tested against similar industry (public construction). In Ghana, the study is on road projects which is part of the public funded projects.

The study done by (Ameh, et al., 2010) that is in Nigeria has somewhat different factors from other mentioned African countries (Ghana, Uganda). Experienced of the main contractor performing the telecomm project is what made a difference in make the cost of the project goes beyond its planned figure. In addition, material prices play a key role in causing cost overrun in Nigerian Telecomm projects. Having different factors compared to a neighboring country (Ghana) support the argument that the type of construction projects does matter when it comes to the root cause of cost overrun.

In Malaysia, the researcher reviewed the article of (Memon, et al., 2011) and (Rahman, et al., 2013) in which found that material issues and site management were common within the studies. In Jordan, an study by (Sweis, et al., 2013) have found the design issues along with competence of the contractor are the top factors that causes cost overrun. (Alzebdeh,
et al., 2015) have found that instability of US dollar, changes in regulations and poor estimate of cost are the root causes for large construction projects in Oman.

While in UK: Design changes and wrong estimate of budget are some of the top causes of cost overrun in construction projects in UK. Design changes factor is the top factor of cost overrun in (Alinaitwe, et al., 2013) in Uganda, (Sweis, et al., 2013) in Jordan. Therefore, it would appear the causes of cost overrun in UK construction projects is more similar than what they are thought to be (i.e. it is thought by many in the industry that cost overrun causes in Europe is different from Asian countries).

**Cost overrun in Oil and gas Projects**

It has been found that average of cost overrun is 18% among 200 projects studied in oil and gas business (Rui, et al., 2016). In developing countries like Iranian gas projects, (Vafaiee, et al., 2010) found that the cost overrun reached up to 20%. A more frightening stat, earlier report cited in paper of (Olaniran, et al., 2015) states the average cost overrun in mega oil and gas projects in Europe around 91% and in Asia 92%. One project cost an average of USD 2000 million in Europe and USD 1400 to 11000 million in Asia.

Things have not improved much over the years, EY report in 2014 revealed that 64% of Oil and Gas Mega projects faced cost overrun in the world, where middle east is the worst region in that department: 89% proportion of projects suffer from cost overrun. This also backs up the claim by (Zadjali, et al., 2014) and (Alshamsi, et al., 2019) that cost overrun in developing countries are more severe and worse.

There is this article by (Derakhshanalavijeh & Teixeira, 2014) that have been done in Oil and Gas projects and found that “inaccurate cost estimation”, “improper planning” and “frequent design changes” are the top three causes of cost overrun. It is surprising that although complex business and sector like oil and gas, have similar top factor of cost overrun to the public construction projects. Whereas the top causes of time overrun are quite different from one industry to another.

<table>
<thead>
<tr>
<th>Author</th>
<th>Country</th>
<th>Type</th>
<th>Factors Of Cost overrun</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Chileshe &amp; Berko, 2010)</td>
<td>Ghana</td>
<td>Road Construction</td>
<td>Delays in monthly payments to contractors; variations; inflation, and schedule slippage</td>
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<tr>
<td>“Causes of project cost overruns within the Ghanaian road construction sector”</td>
<td></td>
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<tr>
<td>Source</td>
<td>Location</td>
<td>Projects Type</td>
<td>Cost Overrun Factors</td>
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<tr>
<td>(Ameh, et al., 2010)</td>
<td>Nigeria</td>
<td>Telecommunication projects</td>
<td>Lack of contractor experience on the telecommunication projects, the high cost of imported materials and the fluctuation in the prices of materials</td>
</tr>
<tr>
<td>(Memon, et al., 2011)</td>
<td>Malaysia</td>
<td>Construction Projects</td>
<td>Poor design &amp; delays in Design, unrealistic contract duration &amp; requirements imposed, lack of experience, late delivery of materials &amp; equipment,</td>
</tr>
<tr>
<td>(Sweis, et al., 2013)</td>
<td>Jordan</td>
<td>Construction Projects</td>
<td>Design changes, lack of experience of project type and location</td>
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<tr>
<td>(Rahman, et al., 2013)</td>
<td>Malaysia</td>
<td>Large construction projects.</td>
<td>Fluctuation of prices of material, cash flow and financial difficulties faced by contractors and poor site management and supervision.</td>
</tr>
<tr>
<td>(Alzebdeh, et al., 2015)</td>
<td>Oman</td>
<td>Large Construction projects</td>
<td>Instability of the US dollar, changes in governmental regulations, faulty</td>
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<tr>
<td>Title</td>
<td>Country</td>
<td>Sector</td>
<td>Issues</td>
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<tr>
<td>“Applying Interpretive Structural Modeling to Cost Overruns in Construction Projects in the Sultanate of Oman”</td>
<td></td>
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<td>Cost estimation, and poor coordination among projects’ parties</td>
</tr>
<tr>
<td>(Alinaitwe, et al., 2013)</td>
<td>Uganda</td>
<td>Public Construction</td>
<td>Changes in the work scope, high inflation and interest rates, poor monitoring and control, delayed payments to contractors and fuel shortages.</td>
</tr>
<tr>
<td>“Investigation into the causes of delays and cost overruns in Uganda’s Public Sector Construction Project”</td>
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<tr>
<td>(Olawale &amp; M., 2010)</td>
<td>UK</td>
<td>Construction Projects</td>
<td>Design changes Risk and uncertainty associated with projects Inaccurate evaluation of projects time/duration Nonperformance of subcontractors and nominated suppliers Complexity of works</td>
</tr>
<tr>
<td>“cost and time control of construction projects: inhibiting Factors and mitigating measures in practice”</td>
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<tr>
<td>(Derakhshanlavijeh &amp; Teixeira, 2014)</td>
<td>Iran</td>
<td>Oil and Gas</td>
<td>Inaccurate cost estimations, improper planning, frequent design changes, inadequate labour/skill availability, inflation of costs of</td>
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<td>“Causes of Cost overrun in Construction Projects in Developing</td>
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Conclusion:
One of the primary constraints in projects is cost, which is a key element of project management success. This paper reviewed large number literature in order to investigate the budget performance and its root causes in case of overruns. EY Reports have shown that more than 60% of oil and gas projects suffer from cost overrun and in developing countries could reach up to 89%.

This study showed that the sector of the construction projects plays a role in identifying the top cost overrun causes, although one could argue that there are similarities in those factors between different countries. For example, “design changes” found to be common among different countries in different continents as top cost overrun factor. In Fact, this factor has appeared in the highest causes of time overrun in several studies.

Lastly, it is observed that very few articles were found to investigate the cost overrun factors in oil and gas projects in the world, and that is including Oman.

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