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Cost of Creating Winning Proposals for Oil and Gas
by Abhinav Sharma
Student Paper

Cost of Creating Winning Proposals for Oil and Gas[1, 2]

Abhinav Sharma

ABSTRACT

Cash flows from projects are the lifeline for all contractors, in this age of competition and reverse auction processes across contracting increases the pressure on contractors to keep margins lower and costing as close to reality as possible. There are multiple approaches which can be used for the estimation of project cost, but with so many options to choose from it becomes difficult to select only one estimation and just rely on it. Some methods just take the historical input which are not time consuming and can be automated to come up with estimation whereas there are other methods which need more effort from the side of the contractor but give results which are close to real costs if something extraordinary event does not take place. As per AACE guidelines 0.005% of the total cost of project is the optimum cost of estimation for the project, this number comes up to be very low for the second kind of estimation which includes all the plausible scenarios for the project. This paper is an attempt to evaluate multiple methods on this criterion and come up with the probability of winning a project based on the estimation, an imaginary scenario with real numbers as possible are used but a real project is more complex and need more input for evaluation. The probability of winning a bid is the highest in the Definite Estimate as per the analysis. Further, comprehensive research is required to come up with exact time and cost parameters which is out of scope of this research paper.

Keywords: *Bidding, Oil and Gas, Construction, Proposals, Cost, EPC, Outsourcing, Optimum bidding, Cost of Bidding, Winning Bids*

1. Introduction

Energy need of the world is growing immensely with each passing year[3]. Oil and Gas are still among the key energy resources of the world[4]. Each O&G project involves resources and

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[1] Editor's note: Student papers are authored by graduate or undergraduate students based on coursework at accredited universities or training programs. This paper was prepared for the course "International Contract Management" facilitated by Dr Paul D. Giammalvo of PT Mitratata Citragraha, Jakarta, Indonesia as an Adjunct Professor under contract to SKEMA Business School for the program Master of Science in Project and Programme Management and Business Development. http://www.skema.edu/programmes/masters-of-science. For more information on this global program (Lille and Paris in France; Belo Horizonte in Brazil), contact Dr Paul Gardiner, Global Programme Director, at paul.gardiner@skema.edu.

[2] How to cite this paper: Sharma, A. (2018). Cost of Creating Winning Proposals for Oil and Gas, *PM World Journal*, Vol. VII, Issue XII (December).

[3] See EY publication on Spotlight on Oil and Gas Megaprojects http://www.ey.com/Publication/vwLUAssets/EY-spotlight-on-oil-and-gas-megaprojects/$FILE/EY-spotlight-on-oil-and-gas-megaprojects.pdf

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capabilities of people from multiple disciplines. Many different companies across the globe come together to make these projects successful. Engineering Procurement and Construction companies are the first to carry out the estimations for these megaprojects. Many small vendors and contractors are used to carry out the last leg construction of these projects.

With such scale of projects, there is always the possibility of miscommunication and misinterpretation of expectations. The stakeholder to suffer the most because of these issues is the contractor because the livelihood of these contractors is based only on the cash flows from projects. A small misjudgment in bid calculation may lead to the death of such contractors.

A question arises from complexities of these projects; How long should be given to these contractors to make an optimum bid which keeps every stakeholder happy?

There are many assumptions during bid phase of the project[5], which results in contractors using different ways of tackling with uncertainties. Some contractors use the "Magic Number"[6] technique, where they multiply an arbitrary number based on experience with each calculated cost to come up with the final bid price. On the other hand, some contractors dig down to each activity and price the bid based on the calculated cost of each of these activities. The first kind of estimation is quick but may result in very wage bid for large projects whereas the second kind of estimation takes more time but is close to actual cost + profit for the project. There is also a question of the Cost of drafting the bid proposal; these proposals may take hours or months to draft depending on the complexity of projects and type of proposal.

This paper is an attempt at understanding the reasonable time frame and cost which is optimum for all the stakeholders of projects. A study of the type of proposals, the complexity of projects and historical bid errors would help in shedding light on these complex questions.

1.1. Objective statement

What is optimum time and cost associated with a winning proposal?

I. Firstly, evaluating present types of methods used for making proposals based on guidelines given in AACE Education Board Skills and Knowledge document.
II. Secondly, understanding the cost associated with each method.
III. Thirdly, assessing the cost to benefit ratio for each method and present optimum time and cost associated with a winning proposal.

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[4] See EY publication on Spotlight on Oil and Gas Megaprojects http://www.ey.com/Publication/vwLUAssets/EY-spotlight-on-oil-and-gas-megaprojects/$FILE/EY-spotlight-on-oil-and-gas-megaprojects.pdf

[5] See EY publication on Joint Ventures for Oil and Gas Megaprojects http://www.ey.com/Publication/vwLUAssets/ey-joint-ventures-for-oil-and-gas-megaprojects/$FILE/ey-joint-ventures-for-oil-and-gas-megaprojects.pdf

[6] See Guide to bidding by Steven E Moore http://www.irrisoft.net/news/newsletters/january2010/Guide to Bidding.pdf

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1.2. Problem definition

Whenever a contractor bid for a project there are only three outcomes:

1. Contractor doesn't win the project
2. Contractor wins the project but the bid was too low and ends up losing money
3. Contractor wins the project, covers the cost and makes profit

Out of the three outcomes only one outcome is positive for the contractor, but in each possibility, there is considerable time involved in drafting of the proposal. Time spent on proposal implies the time was not billed for any other project. There are multiple methods which are available with contractors to choose from for the project estimation, this paper is an attempt to identify the best alternative among these methods.

2. Methodology

2.1. Problem recognition and definition

Cost estimation must be high for profitability of the contractor and it should also be as close to reality so that contractor is able to win the bid. There are multiple methods which can be used for bid estimation, the time and effort required for each method is different and best alternative among these methods is to be identified for higher probability of success.

2.2. Development of feasible alternatives

Order of Magnitude Estimation Techniques and Definitive Estimates are evaluated for this paper. A Scenario is used to estimate the estimation based on each of the methods and time requirement for each step is calculated.
Some Techniques used for estimation based on Order-Of-Magnitude are[7]

- End Product Units Method
- Scale of Operations
- Ratio or Factor methods
- Physical Dimensions
- Parametric Estimates

Standard Checklist which is required for Definitive Estimate are[8]:

- Geographic Data
- Geological and Subsurface Data

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[7] See AACE Education Board-Skills & knowledge of cost engineering_ A project of the Education Board, AACE-American Association of Cost Engineers Chapter 1
[8] See AACE Education Board-Skills & knowledge of cost engineering_ A project of the Education Board, AACE-American Association of Cost Engineers Chapter 1

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- Meteorological Data
- Site Preparation
- Access and Parking
- Unloading and Storage
- Utilities and Temporary Facilities
- Local Material, Services and Subcontractors
- Local Condition
- Health, Safety, Environment and Security
- Security
- Transportation
- Labor
- Construction Equipment
- Communications
- Permits, Taxes and Fees
- Professional and Office Staff
- Miscellaneous

As this checklist describes the effort, money, and time required for the preparation of Definitive Estimates are considerably higher than Order of Magnitude Estimates, but with higher accuracy for the final estimate number[9].

The attributes which are evaluated for this paper are Scale of Operation method, Ratio or Factor method, Parametric Estimation method and Definite Estimates. The attributes are measured for their deviation from the Definite estimates and the probability of profit, probability of winning the proposals based on the deviations are identified for each scenario, time required for the estimation and accuracy of the estimation.

A method which above average chance of winning the contract along with above average probability of gaining profit would become the best alternative for the project cost estimation.

2.3. Development of outcomes for each alternative

The Scenario for estimation is as described below:

A Client has a plan of building a 1500 barrel per day production capacity Oil and Gas Plant. Historical data available with Contractor for a 1000 - barrel per day plant was $1,250,000[10] project duration of 10 months with 40 workers working 8 hours a day and 20 days working in a month.

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[9] See AACE Education Board-Skills & knowledge of cost engineering_ A project of the Education Board, AACE-American Association of Cost Engineers Chapter 1
[10] Estimated based on A New Long-Term Assessment of Energy Return on Investment (EROI) for U.S. Oil and Gas Discovery and Production, Paper details are mentioned in Bibliography

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- Location of Project: Calgary, Alberta State, Canada
- Type of Project: Green Field
- Geographic Data: Plane Processed fields as similar plants are operating in the vicinity
- Meteorological Data: 50.7inch average snow fall in Calgary[11]
- Unloading and Storage: $1500 per month for 1,950 sq. ft. space[12]
- Labor: $14/hr. minimum wage[13]
- Local Direct + Indirect Cost estimations: $1,070,700[14]
- Duration of project: 14 months

2.4. Selection criteria

Attributes	Scale of Operations Method	Ratio or Factor Method	Parametric Estimation	Definite Estimate
Process Used for calculation	$\frac{Total\ Historical\ Cost}{Historical\ Capacity}\ x\ New\ Capacity$	4.74^{15} x Estimated Cost	Estimation of Cost based on historical cost of each component	Estimation based on all factors related to project
Approximate Estimation for the scenario	$1,875,000	$2,971,980	$1,881,400	$2,084,600
Deviation	-10%	43%	-10%	NA
Probability of receiving Contract	High	Low	High	Moderate
Probability of Profit	Low	Very High	Low	High

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[11] See snow fall data from https://www.currentresults.com/Weather/Canada/Alberta/snowfall-annual-average.php
[12] See warehousing price from https://www.kijiji.ca/v-commercial-office-space/calgary/warehouse-storage/1313698892
[13] See minimum wage data from https://www.retailcouncil.org/quickfacts/minimum-wage-by-province
[14] Estimated based on A New Long-Term Assessment of Energy Return on Investment (EROI) for U.S. Oil and Gas Discovery and Production, Paper details are mentioned in Bibliography
[15] See AACE Education Board-Skills & knowledge of cost engineering_ A project of the Education Board, AACE-American Association of Cost Engineers Chapter 2 for fluid process plants

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Time Required for estimation	Low	Low	Moderate	HIgh
Accuracy	Low	Low	Moderate	High

As per the Qualitative analysis we have

Definite Estimate > Parametric Estimation > Ratio of Factor Method ~ Scale of Operations Method

3. Findings

3.1. Analysis and comparison of alternatives

Probability of receiving Contract	Probability of Profit	Accuracy	Score
	Very High		3
	High		2
	Moderate		1
	Low		0

Time Required for estimation	Score
Low	3
Moderate	2
High	1
Very High	0

Attributes	Scale of Operations Method	Ratio or Factor Method	Parametric Estimation	Definite Estimate
Deviation	-0.10	0.43	-0.10	0
Probability of receiving Contract	1	0	1	0.5
Probability of Profit	0	1	0	0.67
Time Required for estimation	1	0	0.67	0.33
Accuracy	0	0	0.5	1
Totals	1.90	1.43	2.07	2.50

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3.2. Selection of preferred alternative

From this estimation, we can get the ratio scale of our alternatives, which are given in following table

Definite Estimate	175%
Parametric Estimation	145%
Scale of Operations Method	133%
Ratio or Factor Method	100%

We can identify that the Definite Estimate is a better choice when compared to Ratio or Factor Method by 175%. And hence Definite Estimation would be best method for estimation under all the scenarios for project costing.

3.3. Post evaluation of results

As demonstrated in the table above, the Order of Magnitude methods result in either overestimation of the project cost or underestimating the project price based on the method selected for the estimation. As per the AACE guidelines 0.005% of total estimated cost would be optimum for the project estimation, for various estimations this number comes to

Scale of operations	93.75	USD
Ratio or Factor Method	148.599	USD
Parametric Estimation	94.07	USD
Definite Estimate	104.23	USD

If we take these numbers into consideration the time corresponding to these numbers come to approximately 4hrs to 8hrs based on 20USD/hr cost for the manpower.

For a winning proposal with higher probability of Profit we need to go towards the Definite Estimates which include all scenarios the project might end up in. Total time consumed for this estimation is considerably higher as we need to estimate for multiple scenarios based on the checklist provided by AACE.

4. Conclusion

A winning proposal takes both intelligent estimation of the project cost simultaneously keeping it as closed to reality as possible. This exercise takes more time than the 0.005% guidelines given by AACE and higher time should be allotted for it. A definitive estimate method should be used which gives higher probability of success both in terms of profit as well as winning the bid.

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In this paper, different methods of estimation were evaluated based on scenario for Oil and Gas Plant as described in the Methodology. As described in the Findings, the Definite Estimate approach has the best probability for profit as well as winning the contract, but the process is time consuming. The three outcomes of a bid are described before which are

1. Contractor doesn't win the project
2. Contractor wins the project but the bid was too low and ends up losing money
3. Contractor wins the project, covers the cost and makes profit

For long term health of contractors all the projects should fall in the 3rd criteria where the contractor is able to make profit while covering the cost, appropriate estimation with all the plausible scenarios is essential for this outcome and Definite Estimation based on AACE guidelines does result in easy identification of scenarios which can impact the process.

A comprehensive research is required for estimation of the time required for winning proposal which is out of the scope of this research paper.

Appendix

Please see the excel sheet of calculations and assumptions at

https://skema-my.sharepoint.com/personal/abhinav_sharma_skema_edu/Documents/Attachments/Lille3-Abhinav%20Sharma-FinalDraft.xlsx?web=1

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