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OPTIMIZATION OF TENDER PRICE USING SENSITIVITY ANALYSIS

The article deals with determination of an optimal tender price of the specific offer submitted to the public tender, which subject is the public contract on the construction work. The only evaluation criterion in selecting the best bid in this tender is the total bid price, which consists of the affected costs with direct or indirect linkage to the contract and on non-affected costs. The subject of research is the influence of individual variables to a final value of the bid price with utilization on single-parameter and multi-criteria sensitivity analysis.

1 Introduction

The topic of procurement is currently very actual, the state plays an important role in the market economy, where represents the supply side and demand side. The state participates in construction a long time in the supply of labor (50%) and it is the price is the main factor that decides. Public contracts have a very long tradition insight into the history.

In the article talks about a contract the realization the street lighting pillar and luminaires in the village Pouzdřany, located in the southeast of the Czech Republic, which was opened in mid-2012. One of the candidates was the company from České Budějovice OSAM TRADE Ltd., who have submitted a tender offer. This company is mainly engaged in LED lighting technology. Just bid price submitted by the company is the subject to examination.

When the problems are solved associated with the evaluation of investment projects using a variety of methods and techniques, one of the most famous is the sensitivity analysis. This method examines the intensity of the negative impact of input parameters on the final results of the project required. Very important is that a key criterion for sensitivity analysis and for the risk model and analysis in general, are that it must be relevant to a decision. This means that the model output of interest must be directly related to the decision. Using a highly stylized example, if a decision is informed by whether risk is above or below a threshold, then the model output should be a variable indicating the probability that the estimated risk is above or below the threshold. The sensitivity analysis should pertain to variation in inputs that cause a change in the value of the output that would lead to a different decision.

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It mean when performing a sensitivity analysis in the first step is, to define the input variables, whose influence on the project will be analyzed. At the same time calculate the actual values of indicators of economic efficiency of the project (Internal Rate of Return, IRR or Net Present Value, NPV). Then each variable value is increased by_1%, concurrently are the indicators recalculated. If the indicators IRR changes of at least_1% or indicator NPV changes of at least_5%, it is necessary to perform a more detailed analysis focused on risk. In conclusion the results are analyzed and determined solutions that are served to prevent or completely eliminate the adverse impacts. ([1], [2], [3], [4], [6], [7])

2 Description of the Contract

The subject of the public contract was the supply of street lighting in the village Pouzdřany specifically for street U Mlýna and Stepní. It was a total of 16 pieces of park steel poles with concrete foundations with a height of 5 meters and range 35 meters. And 19 pieces Universal type LED lamps for street lighting and pedestrian zones. Desired lifetime light source was min. of 50,000 hours.

Contract costs were distributed to the affected costs with direct link to order (the cost of the main material, installation of masts and lighting and related services, costs of auxiliary material, selection of subcontractors of steel masts, development of light project and insurance), to the affected costs with indirect link to order (cost of foreign financing, advertising and other affected cost) and to the non- affected costs (legislative changes, taxes, increase in fuel prices and change in foreign exchange rates).

For the purposes of sensitivity analysis are chosen input values for several types of costs that will be later examined in terms of their influence on the final offer price. These are the following input values:

- Prices of the lamp street lighting from Czech and Chinese suppliers.
- Prices of the montage mates and luminaires and related services.
- Changes in the exchange rate. ([6])

3 Budget of the Contract

Table 1 shows the budget company OSAM TRADE Ltd. Installation of lighting and masts was ensured through subcontractors Evocati Ltd., including the supply of auxiliary materials and concrete base. The company bought the lighting from Czech supplier of LED lighting, part of the price is too transport costs and surcharge for upper lifetime.

	Price in CZK without VAT	VAT in CZK	Price in CZK with VAT
Montage	23 496,80	4 699,36č	28 196,16
Supply luminaires	182 020,00	36 404,00	218 424,00
Other supplies and materials	70 999,15	14 199,83	85 198,98
Other costs	41 904,56	8 380,91	50 285,47
Altogether	**318 420,51**	**63 684,10**	**382 104,61**

Table 1 Summary of the offering price of the contract

4 Rates Lamp lighting from Czech and Chinese suppliers

The first step is to compare prices from Czech and Chinese supplier lamps, between which in this case can vote. Supplier selection may have on the final bid price of great influence.

	Purchase price per piece	Bid price per piece	Bid price per 19 pieces	Total contract price
Price without VAT	5 590 CZK	9 580 CZK	182 020 CZK	**318 421 CZK**
Price with VAT	6 708 CZK	11 496 CZK	218 424 CZK	**382 105 CZK**

Table 2- Prices Czech supplier

	Purchase price per piece	Bid price per piece	Bid price per 19 pieces	Total contract price
Price without VAT	3 074 CZK	5 267 CZK	100 073 CZK	**236 474 CZK**
Price with VAT	3 689 CZK	6 320 CZK	120 080 CZK	**283 768 CZK**

Table 3- Prices Chinese supplier

The purchase price of a lamp without VAT is varies by 2,516 CZK the difference in the total contract price is then 81 947 CZK without VAT. The company OSAM TRADE Ltd change of supplier and would reduce costs by almost 26 %, so this is a major change in the whole contract.

When the company purchases goods from Chinese suppliers it arises reserve about_15%. This range creates space for possible changes, additional costs, creating higher profits. ([6])

5 Rates montage mates and luminaires and related services

Montage in this contract was provided by EVOCATI Ltd., which is a contracting company subcontractor OSAM TRADE Ltd. The offer price was increased especially transport costs, which are considerable due to the large distance. For this reason, it was considered for a other subcontractor located in the vicinity of the place of performance of the contract. This company was the subcontractor ELIOS Ltd.

The total contract price form EVOCATI Ltd. was 318 421 CZK without VAT and the total contract price from ELIOS Ltd. was 303 027 CZK without VAT. The difference in the total price of the subcontract is 15 394 CZK without VAT, it is caused especially lower costs of transport personnel, material and steel towers at the company ELIOS Ltd. Percentage terms represents a 11,3 % difference. ([6])

6 Foreign exchange rate changes

In this public contract foreign exchange rate changes influenced by the amount of bid price only in the case of collection of goods directly from Chinese manufacturers, they have fixed their price lists of goods but the prices are listed in U.S. dollars. It is necessary to recalculate the Czech crown for customers on the Czech market.

In the table 4 are indicated several kinds of LED lights, including their prices in U.S. dollars, these values are obtained from the price list from a Chinese supplier. Conversion to the Czech crown was related to the date of the 25. 5. 2012, it was the deadline for submitting bids in the public tender, and to the date 11. 4. 2013 for update the values. The second row in the table represents the type of lighting that wanted sponsor public contract in the tender documents and it was therefore subject to supply.

Model	Price in USD	Exchange rate to 25.5.12 in CZK	Price in CZK	Exchange rate to 19.12.12 in CZK	Price in CZK	The difference in CZK
LD-RL-30W-CL1	128,63	20,269	2 607,18	19,764	2 542,22	**64,96**
LD-RL-50W-CL1	146,4	20,269	2 967,45	19,764	2 893,51	**73,93**
LD-RL-80W-CL1	248,37	20,269	5 034,23	19,764	4 908,80	**125,43**
LD-RL-100W-CL1	277,14	20,269	5 617,29	19,764	5 477,34	**139,95**
LD-RL-120W-CL1	300,52	20,269	6 091,32	19,764	5 939,56	**151,76**

Table 4- Impact of the exchange rate on the purchase price of the lamps

But the growth of the exchange rate is never constant, but constantly changing, could have these changes affect (positive and negative) on the final bid price. Company OSAM TRADE Ltd count in their price lists with changes course in the "certainty", which is always higher than the current rate. It is now in the amount of 21 CZK. ([6], [8])

7 Conclusion

Original total price submitted by the company OSAM TRADE Ltd, was 318 421 CZK, in this case, the worst pessimistic scenario. In the most optimistic scenario, the price is reduced to CZK 219 675 (down 31%), this is a variant where the goods are collected from Chinese suppliers, installation performed by ELIOS Ltd. and the exchange rate is at the current level of 19 764 CZK / 1 USD.

The difference of the options is 98 746 CZK, which allows great flexibility above quotation. This reserve can be use to potential changes, as such as the selection of subcontractors, the effect of foreign exchange rate changes or increased overhead and profit.

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