Essential issues of improving commercial offers evaluation scoring methods

One of the procurement procedure stages is the commercial offers evaluation and selection of the best of them. This process is strictly regulated and must be conducted with great care because this is the stage in the most direct impact on the direct supplier choice. And the incorrect calculations presence, for example, can cause not the best offer choice and, as a consequence, the other supplier choice, which may become the subject of litigation in the future.

There are sufficient commercial bids scoring methods because this is the stage in currently developed. But two of them are the most widely used.

The first method is a method presented in "Methodological recommendations for scoring of tender bids and suppliers qualification participating in the orders placing contests for goods supply for state needs" according to the Ministry of Economy of the Russian Federation letter dated June 2, 2000 №AS-751/4-605 (hereinafter - the methodology of the Ministry of Economy of the Russian Federation).

According to the methodological recommendations each natural indicator of particular supplier commercial bid on valued criterion (hereinafter - commercial bid indicator) gets a mark (hereinafter – scoping index) on a ten point scale. With this purpose of commercial bids indicators for certain criteria are ranked for all suppliers. The worst indicator is assigned one point, the better - ten points, and interpolation method using in the 1 - 10 points range allows to determine these indicators score for other suppliers.

In this case j-th index scoring for the i-th supplier for the quantifiable indicators is determined by the following formula:

$$B_{ij} = 1 + \frac{N_{ij} - N_{worj}}{N_{besj} - N_{worj}} * (10 - 1)$$

where:

B_{ij} - j-th index scoring for the i-th supplier;

N_{ij} - evaluated j-th indicator value for the i-th supplier in physical units;

N_{worj} - the worst evaluated j-th indicator value among all suppliers in physical units;

N_{besj} - the best evaluated j-th indicator value among all suppliers in physical units.

For not quantifiable indicators index scoring is determined on the expert assessments method basis which also estimates in 1 - 10 points range.

Later after score of all suppliers commercial indicators for all criteria a total commercial bids score of the i-th supplier is determined by the formula:

$$B_{i\Sigma} = \sum_{j=1}^{n} b_j * B_{ij} \leq 10$$

where:

ß$_j$ - j-th criterion specific weight coefficient of the share of the reflecting the relative criteria importance in accordance with the procurement procedure objectives, in this case the sum of specific weight coefficients of all criteria is equal to one;

n – the number of evaluated criteria.

The winner is the supplier who has received the highest index scoring for his commercial bid.

Another common method is the method presented in the «Practical Guide to contract procedures for European Union external actions » developed on the basis of EU and EDF Financial Regulations, hereinafter - the methodology of the EDF EU.

This method is similar to the Ministry of Economy of the Russian Federation methodology. It also provides the need to develop criteria for commercial bids evaluation with the specific weight coefficient definition for the each criterion, the need for each supplier commercial bids scoring for each criterion, as well as the need to determine the total commercial bids score.

The principle difference of this method from Ministry of economy of the Russian Federation method are other formulas for j-th indicator scoring for the i-th supplier for quantifiable indicators.

This method does not automatically assigns one point to the worst indicator value but provides calculation of the j-th indicator for the i-th supplier scoring under the following formulas:

- in case, when the worst index value is less than his best values:

$$B_{ij} = 10 * \frac{N_{ij}}{N_{besj}}$$

- in case, when the worst index value is greater than his best values:

$$B_{ij} = 10 * \frac{N_{besj}}{N_{ij}}$$

The rest of the calculation algorithm and the formulas used are similar to algorithm and formulas of the Ministry of economy of the Russian Federation methodology.

Analysis of the each methodology mathematical apparatus reveals their specific features.

Thus according to both methods the maximum points number exhibiting at indicator scoring is 10. According the Ministry of Economy of the Russian Federation procedure 10 points set automatically to the best indicator among all suppliers commercial bids. Following the EDF EU the same procedure 10 points is automatically calculated for the best indicator by the corresponding formula.

The main difference lies in the minimum points amount exhibiting. Thus, according to the Ministry of Economy of Russian Federation methodology 1 point automatically exhibiting to the worst commercial bids indicator of all suppliers. Following EDF EU procedure the minimum score for the worst indicator can be determined using any value in 0 to 10 points range when calculating according to respective formula.

Thus, according to the Ministry of Economy of the Russian Federation methodology regardless of the actual commercial bids indicators values 1 to 10 scores range will always be linearly distributed over the difference range between the best and worst natural indicators values by evaluated criterion among all suppliers commercial bids.

Following the EU EDF procedure there are no commercial bids values which can be evaluated with minimum rating of 1 point. And evaluated point calculation is determined by the corresponding formula, expressed by the corresponding values attitude.

Due to the formula hyperbolic dependence 0 to 10 points score will be distributed hyperbolically over a range of difference between the best and worst natural indicators criteria of all suppliers commercial bids. In this case the hyperbole bending slope will be determined by how close are the best and the worst commercial bids indicators natural values for certain criteria.

Let's consider a graphical representation of exhibited score commercial bids indicators dependencies from these indicators actual values of for these methods in the following examples.

Example 1.

Take the case where during commercial bids evaluation according to the "Price" criterion 6 suppliers presented their proposals with the following physical indicators (table 1). In this case the maximum price (the worst natural indicator among all suppliers commercial bids) is several orders higher than the minimum price (the best natural indicator).

Table № 1

Criterion	Supplier					
	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6
Price, USD	1	3	11	31	61	91

Let's calculate indicators scores received by suppliers according to both methods and present the results in tabular and graphical form.

Methodology	Supplier					
	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6
Scoring according to the Ministry of Economy of Russian Federation methodology	10	9,8	9	7	4	1
Scoring according the methodology of the EDF EU	10	3,33	0,91	0,32	0,16	0,11

Let's construct these dependencies according to both methods on the chart. In this case commercial bids indicators scoring will be on the vertical axis, and commercial bids price indicators - on the horizontal axis.
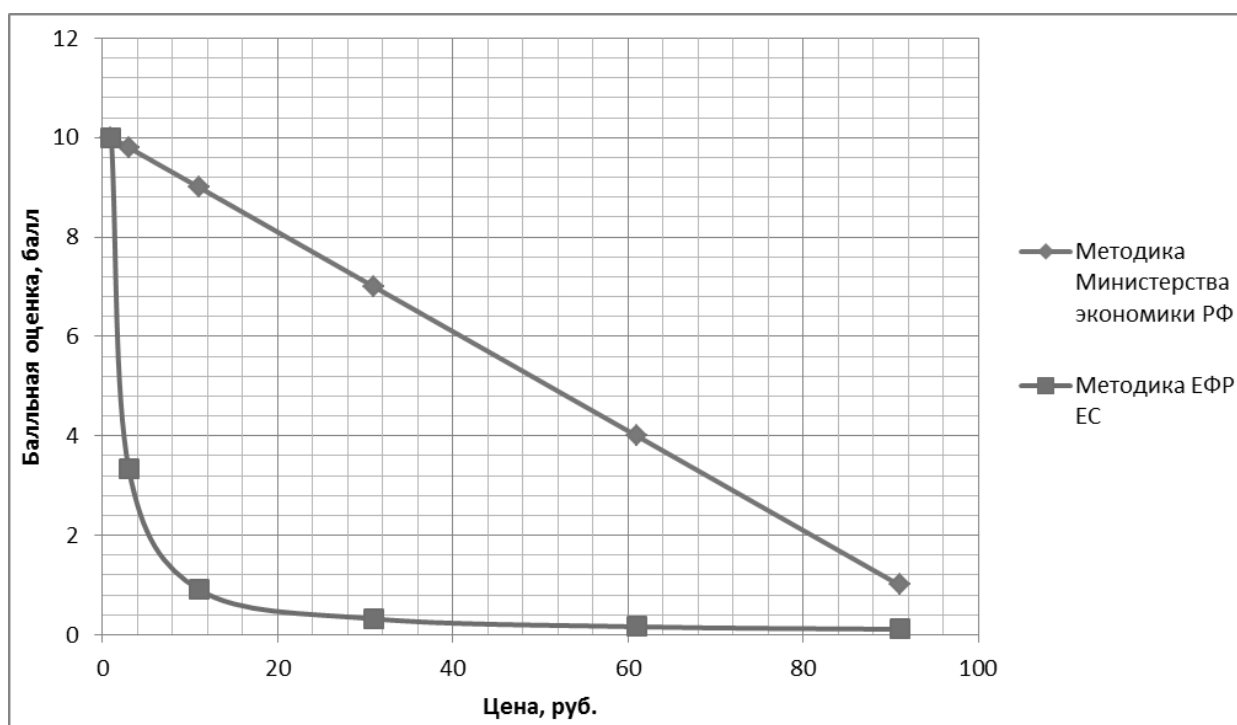
This graph analysis shows that in cases of commercial bids values indicators very large scatter for the individual criteria the so-called "*proportionality effect*" of the ratings distribution is fully manifested. This effect shows the linearity of the estimates distribution using the Ministry of Economy of the Russian Federation procedure, which is the positive characteristic, and hyperbolic estimates distribution using the EDF EU procedure that it is the negative characteristic, since only linear interpolation is consistent with the commercial bids fair business assessment.

Example 2.

Let's take the case where in the commercial bids evaluation according to the "Price" criterion 6 suppliers presented their proposals with the following physical indicators. In this case with the maximum price (the worst natural indicator among all suppliers' commercial bids) is close to the minimum price (the best natural indicator.)

Table № 3

Criterion	Supplier					
	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6
Price, USD	101	102	103	104	105	106

Let's calculate evaluations received by suppliers according to both methods and present the results in tabular and graphical form.

Table № 4

Methodology	Supplier					
	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6
Scoring according to the Ministry of Economy of Russian Federation methodology	10	8,2	6,4	4,6	2,8	1
Scoring according the methodology of the EDF EU	10	9,90	9,81	9,71	9,62	9,53

Let's construct these dependencies for both methods on the same graph.
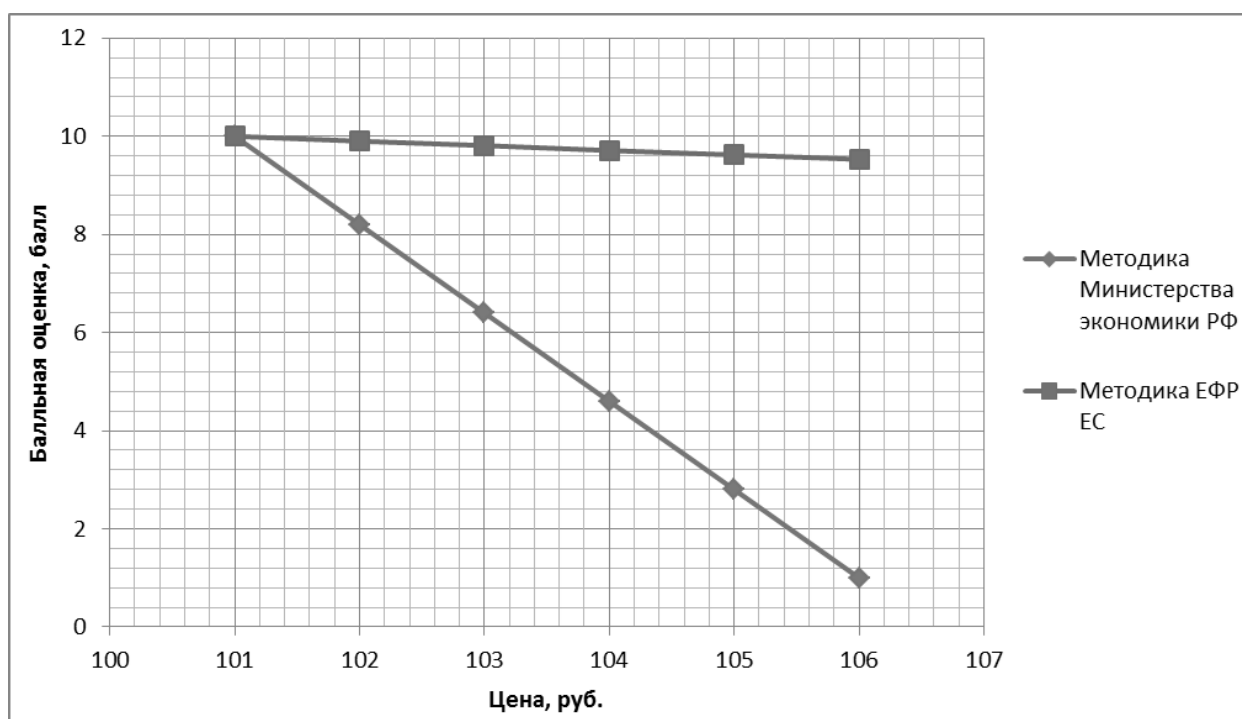
This graph analysis shows that in cases of commercial bids values indicators very slight scatter for the individual criteria the so-called ***"sensitivity effect"*** of the ratings distribution is fully manifested. This effect shows the full scale count from 1 to 10 using the Ministry of Economy of the Russian Federation procedure (this distribution can be called "hypersensitive"), which is its negative characteristic, and slightly different estimates exhibiting using the EDF EU procedure (this distribution can be called "normal"), which is its positive characteristic.

Why hypersensitive distribution is the Ministry of Economy of the Russian Federation method negative characteristic?

It can be demonstrated more clearly by the following practical example.

Let's consider and evaluate two suppliers commercial bids on a specific criteria list one of which is the "Price" criterion with this criterion weighting factor more than 0.5. In this case the first supplier bid price is 1 000 000 USD and the second supplier bid price is 1 000 00**1** USD, i.e. specific price difference relative to the best price will be (1 / 1 000 000) * 100 % = 0,0001 %. According to the of the RF Ministry of Economy procedure first participant index scoring by the "Price" criterion will be 10 points, and the second supplier index scoring will be 1 point that **does not take into account the actual price difference scale.**

In this case the second supplier may have absolutely the best performance for all the remaining criteria: for example, offering more technically advanced equipment, providing equipment from the warehouse, giving a lifetime warranty on all equipment, free spare parts supplying, free maintenance. And he will not be recognized as the procurement procedure winner even if "the issue price" is only 1 USD.

Thus only the normal sensitivity distribution meets the principles of the most advantageous offer choosing.

Based on the foregoing, each of the methods has both advantages and disadvantages.

It is logically in this situation to develop methods that would combine only positive features of considered examining methods: estimates linear distribution and normal sensitivity to variation range of commercial bids indicators actual values for the individual criteria.

This is not a difficult task to develop such advanced method of commercial bids scoring (hereinafter - advanced method).

This method will be is based on the same algorithm which are both considered methods. The only change will be the change in the mathematical apparatus calculation of the scoring j-th index for the i-th supplier for quantifiable indicators. This method will combine both considered methods mathematical apparatus.

Let's consider the algorithm of scoring the j-th index for the i-th supplier for advanced method:

1. The better indicator of all suppliers commercial bids assigned ten points. The worst indicator of all suppliers commercial bids assigned points number calculated by the following formulas:

- when the worst index value is less than his best value $N_{worj} < N_{besj}$ we use the following formula:

$$B_{\min j} = 10 * \frac{N_{worj}}{N_{besj}}$$

where:

B_{minj} - j-th index scoring assigned to the supplier who offered the worst indicator value among all suppliers commercial bids, $0 < B_{minj} < 10$;

- when the worst index value is more than his best value $N_{worj} > N_{besj}$ we use the following formula:

$$B_{\min j} = 10 * \frac{N_{worj}}{N_{besj}}$$

2. The other indicators scores calculated by the following formula:

$$B_{ij} = B_{\min j} + \frac{N_{ij} - N_{worj}}{N_{besj} - N_{worj}} * (10 - B_{\min j})$$

In the rest advanced method algorithm repeats the algorithm of considered methods.

Let's consider the following example for more clearly advanced method definition.

Example 3.

Let's take the case where in commercial bids evaluation for the "Price" criterion 6 suppliers presented their proposals with the following physical indicators.

Таблица № 5

Criterion	Supplier					
	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6
Price, USD	20	25	30	40	50	60

Let's calculate evaluations received by suppliers according to all three methods and present the results in tabular and graphical form.

Table № 6

Methodology	Supplier					
	№ 1	№ 2	№ 3	№ 4	№ 5	№ 6
Scoring according to the Ministry of Economy of Russian Federation methodology	10	8,875	7,75	5,5	3,25	1
Scoring according the methodology of the EDF EU	10	8	6,67	5	4	3,33
Scoring according the advanced method	10	9,167	8,33	6,67	5	3,33

Let's construct these depending on the chart.
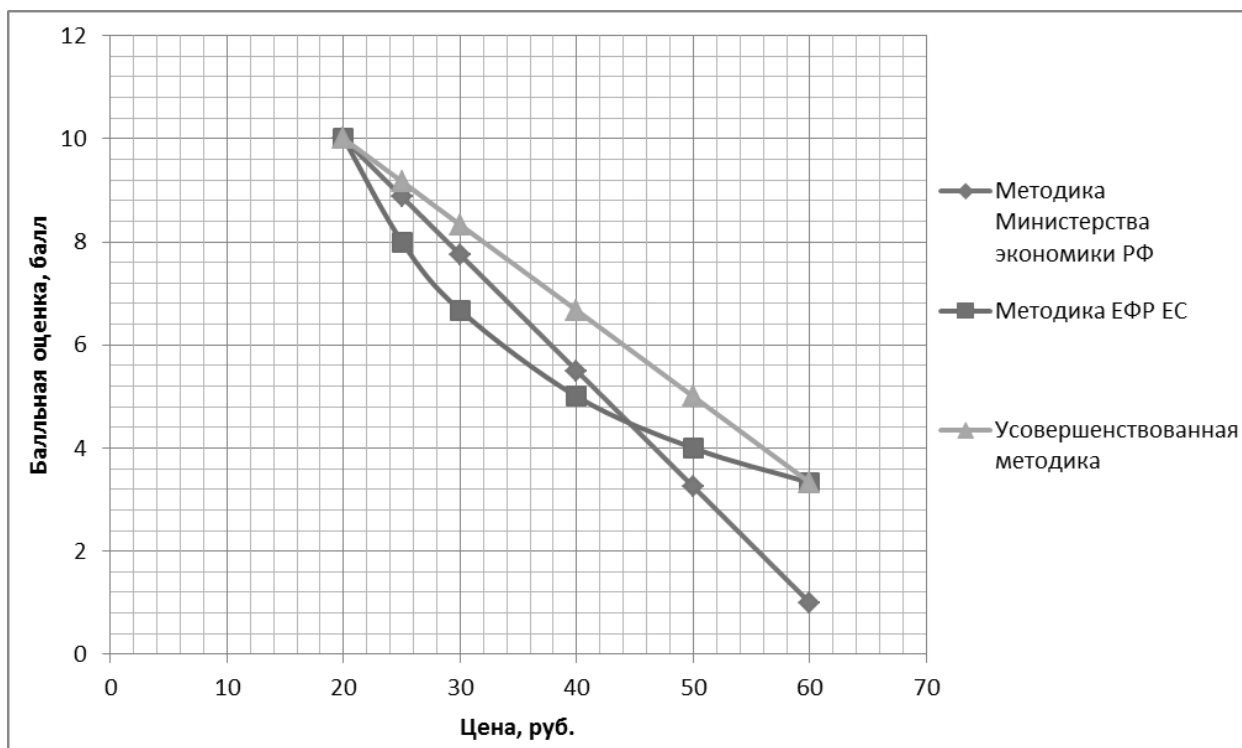
This graph demonstrates that the Ministry of Economy of the Russian Federation method has a linear scores distribution and completely hypersensitive to variation range of commercial bids indicators actual values for the individual criteria. EDF EU method has hyperbolic (curved) scores distribution and normal sensitivity to variation range of commercial bids indicators. But advanced method has a linear scores distribution and normal sensitivity to variation range of commercial bids indicators.

These advanced method positive characteristics have been achieved due to the following changes in the estimation algorithm and mathematical apparatus calculation of scoring j-th index for the i-th supplier for quantifiable indicators:

1. Normal sensitivity to variation range of commercial bids indicators ensured not by one point assigning to the worst indicator value but by assigning a number of points B_{minj} corresponding to the formula. This number of points will be assigned to the worst indicator value taking into account the actual scale difference of commercial bids actual values indicators for the individual criteria.

2. This B_{minj} calculated value is used as the first summand in the scoring j- th indicator for the i- th supplier formula instead of the previously used "1" summand. In this case B_{minj} becomes constant from which only other suppliers upward scores can be calculated. That raises graphically the corresponding line lower point on the graph to B_{minj} value, which is obtained by corresponding formula calculation of EDF EU method. As a result, minimum scoring values are equal for EDF EU method and advanced methods.

This B_{minj} value is also used as the value that is subtracted from the "10" in corresponding formula last factor scoring j-th index for the i-th supplier. That provides the line level slope which is necessary to ensure the calculated estimates values in the range from $B_{min}j$ to 10 points.

In the rest advanced method repeats the algorithm of previously discussed methods.

Thus the proposed advanced method of commercial bids scoring combining only the positive characteristics is the next step towards a more accurate commercial bids scoring.