DE GRUYTER OPEN
International Conference KNOWLEDGE-BASED ORGANIZATION
Vol. XXIII No 2 2017

MODALITY OF DETERMINING THE RISK SCORES AND THEIR RANKING FOR THE DIRECT ACQUISITION MADE IN SEAP

Cristiana Daniela LAZĂR *, Andreea Mihaela MARIN **, Ion PEREŞ *

*** The West University, Timişoara, Romania**
**** „Eftimie Murgu" University Reşiţa, Romania**
cristianamun@yahoo.com, andreeamarinmihaela@yahoo.com

Abstract: *In order to shape a representative economic model, meant to be used for the analysis of direct acquisitions conducted by the public institutions on the electronic platform called SEAP (Electronic System of Public Acquisitions) we need to make a series of calculations which can lead to the establishment of risk scores for this types of acquisitions or procurements and their ranking, This hierarchy shall provide the public institutions with valuable items of information for the awareness of direct acquisitions particularities.*

Keywords: SEAP, direct acquisition, risk, public institution

1. Determining the risk score

The Electronic System of Public Acquisitions (Romanian acronym SEAP) is in fact the „legal procurement market" for all the public institutions in Romania. Like any other market, SEAP is governed also by the law of demand and supply; it is the virtual place where purchasers of products / services / works (namely the state's institutions) meet the economic operators, more precisely the offering firms. In SEAP there is competition, but there are risks too, which may be manifest or not, which may have economic consequences or not. That is why, in the conditions of practising a modern management, any state institution should study both the possible risks threatening the institution, and the possibility of materialising these negative economic consequences which may be transposed into pecuniary losses. From the logic-statistic standpoint, the materialisation of economic consequences of a certain risk will occur only after the risk occurs and manifests itself.

For instance in a hospital (public institution), the risks specific to their direct acquisition in SEAP, more frequently encountered, may be synthesised in the table no.1 below:

Table 1 Determining the probabilities of risks occurrence and effect (source: author's conception and processing)

No.	Risk definition	Symbol	N_{a_i}	P_{sm_i}	V_{e_i}	P_{se_i}
1.	Writing down inaccurate data in the necessary report	R_1	10	0.123	738.81	0.177
2.	Unreal character of the stocks displayed in SEAP	R_2	32	0.395	1638.59	0.393

DOI: 10.1515/kbo-2017-0090

3.	Relatively low price of product doubled by a small quantitative demand	R_3	15	0.185	919.00	0.220
4.	Conditioning the purchase on the acquisition of a minimum imposed quantity	R_4	24	0.297	876.56	0.210
TOTAL			81	1.000	4172.96	1.000

where:

N_{a_i} - total number of occurrences of causes of the "i"-type risk;

P_{sm_i} - statistic-mathematic probability of occurrence of causes generating "i"-type risks;

V_{e_i} - value of economic materialisation of the "i"-type risk;

P_{se_i} - statistic-economic probability of manifestation of the "i"-type risk;

V_{e_i} - value of economic materialisation of the "i"-type risk;

V_t - total value of all risks materialisation.

We point out that the numerical results in table no. 1 are obtained from previous calculations based on the centralisation of the data supplied by the problem identification and analysis charts (Romanian acronym FIAPs), which were elaborated during an audit mission.

We must keep in mind that a general calculation formula of total risk score is:

$T_i = \Pr_{(ri)} I_{(ri)}$, where:

T_i – total score of "i" risk;

$\Pr_{(ri)}$- Manifestation probability of "i" risk;

$I_{(ri)}$-impact of "i" risk (its economic consequence).

Taking into consideration all the above and the results in table no. 1, the total risk score could be calculated with a formula of the type :

$T_i = Psm_i Ve_i$

In these circumstances, the calculation of total risk score for the 4 risks identified in the hospital is elaborated and presented in the following table:

Table 2 Calculation of total risk scores (source: author's conception and processing)

No.	Symbol	P_{sm_i}	V_{e_i}	Total risk score T_i
1.	R_1	0.123	738.81	91.211
2.	R_2	0.395	1638.59	647.344
3.	R_3	0.185	919.00	170.185
4.	R_4	0.297	876.56	260.338
TOTAL		1.000	4172.96	-

2. Risks ranking

Taking into account the data from table no. 3, we may forward the following risks hierarchy:

Table 3 Risks hierarchy depending on score (source: author's conception and processing)

No.	Risk definition	Symbol	Total risk score T_i	Ranking	Risk grade
1.	Conditioning the purchase on the acquisition of a minimum imposed quantity	R_4	260,338	2	Medium risk
2.	Unreal character of the stocks displayed in SEAP	R_2	647,344	1	High risk
3.	Relatively low price of product doubled by a small quantitative demand	R_3	170,185	3	Moderate risk
4.	Writing down inaccurate data in the necessary report	R_1	91,211	4	Low risk

From table no. 3 it results that, depending on the values of the total risk scores, the hospital top management should beware the most the unreal character of the stocks displayed in SEAP by offerors (R_2), and the least the writing down of inaccurate data in the necessary report (R_1).

Although the risk ranking depending on their total scores takes into account the risk materialisation, it does not take into consideration all the economic and social market realities and it may be strongly influenced by (unexpected) „black swan" events, with low probability of occurrence, but with very powerful economic consequences. That is why it would be accurate to temperate these types of events by an approache which should not rely on absolute values, but only on relative values.

By configuring the statistic-mathematic probability fields (Psm) and the statistic-economic probability fields (Pse) by two squares, and taking into account they are mutually conditioned, we should obtain a diagram of the following type:

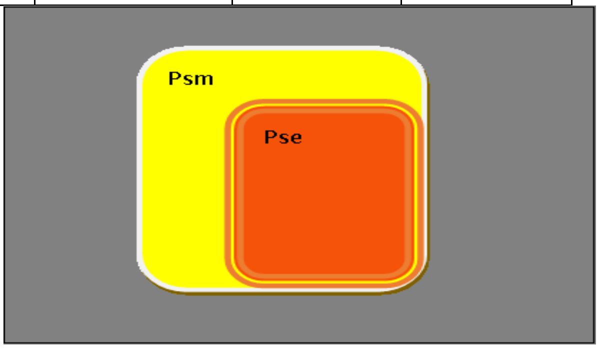

Figure no. 1. The relations between the two probability fields (source: author's conception and processing)

The diagram above reflects the inclusive-order relation between the two fields, the Pse field being included in the other. In other words, risks with Psm probability may occur which are not materialised into economic consequences.

A somewhat graphic vision on the ensemble may lead to a better understanding of the phenomenon. Let's suppose that the danger of risk occurrence represents a „yellow code". In this case the entire large square Psm shall be coloured in yellow. We shall consider that the danger of risks materialisation, transformed into damage, should be represented by a „red code", and thus the small square *Pse* shall be coloured in red. Keeping in mind however the overlapping of the two squares, an „orange code" results for the Pse square. If we transpose the plastic vision above into statistic-mathematic terms, the actual risk is the result of the overlapping of risk occurrence with the materialisation one. The real index of actual risk occurrence will be highlighted by the product of multiplication of the statistic-mathematic probability by the statistic-economic probability; it is what statistics calls aggregated probability (Pa):

$$Pa = Psm * Pse$$

The calculation of the aggregate probability is shown in the table below. In accordance with its value, we may establish the accurate and actual hierarchy of risks.

Table 4 Calculation of the risk aggregate probability (source: author's conception and processing)

No.	Risk symbol	P_{sm_i}	P_{se_i}	P_{a_i}
1.	R_1	0.123	0.177	0.0218
2.	R_2	0.395	0.393	0.1552
3.	R_3	0.185	0.220	0.0407
4.	R_4	0.297	0.210	0.0624
TOTAL		1.000	1.000	-

The use of this criterion is much more appropriate for risk ranking, because it takes into account the sequence of events and, as far as possible, it „dilutes" into the multitude the extraordinary events from the „black swan" category.

Depending on the aggregate probability or the aggregate coefficient, the hierarchy does not change, because the *Pse* weights observe the hierarchy of absolute values of additional expenditure resulted from the materialisation of risks in this total expenditure.

Actually, the hierarchy remains the same, as we can see in the table below:

Table 5 Risk hierarchy depending on the aggregated probability (source: author's conception and processing)

No.	Risk definition	Symbol	Pa Value	Rank	Risk grade
1.	Unreal character of the stocks displayed in SEAP	R_2	0.1552	1	High risk
2.	Conditioning the purchase on the acquisition of a minimum imposed quantity	R_4	0.0624	2	Medium risk
3.	Relatively low price of product doubled by a small quantitative demand	R_3	0.0407	3	Moderate risk
4.	Writing down inaccurate data in the necessary report	R_1	0.0217	4	Low risk
TOTAL		1.000	1.000	-	

3. Conclusions

Taking into consideration the analysis conducted, we may conclude that one may identify and separate the causes of risks of a direct acquisition made in the Electronic System of Public Acquisitions, and the extent to which they may influence the consequences can be measured.

Obviously, for the elaboration of factorial-causal econometric models we may take into account three relations, two certain and one uncertain, as follows:

$T = Psm * Ve$ (certain relation);

$Pa = Psm * Pse$ (certain relation);

$Pse = f(Psm)$ (uncertain relation).

The first two relations are classic, of factorial dependences, and can be investigated under several aspects (dynamic, for instance), highlighting the contribution of each factor in the global evolution of the direct acquisition phenomenon. In search of the connection between two or several variables, it is only natural to start from the hypothesis of a linear dependency, because linearity is usually the most frequently form remarked in the environment, and within the social-economic phenomena. Nevertheless, independently from the dependency form, there will always be two factors:

Psm (statistic-mathematicprobability): independent factor, *cause*;

Pse (statistic-economic probability): factor depending on the prior factor, *effect*.

From the standpoint of informational content, the third relation may be considered much more relevant and useful.

References

[1] Munteanu Victor, *Internal audit in public enterprises and institutions (in original in Romanian)*, Wolters Kluwer Ed., March 2010.

[2] Dascălu Elena Doina, Nicolae Florina, *Internal audit in public institutions (in original in Romanian)*, Economic Publishing House, January 2006.

[3] Voina Cristina Maria, *Internal audit between theory and practice (in original in Romanian)*, Pro Universitaria Press, Ave Science collection, October 2016.