NON-PRICE CRITERIA FOR ASSESSING SUPPLIERS' OFFERS IN SUPPLY LOGISTICS

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Abstract

Processes in the area of supply logistics require managers to make effective and efficient decisions. This applies to a large extent to the public finance sector but practice shows that it covers the interface area of both sectors. Clear criteria for the evaluation of offers in purchasing logistics ensure freedom of decision making. The simultaneous use of information on resources (suppliers) contained in databases allows for the assessment of quality, security or costs. The article is an attempt to exemplify the problem of decision making in the area of supply logistics based on quantified non-price criteria.

1. INTRODUCTION

In recent years, an important role in the selection of offers was played by the assessment of suppliers from the perspective of their reliability, thus trying to eliminate unreliable suppliers from the selection process. This criterion, also referred to as the subjective criterion, consisted in assessing primarily the credibility of the supplier. Methods for assessing the credibility of the supplier include, for example, letters of recommendation or the current level of services rendered and deliveries delivered to the customer. This approach has dominated in recent years, but Poland's integration with the EU has led to a change in optics in this area. Therefore, the use of subjective criteria was banned, while ordering to focus on objective criteria. In practice, this means the dominance of measurable and algorithmic criteria. In addition, price and para-price criteria are used. As practice shows, applying only price criteria to supplies and services for Public Sector Units, including the Armed Forces, leads to inefficient choices. The reasons should be seen in the lack of good practices and the inability to apply benchmarking due to the fact that all entities faced the same problem. In this case, benchmarking is understood as an analysis of observed entities or organizations that are a role model, and the goal is to identify the causes of their successes and failures.

In practice, it turned out that for the purposes of procurement (services and supplies, including in the area of logistics of the Public Finance Sector), it is not only the selection of criteria that is appropriate, but also the rules for assessing suppliers through the prism of verified criteria. The principles of algorithmic assessment of criteria are not adequate for each of them. Many times, there is a need to parameterize descriptive and individualized criteria for the needs of specific recipients.

2. APPLICATION OF VERIFIABLE CRITERIA

Supply logistics in the area of supplies and services (in the context of public procurement law - also construction works) is based on the proper construction of the criteria for the evaluation of offers. Criteria or subcriteria should be given point or weight significance (weight). However, this does not mean the need for algorithmization. Indefinite criteria (impossible to write in mathematical form) are allowed. When specifying the percentage weight, the sum of the weights should be 100 %. In the case of irrational criteria, the description of how to assess them should be as comprehensive and accurately described.

A quantitative variable can be described by a number for which arithmetic operations such as averaging make sense. A qualitative (or categorical) variable simply records a quality [6].

The criteria for the evaluation of the offers should enable checking the information provided by the suppliers (contractors). The contracting entity should not rely on unverifiable declarations included in the offers. The essence in this case is the evaluation of the quality of offers separated from the contractor's credibility. Credibility is assessed using two tools: the grounds for exclusion and the conditions for participating in the procedure.If the customer in relation to potential suppliers (contractors) does not specify quality standards relating to all the essential characteristics of the item replaces, the price criterion may not exceed 60 % of the total weight.

3.   MODELING OF SUPPLY LOGISTICS AREA

In logistic modeling, the criteria of the beneficiary (recipient) should be specified in the selection of criteria, and it will be possible to make the optimal selection using appropriate comparative methods. The available set of methods for detecting regularities in object communities, which are described by relatively numerous sets of their properties, includes multidimensional comparative analysis. It is a method of classifying objects described by many of their properties from the group of taxonomic methods [3].

This method involves both organizing the set of objects and their grouping into subsets of units similar to each other due to the characteristics that characterize them and the selection of representatives of the received object groups. Supply processes in the area of public logistics sector can be correlated with the so-called a function of benefits. This is a function that allows you to choose the optimal purchasing order strategy related to making the right decision in this regard. The mathematical form of the benefit function is as follows:

$$B = f(D, S) \tag{1}$$

where:

B - function of benefits,

D - set of possible decisions D = {D1, D2, ..., Dn},

S - set of possible states of nature, S = {S1, S2, ..., Sm}.

Therefore, for the purposes of logistics in the areas of supplying entities, the question arises as to which decision an entity should make if it is not known at the moment of making which of the possible states of nature will arise. In such cases, the principle of maximizing the expected benefits is most often used, expressed by the following formula:

$$B = \max V[v(Di, Sj)] \tag{2}$$

where:

V - expected value of benefits from the decision made, with known probabilities of natural states,

v - value of the benefit (payment) function for the i-th decision and j-th state of nature.

4.   NECESSITY TO APPLY NON-PRICE CRITERIA

If the customer in relation to potential suppliers (contractors) does not specify quality standards relating to all the essential characteristics of the item replaces, the price criterion may not exceed 60 % of the total weight.

Table 1 A table for description of the criterion (sub-criteria)

Describe	Ascending (a) descending (d)	Minimum value (eg. 0 - 1)	Optimal value	Maximum number of points	Offered
Aesthetics reliability warranty service etc.	**Nominants and denominants**	**0**	**1**	Σ	

Source: own study

From an economic point of view, the offer can be selected in one of three strategies (**Figure 1**):

- minimizing costs;
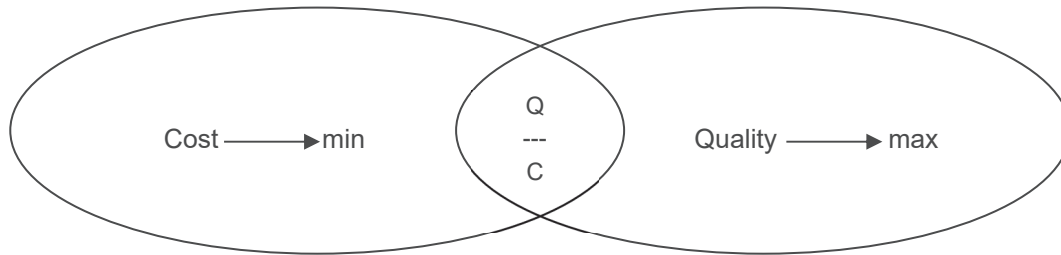- the best balance of costs and quality;
- the highest quality.

Figure 1 Offers selection strategies (Source: own study)

In the case of cost minimization strategies, the selection is based on the price or cost criterion. In this case, the quality standards relating to the characteristics of the products and services should be used. In addition, it is important to include life-cycle costs (LCC) in the description.The second of these strategies based on cost and quality balancing is based on cost and subject criteria. The awarding entity determines the ratio of quality (Q) to price (cost-C). The key in this case is the proper selection of criteria and weights. In the case of rational criteria (in numerical form), e.g. utility function can be used. It may take a linear form according to the formula [3]:

$$Np = \frac{V_{max} - V_{of}}{V_{max} - V_{min}} \times N_{max}$$
(3)

where:

Np - number of points of the evaluated offer;

V of - value of the evaluated offer parameter;

V min - minimum value of the parameter;

V max - optimal value of the parameter;

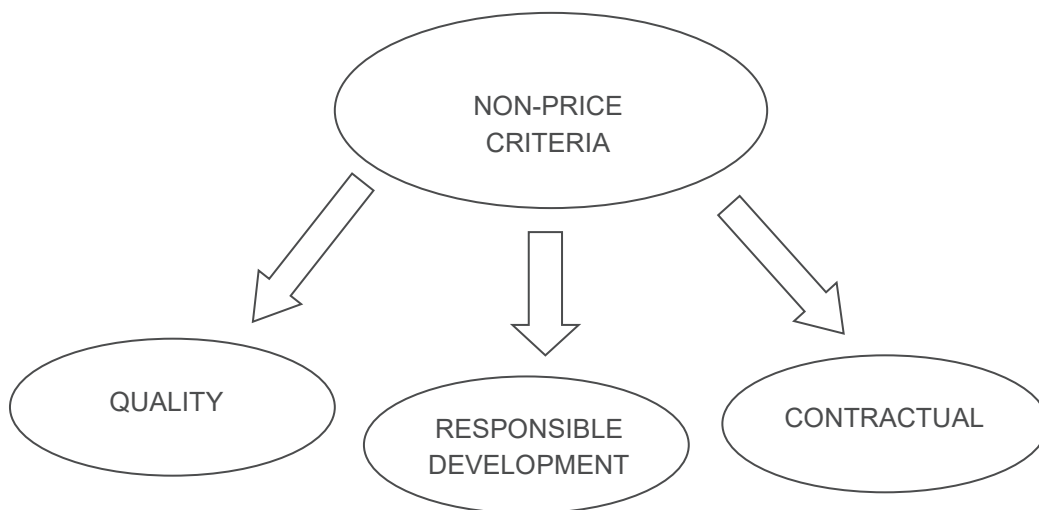*N max - the maximum number of points that can be obtained for a given parameter.*

Figure 2 Non-price criteria (Source: own study)

Cost criteria are not taken into account for the highest quality strategy. Among the non-price criteria are (**Figure 2**):

- quality, including technical parameters, aesthetic and functional properties;

- environmental aspects (e.g. energy efficiency);

- innovative aspects;

- servis, technical support, delivery terms, delivery time, etc.

5.   QUALITY AS A NON-PRICE CRITERION

According to A. Hamrol, quality is perceived as the degree to which a set of inherent properties meets the requirements [1]. A requirement is understood as a need or expectation that has been established, accepted by custom or compulsory. Customary acceptance means that there is a custom or widespread practice of the organization, its clients or other interested parties that a need or expectation is considered mandatory [2]. Inherent properties are the properties of an object that exist in themselves, unlike those assigned. Each object (product or service) has a unique set of properties (dimension, shape, color, performance, utility function). Measurable features due to the possibilities of their measurement can be divided into [1]:

Measurable - expressed numerically by means of a measure on an interval or quotient scale (continuous, where the measurement can be carried out with any accuracy and discrete, where the measurement allows to distinguish only a finite number of states;

Immeasurable - they can be observed or studied, and the results of observation or research are expressed descriptively using two states (alternatively) or multiple states.

Measurable features are called numerical features (length, density, roughness), and non-measurable alternative features (occurring in only two states, e.g. 0 - no damage, 1- occurrence of damage).

However, other occasions will require an integrated and collaborative approach to effect real change[7].

6.   TAXONOMIC METHODS IN LOGISTICS MODELING

When dividing taxonomic methods by the purpose of the study, we distinguish methods ordering the examined objects (linear ordering, nonlinear ordering) and methods of grouping the examined objects (direct, iterative). In the next part, when choosing methods for selecting object representatives and diagnostic variables, one should rely on a distance matrix or correlation matrix, and in the methodology of constructing aggregate diagnostic variables, be based on the distance to the reference point (or lack thereof).

To use taxonomic methods in supply logistics management, it is necessary to specify the elements of the set of objects (features, criteria) and the set of output features. The continuation will be the collection of complete and adequate statistical data including:

- bringing data to cross-comparability,

- elimination of observations with abnormal (extreme) features,

- interpolation of missing information,

- determination of processed variables (percentages, dynamics, economic indicators, etc.)

Further on, it will be necessary to perform statistical analysis of the input data, i.e. to determine and analyze the descriptive parameters of the distribution (average measures, dispersion measures, asymmetry measures, concentration measures) and assess the degree and direction of interdependence between output variables. The selection of the optimal subset of diagnostic variables will consist in: elimination of quasi-constant variables, analysis of the correlation matrix structure and determination of the final list of variables. At a later stage of the research, it will be necessary to organize and group objects within the analyzed variable systems,

consisting of: selection of the classification method, determination of distance measures (similarities), determination of variable normalization and aggregation, and classification of objects using the selected method. In the final part of the research, it will be important to analyze and interpret the results and, as a consequence, to formulate final conclusions.

In the assessment of the delivery criteria, it is necessary to normalize the variables, which I perform to meet specific criteria (postulates) [3]:

- the idea of bringing dissimilar features to mutual comparability (additivity demand),
- the unification of the nature of the variables, by transforming the destimulant (s) stimulants or vice versa (postulate of uniform preference),
- elimination of negative values from the calculations (postulate of positivity) and
- replacing the variation in the ranges of variability of individual features with a fixed range (called the postulate of range or stability of extreme values).

The normalization of variables leads to: standardization and unitarisation, and the determination of the nature of variables is based on stimulants and destimulants as well as variables called nominants.

7.   CONCLUSIONS

The basic principle that the logistician should follow during the selection process is to evaluate only the features of products and services, not to assess suppliers and bidders. When assessing the features of products and services, a properly developed algorithm should be used that includes cost, quality, contract and responsible development criteria. From a logistics point of view, non-price criteria must be properly quantified for their proper verification and assessment. Appropriate selection of criteria will ensure optimal use of financial resources. A number of tools should be used to assess non-price criteria, including taxonomic methods. Quality is a key factor among non-price criteria, and its use allows making effective choices.

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