The Improvement of Methods for the Assessment of Enterprise’s Competitiveness

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Abstract: The authors of this article worked out suggestions concerning the improvement of the assessment methodology for the competitiveness of enterprises. If implemented, these suggestions will make it possible to analyze the influence of various competitiveness factors from single positions. The authors recommend that one should use either Lerner’s coefficient or market share or their geometric average as a resulting criterion of enterprise competitiveness depending on its strategy. These criteria allow us to abandon the reduction of heterogeneous indexes, influencing the competitiveness, to a single integrated index based on expert survey data that are notable for certain subjectivity. Besides, the authors developed the principles and rules of standardizing indexes which influence the competitiveness of enterprise. Worked out methodical propositions will increase the reliability of competitiveness assessment and the validity of priority lines for its increase.

Key words: Enterprise’s competitiveness • criterion • model • the standardization of indexes

INTRODUCTION

Competitiveness is an economic category with many aspects. It is considered in international context; for example [1-4], from the point of view of certain enterprises [5-7], in methodological [7, 10, 11] and practical aspects.

Many publications cover the questions of the assessment of enterprise’s competitiveness. These publications differ by the level of methodological and theoretical generalization: from fully formed theories (such as Porter’s theory of competitive advantage and competitive advantages based on values theory etc.) to papers containing strictly particular aspects of competitiveness. Many papers are connected with analyzing the factors of enterprise’s competitiveness when enterprises differ from each other by the nomenclature of considered factors (from several pieces to two-three dozen) according to their classification and grouping [6, 7, 9, 11, 12].

While analyzing the existing methods used in the field of enterprise’s competitiveness, it should be noted that the basis of the whole assessment system is not sufficiently perfect. It refers to: the criterion of competitiveness; the methods of reducing heterogeneous indexes of enterprise’s activity and products, influencing its competitiveness, to a single integrated index; and the principles of creating the most adequate mathematic economic models. If we use an integrated index, the reduction of heterogeneous competitiveness factors is performed as a rule with the help of weight coefficients obtained by expertise. The authors of many papers note this fact as one of the drawbacks of existing methods. They think that this drawback make the assessment more subjective and less reliable. Nevertheless, methods based on expert survey are still proposed in spite of the criticism. These proposals are not principal and they deal only with secondary aspects. Here we do not speak about the fact that the methods for expert survey and analysis of its results are ill-developed but about its practical application and the accuracy of experiments. This is indirectly confirmed by the existence of methods in which weight coefficients differ from each other several times [6] and methods presupposing equal degree of impact of competitiveness factors taken into account [12].

In many papers, authors depart from the fundamental principles of selecting criteria and do not follow the requirements. We must admit that relative indexes are used soundly in some papers, but at the same time the erroneous rules of standardizing are implemented there.

On the basis of the analysis of publications devoted to the assessment of enterprise’s competitiveness, the authors of paper [13] note that the results of investigating certain aspects of competitiveness assessment are of high scientific level. Besides, they
have an obvious practical importance. At the same
time, the methodological materials of this sphere are
not united by a single methodological idea. If we do
not decide general issues, we will not be able to
combine our achievements into integral harmonious
methodology.

It is impossible to produce a final objective
characteristic for the competitiveness of an enterprise
without solving general methodological problems and
assessing the influence of all factors upon enterprise’s
competitiveness from single point of view. In its turn,
this creates conceptual difficulties in grounding the
most effective and priority directions for increasing
the competitiveness of an enterprise. The absence of
precise guidelines towards the prospective and
grounded measures on the improvement of enterprise’s
activity will practically lead to the loss of gained
positions and even the exit from the market.

**Main part:** A certain step towards the elimination of
the above mentioned methodological drawbacks of
competitiveness assessment was made in paper [13].

As is known, one of the basic requirements for a
criterion is representativeness according to which the
criterion must assess the degree of chief goal
achievement and the level of basic problem solving. It
should be noted in this aspect that every businessman
aspires to gain certain advantages in competitive
struggle. As a result, he either gains them and obtains a
certain power over the market or yields to his rivals. So,
the criterion of enterprise’s competitiveness must
reflect its market power.

Market power can be consider from two points
of view:

- The degree of how an enterprise influences market
  prices (it is evaluated by Lerner’s coefficient);
- Enterprise’s market share after it carried out a
  policy of expansion.

Just these criteria, either individually or together,
should be used for the assessment of enterprise’s
competitiveness. The choice of one or another criterion
depends on the goal of enterprise. Besides, mentioned
criteria meet such requirements as clear physical sense
and simplicity.

Marking out these criteria as the basic ones will
allow us to avoid a methodological mistake when the
criteria of different hierarchical levels are reduced to
one integrated criterion. For instance, enterprise’s
market share and such local criteria as indexes of
enterprise’s financial condition, business effectiveness
etc. Moreover, the criteria recommended above make
it possible to develop the regressional dependence of
enterprise’s competitiveness on its main factors and to
limit the usage of expert judgments.

The methodological basis of competitiveness
assessment in the context of its influence over market
prices is thoroughly stated in paper [13].

Suppose many i-factors (characteristics) influence
the competitiveness of an enterprise, \( i = 1, m \). In general
case, these factors can be expressed either in
qualitative or in quantitative terms of different
size. In this situation, it is logical to use not absolute
but relative characteristics while assessing the
competitiveness of an enterprise. As a preliminary,

it is necessary to find a quantitative expression for
qualitative characteristics.

Usually, the comparison is carried out using
so called reference quantity with the help of the
following formula (the authors of publications use
mainly its top part):

\[
\begin{align*}
&\text{if the characteristic is maximized} \\
&\text{if the characteristic is minimized}
\end{align*}
\]

\[\frac{P_i}{P_{i\text{max}}} = \text{standardized value of } i\text{-characteristic for the} \]
\[\text{considered object;}
\]
\[P_i = \text{the value of } i\text{-characteristic for the considered}
\]
\[\text{object;}
\]
\[P_{i\min}, P_{i\max} \text{ are respectively the maximum and minimum}
\]
\[\text{values of a characteristic among the group of}
\]
\[\text{considered } j\text{-objects } (j = 1, j), \text{that is:}
\]

\[
P_{i\text{min}} = \min_j P_{ij}, P_{i\text{max}} = \max_j P_{ij}
\]

The standardization of indexes by (1) formula is
not fully correct. Its usage can lead to mistaken results,
as shown in paper [13]. The author recommends to
standardize indexes using the following method:

- Standardized index should range within 0…1;
- The large value of standardized index is the
evidence of higher quality of the object (higher
characteristic of Enterprise’s operation, higher
quality of products, etc.);
- While standardizing indexes, one should take into
account:
- The range of characteristic;
- The improvement direction of characteristic;
- The requirements of optimality for
characteristics (the account of optimal and
recommended values for the characteristic).
In order to ensure the account and implementation of formulated points, it is necessary to divide all indexes that influence enterprise’s competitiveness into five groups:

1. Indexes towards which it is correct to say that: “the more index value, the better”. These indexes should be maximized.
2. Indexes towards which it is correct to say that: “the less index value, the better”. Enterprises seek to minimize these indexes in order to increase their competitiveness.
3. Indexes that should have values not less than a certain low boundary value, that is:

\[ P_i \geq P_{\text{low}} \]

where

- \( P_i \) is the value of \( i \)-characteristic;
- \( P_{\text{low}} \) is the recommended low value of \( i \)-characteristic.

4. Indexes that should have values not more than a certain upper boundary value, that is:

\[ P_i \leq P_{\text{upper}} \]

where, \( P_{\text{upper}} \) is the recommended upper value of \( i \) characteristic.

5. Indexes that should have values within a certain recommended range, that is:

\[ P_{\text{low}} \leq P_i \leq P_{\text{upper}} \]

A number of characteristics that influence enterprise’s competitiveness can be expressed in quantitative terms. Particularly, the financial condition of an enterprise can be assessed as a complex of quantitative indexes (liquidity, solvency, etc.) or qualitative indexes (absolute stability, normal stability, financial uncertainty and financial crisis). It is difficult to give a quantitative characteristic to some factors influencing enterprise’s competitiveness. For example, they include trade mark, team spirit and customer loyalty.

In order to make quantitative assessment of qualitative characteristic, we should use verbal-numerical scales.

Indexes should be standardized according to Table 1 [13].

The following additive linear model is often used for the assessment of enterprise’s competitiveness:

\[ K_{\text{comp}} = W_1 P_1^{\text{stand}} + W_2 P_2^{\text{stand}} + \ldots + W_n P_n^{\text{stand}} \]

(2)

where

- \( K_{\text{comp}} \) is the index of enterprise’s competitiveness;
- \( W_i \) is the coefficient of importance for \( i \)-characteristic found by expert way;
- \( P_i^{\text{stand}} \) is the standardized value of \( i \) index computed according to Table 1.
Above we stated that the index of enterprise’s competitiveness should essentially correspond to Lerner’s coefficient if an enterprise is not aimed at the increase of market share. At the same time, this statement makes for the possibility of using regresional dependencies for the assessment of enterprise’s competitiveness. Such dependencies can look like this:

\[ L = a_0 + a_1 p_1^{\text{stand}} + a_2 p_2^{\text{stand}} + \ldots + a_i p_i^{\text{stand}} + \ldots + a_n p_n^{\text{stand}} \]  

where,

- \( L \) is Lerner’s coefficient;
- \( a_0, a_i \) are coefficients of regression;
- Lerner’s coefficient is computed by the dependence:

\[ L = \frac{Pr}{Rec} \]

where,

- \( Pr \) is enterprise’s annual profit;
- \( Rec \) is enterprise’s annual receipt.

The least-squares method is used to find the statistical coefficients for the n-factor model (3). The following system of \((n+1)\) equation is solved according to this method:

\[
\begin{align*}
  a_0 \cdot \sum p_i^{\text{stand}} + a_1 \cdot \sum (p_i^{\text{stand}})^2 + \ldots + a_i \cdot \sum (p_i^{\text{stand}})^2 + \ldots + a_n \cdot \sum (p_n^{\text{stand}})^2 &= \sum L \\
  a_0 \cdot \sum p_1^{\text{stand}} + a_1 \cdot \sum (p_1^{\text{stand}})^2 + \ldots + a_i \cdot \sum (p_i^{\text{stand}})^2 + \ldots + a_n \cdot \sum (p_n^{\text{stand}})^2 &= \sum L_p^{\text{stand}} \\
  \vdots \\
  a_0 \cdot \sum p_n^{\text{stand}} + a_1 \cdot \sum (p_n^{\text{stand}})^2 + \ldots + a_i \cdot \sum (p_n^{\text{stand}})^2 + \ldots + a_n \cdot \sum (p_n^{\text{stand}})^2 &= \sum L_p^{\text{stand}}
\end{align*}
\]

Taking into account the above mentioned principles of the standardization of competitiveness factors, it seems obvious that coefficients \( a_1, \ldots, a_i, \ldots, a_n \) of equation (3) obtained this way should essentially be close to importance coefficients \( W_1, \ldots, W_i, \ldots, W_n \) of equation (2). So, this recommended approach based on model (3) will make it possible to give an objective assessment to the validity of importance coefficients obtained by expert way and consequently to expert judgment itself. It should be noted that lately the correctness of expert survey and its results are increasingly doubted both in general and while building a model of competitiveness assessment. That is why the possibility to carry out the analysis of the adequacy of such models as (2) in comparison with model (3) is of unquestionable practical importance.

Besides, as opposed to the existing methods based on the comparison with a certain basic (real or hypothetical) enterprise, here there is no need for the information about competitive enterprises. The competitiveness of an enterprise and its tendency can be assessed only on the basis of data connected with the assessed enterprise.

If an enterprise is aimed at marketing development, it is logical to take its market share as an index of its competitiveness. While implementing both these strategies, the competitiveness is assessed in the context of price control and market position. In these conditions the index of competitiveness should be found by the following dependence:

\[ K_{\text{com}} = \sqrt[\text{L} \times D} \]

where,

- \( L \) is Lerner’s coefficient;
- \( D \) is enterprise’s market share.

The above statements about the way of building regresional dependencies, illustrated by the example with Lerner’s coefficient, are true for index \( D \) and in case when both indexes are used.

The objective assessment of enterprise’s competitiveness is not an end in itself. It is more important that correct methods will allow us to find the most effective directions of competitiveness increase. It is obvious that the greater the potential of a certain direction of competitiveness increase (package of
At the same time, the influence of a factor on the final index looks a little bit different. At first, when a characteristic increases, the influence is small, but then it grows. Later it begins to slow down and has an S-shape. In order to describe this kind of influence we will use the reasoning taken from paper [14]. This reasoning concerns the influence of the quantity of resources on the probability of successful experimental engineering work.

Suppose that the standardized index reflecting the influence of a factor on enterprise’s competitiveness is a never-decreasing function. The change of this index is proportional to the value of characteristic. That is:

\[ \frac{\partial p_i^{\text{stand}}(P_i)}{\partial P_i} = c P_i \]  

where, \( c \) is a coefficient that linearly depends on value \( P_i \) and on the degree of how close standardized value \( P_i^{\text{stand}} \) is to its maximum value \( P_i^{\text{max}} \).

For each characteristic, there is a certain value the excess of which does not lead to the significant influence on enterprise’s competitiveness. Consequently,

\[ c = \| P_i P_i^{\text{stand}} - P_i^{\text{stand}}(P_i) \| \]

Then, as in paper [14] we accept that \( c_1 = b_1 P_i \) and

\[ c_2 = b_2[P_i^{\text{stand}} - P_i^{\text{stand}}(P_i)] \]

Believing that \( c = c_1-c_2 \) we have:

\[ c = b P_i [P_i^{\text{stand}} - P_i^{\text{stand}}(P_i)] \]

where \( b = b_1 b_2 \).
Considering (8) and (9) we can build a differential equation. If there is a boundary condition \( P_{i\text{stand}}(0) = 0 \), the equation looks like this:

\[
P_{i\text{stand}} = P_{i\text{max}} \left( 1 - e^{-\frac{br^2}{2}} \right)
\]

(10)

In order to find coefficient \( b \) it is necessary to introduce the following boundary condition:

\[
P_i = P_{i\text{max}} r_{\text{stand}} = P_{i\text{max}} - s
\]

(11)

where, \( s \) is a infinitesimal.

While standardizing indexes with the help of formula (8) we suggest using correction coefficients to reduce the volume of computations. In this case, at first the standardization is performed according Table 1. Then obtained indexes are multiplied by correction coefficient \( r \).

If we accept that in boundary condition (9) \( s = 0.01 \), then the values of correction coefficients are shown in Table 2.

### SUMMARY

1. The worked out methods are of high generalization level. They are aimed at solving general system problems of enterprise’s competitiveness. They make it possible to consider the influence of heterogeneous factors and aspects of competitiveness from the single position of integrity.

2. The implementation of suggested basic principles and worked out rules of standardizing characteristics increases the adequacy of competitiveness models and the validity of assessments based on it. Besides, worked out principles and rules can be used in creating both models shown in this article and models with other purposes that deal with relative values and presuppose the standardization of indexes.

3. If we use Lerner’s coefficient, or enterprise’s market share, or their geometric average, as a generalized index of enterprise’s competitiveness, we get the possibility to build regression models and to assess the adequacy of created competitiveness models based on the reduction of heterogeneous indexes to a single integrated index. Heterogeneous indexes are founded by means expert survey and they are a little bit subjective.

4. Regression models of competitiveness based on actual data increase the reliability of assessment and the validity of priority measures for competitiveness improvement.

5. The assessment of the evolution of enterprise’s competitiveness with the help of the method described in this article can be carried out without information about rivals that is often hard to obtain.

### REFERENCES


