The region’s competitiveness assessment on the basis of "sustainable development" concept

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Abstract. The authors propose an improved method of assessment the competitiveness of regions. The novelty of method is the selection of competitiveness factors on the basis of "Sustainable development" concept. The study selected and classified influencing factors of the competitiveness by the expert evaluation. The first selecting criterion is long-term and short-term action of the factors. The second one is financial results production and consumption of the product. The third criterion is the complex of standards in the production and consumption of the product. Other criteria are the extensiveness of changes, integration in the production and consumption. The assessment of competitiveness involves calculating points and ratings on these criteria. As a result, the method allows to classify the regions by level of competitiveness which depends on the points calculated in the short and long terms. The higher the region's class number is the more competitive the region itself, and vice versa. This assessment allows to form the strategies for the new products and cooperation of the regions.

Keywords: sustainable development, competitiveness, region, innovation, standard, integration.

1 Introduction

Currently, the process is transforming to a new model of economic in UN countries. It is the economics of sustainable development. So, the goal of countries is to improve human well-being and ensure social justice, reducing the risks to the environment until 2030. A high level of region's competitiveness is necessary for achieving this aim. The countries need the assessment of the region’s competitiveness. It will allow forming the strategy of new products and cooperation.

The purpose of the research is to study the assessments of region's competitiveness considering its sustainable development.

The object of the study is the complex of methods used in the region’s competitiveness assessment.

The subject of the study is the set of factors that influence the region's competitiveness.

The hypothesis is based on the following assumption. The assessment region's competitiveness should consider the short and long terms, the concept of the sustainable development.

The popular method of the assessment is the global competitiveness index of countries. This method was proposed in 2004 on the World economic forum [1]. European regional competitiveness index has been developed for individual European Union countries. It is based on of the global competitiveness index [2]. Such authors as S. Bucher, N. Psofiorgos and T. Metaxas emphasize the importance of regional competitiveness assessment [3], [4]. The global and European competitiveness indices don’t take into account all factors. For example, these are factors of the sustainable development.
Thus, A. Bilbao-Terol, M. Arenas-Parra, V. Onopko-Onopko propose to include environmental indicators in the European regional index. These indicators are CO2 emissions waste per capita, environmental investment [5]. A. Bilbao -Teirol, M. Arenas-Parra, V. Onopko-Onopko modified European competitiveness index. Currently, researchers do not have a single approach to the method of assessing competitiveness. There are no uniform methods based on sustainable development. A few researchers believe it is necessary to develop the region's competitiveness on the base of sustainable development [6-10]. S. Bucher notes that region's competitiveness is necessary for comfortable and sustainable environment of businesses and citizens [3]. Authors D. Gligor,C. N. Jurcut support his view on the need to consider competitiveness by the concept of sustainable development [11]. But, D. Vrontis, G. Tardivo, S. Bresciania, M. Viassone do not consider the sustainable development in the assessment of competitiveness [12]. They propose to use the following factors: the number and size of firms, the characteristics of the entrepreneur, the level of investment, internationalization, the ability to create networks and partnerships, outsource part of their activities, innovation [12]. Other researchers W. Cui, X. Cui, C. Hao assessed the competitiveness of provinces in China. Their assessment was based on three factors: productivity, innovation, environmental protection and resources [13].

M. Porter and C. Van der Linde emphasize the relationship between competitiveness and the environment [14]. They believe that competitiveness is a manifest where the right environmental standards have developed. These standards are the source of implementation and continuous improvement of innovations [14]. These innovations create prerequisites for the creation of the new economic sectors. The recycling industry can be taken as an example. This is confirmed by the research of T. J. Lah, S. Park, M. De Bree [15], [16].

W. B. Gray also adheres to this point of view. He believes the environmental standards should implement if society benefits exceed the costs [17]. If this condition is not met, enterprises tend to move production to regions with less strict regulation [17]. According to M. Porter and C. Van der Linde, if the right environmental standards are introduced before others, region will move on the global market before others [14]. These regions will have the high added value of product.

Also, according to M. Porter and M. R. Kramer, W. E. Deming, it is necessary to take into account the long-term perspective. This assessment should take into account not only the financial result in the short term [18], [19]. The approach of I. Adizes is interesting. It takes into account the competitiveness in the short and long terms [20]. For example, the short-term perspective is responsible for meeting the current consumer's needs. The long-term perspective is responsible for meeting the future needs of the consumers [20].

A few researchers study the relationship between "Sustainable development" and "Lean production". T. Larson and R. Greenwood consider these concepts are not related [21]. A.A. King and M.J. Lenox believe that "Sustainable development" is a positive side effect of "Lean production" [22]. Many regions are moving to the "Sustainable development". The reason for this is the growing popularity of "Lean production". G. G. Bergmiller and P.R. McCright, Ch.M.Kim, H.T. Ming Lim emphasize that regions achieve better results under certain conditions, if they realize the concept of "Sustainable development" together with the concept of "Lean production" [23], [24]. J. D. Hansen, S. Melnyk, R. J. Calantone believe that the introduction of "Sustainable development" and "Lean production" should be carried out at the same time [25].

Such an author as D. Doncheva believes that competitiveness should be assessed by the activity of clusters in the regions [26].

2 Methods
The study consisted of the following three stages.

Firstly, the factors of the region's competitiveness were selected and classified. For this purpose, the method of expert evaluation was used. We studied the works of the following authors: of M. Porter and C. Van der Linde, I. Adizes, W. E. Deming, T. J. Lah, S. Park, M. De Bree.
Secondly, the assessment of the region's competitiveness was proposed. The assessment included the factors selected at the first stage of the study. The threshold value was determined by the expert method for each factor. The points were calculated for each factor.

Thirdly, the classification of the levels of the competitiveness was developed. It was based on the points of factors were calculated at the second stage of the study.

### 3 Results

The authors propose the factors for the region's competitiveness assessment by the sustainable development. This concept is based on the desire to increase value for the society of the regions. On the basis of the concept by I. Adizes, the factors of competitiveness of the region should be classified into two groups: in the short and long term [20]. The first group is named as short-term factors. This group is responsible for meeting the current consumer's needs. And the second group is named as long-term factors. This group is responsible for meeting the needs of future consumers.

At the same time, the factors should be grouped according to the second classification. The factors of competitiveness should be broken down into four groups. The first group of factors is responsible for the financial result of products in the short term. The second group of factors is the "Standards" for products in the short term. The third group of factors is responsible for the extent of changes in the long term. The fourth group of factors is named as the "Integration" in the long term. The author's integrated assessment of the regions competitiveness is presented in table 1. It includes the factors listed above.

#### Table 1. Integrated assessment of the region’s competitiveness.

| Symbol of the group of the factors | Name of group of factors | Indicator is included in the group | Period | Threshold value in points |
|-----------------------------------|-------------------------|------------------------------------|--------|--------------------------|
| F                                 | financial result        | profitability of sales              | Short  | 0                        |
|                                   |                         | costs per 1 monetary unit          |        | 25                       |
|                                   |                         | environmental pollution (water, atmosphere, solid waste) | | |
|                                   |                         | energy intensity                   |        |                           |
|                                   |                         | value of capital assets            |        |                           |
|                                   |                         | wage                               |        |                           |
|                                   |                         | number employees                   |        |                           |
|                                   |                         | market share                       |        |                           |
|                                   |                         | net exports                        |        |                           |
|                                   |                         | environmental charges              |        |                           |
| S                                 | standards               | standards of production            | Short  | 0                        |
|                                   |                         | licensing                          |        | 25                       |
|                                   |                         | declaration or certification of products | | |
|                                   |                         | hazard class of working conditions |        |                           |
|                                   |                         | waste class of product and packaging |     |                           |
|                                   |                         | renewable materials                |        |                           |
|                                   |                         | dangerous goods to transport        |        |                           |
|                                   |                         | clean energy                       |        |                           |
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| Extensiveness of the changes | Level of innovation activity |
|-----------------------------|-----------------------------|
|                            | Number of advanced technologies |
|                            | The level of recycling technologies |
|                            | Stage of the product life cycle |
|                            | Human Development Index |
|                            | Number of clusters in the region |
|                            | Number of priority development territories |
|                            | Number of associations |
|                            | Number of competitors in the region |
|                            | Number of recycling companies in the region |
| I                          | Integration |
|                            | Availability of transport infrastructure |
|                            | Availability of resellers in the region |
|                            | Availability of material suppliers in the region |
|                            | Availability of equipment suppliers in the region |
|                            | Availability of substitute products |
|                            | Need for complementary products |

Each of the 34 indicators is assigned points according to the numerical scale. Each group of factors receives the same significance rank. The specific weight of each group is 25% for a total 100%.

The criteria for calculating the assessment of the region's competitiveness are presented in the table 1. This assessment is based on the methods of the score and the ranking of the indicators.

The number of points for each indicator depends on the specific weights set above. The maximum value of the score scale is the maximum specific weight of the indicator. The minimum value of the scale is 0 points.

The calculation of the point’s reduction is performed using the following Eq. (1):

\[
D_i = \frac{W_i}{\Delta I},
\]

where:

- \( D_i \) – the size of the reduction of the indicator from the norm by 1%, points;
- \( W_i \) – specific weight of the indicator, %;
- \( \Delta I \) – difference between the maximum and minimum threshold value of the indicator.

But, it is not enough to draw conclusions about the competitiveness only by the integrated indicator. The levels of competitiveness of each group of the factors are presented in the table 2.

The authors developed the classification of regions to determine the level of competitiveness. It consists of five classes. The higher the region's class number is the more competitive the region, and vice versa.

The classification which determines the level of the competitiveness is presented in figure 1.

If insufficient level of the competitiveness in the short and long terms the region is considered to be 0 – class.

The region belongs to the 1 – class. If it has insufficient level of the competitiveness in the short term and average level in the long term. Or it has average level of the competitiveness in the short term and the insufficient level of the competitiveness in the long term.

The region belongs to the 2 – class, if (1) it has insufficient level of the competitiveness in the short
term and high level in the long term; (2) it has average level of the competitiveness in the short and long terms; (3) it has high level of the competitiveness in the short term and insufficient level in the long term.

Table 2. The levels of the region’s competitiveness.

| Levels of the group of the factors | Symbol of the group of the factors | Threshold value in points |
|-----------------------------------|------------------------------------|---------------------------|
| High level of the competitive advantage of the region | F S C I | 16.67 25.00 |
| Average level of the competitive advantage of the region | f s c i | 8.34 16.66 |
| Insufficient level of the competitive advantage of the region | _ _ _ _ | 0.00 8.33 |

Figure 1. The classification of the level of the region's competitiveness.

The region belongs to the 3 – class, if it has average level of the competitiveness in the short term and high level in the long term or high level of the competitiveness in the short term and average level in the long term.

When region has high level of the competitiveness in the short and long terms, it belongs to 4 – class.
4 Discussions
Current methods of region's competitiveness are intended only for total assessment. They are not calculated for individual industries or products in the region.

These assessments do not take into account the time factor in the calculations. All assessments are based on data from the previous period. Usually, it takes one or two years. Investors need the foresight of competitiveness for at least one year. It is necessary when making the decision at once.

Firstly, the author's assessment of competitiveness takes into account the time factor. This allows investors to make a more accurate foresight of competitiveness.

Secondly, the author's assessment is intended for calculating individual industries and products in the region. This is applicable for making business plans.

Thirdly, this assessment is embedded in the "Circular economy" model. It can be used to estimate the conformity with sustainable development goals of industries.

Thus, the hypothesis put forward by the authors was confirmed. Effective and modern assessment of the region's competitiveness should be integrated. It should be based on the concepts of the sustainable development. This assessment should take into account the short and long terms.

In the authors' method all indicators are based on accessible, official information. These are the statistics and customs services. The factors were based on the experience of the following researchers: M. Porter and C. Van der Linde, T. J. Lah, S. Park, M. De Bree, W. E. Deming, I. Adizes [14], [15], [16], [19], [20].

Prospects for the study include the test of the assessment competitiveness method for a long period. It is necessary to include the more regions of the country in the sample.

5 Conclusions
The practical significance of the study is as follows. The assessing of the region's competitiveness method proposed by the authors can be used as a monitoring one. It makes possible to determine the reasons of the region's competitiveness. It is necessary for the regions to take measures to improve their competitiveness in time. This method allows regions changing their competitive strategy. The insufficient level of competitiveness is a signal to the society living in the region due to low indicator of the standards. It is the insufficient level of sustainable development. Conversely, the high level of the competitiveness testifies to the correct chosen strategy. This strategy adds the value for society from the standpoint of "Sustainable development". The authors' method allows researchers to classify regions according to the their level of the competitiveness. On this basis, the business and the cooperation strategies should be formed.

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