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## The assessment of regional economic potential based on the methodology of fuzzy set theory

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### Abstract

The article proposes a methodical approach to the assessment of regional economic potential on the basis of using the tools of the theory of fuzzy sets. The final value is formed on the basis of an analysis of the parameters of such variables as the amount of resources available to the region, an assessment of the possibilities for attracting additional resources, and an assessment of the level of effectiveness of managing these resources and opportunities.

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*Keywords:* Regional economic; fuzzy set theory.

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### 1. The course of the study

Successful implementation of the policy of territorial development is the result of applying a set of capabilities, due to the region's necessary economic potential. The most important task is an objective assessment of capacity in respect of which there are many different approaches.

In this regard, it should be noted that many key disadvantages common to most methods of assessing regional economic potential are allocated by experts, and they include:

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- the exception of complex assessment elements of intangible resources (for example, quality level of the management of the region, the accumulated traditions and experience of developing business structures, the level of innovation development, etc.);
- the capacity assessment is divorced from the development goals of the region that are not utilizing the maximum amount of resources, and improve socio-economic development of the territory;
- the capacity assessment ignores the possibility of increment of reserves, based on the transformation of savings into investment resources;
- the capacity of the regional economy is seen as a static assessment in the whole complex of resources, without regarded to position in the structure of opportunities for strategic development.

To avoid such inconsistencies, in our opinion, becomes possible in assessing the economic potential of the region as a set of resources, which are available to the region, opportunities to attract additional resources and mechanism of data management resources and capabilities.

In this context, the assessment of regional economic potential is expected to use a large number of parameters, not always with a clear quantitative interpretation. Tool for resolving this conflict, in our view, is a Toolkit provided by the theory of fuzzy sets.

Methodological apparatus of the theory of fuzzy sets is relatively new and quite specific tools of research of economic processes.

The main essential content of the methods based on using the fuzzy set theory, lies in the formalization of the description of the input parameters and the target reflecting the level of regional economic potential and, as a fuzzy interval, finding in each period of which can be characterized by some degree of uncertainty. Based on certain transaction parameters, it is possible to obtain the resulting fuzzy interval for the target.

The basis for the implementation of this approach is the fuzzy set of the first order, determined by the expression:

$$A = \{(x, \mu_A(x)) | x \in X\}, \quad (1)$$

$\mu_A(x)$  is a membership function of element  $X$  to the fuzzy set  $A$ . This function can take values belonging to the set of facilities  $M$ , usually taken as the interval  $[0;1]$ . Lets note that L. Zade, who proposed this approach, expanded considered classical kantarovski notion of a set, allowing for the membership functions of the element to many possible values within the interval  $[0;1]$ , not just 0 or 1.3.

Among to the key concepts, which are used in the framework of fuzzy set theory, there is a definition of "linguistic variable" whose values are formalized in the form of qualitative statements or estimates, for example, "large", "above average", "average", "below average", "small".

It is worth to note that this estimate is not less informative than a numeric, as defined by the expert. Also, instead of the doubtful point estimates we get a range where it can be investigated setting, as well as evaluating the truth (or possible implementation). Therefore, the value of the corresponding membership functions can be interpreted as estimates of the truth.

Applying the proposed approach to the considered issue, point out that the level of economic potential of the region can be denoted by a vector  $F = \{f_k(T), k = \overline{1, K}\}$  of factors and conditions that determine the set of parameters of the regional economic potential  $F = \{f_k(T), k = \overline{1, K}\} \rightarrow I$ . Graphically, this approach can be represented in a hierarchical tree of logical inference, which is shown on picture 1.

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