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**COMPARATIVE CHARACTERISTICS OF APPROACHES TO
DIFFERENTIATION OF ELEMENTS OF TERRITORIAL SOCIO-
ECONOMIC SYSTEMS**

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Abstract

This article characterizes approaches to the differentiation of elements of territorial socio-economic systems, methods for their implementation in modern conditions. An assessment is made of the significance of these methods for such expert groups as state and municipal authorities and the scientific community. The article presents the research results on the major means of studying the differentiation of territorial socio-economic systems, their capabilities and limitations. The authors render the results of the comparative characteristics of approaches to the differentiation of structural elements of territorial socio-economic systems, as well as the spheres of application of heuristic and formalized methods to the differentiation of territories, their advantages and disadvantages. On the basis of a non-repetitive sampling study, acceptable to both state and municipal employees and scientists methods were selected. It could result in the intensifications of activities of entities which assess the socio-economic situation of the territories, differentiating them by the combination of elements. The assessment of the consistency of the respondents' opinion, implemented in the research work, proved the reliability of the results obtained. The comparative analysis of the qualitative characteristics of the currently existing approaches allowed the authors of the article to identify those methods that are most appropriate in assessing the differentiation of elements of territorial socio-economic systems.

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Keywords: Differentiation of territories, formalized methods, heuristic methods, territorial disproportions, territorial socio-economic system.



1. Introduction

The diversity of socio-economic, environmental-economic, socio-political ties and the corresponding organizational and managerial influences is a complex multi-level mechanism in any modern state. The study of this area is especially important for the Russian Federation with its significant territorial coverage. Consequently, the tasks of analyzing and evaluating the quality of functioning, differentiation of territorial socio-economic management systems are becoming increasingly relevant.

The objective need to develop sound methodological approaches to the assessment of results of managerial activities is recognized at the highest level and is enshrined in Presidential Decree No. 1199 of August 21, 2012 (as amended on January 16, 2015) "On Performance Evaluation of the Executive Bodies of the Russian Federation Subjects". The use of special approaches and methods for assessment of the differentiation of elements of territorial social systems will allow solving a number of problems currently existing in the field of territorial development management.

The current processes of increasing socio-economic interregional inequality are stipulated by the impact of a complex of territorial socio-economic systems' elements, namely, social, economic, demographic, environmental, geopolitical elements that are inextricably linked with the trends in the territorial organization of the population. At the level of municipal formations, territorial differentiation is even more complicated and is accompanied by the formation and presence of internal "centers" where the main population and production are concentrated, which causes differences in the degree of intensity, duration and directions of development of socio-economic and demographic processes.

Thus, the practical use of adequate methods for assessing the differentiation of territorial socio-economic systems becomes one of the conditions ensuring the quality of research and the isolation of multifunctional zones with high socio-economic and demographic potential, and depressed territories. Please replace this text with context of your paper.

2. Problem Statement

At present, the lack of a balanced approach to the analysis of a territory as a single socio-economic and ecological system is becoming an important problem of ensuring the formation of a complex typology of territories with consideration to socio-economic and environmental factors, as well as the degree of differentiation of the main elements of spatial development. A particular difficulty is the choice of a specific approach and research method.

The methodological approach to the differentiation of territorial socio-economic systems should address the following problems:

- assessing both private analytical indicators and aggregate, integrated indicators;
- conducting a comparative analysis of indicators of a comprehensive assessment of the state of the territories and a synthetic (integrated) indicator, which levels the features and main factors of the development of the territorial socio-economic system;

- implementation of private indicators' stocktaking with the subsequent assessment of the impact of regional development on the main elements of the system: economic, social, environmental, investment and innovative.

The difficulty of choosing an approach to study the differences in territorial socio-economic systems lies in the fact that such a system is multiparametric, it is weakly structured and can be characterized by a large number of quantitative and qualitative factors.

3. Research Questions

What components of the study of the differentiation of territorial socio-economic systems can be classified as the key ones?

What are the spheres of application, advantages and disadvantages of the existing approaches to the differentiation of socio-economic systems?

What methods of assessing the degree of differentiation of elements of territorial socio-economic systems are currently acceptable?

What are the features of methods for assessing the degree of differentiation of elements of territorial socio-economic systems?

4. Purpose of the Study

Give a comparative description of the components and approaches of the study of the differentiation of elements of territorial socio-economic systems.

Analyze methods for assessing the degree of differentiation of elements of territorial socio-economic systems and their practical significance from the point of view of the scientific community and representatives of state and municipal authorities.

Determine the peculiar features of the application of methods for assessing the degree of differentiation of elements of territorial socio-economic systems at the present time in the aspect of smoothing territorial disproportions.

5. Research Methods

1) Comparative analysis allowed comparing the state of one object with another, identifying their advantages and disadvantages, clarifying the significance of the approaches and methods used to differentiate the elements of territorial socio-economic systems.

2) The application of the sampling method (survey), taking into account the principle of interconnection and interdependence of the qualitative characteristics of the object of study, let the researchers form a representative sample of respondents whose opinion determined the essential methods for assessing the differentiation of elements of territorial socio-economic systems.

3) Statistical analysis of non-quantitative variables with the calculation of the coefficient of concordance made it possible to assess the degree of consistency of respondents.

6. Findings

At present, considerable theoretical and practical methodological experience has been gained in the area of classification of territories as a socio-economic system. The methodological approaches used are interpreted and justified differently, classified and combined, they have their own capabilities and limitations, advantages and disadvantages.

To achieve the above mentioned purpose, the authors summarized the research (Kukushkina, 2007; Malakhovskaya & Pekarsky, 2012; Sokolov, 2009) and described the main components of the study of differentiation of territorial socio-economic systems (Table 01), among which they singled out expert assessment, intellectual processing of information, use of information and communication technologies.

Table 01. Components of the study of the differentiation of territorial socio-economic systems

Components of the study	Major means	Possibilities	Components of the study
Expert assessment	- ranking; - structural and hierarchical expertise; - cross expertise; - group multivariate expertise.	- allow formulating analytical conclusions if the object (economic phenomenon) is not amenable to mathematical description or formalization, and there is also no representative statistical sample; - provide an opportunity to make a quick decision in an extreme situation in the absence of the necessary financial and labor resources.	Expert assessment
Intellectual processing of information	-mathematical programming; - econometric modeling; - adaptive forecasting methods; - genetic algorithms; - structural classification analysis; -illegible cognitive modeling.	- enable the formalization of quantitatively immeasurable parameters; - can be applied in the presence of illegible, incomplete and even contradictory information.	Intellectual processing of information
Information and communication technologies	technical means; - communication tools; - organizational and methodological support; - standardization.	- allow structuring digital data exchange algorithms; - allow using digital information preservation; - allow the transfer of information through digital technology at a virtually unlimited distance.	Information and communication technologies

It should be noted that the most acceptable and adequate in the study is a combination of different components, as they complement each other. The lower the socio-economic characteristics of the territory are, the higher is the urgency of using the sociological component in assessing the current situation. The absence of important indicators in statistical reporting is a prerequisite for finding alternative indicators

that can be obtained through the use of sociological assessments during the expert assessment. At the same time, productive processing of information flows maximally takes into account the existing specifics of territorial socio-economic systems.

Summarizing the research (Ayvazyan, Enyukov, & Meshalkin, 1983; Darmanyanyan, 2013; Ratnikova, 2006), the authors in table 02 highlight the main characteristics of approaches to the differentiation of elements of territorial socio-economic systems.

Table 02. Comparative characteristics of approaches to the differentiation of elements of territorial socio-economic systems (TSES)

Approaches to the TSES differentiation	Essential characteristic of the approach	Advantages of the approach
1. Study of differences in each territory development indicator	Rating differentiation indicators of TSES	- tested, accessible toolkit; - allows defining intra-territorial and inter-territorial differences; - gives a quantitative characteristic for each indicator in statics and dynamics
2. Study of differences according to the integral indicator of the development of the territory	a comprehensive (integrated) assessment, rating of TSES	- simplicity of calculation and interpretation of the obtained summary information; - comprehensive assessment.
3. Study of the structure of differentiation of elements of TSES	In the process of implementing the approach, a transition is made from the initial system of indicators to a new set of indicators (main components)	- allows evaluating the contribution of each socio-economic indicator in the final indicator of the development of the territory; - allows assessing the direction of development of inter-territorial socio-economic differentiation.
4. Research and identification of cause-effect relationships	Making models that describe the spatial relationships of factors (elements of TSES)	- defines the degree of determination of the dependent variable from one independent (or several independent) variable; - determine the contribution of independent variables to the effective feature; - forecast of the value of the effective feature.

It should be noted that there is a drawback inherent in the first and second approaches; they form only an average estimate of the differentiation of elements of territorial socio-economic systems. The first approach to the differentiation of elements of territorial socio-economic systems can be attributed to the heuristic approach, the second, third and fourth belong the formalized approach, in table 03 we reveal the set of specific methods that can be used during the application of one or another approach.

Table 03. Characterization of methods for differentiating elements of territorial socio-economic systems (TSES) (Ayvazyan, Enyukov, & Meshalkin, 1983; Ignatieva & Mariev, 2013; Sokolov, 2009)

Approaches to the differentiation of TSES	Methods	Sphere of application	Advantages	Disadvantages
Heuristic	<ul style="list-style-type: none"> - individual expertise: an interview, analytical notes, scripting - group expertise: the brainstorming method, the “committees and round table” method, the Delphi method, the Target Tree method, the matrix method, the heuristic image prediction method. 	<ul style="list-style-type: none"> - study of the phenomenon (process) that is not subject to formalization; - study of the individual characteristics of socio-economic phenomena and processes; - study of semi-structured socio-economic and organizational management systems. 	<ul style="list-style-type: none"> - allows reflecting the dependence of internal and external factors of the system; - provides an opportunity to get “average” expert opinions on the problem through independent judgments. <p>Thus, the researchers receive not a quantitative distribution of the probability of solving the problems studied, but a qualitative statistical expression of individual expert assessments.</p>	<ul style="list-style-type: none"> - evaluation criteria cannot be formulated quite clearly; - the presence of risks associated with possible incompetence or subjectivity of the expert, the wrong choice of measuring scale; - the need for verification of expert assessments for consistency and lack of inconsistency, - the presence of difficulties in the organization of the process of experts’ communication; - for the most part, expert assessments are subjective and insufficiently perfect in terms of the reliability of the results obtained
Formalized (mathematical) approach	<ul style="list-style-type: none"> - economic: structural, network, imitation; - statistical: factor analysis, cluster analysis, correlation and regression analysis; - economic and mathematical based on models: deterministic, linear-dynamic, nonlinear, stochastic, using the theory of catastrophes and neural networks. 	<ul style="list-style-type: none"> - study of the phenomenon (process) that requires a rigorous substantiation of the mathematical model; - characteristics of individual, as well as aggregated and integral indicators of socio-economic phenomena and processes; - the study of clearly structured socio-economic and organizational management systems. 	<ul style="list-style-type: none"> - assume activities for the collection, distribution and grouping of significant arrays of data on various processes and phenomena of social life; - the resulting mathematical models are considered as a universal apparatus for decision-making at various levels of management, which is important in the quality management system. - assume the construction of “self-correcting” economic-mathematical models capable of reacting to changes in the socio-economic conditions of the development of the territory. 	<ul style="list-style-type: none"> - the need to calculate descriptive characteristics at the initial stage of modeling; - difficulties in using the mathematical apparatus; - difficulty in competent interpretation of the results.

Thus, numerous tasks and problems associated with the differentiation of elements of territorial socio-economic systems can be formalized and solved using special mathematical methods. At the same time, considerable attention should be paid to heuristic research methods, since they deal with the qualitative characteristics of the system. In practice, it is almost impossible to say where the application of one method has ended, and the application of another has begun. Therefore, the effective condition for the study of systems, including territorial ones, is the study of information with combined methods. Consequently, all the considered methods (Table 03) are applied in a complex, since each method solves a certain task.

In the research on territorial socio-economic systems, the task is to study a large amount of primary information. In this case, the choice of methods for targeted structural analysis of large amounts of information is required.

To solve the tasks posed in the study, methods were identified that are acceptable for assessing the degree of differentiation of territorial socio-economic systems. A selective survey (questioning) of two groups of respondents was conducted - representatives of the regional scientific community and representatives of the state and municipal authorities - in order to select practically relevant methods that allow assessing territorial disparities. Respondents were asked to choose the most acceptable of the methods of assessing the degree of differentiation of territorial socio-economic systems listed in the questionnaires. The selection was based on the following criteria: the complexity of the method, the competence of the researcher, the availability of incoming information, the availability of information processing software.

To assess the average degree of consistency of opinions, the coefficient of concordance was used (Ayvazyan et al., 1983):

with S – the sum of the squares of the deviations of the sum of the ranks of each object from the average sum of the ranks; n – sample size (number of respondents); m – number of ordinal variables (number of evaluation criteria).

As a result of processing the questionnaires we received:

$$\text{A) group "scientific community"} \quad W = \frac{227485,4}{\frac{1}{12} \cdot [4^2 \cdot (64^3 - 64)]} = 0,651;$$

$$\text{B) group "state and municipal employees"} \quad W = \frac{131503,7}{\frac{1}{12} \cdot [4^2 \cdot (55^3 - 55)]} = 0,593.$$

The value of the coefficients indicates a high degree of consistency of respondents' opinions. Testing of the significance of the coefficients was carried out using the criterion of agreement - Pearson criterion (), which calculated values significantly exceed the table ones:

$$\text{A) } \chi^2 = \frac{12 \cdot 227485,4}{3 \cdot 64 \cdot (64 - 1)} = 225,7 \quad (\chi_{\text{табл}}^2 = 79,01 \text{ at } \text{and } v = n - 1 = 63),$$

$$B) \chi^2 = \frac{12 \cdot 131503,7}{3 \cdot 55 \cdot (55 - 1)} = 177,1 \quad (\chi_{\text{мабл}}^2 = 55,76 \quad \text{at} \quad \text{and } \nu = n - 1 = 54).$$

Consequently, the obtained values the concordance coefficient are not random values, therefore, the survey results can be considered reliable.

The results of the survey are presented in Figure 1, the respondents of the “scientific community” group preferred such assessment methods as factor analysis (32%), statistical methods (24%) and collective expert assessment (20%). Representatives of the second group “state and municipal employees” singled out such methods as collective expert assessment (31%), statistical analysis (28%), individual expert assessment and factor analysis (13%). The emphasis of state and municipal employees on the heuristic approach is traditional.

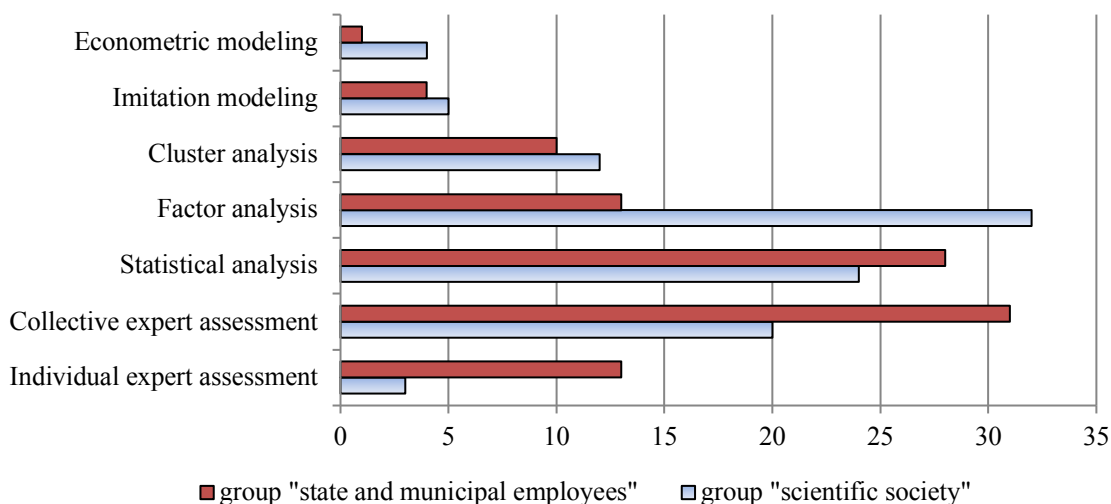


Figure 01. Distribution of respondents' opinions on the choice of methods for assessing the degree of differentiation of territorial socio-economic systems

According to the results of the survey, experts rejected such methods as imitative and econometric modeling due to the complexity of their implementation and high requirements for information support.

Based on the results of a sample study, we present the characteristics of the methods identified by both groups of respondents as the most accurately meeting the specified selection criteria – table 04.

Table 04. Characteristics of methods for assessing the degree of differentiation of elements of territorial socio-economic systems (Darmanyanyan, 2013; Ignatieva & Mariev, 2013; Kukushkina, 2007; Malakhovskaya & Pekarsky, 2012)

Method	Characteristics	Number of respondents, %	
		“scientific community” sample	sample “state and municipal employees”
Collective expertise assessment	- importance in the conditions of uncertainty and instability of the development of territorial socio-economic systems, as the resulting	20	31

	assessment is given by independent experts in various fields of activity; - reflects the average opinion of experts, minimizes the negative impact of the personal factor (prejudice, incompetence, subjectivity, limited individual evaluations).		
Statistical analysis (grouping, variation analysis, dynamics analysis)	- summarizes and systematizes the qualitative and quantitative characteristics, structures the facts; - characterizes the typicality of the studied traits and the degree of homogeneity of the studied set of territories; - represents the change of phenomena in time, describes the processes based on trend models	24	28
Factor analysis (deterministic, stochastic)	- determines the whole range of relationships between variables; - describes existing relationships using systems of equations; - reflects the parameters of the system using autonomous statistical indicators, subsequently expressed by the index system; - minimizes the number of variables.	32	13

The research identified acceptable methods for analyzing information within the framework of existing approaches to assess the degree of differentiation of elements of territorial socio-economic systems. On the one hand, these methods make it possible to identify a preliminary assessment of the logical connection of individual characteristics and factors of development of TSES in order to increase the validity of quantitative estimates of managerial decisions. On the other hand, the use of quantitative methods provides a certain reduction of the gap in the principles of modeling socio-economic processes.

7. Conclusion

Thus, the research identified and described the main components of the study of the differentiation of territorial socio-economic systems – expert assessment, intelligent information processing, information and communication technologies. The most acceptable use of the listed components is their combination, since they complement each other.

Comparative characteristics of the approaches to the differentiation of elements of territorial socio-economic systems allowed describing their advantages and essential characteristics, as well as the scope of application, the possibilities and disadvantages of the methods of heuristic and formalized approaches to the differentiation of territories.

On the basis of the conducted selective research, the methods were identified that allow activating the activity of the subjects conducting the assessment of the socio-economic situation of the territories while differentiating them according to a set of elements. So, at present, in order to identify and

subsequently smooth out territorial disproportions, the most acceptable are such methods as collective assessment, static analysis, factor analysis.

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