

ENSURING ECONOMIC SECURITY OF REGIONS AS A POTENTIAL-FORMING SPACE IN THE CONDITIONS OF INTELLECTUALIZATION

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ABSTRACT

Within the article, methodological tools for assessing the economic security of regions as a potential-forming space in terms of intellectualization are offered. It is substantiated that the intellectualization processes provides the basis for the potential-forming space and manifest itself in a number of important aspects from the standpoint of the economic analysis. As a methodological approach to the analysis of ensuring economic security of regional economic systems as a potential-forming space in terms of intellectualization, the authors propose to use the method of the taxonomic analysis. The proposed sequence of the taxonomic analysis of the economic security level of regional systems as a potential-forming space in terms of intellectualization is as follows: formation of an array of source data; identification of the type of the influence of selected analytical features; standardization of the obtained array of initial data; determination of the reference vector; calculation of the integrated indicator. The proposed methodological approach to the regions of Ukraine has been tested.

Keywords: Economic Security, Region, Potential, Economic Space, Intellectualization.

INTRODUCTION

The post-industrial vector of the social development of economic systems manifests itself most clearly in comprehensive processes of intellectualization, which have a direct impact on the ability to achieve certain target security conditions. The intellectualization process provides the basis for the potential-forming space and manifests itself in a number of important, from the standpoint of economic analysis, aspects, in particular: the leading role of knowledge, technology and information in the formation of the intellectual potential of economic development; formation of intellectual potential as a key determinant of intensive economic development and the basic factor of production capable of providing maximum growth in value added; humanization of economic systems; creativeization of economic processes; active processes of digitalization of economic processes; high competitiveness of the business

environment of business entities, which requires the latter to provide opportunities for rapid adaptation and implementation of leading technological developments.

Thus, the intellectualization process of economic systems form preconditions for qualitative transformation of economic systems, actualizing the issue of ensuring their safe operation in appropriate conditions, providing potential-forming space for their development.

The aim of the article is to develop methodological tools for assessing economic security of regions as a potential-forming space in terms of intellectualization. To achieve this goal, the following tasks were identified and achieved: features of the intellectualization process to ensure the potential-forming space of regional developmen are pointed out; a methodological approach is proposed to assessing economic security of the regional economic systems in terms of intellectualization using the method of taxonomic analysis; approbation of the offered methodical approach for the estimation of the economic safety maintenance of regions as the potential-forming space in the conditions of intellectualization concerning regions of Ukraine is carried out.

LITERATURE REVIEW

Domestic and foreign scientists are devoting more and more scientific works on extremely topical issues of economic security of the regions, namely: Agarkov and Tarasyeva (2019); Akhmetshin and Pavlyuk (2018); (Chimee, 2019); Garafonova and Kovalska (2021); Glechikova and Nechaev (2020); Kravchenko (2021); Makarov and Nikolaeva (2018); Marhasova and Kharchenko (2021); Pesotskiy and Koscheyev (2020); Pestryakov and Sbrodova (2020); Rudenko (2019); Rudenko (2020); Trusova and Hryvkivska (2020); Vovk and Dergaliuk (2021) and others.

The authors (Pestryakov et al., 2020) determine the level of damage and threshold values in assessing economic security of the region and test the original method in Sverdlovsk region. Article (Pesotskiy et al., 2020) addresses current issues related to the theory and practice of ensuring Russia's economic security at the federal and regional levels in terms of assessing the risks posed by globalization. In the Article (Agarkov et al., 2019), the methodological basis and assesses the economic resilience of the region to external threats are considered.

Within the Article (Trusova et al., 2020), the basis for structural transformations of the economic security system of regions through a comprehensive approach to assessing potential financial capabilities of the agricultural sector is developed. Article (Rudenko, 2020) shows how economic security of the region correlates with economic development of the region with the creation of a stable mechanism for maintaining the welfare and security of the region. In the paper (Chimee, 2019), the intention is made to study the factors of economic security, status negotiations and political opportunities as a correlation that explains the conversion to Islam in the northern region and parts of Igboland in southeastern Nigeria.

The basis of the article (Rudenko, 2019) is the consideration and development of basic approaches to understanding the region, economic security of the region, approaches to assessing economic security of regions, in the study, the statistics for a particular region is analyzed. The authors (Makarov, 2019) believe that one of the aspects of improving economic security of the region is the creation of economically stable and efficient economic structures. In the article, conditions of organizational and economic stability of the regional logistics industrial park of the transit region are considered. In the Article (Akhmetshin et al., 2018), the main approaches to the economic security concept in general, as well as economic security of the region, financial

security, as well as approaches to the methodology of assessing economic security of regions, the statistical analysis and comparison with other regions are discussed.

METHODOLOGY

Based on the fact that one of the main conditions for the intensification of economic development in the context of intellectualization is the formation of stable parameters of economic, social, institutional, legal and infrastructural support of regional economic entities, in the opinion of the authors, security should be the basis of a methodological approach to further evaluation, the measurement of the functioning of regional economic systems, which aims to identify key factors influencing these processes as a basic basis for the development of further applied recommendations in the chosen direction.

As a methodological approach to the economic security analysis of regional economic systems as a potential-forming space in terms of intellectualization, the authors propose to use the method of the taxonomic analysis, which will quantify the economic security level of regional entities in accordance with the results of the cluster analysis and structured indicators security. The sequence of taxonomic analysis of the economic security level of regional systems as a potential-forming space in terms of intellectualization is as follows.

1. Formation of an array of source data represented by a set of analytical features and the formation on its basis of a matrix of observations (formula (1)).

$$X = \begin{bmatrix} x_{11} & x_{1j} & x_{1m} \\ x_{i1} & x_{ij} & x_{im} \\ x_{n1} & x_{nj} & x_{nm} \end{bmatrix} \quad (1)$$

where n – the number of studied regions;

m - the number of indicators-criteria for assessing the economic security level of the regional entities in terms of intellectualization;

x_{ij} – the value of the j -th indicator-criterion for the i -th region.

Further calculations will be carried out in accordance with the structured set of indicators for assessing economic security of regional economic systems as a potential-forming space in terms of intellectualization in terms of: stable operation (10 indicators), effective functioning (9 indicators), progressive functioning (11 indicators).

2. Identification of the type of the influence of selected analytical features, which determines the qualitative nature of the dynamics of change of an indicator in the context of economic security of regional economic systems as a potential-forming space in terms of intellectualization.

3. Standardization of the obtained array of initial data, which is carried out in order to ensure the comparability of the analyzed indicators and to ensure the overall representativeness of the obtained results of the taxonomic analysis. Standardization of values is carried out according to the formula (2).

$$y_{ij} = \frac{x_{ij} - \bar{x}_j}{\sigma_j} \quad (2)$$

where \bar{x}_j – the arithmetic mean of the j-th sign;

σ_j – standard deviation of the j-th sign.

4. Determining the reference vector by finding the maximum values of indicators of economic security of regional entities as a potential-forming space in the conditions of intellectualization (3).

$$y_{oj} = \begin{cases} \max_i y_{ik}, \text{ subject to the stimulating effect of the analytical feature} \\ \min_i y_{ik}, \text{ subject to the disincentive effect of the analytical feature} \end{cases} \quad (3)$$

5. Calculation of distances of quantitative values on the chosen analytical signs from the generated reference vector (formula (4)).

$$d_{i0} = \sqrt{\sum_{j=1}^n (y_{ik} - y_{oj})^2} \quad (4)$$

where d_{i0} is the distance between y_{ij} and the values of the generated reference vector.

6. Calculation of the integrated indicator of the economic security level of regional economic systems as a potential-forming space in the conditions of intellectualization, which is carried out by sequential calculation of the indicators presented in formulas (5) - (9).

$$M(d_{i0}) = \bar{d}_0 = \frac{1}{m} \sum_{i=1}^m d_{i0} \quad (5)$$

where $M(d_{i0})$ is the average level of deviations of analytical features from the reference vector.

$$\sigma_0 = \sqrt{\frac{1}{m} \sum_{i=1}^m (d_{i0} - \bar{d}_0)^2} \quad (6)$$

where σ_0 is the standard deviation of d_{i0} .

$$d_0 = \bar{d}_0 + 3 \cdot \sigma_0 \quad (7)$$

where d_0 – the maximum level of deviation from the standard is calculated according to the rule of x-sigma.

$$c_i^* = \frac{d_{i0}}{d_0} \quad (8)$$

where c_i^* – intermediate value of the indicator of the economic security level of regional economic systems in terms of intellectualization.

$$C_i = 1 - c_i^* \quad (9)$$

where C_i - an indicator of the economic security level of regional economic systems as a potential-forming space in terms of intellectualization.

7. Interpretation of the obtained results of the taxonomic analysis of ensuring economic security of regional economic systems in terms of intellectualization, which involves the calculation of the relevant integrated indicators according to the formed clusters and the formation of appropriate conclusions.

RESULTS

The approbation of the offered methodical approach for the estimation of the economic safety maintenance of regions as potential-forming space in the conditions of intellectualization is carried out concerning the regions of Ukraine. Table 1 presents the calculated integrated indicators of the economic security level of regional economic systems as a potential-forming space in terms of intellectualization and the rank of regions by the values of integrated indices.

Region	Years									
	2016		2017		2018		2019		2020	
	Integral indicator	Rank of the region	Integral indicator	Rank of the region	Integral indicator	Rank of the region	Integral indicator	Rank of the region	Integral indicator	Rank of the region
Vinnitsia	32,8	8	33,1	9	32,6	12	37,5	5	33,4	5
Volyn	27,5	16	24,8	21	24,7	23	27,2	19	24,1	21
Dnepropetrovsk	40,6	3	39,1	2	43,7	2	41,9	2	40,8	2
Donetsk	18,8	24	29,5	13	27,8	20	30,7	14	26,3	18
Zhytomyr	29,3	13	30,0	12	32,9	11	28,4	16	27,9	15
Transcarpathian	26,4	18	27,5	18	33,2	10	23,7	23	24,0	23
Zaporozhzhia	37,7	4	34,7	6	41,0	4	39,2	3	31,9	8
Ivano-Frankivsk	28,6	15	23,2	22	32,3	13	27,4	18	25,2	20
Kiev	37,4	5	38,2	3	38,1	7	32,5	9	36,9	3
Kirovohrad	26,1	19	31,2	10	30,5	17	26,5	21	28,5	13
Luhansk	12,8	25	20,9	24	10,7	25	17,0	25	22,7	25
Lviv	34,7	6	35,3	5	38,2	6	35,0	6	32,8	7
Mykolaiv	34,2	7	34,7	7	33,8	9	30,8	13	33,8	4
Odessa	32,7	9	36,6	4	38,5	5	32,5	10	33,3	6
Poltava	31,9	10	28,7	14	36,0	8	33,8	7	31,3	10
Rivne	24,9	21	21,9	23	26,8	22	28,4	17	26,9	16
Sumy	30,4	12	25,3	20	30,3	18	31,0	11	26,6	17
Ternopil	24,8	22	27,8	17	27,5	21	24,8	22	30,8	12
Kharkiv	41,1	2	34,1	8	43,0	3	38,4	4	31,6	9
Kherson	26,0	20	28,3	16	32,0	14	26,6	20	31,1	11
Khmelnysky	29,1	14	28,4	15	30,1	19	28,9	15	23,2	24
Cherkasy	31,0	11	30,8	11	30,7	16	33,6	8	28,5	14
Chernivtsi	21,5	23	20,4	25	24,4	24	22,8	24	24,1	22
Chernihiv	26,7	17	27,1	19	31,6	15	30,9	12	26,2	19
Kyiv city	60,2	1	58,3	1	66,0	1	69,1	1	65,3	1

Source: calculated by the authors

Calculations of the integrated indicator of the economic security level of regional economic systems as a potential-forming space in terms of intellectualization presented in Table 1 showed that only the city of Kyiv for the study period from 2016-2020 was not a variable leader among the regions. Dnipropetrovsk region in addition to 2016 (3rd place in rank) ranked 2nd position in terms of the integrated indicator, also Luhansk region ranked 25th in rank except in 2017 (24th place). Minor changes in ranks during the study period can be traced in Lviv region, which varied from 5 to 7. However, in most regions there were quite significant fluctuations in the ranks of the integrated indicator for the study period.

The results of the taxonomic analysis of the regions of Ukraine on the economic security level as a potentially formative space in terms of intellectualization during 2016-2020 are presented, fixing stable dominance of Kiev region on the level of relevant security indicators, exceeding average security levels on Dnipropetrovsk and Kharkiv regions, as well overall low level of economic security in most regions. The results of the calculations also reflect the impact of the crisis on the assessed safety parameters, in particular, we can observe a general decline in the relevant indicators in 2017.

In Table 2, a table of results of the taxonomic analysis of economic security of regional economic systems as a potential-forming space in terms of intellectualization is presented.

Cluster name	Regions distribution clusters	Level of stable functioning	Level of effective functioning	Level of progressive functioning	Level of general security
A	Kyiv city	71,0%	39,4%	85,4%	65,3%
B	Dnipropetrovsk, Kharkiv region	39,1%	14,2%	55,3%	36,2%
C	Lviv, Odessa, Zaporizhia, Poltava, Kiev regions	35,4%	25,3%	39,1%	33,3%
D	Zhytomyr, Chernihiv, Kirovohrad, Cherkasy, Sumy, Vinnytsia, Mykolaiv, Kherson, Volyn, Rivne, Chernivtsi, Ivano-Frankivsk, Khmelnytsky, Transcarpathian, Ternopil regions	26,4%	25,6%	30,9%	27,6%
E	Luhansk, Donetsk regions	30,2%	23,8%	41,2%	31,7%

Source: Calculated by the authors

The presented indicators indicate the dominance of cluster A in terms of the achieved level of general security (65.3%), with high indicators of stable and progressive functioning of this cluster (71.0% and 85.4%, respectively), a markedly reduced level of effective functioning (39.4%) is due to the relative nature of the selected indicators-criteria within this functional block, which leads to a constant increase in the base of comparison and the need for constant intensification of efforts to achieve appropriate high levels.

The overall security level of cluster B is 36.2%, but there is the lowest level of performance indicators, due to the low level of environmental indicators of the cluster regions included in this functional block of indicators. Cluster D has the lowest level of security, due to the weakness of the existing industrial potential and objective impossibility of achieving stable indicators of the dynamics of a stable security situation in the regions. Despite the presence of

unresolved problems of the military-political nature, the level of economic security of the regions of cluster E is at the level of 31.7%, which is explained by the preservation of the remnants of industrial potential and increasing capacity of the military-industrial complex within the respective regions.

CONCLUSION

In summary, the use of the taxonomic analysis to assess the economic security level of regional systems as a potential-forming space in terms of intellectualization will contribute to: ensuring a differentiated approach in the implementation of the state regional policy of security development, taking into account common features of socio-economic development of individual regional entities and their key issues; improvement of strategic tools for the regional development planning on the basis of more complex multicriteria methods for assessing their security development; increasing the efficiency of prioritizing the distribution of financial and managerial resources of the spatial development of regional entities; identification and overcoming of key threats and barriers of the intellectual and innovative development of regions; assistance in the processes intensification of the innovative development and the activity of key subjects of these processes; providing a selective approach to the use of public administration tools of development in terms of the intellectualization of economic processes, aimed at developing human potential and increasing the overall level of the competitiveness of the respective territorial entities.

The scientific novelty of this study is the use of the taxonomic analysis of the economic security level of regional systems as a potential-forming space in terms of intellectualization, which allows, on the one hand, to qualitatively differentiate regions by the level of similarity of key security parameters.

Applied application of the proposed methodological approach is, firstly, the ability to use large arrays of heterogeneous development parameters that characterize the economic security level of regional entities, and secondly, the implementation of a priority approach to strategic measures to ensure economic security of regional systems in terms of intellectualization indicators of their stable, effective and progressive security operation.

Further scientific research is required to develop an organizational and economic mechanism to ensure economic security of the regions, which will help increase their competitiveness and achieve sustainable development goals.

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