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Assessment of the economic security of the intersectoral complex: a regional aspect

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Abstract. The article is devoted to the generalization and systematization of theoretical, methodological and practical aspects of assessing the economic security of a regional intersectoral complex. The object of the study is the forest sector as a set of traditional industries and types of economic activity of a separate Russian region united by consistent technological, production, and financial links in the use and reproduction of forest resources. The theoretical and methodological basis of the study was the analysis of scientific works of Russian and foreign scientists devoted to the study of economic security and methodological support for its assessment, modeling of the forest sector, and forest management. The research used methods of multidimensional comparative analysis, as well as traditional methods of processing statistical information. The result of the study is the development of a methodology for rating the economic security of a regional industrial complex and its practical testing in relation to the forest sector of the economy of the subjects of the Ural Federal District. The proposed methodology is universal and, provided that the key provisions are preserved, can be used to assess the economic security of other socio-economic systems.

1. Introduction

In the conditions of economic instability, global crises and epidemics, increasing interdependence of political and economic spheres of activity, the issues of ensuring the economic security of socio-economic systems of various kinds do not lose their relevance. The highest level of elaboration of the organizational, regulatory and legal and methodological support of the main elements of the economic security system is characteristic for objects of the macroeconomic level (state) and microeconomic level (enterprise). Currently, a social order has been formed for the development of a meso-level of economic security – territorial and sectoral formations

Ensuring the economic security of forest sector models requires the use of effective tools for organizational, informational and regulatory support for decision-making in the field of forest planning. These tools should be adapted to the specific features of the object of assessment.

The results of the assessment of the economic security of regional industrial complexes become the information and analytical basis for the justification of management policies at various levels, the development of industry strategies and programs of socio-economic development.

Theoretical and practice-oriented research focused on the forestry sector has a long history. A A Nartov in the article "On the sowing of forests" (1765) presented the first scientific studies on the typology of forests and thinning [1].

Since 1849, M Faustman's model (M Faustman's formula) has been studied to determine the current value of the income stream from timber turnover. This model is also known as the optimal harvesting

criterion [2]. Starting with simple questions about felling methods characteristic of early developments, studies of the specifics and patterns of the development of the forest sector since the 1970s have been focused on large-scale models of the forest sector. Such models are applicable in assessing the state and forecasting the dynamics of forest products markets and involve the use of mathematical and statistical tools.

Forest sector model studies is aimed at the formation of network interaction of entities whose economic activity is based on the use of forest resources. Forest sector models are an element of forest management policy and pursue the goal of multipurpose use of forest resources.

The forestry sector has socio-economic, material, environmental and cultural projections. The multi-factor model of the forestry sector is a spatial model located at the intersection of global, national and local space. Its construction requires the coordination of the actions of the subjects vested with powers in the field of forestry relations at all levels of government.

In recent decades, research in the forestry sector has increasingly become interdisciplinary and project-based. Such studies include not only issues of production of goods from wood, but also aimed at solving problems of environmental protection, adverse climate change, production of wood biofuel in the projection of the integrated use of wood raw materials. Carbon farms and carbon landfills are becoming the development drivers of the sequestration industry [3].

The reliability and effectiveness of global and local forestry strategies is increasing in the context of adaptive forestry, which levels out the deep uncertainties in the development of the forestry sector caused by climate change. Natural uncertainties are often ignored in strategic forest planning documents [4].

The forestry sector is a socio-economic system consisting of several integrated activities. This target system is based on the intersectoral interaction of economic entities operating in the field of forestry in a broad sense [2].

Solberg believed that the forestry sector consists of forestry, the timber industry and the interrelationships between them [5]. This division of the target system into a production segment and a refining segment is traditional (economic thinking). Stable vertical and horizontal economic ties between elements of the forestry sector (segments of the forestry business, individual enterprises) are due to the rational economic behavior of economic entities, biological dynamics (natural dynamics) of the forest as a basic resource, production chains of value added formation, etc. Accordingly, the forestry sector should be understood as the organizational and economic integrity of forestry, timber industry and forest ecosystems.

Regional forestry sectors are quite complex economic models, which in some studies are referred to as bioeconomic ones. The susceptibility to the influence of various combinations of factors, among which often natural factors such as the quality of forest resources, their availability, determine the orientation of the forest sector in a particular region (the sector's gravitation towards forestry, woodworking, ecological tourism, bioenergy production). At the same time, the degree of integration of the target system also differs in different localities [6].

The forestry sector is a target system with a specific structure and a set of elements. It is linked directly or indirectly to other segments of the economy. The forestry sector is a consumer and supplier of goods and services for other market segments. Mechanical engineering, energy, water supply, chemical industry, logistics, education provide the forestry sector with material and labor resources. Wood and wood products are irreplaceable materials for construction and furniture production, printing and publishing activities and bioenergy. Forest as an ecosystem is an environment for tourism, beekeeping, hunting and recreation. Forestry has a complex relationship with agriculture and urban environment.

According to Petrov and Pryadilina, strategic forest planning requires identifying industry priorities and ranking forest industries depending on their contribution to the national economy. These scientists associate forestry planning priorities with the industry sector's ability to grow innovatively and produce competitive products. The author's strategic planning concept creates a matrix of sectoral and regional priorities. They call their tool the decision-making matrix for strategic planning of the forest sector development. The use of this tool ensures the formation of a sustainable model of the forest sector,

namely a model of facilitating profitable forest management supported by sustainable forest management and environmental measures [7].

Diversity of institutional conditions, decentralization of management and politicization of economic decisions in the forest sector requires improvement of models and tools of forest management and analysis of forest policy [8]. Organizational, informational and regulatory support for decision-making in forest planning is a key factor in ensuring the economic security of forest sector models.

Research in the field of economic security is mainly devoted to the systematization of threats to the financial security of an enterprise, a description of methods for a comprehensive assessment of the functional components of the economic security of an enterprise [9].

O Stashchuk and others propose a method for constructing a goal tree and rating tree. Their concept involves modeling options for building a system for ensuring the economic security of an enterprise. Quality and cost are the criteria for evaluating each option in order to select the best one [10].

V Kraevsky and others are followers of the functional approach to understanding the category of "economic security". The authors identify seven main components of economic security: financial, personnel, technical and technological, power, information, resource, political and legal. For each component, the authors set weights. Financial security is considered as the most significant, the lowest rank is assigned to the political and legal sector. Each component of economic security is assessed based on a set of indicators. The calculation results of the functional components of economic security are the information basis for tactical and strategic assessment of decisions on managing the economic security of an enterprise [11].

2. Methods and materials

A comprehensive rating assessment of the economic security of the regional forest sector of the subjects of the Ural Federal District was carried out on the basis of a multidimensional analysis method based on the Euclidean distance method. The application of the methodology allows us to give a comparative assessment of several regions by different indicators, grouped by significant characteristics.

The source of information for the study was the official statistical information for 2018-2019, presented in the Unified Interdepartmental Information and Statistical System for the types of economic activities that form the sector. In general, more than 100 indicators were studied, about 30 of them were calculated.

3. Results and discussion

The forest sector should be considered as a typical example of socio-economic education of the meso-level. The basis of its functioning is the intersectoral interaction of economic entities engaged in the use and reproduction of forest resources. Sustainable development of forest sector models is based on economic, technological and reproduction links that ensure the neutralization of internal and external threats on markets of different levels (global, national, regional). In this context, it is of prime importance to solve the problem of a reliable, complete, timely assessment of the category under study.

The absence of reliable threshold values of both private and integral indicators of economic security has led to the expediency of using rating assessment tools. The economic security of the regional model of the forestry complex should be interpreted as the ability of all its systemic elements to maintain quantitative and qualitative parameters at the required level. The required level is characterized as the ability to create and (or) maintain advantages over similar models from other regions, or industry complexes that produce substitutes for an industry product, or other industry complexes of the same region based on a comparison of the contribution to the gross regional product.

Decomposition of the category "economic security" into components corresponding to the type of threat and defining the scope of security is carried out within the framework of the system-functional approach. Each component (type) of economic security is concretized by a set of quantitative and qualitative indicators (parameters) that reflect the scale and effectiveness of the subject area.

The components of economic security correspond to the main economic resources (factors of production). An assessment of the level of each type of economic security can be carried out on the basis

of an analysis of an array of private indicators that take into account the sectoral specifics of the forest sector of the economy (table 1). Within each component of economic security in the context of the Ural Federal District's subjects, the average values of the ranks were determined. Based on these ranks, the source data matrices were constructed.

Table 1. Indicators for assessing economic security regional forestry sector.

Type of security	Indicators
Resource and raw material security	Forest cover of the territory; estimated cutting area and the level of its development; reforestation coefficient; forest land area; wood stock; transport accessibility of forest resources; fire hazard indicators
Industrial and technological security	Absolute and relative indicators of fixed assets; indicators of the state and efficiency of the use of fixed assets; production indices; production volumes
Financial security	Financial ratios; absolute and relative indicators of investments in fixed assets; sales volumes; profitability indicators
Personnel security	The number of employees employed in the sector; the share of employees in the sector in the number of employees in the region; the number of high-performance jobs; labor productivity; training; staff turnover
Innovative security	Volume of innovative goods; costs of technological innovations; share of innovative goods in the volume of products shipped; innovative activity of sector entities; share of sector entities that implemented technological innovations

A matrix of standardized coefficients was created based on the comparison of subjects for certain types of economic security with a conditional reference subject that has the best results (table 2).

Table 2. Matrix of standardized coefficients for rating the level of economic security of the forest sector economy of the Ural Federal District's subjects.

Subjects of the Ural Federal District	Type of security				
	resource and raw material	industrial and technological	financial	personnel	innovative
Sverdlovsk Oblast	0.743	0.499	0.782	0.669	0.216
Kurgan Oblast	0.433	0.567	0.280	0.322	0.000
Tyumen Oblast	0.516	0.494	0.486	0.560	0.000
Chelyabinsk Oblast	0.401	0.477	0.256	0.428	0.000
Khanty-Mansi Autonomous Okrug	0.671	0.268	0.211	0.518	0.429
Yamalo-Nenets Autonomous Okrug	0.384	0.090	0.134	0.111	0.000

The calculation of the integral indicator by the "distance" method allowed us to determine the rating of each subject of the Ural Federal District according to the level of economic security of the forest sector of the economy (table 3).

According to the results of the economic security assessment, the first rank was assigned to the forest sector of the economy of the Sverdlovsk region (figure 1). The region's leading position in 2019 was due to the highest values of indicators calculated for resource and raw materials, financial and personnel security. A significant level of resource and raw material safety of the Sverdlovsk region is due to high indicators of forest cover of the territory, the total and specific stock of wood, and lower, in comparison with other regions of the district, indicators of fire hazard. This indicates a sufficiently high economic potential of the forest industry in the region and the effectiveness of the regional policy for the protection of forests. The growth in the number of high-performance jobs and the average number of employees in

the industry, as well as more favorable positions on the financial condition of the enterprises of the forest complex and their investment activity, allowed us to assess the personnel potential and financial security of the forest sector of the Sverdlovsk region completely high.

Table 3. Results of the comparative rating assessment of the level of economic security of the forest sector of the economy of the subjects of the Ural Federal District.

Subjects of the Ural Federal District	Type of security					Integral value	Rank
	resource and raw material	industrial and technological	financial	personnel	innovative		
Sverdlovsk Oblast	1.000	0.776	1.000	1.000	0.253	2.007	1
Kurgan Oblast	0.340	1.000	0.128	0.231	0.000	1.304	4
Tyumen Oblast	0.481	0.760	0.386	0.702	0.000	1.526	3
Chelyabinsk Oblast	0.291	0.709	0.106	0.411	0.000	1.232	5
Khanty-Mansi Aut. Okrug	0.814	0.223	0.073	0.599	1.000	1.646	2
Yamalo-Nenets Aut. Okrug	0.267	0.025	0.029	0.028	0.000	0.591	6

- The median value of the integral indicator of the level of economic security of the forest sector of the Ural Federal District (1.384)
- Integral indicators of the level of economic security of the forest sector of the subjects of the Ural Federal District
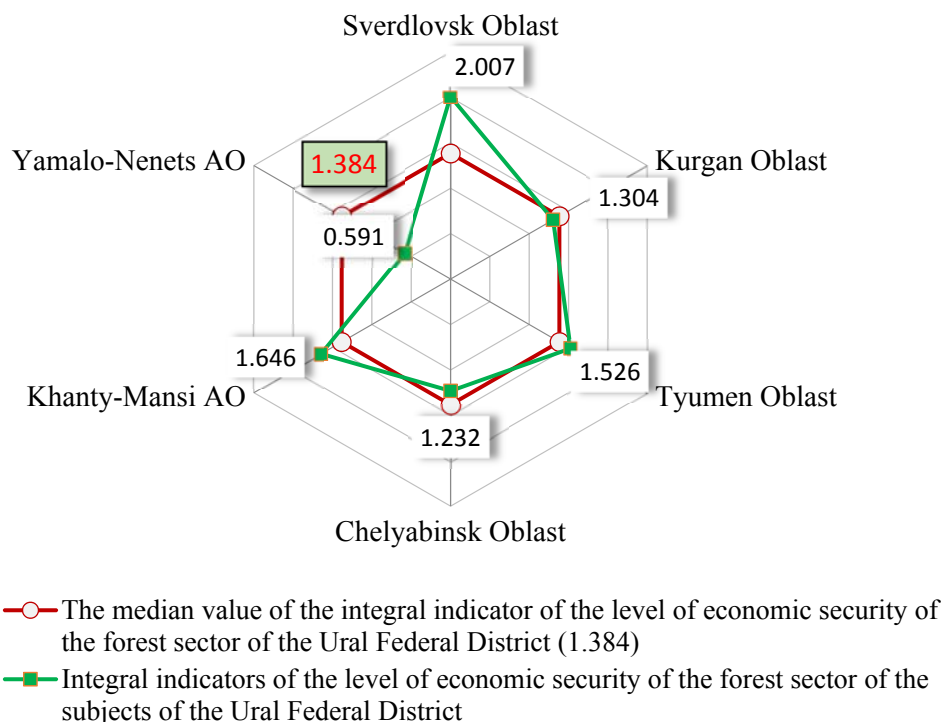
Figure 1. Positions of the subjects of the Ural Federal District by the integral indicator of the level of security of the forestry sector.

The ranking of the subjects of the Ural Federal District in terms of the level of economic security allowed us to conclude that the level of security of the forest sector of the economy of the Tyumen

Oblast and the Khanty-Mansi Autonomous Okrug is above average, the Kurgan and Chelyabinsk regions are slightly below the median values, and the Yamalo-Nenets Autonomous Okrug is low.

Modern researchers note that at the present stage, economic relations go beyond the traditional models of industry markets, new structures are emerging based on intersectoral relationships. The degree to which industry models are balanced determines the level of economic security of different socio-economic systems (enterprises, municipalities, regions, states) [12]. The effectiveness of strategic planning increases many times when using tools for assessing regional and industry priorities and threats. In the context of the information industry, studies of socio-economic systems based on interregional, intersectoral and other interaction (macroregions, network-related industries, networks, intersectoral complexes) are of high value [13].

Determining the level of development of a territorial or sectoral entity based on its rating in relation to similar socio-economic systems has advantages and disadvantages. The use of median characteristics makes it possible to differentiate with greater accuracy the same type of socio-economic systems. This increases the effectiveness of development programs and strategies, regional policy [14].

4. Conclusion
The result of the study is the development and testing of a methodology for comparative assessment of the economic security of the regional forest sector. The value of the methodology lies in its model, universal nature. The tools of the methodology can be adjusted depending on the purpose, object and subject of the study, while maintaining the main provisions.

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