

Механизм развития инновационных процессов в лесном секторе экономики

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Аннотация. В статье проведен анализ Стратегии развития лесного сектора России до 2030 года, в результате которого выявлено, что комплексная инновационная политика в лесном секторе экономики отсутствует. Предлагается механизм развития инновационных процессов на основе создания кластера (на примере Брянской области). Формулируются условия, которые помогут доводить инновационные разработки до конечных потребителей, запуская тем самым механизм развития инновационных процессов.

Ключевые слова: лесная политика, инновационные процессы, лесной сектор, фрактал, кластер, информационно-регуляционный центр, био-социально-экономическая система.

Mechanism of development of innovative processes in the forest sector of economy

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Annotation. The article analyzes the development strategy of the forest sector in Russia until 2030, as a result of which it was revealed that there is no comprehensive innovation policy in the forest sector of the economy.

A mechanism for the development of innovation processes based on the creation of a cluster (on the example of the Bryansk region) is proposed. Conditions are

formulated that will help bring innovation to the final consumers, thereby launching a mechanism for the development of innovative processes.

Keywords: forest policy, innovation processes, forest sector, fractal, cluster, information and regulatory center, bio-socio-economic system.

At present, the forest policy is characterized by the following features noted in the Forecast of the forest sector of Russia up to 2030. Thus, during 2020-2030, certain measures of political support should be implemented. A common task is to ensure sustainable forest management and increase their resource and ecological potential; achievement by the Russian Federation of leading positions in the world markets for wood and paper products; the transformation of forestry from subsidized to highly profitable industry¹.

In the area of property relations: improving the legal status of forests; strengthening the legal protection of forests as a renewable natural resource and the most important component of the biosphere; ensuring the diversity of ownership of forests and forest land while maintaining the dominant state ownership of the federal and constituent entities of the Russian Federation. In the field of forest management: creating a system of strategic planning and adaptive management of forests of all forms of ownership; decentralization of state forest management and increasing the role of the public in management decision making; strengthening state regulation of forest industry; restoration of vertically integrated structures from logging and woodworking enterprises at the regional and federal levels.

In the use of forest resources: the intensification of the use of softwood, low-grade wood and logging waste; integration of forest management, forest inventory and monitoring of forests into a single forest management information system.

In the area of forest conservation and protection: ensuring an adequate level of forest protection and protection; transition to the management of forest fires; the creation of a centralized management system for aviation and land protection of forests,

¹ The development strategy of the forest complex of the Russian Federation for the period up to 2030. Approved by the order of the Government of the Russian Federation of 20.09. 2018 № 1989-p [electronic resource] - Access mode: <http://government.ru/docs/34064/>

a network of forest fire centers to assist the regions in conditions of high and extreme fire danger; creating a system of integrated forest protection based on zoning, forecasting and evaluating the effectiveness of work; development of methods for assessing and reducing the risk of catastrophic forest fires, outbreaks of pests and forest diseases.

In the field of reforestation and reproduction of forest resources: the development of a permanent forest seed base on a genetic selection basis; development of a network of forest nurseries for the production of breeding planting materials; an increase in the volume of measures for artificial reforestation and an increase in the proportion of forest crops with improved hereditary properties; creating conditions for the natural renewal of economically valuable tree species; reduction in the mortality of valuable youngsters, and forest crops as a result of poor agricultural practices, overgrowing of low-value species and the impact of other destructive factors^{2 3}.

Analyzing the above material, we note that there is still no comprehensive innovation policy in the forest sector, although some positive steps are being taken in this direction. These include the holding of All-Russian and international conferences, the achievement of targeted innovation agreements with the forest ministries of the Scandinavian countries, the first steps towards the formation of an innovative forest center on the basis of the Federal State All-Russian Research Institute of Forestry and Forestry Mechanization. As for the contribution of the subjects of the Russian Federation to this process, we note the activity of some subjects, for example, Tatarstan, the Voronezh and Kostroma regions, whose activity is mainly related to the construction of a forest selection and seed-growing center that fell into a special Rosleskhoz program funded exclusively by means.

On the other hand, in order to be able to talk about the effectiveness of the implementation of innovation policy on a scale, for example, in the federal district, there should be a clear understanding on the part of regional officials of the importance

² The development strategy of the forest complex of the Russian Federation for the period up to 2030. Approved by the order of the Government of the Russian Federation of 20.09. 2018 № 1989-p [electronic resource] - Access mode: <http://government.ru/docs/34064/>

³ Rebrina T.G., Silaeva V.V., Nazarova O.G., Muraviova M.A. Problems and prospects for the development of innovation policy at the national and regional levels // Economy: yesterday, today, tomorrow. 2016. No. 8. p. 168-179.

and special significance of the problems under consideration, and work to attract small businesses to the forest sector purposefully and in conjunction with the federal industry structures.

As an example, we cite the readiness of the All-Russian Research Institute for Forestry and Forestry Mechanization to cooperate with regional authorities and commercial structures in the following areas of the provision of specific innovative technologies: forest felling and forest regeneration in production and protective forests; the cultivation of planting material and the creation of forest crops; fire protection of forests; technological processes for wood processing, including the production of biofuels; growing berry plants and other models.

One of the main tools for the intensification of forest use is the introduction of innovative models of forest cutting and reproduction of forests. Innovative logging technologies should ensure maximum economic efficiency of logging and at the same time comply with forestry and environmental requirements. The All-Russian Research Institute of Forestry and Forestry Mechanization and other research institutes of Rosleskhoz have a set of technologies for creating targeted coniferous and deciduous plantations for various zonal-typological conditions. These are technologies with the use of harvesters, chainsaws and forwarders with the preservation of undergrowth, measures to promote reforestation, artificial reforestation and intensive care for the formation of new productive plantations. At the same time, by increasing the annual growth of the forest and reducing the ages of logging, it is possible to achieve a significant increase in the volume of timber harvesting and improving the quality of forests. And if the so-called Scandinavian technologies are adapted mainly for the same type of conditions in north-west Russia, the technologies being developed are intended in general for all regions and forest conditions of Russia, i.e. taking into account the age structure, forest types, conditions of renewal, species composition, and other indicators. New technologies are also proposed for the reorganization of deciduous-spruce plantations into target spruce forests and technologies for the reconstruction of low-value plantations into valuable target ones. The proposed technologies should be tested in existing models in real production conditions for further distribution in the

forestry of Russia.

Among the many concrete innovative results we note, for example, an innovative technology of growing planting material with improved properties using the methods of clonal micro propagation of aspen, spruce, pine. The innovation center is ready to provide scientific and methodological support, transfer technology centers, regulations, guidelines for growing planting material to forest seed centers, and, subject to timely funding, transfer pilot lots of micro plants and planting material with a closed root system with improved hereditary properties.

A second example is the innovative technology of growing patented varieties of cranberries and lingonberries. The All-Russian Research Institute of Forestry and Forestry Mechanization has created 9 new varieties of cranberries and lingonberries, for which patents have been obtained. Specialists of the institute will help you choose the right plots for plantations of wild berries, provide varietal planting material, give recommendations for the care and monitoring of the condition.

Consequently, the developments have been completed, but stopped at the stage of introduction into production due to the lack of interest (or awareness) of the business and special targeted programs of forestry, federal or regional, and the lack of interest of officials in developing new projects. There is an inconsistency in the actions of participants in the forestry sector, with direct losses and negative economic consequences for the region⁴.

To date, the absolute majority of the forest areas of the Bryansk region have a forest income consisting of revenues of forest taxes for wood, the indicator reaches 99.61% of the total forest income, i.e. use of other sources is negligible. Revenues from the use of non-timber resources are received by 9 forest districts (Bryansk, Vygonichi, Zhukovka, Zlynka, Unecha, Dyatkovo, Trubchevsk, Sevsk, Educational-experienced). However, the proportion of income from this source remains extremely low, at 6 of the total. The organization of hunting, agriculture, the use of forest land for the construction of linear structures is not a popular source for forestry areas: in the context

⁴ Gorbov N.M., Muraviova M.A., Nazarova O.G., Silaeva V.V. Environmental management as a path to sustainable development // Economy and entrepreneurship. 2015. № 2 (55). Pp. 830-834.

of each activity cash flow is noted on average in one forest area (only two forest areas of the region use several types of income sources: for example, the main control department "Dyatkovo forest area" mobilizes income at the expense of hunting and agriculture, as well as obtaining financial resources in the construction of linear structures).

Recreational forest management is one of the most promising species, given the difficult ecological situation and high forest cover in most areas of the region. However, this source is used only by two forest districts - Bryansk (16,14% in the total income structure) and Unecha (1,05% of the amount of income). Estimating the general structure of sources and types of payments for the analyzed period, it can be noted that payments for the use of wood constitute more than 97%, and other types do not provide a stable and substantial income. Establishing a cooperation mechanism with the largest forestry research institute can be a significant achievement for the region's forest sector, as it will not only help increase the region's forest income, but also solve complex integrated forest management tasks⁵.

In order to bring scientific and technical products to finished innovative products of research institutes, it is necessary to have testing grounds for testing specific innovative models of production processes for the use, reproduction, protection and conservation of forests.

As polygons can be used:

- forestry of the Bryansk region with the status of an experimental farm (for example, educational-experienced forestry), which carry out forestry activities through targeted programs;
- forest experimental stations and tenant plots (under contracts or agreements).

In order to improve and enhance the protective functions of the forests of the Bryansk region, especially those passed by fires and windfalls, the research institute is ready to create, prepare changes to the rules for logging and ensure the introduction of unified technologies for planting and forest reproduction in protective forests for green,

⁵ Forest plan of the Bryansk region for 2009–2018 / Developer's BSITA, by F. V. Kishenkov (Changes by branch of "Zaplesproekt" FSUE "Roslesinfor"). Bryansk Zaplesproekt, 2010. – 567 p.

forest-park, water protection and other zones.

To establish a cooperation mechanism with the largest forestry research institute it is necessary:

- create a pilot forestry on the basis of 1-2 forest areas;
- develop a project for the management of pilot forestry, including: the use of innovative forest management technologies, an assessment of the volume, quality and concentration of forest resources: a balance between its production and consumption;
- logistics of timber supply for existing processing enterprises;
- creation of new and increase of efficiency of already used processing capacities (for example, production of sawn timber and bioenergy).

Specific innovative technologies can be chosen as the existing innovative models for the region:

- logging and reforestation in operational and protective forests;
- the cultivation of planting material and the creation of forest crops;
- fire-prevention arrangement of woods;
- forecasting the number and time of occurrence of fires based on fire hazard classes and weather forecast;
- technological processes for wood processing, including the production of biofuels;
- cultivation of forest berry plants and other models.

It is also necessary to take into account the fact that the Forest Code of 2007 made the constituent entities of the Russian Federation dependent on the size of the allocated subventions based on the implementation of regional forest plans. The plans, programs and concepts of forestry development developed at the federal level are not tied to the plans for the development of the timber industry complex, which negatively affects their mutual relations and economic interests.

In the conditions of the established procedure for financing, solving the above problems lies in drawing up comprehensive plans for the development of the forest industry in the region as a whole, with maximum respect for the economic interests of all forest management participants: state forest management authorities, logging and

wood processing enterprises, regional governments and the local population.

To carry out such work, it is necessary to create a new structure capable of coordinating the interests of all the above-mentioned entities, taking into account the developed innovative technologies. An information and regulatory center should be established within the forest cluster representing a circular fractal.

It should be borne in mind that the indicator of successful implementation of state programs aimed at the development of the forest complex is the ratio of the actual volumes of forest resources to the established allowable volumes of their withdrawal. In accordance with this, by efficiency, we will understand not the ratio between profit and cost, but the level of use of the potential of the forest sector of the economy.

The forest cluster has several features, and this is, first of all, a synergistic effect, which is the accumulation of energy from the combination of production, and which, by controlling, can be directed to increase productivity. The synergistic effect of the merger of enterprises into a single whole, generates a system that has properties that are absent from individual parts of it, which allows to achieve the best results in solving the tasks due to a single, centralized structure. The appearance of such an effect is an advantage of the cluster over private production⁶.

The following inequality can be used as an assessment of synergistic efficiency in the cluster structures of the forest sector as a bio-socio-economic system:

$$\left(\frac{\sum_{i=1}^n S_i^0 \cdot Q_i^0 \cdot M_i^0 \cdot P_i \cdot K}{\sum_{i=1}^n Q_i^0 \cdot C_i^0} - 1 \right) \div \left(\frac{\sum_{i=1}^n S_i^1 \cdot Q_i^1 \cdot M_i^1 \cdot P_i \cdot K}{\sum_{i=1}^n Q_i^1 \cdot C_i^1} - 1 \right) \geq 1,$$

where S_i^1, S_i^0 , – potential and actual areas occupied by i resources;

Q_i^1, Q_i^0 , – potential and actual quantities;

M_i^1, M_i^0 – the proportion of output i products;

C_i^1, C_i^0 – potential and actual costs of production i ;

⁶ Muraviova M.A., Nazarova O.G. Managing the development of innovative processes in regions based on clustering // Collection: Socio-economic and legal studies: theory, methodology and practice. Materials of the All-Russian scientific-practical conference. 2016. pp. 51-56.

P_i – selling price i products;

K – coefficient taking into account the impossibility of carrying out in full the work on radioactively contaminated territories.

Potentially possible values of indicators characteristic of enterprises outside the cluster may turn out to be less than the values of similar indicators for enterprises included in the cluster structure.

In addition to the synergistic cluster, a multiplicative effect is also created, which is manifested in the influence of the cluster on the region where it is located, and is the sum of all indirect effects of the cluster's influence on other industries and industries. The multiplicative effect is expressed in the formation of a completely new sales market, a change in the appearance of the region, the creation of new competitive products and prerequisites for the entry of individual industries into the cluster.

Due to the multiplicative effect, not only the entire cluster begins to develop, but also the production and service enterprises that accompany the cluster. This, in turn, leads to the development of entrepreneurial structures, growth of the gross regional product, improvement of the quality of life, i.e. a cumulative effect is created (Figure 1).

Synergistic, multiplicative and cumulative effects can be represented in the framework of the model of the unit of the bio-socio-economic system that we used in the diagnosis of the «slice» of the bio-socio-economic system. The “slice” scheme plays an important role in improving the methodological organization of management. This scheme should form the basis for determining the internal and external elements of any organization.

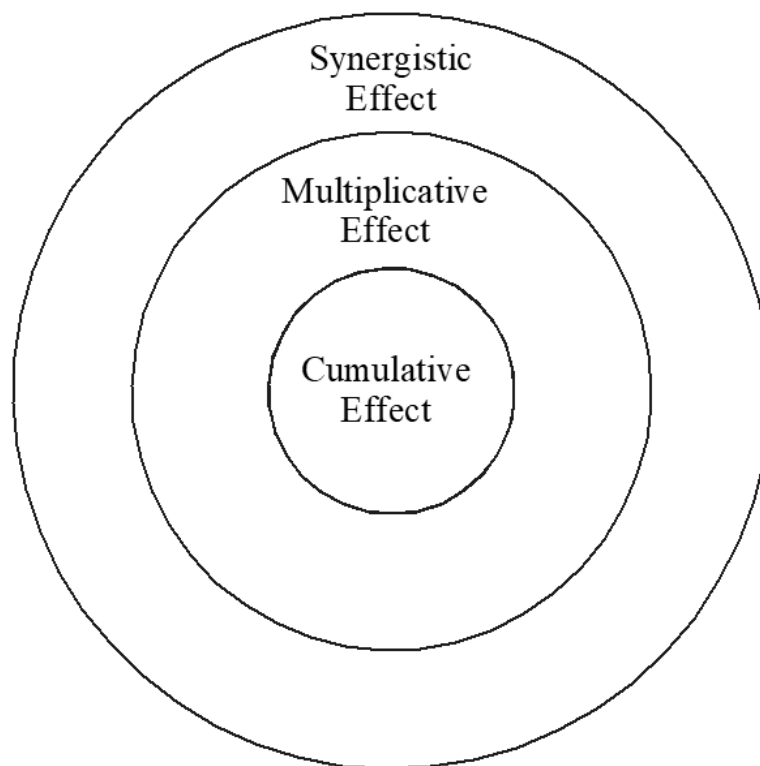


Figure 1 – Effects generated in cluster structures

If we consider this scheme from the point of view of obtaining synergistic, multiplicative and cumulative effects of clustering, we get the model shown in Figure 2.

This model suggests that by combining into a cluster, we obtain not just a large number of “trees” (organizations), but «forest».

It can be said that a forest is represented by a multitude of trees, bushes, herbaceous plants, animals, microorganisms that are biologically interconnected and affect both each other and the environment⁷.

In accordance with the above definition of forest, it is possible to define the forest cluster, which is represented by a whole separate environment, which creates conditions for comfortable development and competition between members of this community, constantly expanding and attracting new participants, for joint environmental impact.

⁷ Gorbov N.M., Muraviova M.A., Nazarova O.G., Silaeva V.V. Environmental management as a path to sustainable development // Economy and entrepreneurship. 2015. № 2 (55). Pp. 830-834.

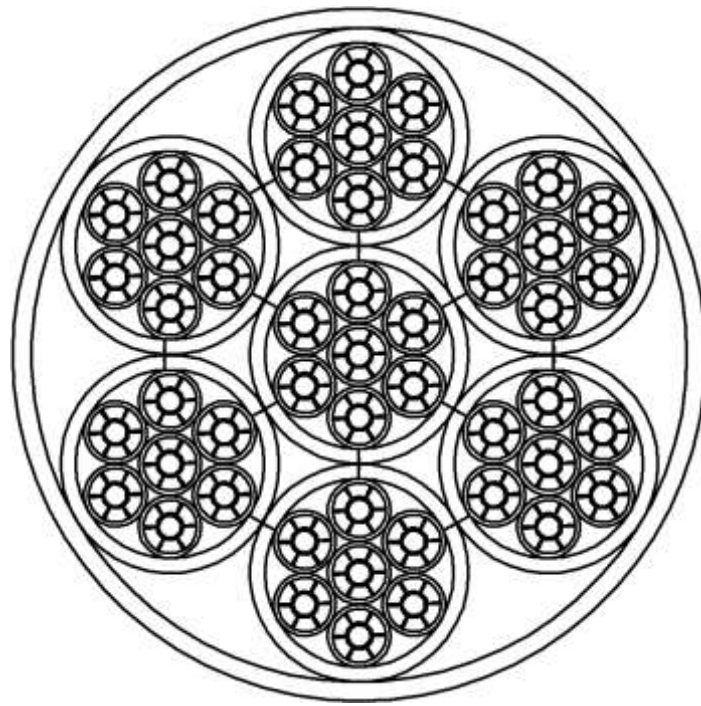


Figure 2 – The relationship of the elements of the bio-socio-economic system in the cluster structure

As we see, there is much in common between these definitions. Thus, it can be said that the increase in the profitability of the forest sector of the economy on the basis of the cluster approach is achieved by taking into account the rational use of all types of forest resources.

Considering the graphic image of the cluster structure, which is a single living organism, it can be concluded that the construction of such structures occurs according to the fractal principle. If we use a simplified idealistic model, each of the enterprises can be represented as separate fractals that make up a single living organism. Representing an enterprise as a living organism, one should take into account that the forms of exchange of resources and information will differ significantly from similar systems characteristic of hierarchical mechanistic structures.

The methodology of fractal structures can be effectively used in the course of economic research relating to the problems of the formation and development of clusters and their presentation as bio-socio-economic systems (Figure 3).

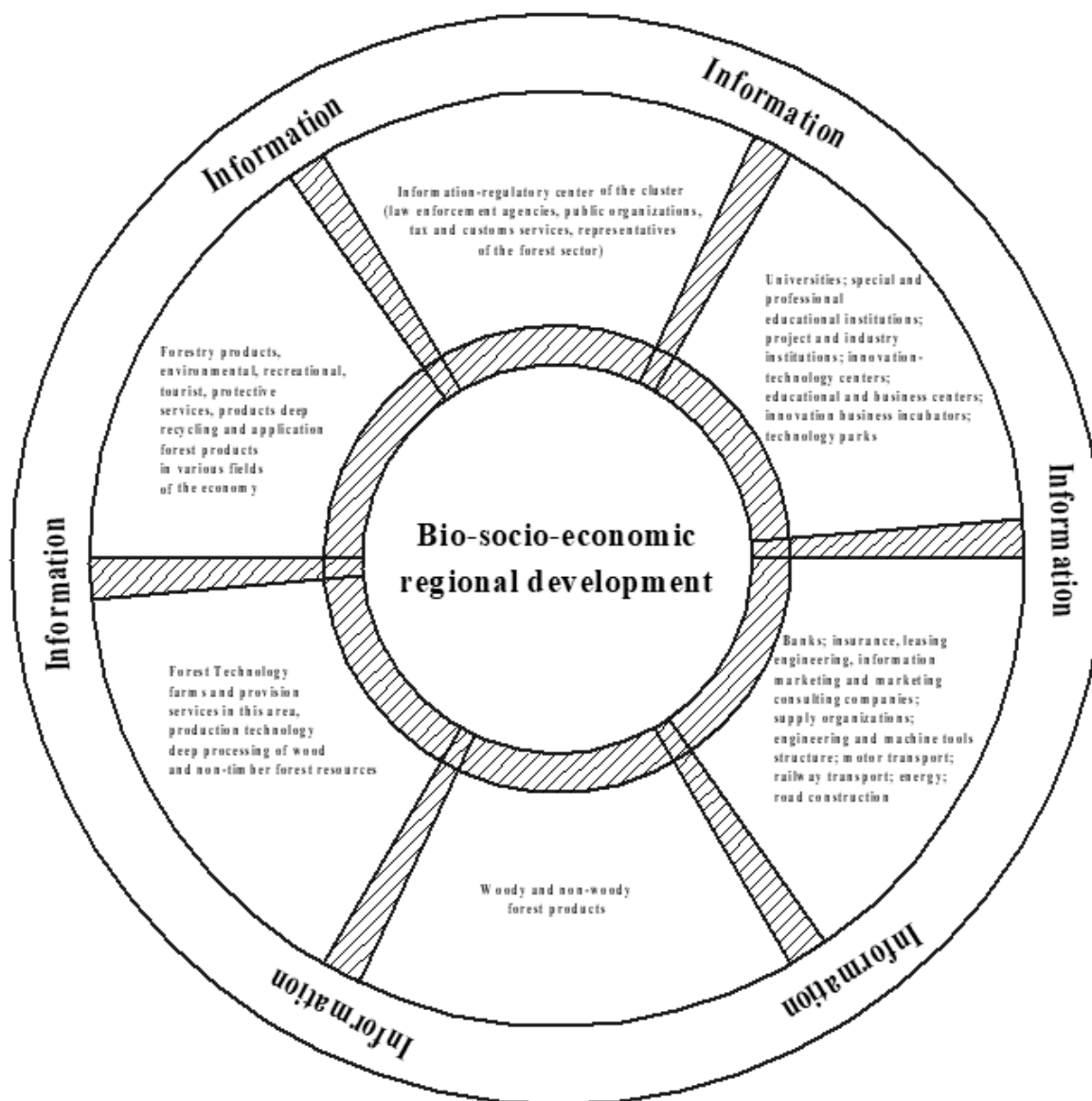


Figure 3 – Forest cluster model using a circular fractal

According to the investment strategy of the Bryansk region for the period up to 2020, only the development of a furniture cluster is envisaged with localization around the enterprises of the «Katyusha» furniture concern in the Dyatkovo district. However, we believe that the furniture cluster is only one of the components of the forest cluster.

Conditions for the formation of needs for changing the current situation, determined during diagnostics, are created, according to the presented forest cluster model using a circular fractal, in the cluster information and regulation center (socio-consumer subsystem) based on the accumulation of information flows from all subsystems of the cluster structure. Thus, the mechanism for the development of

innovation processes is launched^{8 9}.

The following set of issues (in order) that fall within the functional responsibilities of the information and regulatory center can be an algorithm for making management decisions in the forest sector of the economy, which does not contradict the fractal principle:

- 1) the choice of methods of accounting for forests;
- 2) the allocation of resource-ecological forest areas of the Bryansk region, taking into account the quantitative and qualitative characteristics of forests for the formation of the regulatory framework for the design of forest development, the development of an optimal forest plan, information management in the use, protection, conservation and reproduction of forests in the region;
- 3) assessment of the potential of each resource-ecological forest region;
- 4) assessment of the existing infrastructure and enterprises engaged in work in the field of processing of forest resources;
- 5) analysis of the elements characterizing the level of use of the production potential of the enterprise;
- 6) analysis of the state of domestic and foreign markets, determining the demand for wood;
- 7) cooperation with large research institutes of forestry;
- 8) as a result of analyzing the elements characterizing the level of use of the production potential of an enterprise, it is necessary to select those that need to be changed or added, as well as to determine the vectors and ways of developing the production potential, to choose the most effective mechanisms;
- 9) the definition of organizations that have the opportunity to ensure the revitalization of the production potential of the enterprise (credit, leasing, insurance organizations, factoring companies, scientific and educational institutions, etc.);
- 10) identification of options for interaction between enterprises: financial and

⁸ Muraviova M.A. Bio-socio-economic systems as an object for managing innovation processes // Bulletin of Bryansk State University. 2015. No. 3. p. 319-322.

⁹ Muraviova M.A., Nazarova O.G. Managing the development of innovative processes in regions based on clustering // Collection: Socio-economic and legal studies: theory, methodology and practice. Materials of the All-Russian scientific-practical conference. 2016. pp. 51-56.

managerial, operational and sales, complex and strategic;

11) ensuring interaction between enterprises implementing state and economic functions and state bodies;

12) determining the market price for forest plantations and plots to establish an objective amount of the costs of doing business, as well as accelerating the development of the timber industry complex;

13) determination of the system of legal relations between organizations that are part of the forest cluster;

14) coordination of the work of all forest users on the formation and use of information prepared in the framework of the information and regulatory center.

The presented issues that should be within the competence of the information and regulatory center and form an algorithm for making management decisions in the forest sector of the economy, implemented within the regional forest cluster, help in determining the cluster structure and composition of participants, the required amount of wood and non-wood raw materials and their corresponding production capacities the required amount of investment, forms of cooperation and the order of organization of joint work, the legal relations between the different businesses.

Creating the structure discussed above, we create conditions that will lead to an increase in the share of innovative developments in the forest sector, the promotion of priority research areas, the integration of science and education, and the involvement of private investors in the forest sector of economy.

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