Main problems of innovative development of the forestry sector of the economy and possible solutions

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Abstract. The ways of innovations in the forestry sector and the main problems arising in this regard are discussed in the present paper. The following reasons restraining innovative activities in forestry may take place, among the others, were pointed out: 1) inadequacy of the legal framework, together with forms, content and procedure, for submitting reports on the implementation of delegated authorities; 2) insufficient interest of the federal and regional governments in the Russian Federation in the field of forestry relations regarding innovations; 3) imperfection of the algorithm for the integration of research and advanced development results into the forestry practice; and 4) weak intersectoral management on providing coordination over activities to find an integrated solution to the problem of increasing the economic efficiency of the forest industry. Furthermore, mechanisms ensuring the formation and implementation of innovation policy in forestry were considered. It was noted that there is an urgent need for developing ways to broadly implement research and development results in leased forest areas provided for all types of using, for instant, cultivation of planting material, hunting, recreational activities, etc. Possible directions in the implementation of these mechanisms were proposed taking into account the successful experience of the Federal Forestry Agency and its subordinate organizations.

1. Introduction
The competitiveness of the country's economy on the whole and individual industries in particular largely depends on the innovation effectiveness. In this regard, the conditions required for performing efficient innovation activities, from creating innovations to their promotion and implementation, are as follows: 1) government support (provision of tax incentives and preferences to enterprises engaged in the innovation activities or using innovative products); 2) creation of a demand for innovative products (increasing the share of innovative products in the government procurement), 3) business interest in financing scientific research; 4) development of technology parks, industrial clusters, technology transfer centers, etc.

Establishing and meeting these conditions helps in ensuring that our forest management policies, planning, guidelines and practices are firmly rooted in science. The research gives us tools to explore natural systems, understand what we see, and apply that knowledge to solving environmental challenges [1].

Sustainable forest management implies controlled forest utilization: during the year, the growth of wood exceeds its felling. For example, Finland has been practicing sustainable forest management for a long time. The term "sustainable forestry" means that the forest management and use are
ecologically, socially, economically and culturally sustainable. Six criteria have been defined for the sustainable forestry, based on which sustainability can be assessed [2].

Activity analysis of Russia’s constituent entities in the field of forestry relations showed that despite the demand for forestry in high-tech developments, the contractual work on the scientific and technical support of decisions made for forest conservation, protection and reforestation is not currently carried out to the required extent.

To activate the innovation activity in forestry, since 2012, the Federal Forestry Agency has begun systematic work on arranging scientific and technical support for activities of the executive authorities of the constituent entities of the Russian Federation on the above-mentioned matters, involving scientific and research organizations.

The practice of regular meetings with the heads of the forestry departments of the federal districts has been introduced, where the issues of innovative development of the forestry sector of the country regions are discussed.

Considering the aforementioned, the aim of the present work was to identify the main obstacles for performing innovative activities in the forestry sector, and propose adequate solutions to overcome them.

2. Ways and obstacles for introducing innovations into the forestry sector
The problem of introducing high-tech developments into the forestry sector of Russia’s economy has a set of features mentioned below.

2.1. Research and advanced development by business structures
Research and advanced development results obtained by scientific organizations under the jurisdiction of the Federal Forestry Agency, as well as by business structures such as legal entities and individual entrepreneurs operating in the forestry sector, are currently implemented. Most often, the implementations are carried out based on business agreements (contracts) in order to optimize production processes and increase production profitability.

Since private companies use scientific developments in forestry areas leased from the State, the introduction of advanced technologies for the use, reforestation, conservation and protection of forests lies in direct accordance with the State interests.

Technology and methods for chemical treatment of forests, used in individual forest nursery-gardens and selection and seed centers supplying planting materials on a commercial basis to forest fund leaseholders, can serve as an example of such a transfer of innovations.

2.2. Research and advanced development by executive authorities of Russia’s constituent entities
Executive authorities of Russia’s constituent entities in the field of forestry relations can act as a customer of the research work. However, they do not directly represent economic entities, but are able to determine the needs in the research and advanced development for forestry based on conducting marketing research of business requirements, as well as consultations with commercial organizations or their associations (for instance, with the Union of Timber Agents of the corresponding region). As a result, the region can form a list of scientific and research developments that are in demand in the forestry sector of the economy.

The deployment of the research and advanced development results will be promoted by the timely introduction of changes into sectorial regulations in terms of the most promising technologies, methods, as well as means of use, conservation, protection and reforestation.

2.3. Inadequacy of the legal framework and reporting forms
The innovative process in forestry is hampered by the inadequacy of the legal framework and the existing forms of industry reporting. The main reporting forms of the constituent entities of the Russian Federation contain qualitative and quantitative indicators of the forest state, but they lack
sections or clauses containing information on the implementation of the research and development results, and an assessment of the effectiveness of forestry after their implementation.

However, if necessary, the constituent entity can and must introduce innovations, for instance, apply the existing high technology to combat forest insect pests. Available funds must be allocated for this.

To purposefully introduce the scientific research results into forestry, they must be stated in advance in the Forestry Plan of the region, and funding should be planned for them. Besides, this document should include an article reflecting potential revenues from the practical implementation of research and development. For entities that receive income from the use of innovative developments, preferences should be provided (for instance, tax breaks). The State Forestry Sector needs to develop specific mechanisms for implementing this approach in the near future.

It is obvious that the results obtained after the implementation of the research works, in some cases, do not fully comply with regulatory documents. In this regard, to implement the obtained results, a procedure should be developed to coordinate a request on the implementation of the research and advanced development results based on the forestry user, issued by the forest management authority of Russia’s specific constituent entity, with the Federal Forestry Agency. Currently, such a procedure is absent.

The forestry user is limited in its activities by the terms of the lease agreement for particular type of activities (in accordance with Article 25 of the Forest Code of the Russian Federation), since it clearly indicates the scope of activities that must be carried out according to regulatory legal documents. In a number of cases, matters of scientific development approbation in forestry practice are solved by transferring forest areas to scientific and educational organizations for scientific and educational purposes (Article 40 of the Forest Code) [3]. But the implementation of the results obtained in this case into wide practice is facing the difficulties mentioned above.

Thus, at present, the activity of introducing the high-tech developments into the forestry practice is at the level of risks. The introduction of the research and advanced development into the forestry activities seems more problematic than the new technical improvement for forestry and forestry management.

2.4. Inadequacy of the algorithm for the implementation of research and development in forestry

Analysis of the situation on introducing the high-tech developments into the forestry sector of the economy has shown that the executive authorities of Russia’s constituent entities authorized in the field of forestry relations are not very interested in concluding agreements with scientific organizations to carry out the research and advanced development activities in order to provide scientific and technical support for the decisions taken regarding conservation, protection, use and forest regeneration. Apparently, this, in particular, can be explained by the fact that there is a certain system error in the algorithm for introducing the research and development into forestry.

The activities of the government bodies of Russia’s constituent entities are determined by the execution of the delegated powers related to regional specificity. Their main functions are not related to economic activity and efficiency. The activities of the constituent entities are strictly regulated by the federal regulatory legal acts. Regions are obliged to work and make decisions within the framework of the existing legal field. In accordance with the current Forestry Code, the functions of the regional authorities include, first and foremost, the following administrative functions: formation of a system of forestry management bodies of the entity, organization of the transfer of forests for use, conservation, protection and reforestation, implementation of the State forest control and supervision (forest service). In the framework of the delegated powers, in a number of cases, the constituent entities monitor the achievement of the reported indicators rather formally.

The research and development activities (modern methods and technologies, improvement of the regulatory framework) are aimed at optimizing the effective industry model of management and thus achieving a significant economic effect. However, the constituent entities do not issue reports regarding these indicators. Besides, the introduction of knowledge-intensive techniques and
technologies can lead to changes in reporting indicators, which is not always desirable for the constituent entity, as mentioned above. Regarding the improvement of the regulatory framework, the functions of the regulatory framework in making management decisions are outside their competence - this is the prerogative of the Ministry of Natural Resources and Environment of the Russian Federation and the Federal Forestry Agency.

In the forestry sector, there is virtually no intersectorial management that would provide for solving a complex task of increasing the economic efficiency of the forestry sector, including its productivity (qualitative and quantitative characteristics of the resource base), ensuring the maximum return for the production capacity in the timber industry. At the federal level, the forestry issues are within the competence of 12 ministries and departments, which may be the cause of inconsistency and lack of action coordination when making the management decisions. In particular, the construction of the same type of wood processing enterprises in the border entity areas creates a threat of shortage of raw materials for them in the future.

The construction of large timber processing centers in the Arkhangelsk and Vologda Regions and in the Republic of Karelia may serve as an example for this. A number of investment projects are often implemented without comprehensive analysis of the forest and resource base and evaluation of its potential.

Thus, in the Republic of Karelia, the “Kalevala” woodworking integrated plant began to work five years ago, and soon it should reach its planned capacity. In the same region, the “Pitkyaranta” pulp and paper plant, which was practically not functioning, was purchased by the “RK-Grand” LLC, which plans to launch the plant in the near future. The same situation happens with the “Kondopoga” LLC - it is planned to launch it at full capacity after a long standstill. Currently, the “Segezhsky” pulp and paper plant is already successfully operating in Karelia. Only the largest consumers of wood raw materials are listed here; they are active or will soon reach the planned capacity. It should be noted that large tracts of forests in the Republic of Karelia have the status of specially protected natural territories, where industrial harvesting of wood raw materials is prohibited or limited.

The reason for the occurrence of such situations is that the cluster approach for the integrated use of industry-specific and capacities related to them (road construction, automotive, social services, etc) does not work.

3. Innovative mechanisms (government regulations and promotion of scientific and technological progress)

Innovative mechanisms represent organizational-economic forms of innovation and promotion of their implementation and searching for innovative solutions as well as a lever to stimulate and control such activities [4].

Depending on the stage of development of the innovation process, the mechanisms can conventionally divided into the following main groups:

- organizational;
- development and implementation;
- financing and incentives;
- technological transfer and intellectual property.

Below, a detailed description of these groups is provided in terms of forestry.

The organizational mechanism is aimed at creating structures that implement innovative processes (or modernize the existing ones). This means the formation of new enterprises or divisions, the goal of which is the development of innovative activity. In the Federal Forestry Agency system, the structures that, to varying degrees, carry out innovative activities include the Innovation Center at the All-Russian Research Institute of Silviculture and Mechanization of Forestry, the Forest Biotechnology Center at the All-Russian Research Institute of Forest Genetics, Breeding and Biotechnology, subordinate scientific and research institutes, whereas the Federal Forestry Agency administration is the State assignment customer. Thus, there is no single structure coordinating the innovation activities in the field of forestry as a whole.
In the forestry sector, after the collapse of the USSR and the transition to new methods of management, the streamlined mechanism for innovations was lost. There was a gap in the vertical of power in terms of the authority delegated to the implementation of the research and advanced development. The new Forest Code of the Russian Federation adopted in 2006, as well as the elimination of forestry enterprises as the main economic unit, the loss of pilot production of scientific and research institutes, played a role here.

The Soviet mechanism for organizing innovative processes in the industry was focused on the implementation of the latest developments and best practices of specialized scientific and educational institutions, most of which had corresponding scientific and problem laboratories [5]. The innovation system corresponded to the classical linear model of “pushing technologies through” developed by J.A. Schumpeter at the beginning of the 20th century. This model involves sequential implementation of four stages: 1) research and development, 2) pilot production, 3) industrial production, and 4) marketing [6]. Technology transfer represented a multi-step process consisting of a large number of participants. Moreover, this process previously included not only the transfer of knowledge (technology, “know-hows”) between the participants, but also further cooperation of the creator, the recipient, and the user of the information.

In the forestry system, this mechanism for organizing innovative activity has shown its effectiveness. At the scientific and research institutes of our country, there were experimental forest areas, where the developed technologies and methods were tested, and then, were introduced into forestry practice through forestry farms.

The international project of the World Wide Fund for Nature entitled “Pskov Model Forest”, which was carried out under the scientific leadership of the Saint Petersburg Forestry Research Institute in the Strugokrasnensky forestry of the Pskov Region, may be an example for this. The results of the implementation of this project became the basis for the Concept of intensive use and regeneration of forests. The specialists working within the project proposed new approaches to biodiversity conservation in industrially exploited forests, and the environmental planning system developed with due consideration for the world experience, and their own research was aimed at establishing the optimal balance between the ecological and economic functions of forest plantations.

Unfortunately, it is necessary to state that under the conditions of the modern structure of management of the forest sector of the economy, there are no organizational mechanisms to ensure effective innovation, since the chain links do not have shared sense of purpose, a coordination center providing state support, both communication and legal, and there is no main link (translator) between science and industry, which was previously represented by pilot production. In the 80s, only Leningrad (now, Saint-Petersburg) Forestry Research Institute had six forest experimental stations, as well as the Luzhsky base station, the Vyritsky Experimental Mechanical Plant, and later, the Siversky Experimental Mechanized Forestry Enterprise. In the period of the 1990-2000s, this experimental base was almost completely lost.

At present, there exists a strict division of the innovative process into science and production (business), its dependence on the government support, inability of scientific organizations to commercialize their products and introduce them into production. Thus, there is no direct interaction between the business area and scientific and research complexes. In other words, the conditions for the implementation of the commercialization process are absent or rather complex.

In the field of forestry, the existing uneven distribution of forestry management functions, among which the legislative and financial functions are maintained at the federal level, whereas the administrative functions are performed at the regional level, has led, as stated above, to a break in the implementation vertical. Along with the lack of pilot production and an unresolved financing mechanism for the implementation of scientific research into practice, the innovation activities in the forest sector are hampered.

The development and implementation mechanisms encompass finding innovative solutions, creating innovations, and subsequently implementing them. In the Federal Forestry Agency system,
the first two aspects are carried out by subordinated research institutes, whereas the latter is currently imperfect and needs to be improved.

The current forest management system in Russia is built upon monitoring the bottom-up implementation of standards – from the forest area level to the federal level. Thus, the process of implementing the standards is monitored, but neither the result, nor the economic efficiency of forest development. This fact is confirmed by the absence of the indicator related to the profitability (increase in profitability) of the forest sector in the reports of all the structures (forestry departments and entities, lessees). It should be noted that the generalized indicators are not available for public control, there are no calculations of the effectiveness of forest management based on significant indicators, there is no clear and understandable economic evaluation of forests. Moreover, in open access, there is no forecast data on the forest sector based on the planned achievements of the relevant economic and silvicultural characteristics [7].

At present, in fact, the Federal Forestry Agency lacks a mechanism for the development of forests as a resource, from an economic point of view, which is related with such an aspect as the division of functions between the Federal Forestry Agency (monitoring the forest state in terms of the achievement of control figures when fulfilling standards in physical terms without evaluating the economic resource component) and the Ministry of Industry and Trade that deals, among the other things, with the economic issues of creating and operating forest enterprises.

One of the steps to change this situation is to introduce direct economic indicators into the relevant reporting documents of the State Forestry Sector and State authorities of Russia’s constituent entities. The financing and incentive mechanisms allow the State and business structures to form a financial base that will make it possible for entrepreneurs to be interested in financing research and development to receive innovations, as well as stimulate government and private partnerships to introduce innovations. The mechanisms of crediting, formation of own capital, formation of expenses for research and advanced development (including the costs of their implementation) and taxation are highlighted.

Nevertheless, the implementation of the innovation process in the field of forestry is facing the imperfection of the mechanism for its financing.

The delimitation of the powers of the State authorities of the Russian Federation, the State authorities of the constituent entities and the local governments in the field of forest relations, and, accordingly, financial flows from the federal budget, has led to the fact that the funds for financing the implementation of high-tech developments from the constituent entities is not enough (the standard form of the Forest Plan of Russia’s constituent entities, Appendix 33 “Estimation of the Amount of Funding for Activities Provided in the Forest Plan from Various Sources for the Period of Validity of the Previous Forest Plan of the Constituent Entity of the Russian Federation”).

An example of a tool to promote innovative products to the market is the “Register of Innovative Products, Technologies and Services Recommended for Use in the Russian Federation”, which got started in 2012 in the framework of the innovation process support platform “StartBase”. This resource was created on behalf of the Government of the Russian Federation with the participation of the Ministry of Economic Development, the Ministry of Industry and Trade, the Federal Environmental, Industrial and Nuclear Supervision Service of Russia, RUSNANO OJSC, the Fund for Infrastructure and Educational Programs, External Economic Bank (Vneshekonombank), the Russian Venture Company, Skolkovo, the Foundation for Assistance to the Development of Small Enterprises in the Scientific and Technical Sphere, and the Moscow Exchange Market for Innovations and Investments [8].

The registers of innovative products are maintained by Russia’s constituent entities to stimulate demands for innovative products manufactured in their territories. An innovative company or an individual entrepreneur registered in the territory of the constituent entity, which has submitted an application for the inclusion of its products and has passed the initial examination, may become a participant in the register. Such registers exist in the St. Petersburg, Moscow, Samara, Novosibirsk, Krasnoyarsk and the other Regions.
One of the instruments of the State stimulation of innovative activity in the field of organizational and regulatory support for small and medium-sized businesses is the creation of conditions for the formation of a system of new technical standards and the simplification of the procedure for introducing new equipment and technologies.

Indirect economic mechanisms include such methods as credit and tax policies (including tax breaks), depreciation regulation, and protection of intellectual property. Credit and tax policies are the most significant indirect methods. The credit policy regulates the amount of financial resources available for financing innovations. Tax incentives are focused mainly on promoting the implementation of scientific and technological progress [9].

One of the components of the innovation support system is venture financing. Venture funds can provide funds at various stages of innovation, but, as a rule, lending is carried out at the initial stages due to the high uncertainty of expected results and, consequently, large risks associated with profit. Investing can be carried out both in the form of financing, and leasing, or other forms (stock operations, programming, etc).

Below, the typology of measures to stimulate small and medium-sized businesses in the implementation of research and development work for the needs of the forestry complex is given (table 1).

| Spheres of application of measures | Types of measures |
|-----------------------------------|------------------|
| Improving the organizational and regulatory adjustment of the activities of the constituent entities of the Russian Federation in the field of forest relations | Creating conditions for the interest of Russia’s constituent entities to increase the economic efficiency of forestry |
| Organizational and regulatory support for small and medium-sized businesses | Creating conditions for the formation of a system of new technical standards, simplifying the procedure for introducing new equipment |
| Financing innovations | Direct financing, lending, leasing, stock operations, planning and programming, as well as state entrepreneurship and government orders |
| Indirect economic methods | Loan and tax policy |

The technology transfer and intellectual property mechanisms are interrelated. Technology transfer is the transfer of developments and technologies created by State research institutes to industrial enterprises, including business structures. As a rule, most high-tech developments are obtained at State scientific and research institutes, but their implementation requires additional financial investments that are comparable and sometimes exceed the costs for developing innovations.

Based on the specifics of developments transferred to the business from the scientific and research institutes, various types of forms can be used: selling licenses and patents, providing large companies with their production base for conducting and testing research institutes, etc. When considering the mechanisms of technological transfer and intellectual property, they can be traced back to the previous paragraph dedicate to the economic mechanisms to stimulate innovations in small and medium-sized businesses.

It should be noted that the research institutes subordinated to the Federal Forestry Agency have the experience of successful cooperation with the business in the implementation of their scientific developments through the conclusion of economic contracts. A vivid example of such interaction can
be the contractual work of the St. Petersburg Forestry Research Institute with the largest representatives of the forestry business in introducing methods of conducting intensive forestry as pilot projects.

In addition, the Federal Forestry Agency organizationally provides assistance to the constituent entities of the Russian Federation in the implementation of scientific results created by the subordinate scientific and research institutes. The transfer of innovations (techniques, technologies of forest exploitation, reforestation and afforestation) to the State authorities of the constituent entities in the field of forest relations is carried out, and the need of constituent entities for new high-tech developments is brought to the attention of the research institutes.

Thus, to transfer the forestry sector of the economy to a fundamentally new path of development - innovative, clear mechanisms for transferring the innovations should be developed and introduced, and a system of instruments of State incentives for scientific, technical and investment activities should be developed, including administrative and indirect methods. To implement this approach, a solution of the triune problem is required:

- the main task is to organize an effective forest management system, including the development of a mechanism for the intersectoral interaction in making decisions on the forestry activities;
- development of mechanisms for the interest of the constituent entities in improving the economic efficiency of forest management;
- attraction of business funds to the development of high technologies and the introduction of the research and development into practice.

4. Conclusions

The development of innovative processes in the Russian forestry encounters low demand. Unfortunately, both private and State-owned companies are not focused on the innovation. Most of them are practically not engaged in the research and advanced development activities, have weak (or do not have at all) relations with the scientific institutes and universities. Studying the innovative development of the Russian Federation in the field of forestry showed that in this area, the issue of introducing innovative developments is multi-factorial and requires a multifaceted investigation.

The main groups that form the innovative mechanisms in the forest industry were considered, and possible ways of implementing these mechanisms in the framework of the development of a set of measures for organizational and regulatory support of the innovation activities in the forest sector, taking into account the experience of Federal Forestry Agency, were proposed.

The analysis of the reasons for insufficient innovation activity in the forestry sector showed that at present, there are virtually no mechanisms for increasing the economic efficiency of the forestry sector. The current situation is explained by delimiting the functions between the Federal Forestry Agency and the Ministry of Industry and Trade. One of the steps to change this situation is the introduction of direct specific economic indicators into the relevant reporting documents of the Federal Forestry Agency and the State authorities of the constituent entities of the Russian Federation. Such delimitation of powers of the state authorities of the Russian Federation, State authorities of the constituent entities and the local governments in the field of forest relations, and, accordingly, the direction of financial flows from the federal budget, has led to the fact that funds to finance activities on the implementation of high-tech developments among the constituent entities of the Russian Federation are not enough.

In the chain of the implementation of innovative mechanisms, the main links should include: restoring the “implementation vertical”, making changes to the forestry sector management system, taking into account the need to improve the economic efficiency, the ecological importance of forests, and developing effective principles of the cluster approach on the integrated use of industry-specific and related capacities. For entities receiving income from the use of innovative developments, preferences should be provided (for instance, tax).

Thus, wider usage of the incentive measures for small and medium-sized businesses in the commencing and implementation of the research and development activities for the needs of the
forestry complex is required (improvement of organizational and regulatory adjustment of the activities of the constituent entities of the Russian Federation; organizational and regulatory support for small and medium businesses; financing innovation; indirect economic methods).

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