Innovations and institutional transformations in the forest industry of Russia

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Abstract. The work presents the concepts of innovations and institutional transformations happening in the forest industry of Russia, which plays a special role in the national economy. Theoretical aspects of innovations development and institutional transformations in the forest industry, with particular stress on institutional and ecological innovations, as well as institutional background and framework for innovative development of the forest industry, are discussed. The components of the Russian forest complex, resulting from abundant Russian forest resources and their great role and importance for the economy, are presented. The socio-economic, ecological, recreational and another importance of the Russian forests is revealed too. There are defining institutions and main institutional problems in the forest industry, which play a crucial role in the forest industry development. To evaluate innovations and institutional transformations in the forest industry, the effectiveness of innovations is suggested for evaluation using the cross-sectional regression model presented, as well as the model for evaluation of the role of institutional innovations in the forest industry. The ongoing solutions for sustainable development of the forest industry and for effective multi-purpose forest management are suggested in accordance with the measures planned by the President and Russian government.

1. Introduction
Today, Russian economy and forest industry, in particular, are undergoing global changes due to sanctions, Covid-19 pandemic, and new focus on innovative development. This is the period of new relations formation based on innovations, both in the economic and socio-cultural sphere, which eventually form stable patterns of behavior. We are talking about institutional factors, which impact on economic development is not disputed today. However, it would be incorrect to discuss only general institutional conditions for development, without revealing their specifics for the forest industry in particular.

The relevance of the study of innovations and institutional aspects of innovative development of the forest industry is substantiated by the urgent need to improve its efficiency. The processes of reforms and markets globalization resulted in the squeezing out of inefficient domestic producers from traditional domestic and world markets. The statistics indicate a decrease in the efficiency of functioning of the forest industry. The share of unprofitable enterprises is growing, the level of tax payments is decreasing, and the depreciation of fixed assets in the industry is increasing. At the same
time, there is a good resource potential, scientific researches and innovative projects that can serve as the basis for innovative development of the industry under appropriate institutional conditions.

The study of innovations and institutional changes in the forest industry is particularly relevant due to the special role of this industry in the national economy. Russia is the world’s leading producer of lumber. The prospects for international cooperation in this area are expanding. The ecological importance of the forest resources related to the aggravation of global warming problems is increasing. The forest resources are decreasing in international consumption. The problems of forest fires, restoration and conservation and other aspects of forest management are very acute and on the agenda in the forest regions of Russia.

2. Methods and Materials

The problem of the complex evaluation of innovations and institutional transformations has long been the focus of attention of scientists, economists and practitioners. The purpose of this paragraph is to identify various tools and methods for evaluating innovations, institutions, and institutional transformations, which are presented in the scientific literature. A large amount of research has been conducted during the recent years and scientific works published by such authors as E Krylov, V Vlasov, I Zhuravkova, A Trifilova, devoted to the problem of evaluating the effectiveness of innovations [1, 2] and by A Libman, K Woodruff about institutional transformations [3, 4].

The effectiveness of innovations is one of the most controversial and problematic aspects of innovation management. It is determined primarily by the results of innovations. For example, the specific ability to save the appropriate amount of labor, time, resources, and money per unit of all the necessary and expected useful effects of products, technical systems, and structures being created.

The result of innovations implementation can be the following types of effects obtained: economic, scientific and technical, resource related, financial, social, and environmental. Each type of effect is characterized by a set of indicators. For example, the economic effect is characterized by profit, increased sales, improved resource use; the social effect is an increase in the number of jobs, increased employee safety, improved working conditions; the environmental effect is a reduction in emissions of harmful substances into the atmosphere and water, environmental improvement, and other.

It should be noted that, currently, in real practice of calculating the effectiveness of innovations, only economic efficiency is mainly determined and taken into account. Other types of effects are difficult to quantify due to the lack of clear guidelines, insufficient and unreliable sources of information, so they are not taken into account often.

The concept of innovation effectiveness in the forest industry is closely related to the economic value of forest resources and their assessment too. The issue of assessing forest resources is one of the most urgent. The determination of economic value of forest ecosystems can be expressed not only in monetary terms, since it is difficult to measure such values as, for example, beautiful view and other recreational characteristics of forest nature: all that, actually, has an extremely high utility for individuals. However, the market economy implies an assessment of the following environmental functions: a) provision of natural resources; b) assimilation of waste and pollution; c) provision of natural goods: recreational, aesthetic, and other.

It is possible to quantify the effectiveness of innovations and institutional transformations by using cross-sectional regression models. To assess the effectiveness of innovation and institutional transformation, we propose the following model:

\[ Ef = f(I_{te}, I_{teo}, I_{IT}, I_{ITo}, I_{nano}, I_{bio}, I_{instform}, I_{instinform}, I_{org}, I_{eco}) \]  

(1)

where, \( Ef \) is criteria for the effectiveness of the development of the forest industry; \( I_{te} \) - technological innovations in logging; \( I_{teo} \) - technological innovations in wood processing; \( I_{IT} \) - IT-innovations; \( I_{ITo} \) - product innovations; \( I_{nano} \) - product nano-innovations; \( I_{bio} \) - product bio-innovations; \( I_{instform} \) - institutional innovations in the formal institutions; \( I_{instinform} \) - institutional innovations in informal institutions; \( I_{org} \) - organizational innovations; \( I_{eco} \) - eco-innovations.

The model for evaluation of the role of institutional innovations in the forest industry can be
presented in the following way:

\[ IMP = f (N_{fed}, N_{reg}, G_{fed}, G_{reg}, I_{fin}, I_{prof}, I_{org}, I_{info}, I_{infint}), \]

where, the \( IMP \) indicator characterizes the progress in the field of industry reforming in the context of globalized markets in general (it is an expert assessment of the volume and quality of new legislation and institutions); \( N_{fed} \)-Federal regulatory framework, i.e. Federal norms and legislature; \( N_{reg} \)-regional regulatory and legislative provision; \( G_{fed} \)-the role of the Federal government; \( G_{reg} \)-the role of Regional government (the market orientation of the government and the effectiveness of management at the regional level is evaluated); \( I_{fin} \)-financial sector (assesses the level of independence, business skills, and financial resource allocation practices, as well as the level of monitoring and payment systems); \( I_{org} \)-organizational structure of the industry and enterprises; \( I_{prof} \)-professional training and educational programs for personnel; \( I_{info} \)-information and analytical support; \( I_{infint} \)-informal institutions (methods of contracting and contractual obligations, norms of ethics and morals, traditions).

3. Results and Discussion

The concept of innovations in the modern world is interpreted by scientists in different ways, depending on the context of the object and subject of research. In our expert opinion, it is very important to note that innovation is not just the final result of implementing various novations, but a process focused on results too, which can be expressed in new products, new production, transport and management systems, the development of new sources of raw materials supply and new sales markets, so that these innovations will provide financial results. The understanding of innovation as a process requires understanding the elements of this process, which can be influenced to stimulate innovation.

Innovation processes combine scientific and technical, production, and marketing activities of innovative enterprises to meet the needs and demand of the market. These processes operate within the framework of the innovation system.

Taking into account the modern features and needs of the market economy, the modern definition of innovation appeared, defined as a result of innovative entrepreneurship to create a new product based on improving the ways and opportunities to transform production cycles in order to make a profit. To study the object of our research, which are innovations in the forest industry, the concept of innovations related to the use of natural resources, which are eco-innovations, is important. Eco-innovation is an abbreviated term standing for "ecological innovation". Its use is aimed to associate the innovation process with issues related to the environment, in relation with the commonality with the concept of innovation [5].

Since the environmental crisis, numerous investments in innovations have been associated with environmental requirements, i.e. the need to develop products or processes, which impact on the environment is minimized or eliminated. Various terminology is used to define innovations aimed at stopping or minimizing human impact on the environment due to their activities: environmental innovation, eco-innovation [6], "clean" innovation [7], "green" innovation [8] and sustainable innovation [9], ecological technology or green technology [10].

The concept of innovation is closely related to the concept of productivity. Throughout the era of industrialization and up to our days, business has paid attention to scalable productivity. From a business perspective, innovations provide an increase in productivity primarily through scaling, producing large volumes to increase margins and reduce costs. Today, it is necessary to maintain the balance between productivity and the ability to learn and implement innovations. This is especially important during difficult economic times or unstable geopolitical relations, which are difficult to adapt to.

The great globalization of businesses has happened during the last few decades, which has led to an exponential level of change. New IT technologies have changed the way we do business and trade forever. Companies that have failed to implement innovative processes in their core businesses have found themselves increasingly moving away from the concept of sustainability and are losing many opportunities to meet the needs of their customers. These companies thrive when the situation is
stable, but a careful balance between innovation and productivity is required. Institutional innovation plays an important role in ensuring productivity.

"Institutional innovations", i.e. changes in institutions (rules, norms, mechanisms for their provision) are the main type of innovations. Institutional innovation, as such, allows organizations to rebuild themselves to scale learning processes and generate better innovations at other levels, including products, services, business processes, and management systems to better adapt to market conditions [11]. It gives an organization the ability to change processes and adapt to market conditions.

The possibility of institutional innovation allows companies to adopt a more innovative worldview that will help them to get adapted to this changing world. With this opportunity even more open, companies focused on scaled productivity can rely on institutional innovations as means to implement other innovations. Since the attribute of institutions is learning, institutional innovations allow organizations to generate the necessary innovations in products, services, business structures, and management hierarchies.

Most researches on innovation suggest that innovation is a panacea for a number of economic and social problems. The literature on innovation assumes that innovations should contribute to economic growth, making the country more competitive, and create new jobs [12]. Innovation policy becomes the main political doctrine of economic policy. There is an increasing importance of innovation as a driving force of competitiveness observed.

At the same time forest industry is an important part of the Russian economy, so its condition has a great influence on the Russian economy in general and on various aspects of life, from the production of raw materials for various industries (such as construction, agriculture, furniture production, etc.), ending the recreational role of forests in people's life.

The total area of the forest stand in Russia exceeds 1.1 billion hectares, which is 1/4 of the world's wood reserves. Wood reserves in Russian forests are estimated to be about 75 billion m3. If we make a generalization, each Russian has ten times more forests than an American, and 35 times more than the average European. More than 20% of logs and lumber products are exported from Russia.

Russian forest resources were a trigger for the creation of many branches of the national economy. The Russian forest complex is represented by the following industries:

1. Forestry (leskhoz) is intended for reproduction of the used resources and utilities (services) of forests, their protection from fires, protection from pests and diseases, various kinds of negative natural and anthropogenic impacts, ensuring the needs of society in forest products, preserving and improving the natural environment, resource and environmental potential, biodiversity for current and future generations.

2. Lumber industry complex (LIC), which includes: 1) Logging industry (LI), which priority tasks include harvesting and export of different types of wood; 2) Sawmill and Wood processing industry (SWPI), directly engaged in the production of lumber, fiberboard, hardboard, MDF, chipboard, OSB, plywood and other products; 3) Pulp and paper industry (PPI), production primarily of such products and materials as pulp, paper, newspaper, cardboard, paper bags, etc. PPI is a key and strategically important industry; 4) Chemical industry based on chemical processing of wood. It includes: dry distillation of wood, carbonation and various types of rosin-turpentine production.

The economic importance of forests in meeting the demand for wood is well known. Russian Federation exports the following types of lumber products: roundwood, lumber, fuel wood, sleepers, chipboard and fiberboard, wood, paper and cardboard containers, pulp, paper, cardboard, wallpaper, paper hygiene products, paper and cardboard labels, etc.

However, along with the important role of forests in the socio-economic development of society, the ecological significance of forests is of great relevance. The ecological resource of forests implies regulatory functions (water and heat regimes of the earth's surface, water protection and water regulation functions); formation and preservation of soil cover; regulation and conservation of biodiversity; climate and weather changes; global carbon cycle; sanitary and hygienic, balneological and recreational roles.
The ecological value of forests is not limited to the territory of the State where they mature. Russian forests have a planetary significance and play an important role in global processes of environmental regulation and prevention of negative climate changes. Forests sequester a large share of the world's carbon dioxide emissions.

Another global role of the forest is photocatalytic transformation, carbon dioxide sequestration, and oxygen release. In addition, the forests growing in the catchment area of the lakes and along the banks of rivers play the water protection role, provide regulation and filtration of waste waters and a constant water level. Forests that grow in mountainous areas protect weak soils on the slopes from flushing, weathering, snow avalanches and mudslides too.

It is worth noting the sanitary and hygienic significance and protective function of forests from dust, soot, and noise. Forest plantations protect crops and gardens from cold winds and improve the climate. Forests largely neutralize the effects of harmful emissions from industrial enterprises. It is known that staying in the forest has a beneficial effect on human health and creativity. Given the diverse significance of forests, they should be considered not only natural, but also cultural heritage of the country.

One of the major institutional problems in Russia, the imperfect Federal legislation is the obstacle to effective use of forests. The entities of the Russian Federation had received powers in the field of forest management, as the new forest legislation was introduced. In particular, they are entrusted with forestry planning, providing forest lots within the borders of the forest fund lands, organizing the protection, forests conservation and reproduction of, and implementation of the State forest control and supervision.

However, the issues of solving the problems of lack of raw materials, reduced investment, technical backwardness, shortage of highly qualified personnel, poor use of technologies for deep processing of wood and others are still present. The effective development of the industry is possible only on the innovative basis, which requires, first of all, the restructuring of institutional relations.

The institutional problems presented show that inefficient use of forests is primarily due to ineffective institutional relations in the industry. First of all, this relates to inefficient ownership rights to forest resources.

In fact, until the ratification of the Forest code, there was no institution of ownership for forest resources in Russia. The first legal document that became the basis of the formal institution of ownership of forest resources was the Forest code of the Russian Federation, introduced back in 1997. In the Forest code the right of possession was reserved for Russian Federation for the first time, i.e. actually the Federal form of forest ownership was established and the right of control was transferred to the constituent entities of the Russian Federation, the right of use was granted to forest enterprises and other commercial structures as the rent. It is the Forest code that had become a tool for specifying ownership rights to forest resources [13].

Thus, the scheme of specification of property rights in the Forest code was outlined and the entities for the laws were defined. However, entitlements were not transparently defined among entities. The right of management was divided among the Russian Federation and its entities. The interests of the parties involved clashed and came into conflict. Many business people wanted to get access to forest resources, and after getting forest tickets, they wanted to make the maximum profit without taking into account public interests and the environmental issues.

The question of whether it was the right decision to refuse the forests privatization and solve all production issues exclusively on terms on the rent remains open too. In any case, attempts to form a model of private forest ownership in Russian society proved to be inadequate to the models in developed countries. The attempt to privatize Russian forests became an example of a failed economic experiment in Russia with negative social and environmental consequences. The readiness of the Russian society for private ownership of forests has not been defined, nor have the terms and conditions for social responsibility of forest businesses been defined.

The analysis of the transformation processes happening in the country confirms that with maintaining of the State ownership for forest resources, there may be a conflict related to the "right to
manage" forest resources, which is caused by the redistribution of this right in favor of the Russian Federation or regions as entities of the Russian Federation. Relations among entities were formed empirically during 2005-2013, when there was a significant tendency to centralize Federal power in the forest sector. Regions have lost the ability to participate independently in joint management in relation to the management of the forest fund as the State property. This initiative provoked a strong negative reaction locally. The powers that belonged to the entities of the Russian Federation in accordance with the Forest code were returned and expanded by Federal law No. 199 dated December 31, 2005. It included almost all the functions of State and economic management of the forest fund. Subsequently, the authorities in the region tried to consolidate and expand their rights, sought to tighten the conditions for forest use, and proposed to cancel auctions and replace them with competitions. The forest business itself opposed such changes, considering them as an infringement on the freedom of economic relations [14].

The question of which entities will conduct forest business or implement its individual activities is still open and depends on the forms of forest relations adopted at each stage, taking into account specific conditions. However, knowing that the Russian forests are federally owned, the Federal State authority is responsible for conducting forest activities, taking into account the legally accepted requirements too. So, it delegates the functions of State forest management to the authorized bodies in all executive power blocks.

Today, we can note that the State's influence on the development of the Forest industry is generally not effective enough. The State can and should intervene in the distribution of income through the taxation system, regulation of prices and wages, and can influence the balance of supply and demand through the distribution of income, creating conditions for the reproduction and renewal of forest goods necessary for society. The problems of the forest industry are related not only to the operation of market mechanisms, but also to measures of the State regulation that ensure the balance between economic development and protection of the environment.

4. Conclusion
The organization of the forest industry based on the principles of sustainable and multi-purpose forest management can be effective in the form of multi-level forest management. In this case, forest resources and products are divided into two groups: market resources that have a market value and public goods that are indivisible among individual consumers.

Thus, innovative development of the forest industry, which can increase the efficiency and productivity, are not possible until institutional changes are introduced. The primary condition for the forest industry transformation on the innovative basis is the formation of the forest industry innovative system at the national level. The system which will be based on institutional innovations [12], accumulated efforts of the State, regional, and municipal management bodies, of research and development organizations, and of entrepreneurs in the forest field, which is required to accelerate the implementation of science and technologies achievements to improve the quality of life of the population and provide sustainable economic development [15].

The number of logging companies in Russia has been decreasing for several years. At the same time, the growth of raw wood production as a whole is increasing. Since the beginning of 2020, thousands of illegal logging operations have been detected in Russia. Despite the fact that the average volume of one such felling is only 6.9 m³, the total damage is measured in billions of rubles. Though, a significant reduction in illegal logging is noted too. According to representatives of the authorities, this result has been achieved via monitoring and effective interagency cooperation with law enforcement agencies to identify violations. According to the results of forest land patrol raids and measures to check wood transporting vehicles, the protocols on administrative offenses are written out, and signs of a crime under article 260 of the criminal code of the Russian Federation, which is illegal logging of forest stands, are determined on sites. The materials are sent to law enforcement agencies. Criminal cases have been initiated.

On October 14, 2020, the government of the Russian Federation approved the action plan for
decriminalization and development of the forest industry. The solutions of which are aimed to eliminate important for the forest industry problems. The Ministry of economic development was instructed to prepare a regulatory act on the introduction of a complete ban on the export of raw materials from the country.

According to the planned measures, the Unified State automated information system for accounting of the wood and transactions with it (LesEGAIS) should become a part of or be completely transformed into the Federal State information system for the forest complex (FGIS LC). All the work for the development of FGIS LC is planned to be completed no earlier than at the end of 2022.

An overview of the largest forest enterprises in Russia allows us to conclude that the majority of producers are presented by companies with a significant share of foreign capital. This indicates the strong dependence on foreign partners that might result in a fundamental threat to sustainable development of forest enterprises in Russia in the future, as experts believe, and in the deterioration of the forest ecology. As the certain measures to correct the current situation, some experts suggest to implement urgent concentration of the main part of the capital of the Forest industry enterprises located in the territory of Russia with residents of the country [16]. Since excessive concentration of management functions by foreign persons can cause environmental disasters and a serious obstacle to the development of the industry and to the ensuring of economic security of the territory.

For many years, the forest industry products have been one of the main export components of Russia. The value of Russian forest exports from wood and pulp and paper products is only growing.

Actually, timber harvesting remains the main method of using forest resources in most regions of Russia. According to experts, this is the priority direction, since timber production is one of the leading sectors of the economy of many Russian regions. A large share of the wood harvested in Russia is exported to China and to European countries. All related industries: logging, wood processing, pulp and paper, and wood chemical, are united by the consistent use of wood raw materials and technological chains of relations.

To ensure the sustainable development of the forest industry, it has been proposed to create the LIC clusters. The participation in which allows companies to find new investment niches and partners in industrial cooperation, as well as increases investments in the lumber industry and the volume of production of finished products. On the one hand, this is an increase in the tax base of budgets, and on the other hand, it is the effective use of forest resources.

As the part of the cluster initiative, investment projects have been launched to modernize and expand production. The use of the recreational potential of forests is proposed as new directions for the development of the forestry in forest regions. National parks and specially protected natural areas (SPNAs) are recognized as the most promising for all types of recreation. For this purpose, it is proposed to lease forest lots located in parks and forest areas. Here we can rely on the development of ecological tourism too.

There are other environmentally sound options too for using forests for agricultural use. For example, for grazing and setting up apiaries, hunting farms, research and educational activities.

Regional leaders and the President have repeatedly discussed the issue of creating protective measures for the export of raw wood from the region. In September 2020, Vladimir Putin instructed the government to ban the export of raw or rough wood from Russia starting with January 1, 2022. The President also stated the need to reform the forest management system as a basis for accounting, planning, inventory and assessment of forests, clearly delineating the powers of Federal, regional and local authorities, and proposed to introduce a legal institution for administrative survey of forest areas, where advanced, modern remote sensing methods and unmanned aerial vehicles should be widely used. The President proposed to introduce the post of the chief Federal State forest inspector in the regions of Russia too [17].

In September 2018, the Russian government approved the LIC development strategy till year 2030, developed to increase the competitiveness of the Russian forest industry. According to the results, the total export of the LIC products reached an absolute historical maximum and amounted to 13.4 billion US dollars. In 2019, the positive dynamics in the industry continued, and the forest industry follows
the goals set by the Strategy. So, it amounts to about $20 billion per year, or 11% of industrial roundwood, 21% of the sawnwood, 7% of wood-based panels, 3% of pulp, and 3% of paper and paperboard in the total volume of global forest products exports [18].

Despite the existing achievements, the industry has a significant unrealized development potential both in terms of resource provision and in terms of increasing the depth of wood processing. Much support is provided by the State (support of priority investment projects, special investment contracts, trade duties to protect domestic producers, stimulation of certain segments of the industry development, and so on). Nevertheless, investments in the Russian forest industry are mostly private, and it is necessary to ensure its investment attractiveness for the industry to develop ahead of schedule.

In accordance with the Strategy for the development of the Russian Federation forest industry till year 2030, which was developed and ratified in 2017 and 2018. Two priority tasks were identified: 1. Protection and conservation of Russian forest resources (including fire protection); 2. Establishing the reforestation system.

However, many experts believe that the Strategy for the development of the forest industry, approved back in September 2018, largely does not correspond to existing realities. The contribution of the forest industry to the country’s GDP is 10 times lower than, for example, in the United States, despite the fact that the amount of forest resources in Russian Federation is twice as large as in the United States.

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