Common problems of the forest industry and institutional background for its innovative development in Baikal region

D Dayneko\textsuperscript{1,2*}, A Dayneko\textsuperscript{2} and V Dayneko\textsuperscript{2}

\textsuperscript{1}Irkutsk Scientific Centre SB RAS, Lermontov Street, 134-117 Irkutsk 664033, Russian Federation
\textsuperscript{2}Irkutsk National Research Technical University, 83 Lermontov Street, Irkutsk 664074, Russian Federation

*Corresponding email: ddayneko@oresp.irk.ru

Abstract. The work presents the systematization of the main problems in the Forest industry and institutional background for its development in Baikal region. These problems include the following: production and technological, natural and environmental, institutional and organizational, and problems of the forest protection. The innovative development issues in the Forest industry of has been discussed. The implementation of the Forest innovation system is suggested for sustainable Forest industry management and based on expert opinions to be derived via a special questionnaire distributed

1. Introduction
The haphazard actions in forest management have led to the destruction of most of the forests in Western Europe and Central Russian regions. Despite all the measures taken, the number of illegal timber harvesting in the Baikal region, and in Irkutsk province in particular, is not decreasing. As a result of excessive use of natural resources, there is a threat of destruction of the existing ecosystem, deterioration of the climate, of the water balance, and of the strategic potential of the country in terms of economics. The forest conservation is a necessary condition to contain the ecological crisis on Earth. Forest, which is as an exhaustible but renewable resource, is under the close observation of ecologists and economists. In the era of globalization of commodity and raw materials markets, when most of the forests of the United States and Europe are undergoing conservation and preservation stage, the sustainable management of the environment is very relevant for Russia too and, especially for the Baikal region, for Irkutsk province, which is number one among the country's logging regions in terms of forest harvesting.

2. Methods and Materials
The issue of the development of the innovation system in the Forest industry based on institutional changes has been presented already by authors with the case study of Irkutsk province. To analyze the concept and composition of the innovative system of the Forest industry further and to be implemented in Baikal region, we have to study the advanced up-to-date methods and technologies, including foreign experience in the field of forest management in developed countries. Hence, the profound mutual with the Forest industry experts research is required. Therefore, a profound sociological survey has been conducted and a special questionnaire was developed for experts who’s work is related to the management of the Forest industry [1].
3. Results and Discussion
Now let's highlight the problems of the Forest industry, studied with the Baikal region case, which are typical for the industry as a whole. They can be divided into production and technological, natural and environmental, institutional and organizational, and problems of the forest protection:

1) Production and technological problems. These include:

1.1) imperfection of harvesting and reforestation technologies, low efficiency of the forest reproduction system, due to a significant excess of logging areas over reforestation. In some areas, forests lose their climate and water-regulating significance. There is a decrease in the share of coniferous forests and an increase in the share of soft-leaved plantations due to improper exploitation of forests. Poor reforestation is explained by the termination of self-seeding, destruction of undergrowth, deterioration of soil during forest harvesting and transportation of logs;

1.2) outdated processing technologies and inefficient use of wood. The rational use of wood while harvesting is to fully utilize the resource. However, in practice, losses amount to at least 30% of the total wood losses. They occur due to incomplete logging, under-logging, and trees abandoned on sites. The harvesting technologies, which are applied, result in the destruction of the undergrowth. In addition, losses of bark (10% of the volume of wood), twigs (12%), stumps (8%) are happening during harvesting. The use of outdated wood processing technologies leads to the loss of wood and, as a result, to the high cost of the lumber production;

1.3) the unavailability of huge forest areas for intensive development of the Forest industry due to the lack or absence of roads, the construction of which for the maintenance and operation of forests under existing conditions is highly costly for existing and potential forest users;

1.4) lack of capacity for deep processing of wood: in order to ensure more rational use of natural resources and generate greater export revenues, it is necessary to develop capacities for deeper processing of raw materials. For many decades, our country has been exporting mainly logs (more than 15 million m³ annually), which accounts for about 20% of the commercial timber harvest. Cellulose accounts for the second place. Lumber, paper, cardboard and plywood and other processed wood products are sold in smaller volumes;

1.5) low technical level of production and non-compliance with international standards. The most urgent task of the forest management is to create a national system of forest certification necessary for effective supply and management of forests. The border for non-certified forest is almost closed today. Russian timber producers have limited access to world markets.

1.6) high degree of depreciation of the main industrial and production assets. The level of the main technological equipment depreciation in Baikal region in the Forest industry reaches 80%. Thus, in the most capital-intensive Pulp and paper industry, most of the equipment is physically and morally outdated. Productivity at the best enterprises is 30-40% of the Scandinavian level, and at others about 10%. The problem is further complicated by the lack of domestic made competitive equipment, insufficient private investment, including from foreign sources.

2) Natural and ecological. These include:

2.1) diseases and harmful insects influence on forests, which are assumed to be fought using physical, mechanical, chemical and biological methods of control, and with other forest management measures;

2.2) forest fires is another, one of the most serious problems for Russian forests [2]. The main reason for which is the careless handling of fire;

2.3) environmental aspects of forest management by large timber companies in Russia. Today, we have established environmental requirements for forest exploitation and priority measures for forestry, and forests, which need restoration, have been identified, including those that have to be treated at the expense of the State via subsidies. Forest users are obliged to preserve the flora and fauna. The contradiction between the interests of economic development at the expense of forest raw materials and the ecology based on forest conservation is one of the main problems of environmental protection. For many years, administrative-legal influence, restrictions, administrative and criminal penalties are the tools to solve this problem. The main lever of administrative and legal influence and of economic
mechanism here are institutions that have been operating for a long time and those that are newly created in the Forest industry [2].

2.4) depletion of lumber reserves in areas where existing forest enterprises are located.

3) Institutional and organizational, i.e. those that affect the efficiency of resource use:

The existing institutional structure of the Forest industry for many years did not allow the forest business to function effectively and contribute to the sustainable socio-economic development of territories. The forest management system has undergone significant transformations over the years of reforms. This was due to issues of ownership, organizational restructuring, and changes in forest legislation. The institutional structure and institutional changes in the Forest complex are closely linked to forest policies that regulate economic, environmental and social consequences of forest management, including ownership and management issues. To encourage effective entrepreneurship in the Forest sector, a system of national and regional forest policy measures is required, which requires a thorough institutional analysis.

The defining institutions in the use of forest resources are: ownership institution; investment institutions (banks, insurance companies, funds, etc.); the legal framework for forest management (laws, regulations, decrees, projects, standards and regulations); the taxation system, including rules and regulations that determine how the State receives part of the forest income; the organizational structure of the industry as a whole and the organizational structure of individual enterprises; information support for the industry and organizations; institutions that ensure the development, implementation and enforcement of regulatory documents; institutions that provide professional training and education of personnel; informal institutions that support manufacturing enterprises.

The main institutional problems of the Russian Forest sector are related to the legitimacy of the forest resource consumption. Experts note significant contradictions in the forest legislation and conflicts with other laws of the Russian Federation, as well as non-compliance with environmental standards, delays in their adoption and implementation. This leaves the issue of rights to forest management allocation open. They note the complexity of tax policy that does not promote the development of economic activities or new investments, the problem of returning forest payments back to the Forest sector, the emergence of corruption schemes that become a serious obstacle to the development of business activity in the forest sector, and unavailability or lack of financial information and statistics.

The imperfect Federal legislation is another obstacle to effective use and management of forests. Once the new forest legislation was introduced, the Russian Federation entities had received powers in the field of forest management, in particular, they are entrusted with forestry planning, providing forest lots within the forest fund lands, organizing the conservation, protection and reproduction of forests, and implementing State forest control and supervision. However, the solution of such problems, as the lack of raw materials, reduced investment, technical backwardness, lack of highly qualified personnel, weak implementation of technologies for deep processing of wood, and others, remains open too. The effective development of the industry is possible only based on the innovative approach, which, first of all, requires restructuring of institutional relations.

This inefficient use of forests is primarily due to inefficient institutional relations in the industry. According to the theory of property rights, effective property rights are such, in which the owner makes the best use of his object owned of all the possible ways of use [3]. The most effective use of property rights is provided by the properties of property rights themselves, as well as by external incentives.

In fact, the formal institution of ownership for the forest resources in Russia was absent until year 1997. 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, which was ratified in 1997. The Forest code defined the scheme of property rights specification and defined the main subjects of law. The right of ownership is assigned to the Russian Federation, i.e. in fact, the State form of ownership for the forest is established, and management rights are delegated to the entities of the Russian Federation, the right of use is granted via leases to forest enterprises, and other commercial structures. It is the Forest code
that has become a real tool to specify ownership rights for the forest resources. According to the R. Coase theorem the right of ownership is fully specified, when each right has its own exclusive owner. This right is currently legally established to reduce the risk of alienation of property.

Thus, the scheme of specification of property rights was outlined in the Forest Code and subjects of law were defined. However, entitlements were not transparently defined for the entities. The management right was divided among the Russian Federation and the entities of the Russian Federation. The interests of the parties involved clashed and came into conflict. Many business people sought to get access to forest resources, and after receiving forest tickets, they gained the maximum profits without taking into account public interests and the environment.

The question of whether it was the right decision to refuse forests privatization and solve all production issues exclusively on terms of leases remains unresolved yet. In any case, attempts to form a model of private forest ownership in Russian society turned out to be inadequate if compared with models of developed countries. This attempt to privatize forests became an example of economic experiment in Russia that failed and with negative social and environmental consequences. So, the readiness of Russian society for introduction of private ownership for the forests has not been identified yet nor the mechanism for social responsibility of forest businesses been defined too.

The analysis of the transformation processes happening in the country confirms that while maintaining state ownership of forest resources, there may be a conflict related to the "right to manage" forest resources due to the redistribution of this right in favor of the Russian Federation or the region, as an entity of the Russian Federation. The relations among entities had formed empirically during 2005-2013, when there actually was a significant tendency to centralize Federal power in forest relations. The Russian Federation entities have finally lost the opportunity to participate in mutual work related to the management of the forest fund as the State property. This initiative provoked a strong negative reaction locally. The Federal law # 199, dated December 31, 2005, restored and expanded the powers that belonged to the Russian Federation entities and in accordance with the Forest code. 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. They sought to tighten the conditions for forest use, and proposed to cancel auctions and replace them with contests. The forest business opposed such changes, considering them as an infringement for the freedom of economic relations [4].

The question, which entities will run forestry or implement individual activities, remains unresolved and depends on forms of forest relations adopted at each stage, taking into account specific conditions. However, these are the Federal State authorities, who are responsible for conducting forest activities, and taking into account the legally accepted requirements. They delegate the functions of State forest management to the authorized bodies in all the executive power blocks.

Today, we can also note that the State's influence on the development of the Forest sector of the economy is generally not effective enough. The State can and should intervene in the distribution of income through the taxation system, price regulation, and labor remuneration. It can only 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 work of market mechanisms, but also to measures of the State regulation that ensure the balance between economic development and environmental protection.

4) Forest protection. A number of drawbacks should be noted in this area:

The first official environmental document concerning forests protection appeared on April 4th, 1888. It happened when the tsarist government issued the Forest Protection law, and under the influence of the public opinion, that actually regulated forest management in forests that played already primarily environmental functions, and limited some of the rights of forest owners.

The modern Federal law on Specially Protected Natural Territories, signed by the President of the Russian Federation [5], distinguishes the following categories of specially protected natural territories: State nature reserves; National parks; Natural parks; State nature reserves; Natural monuments; Dendrological parks and Botanical gardens; Health-improving areas and resorts. Besides that, the
Government of the Russian Federation, executive authorities of constituent entities of the Russian Federation, and local self-government bodies may establish other categories of specially protected natural territories (for example, green zones, city forests and parks, protected coastlines, protected landscapes, biological stations, micro-reserves, and others.

Today, forest management, as well as Forest legislation itself, is still complex and confusing in Russia. This problem is faced by the Forest industry workers themselves too, for example, when deciding on which forest regulations to apply. As a matter of fact, certain statements in the forest legislation and regulations conflict with the land, water and environmental legislation. According to the industry employees themselves, the draft of the new Forest code of the Russian Federation has not avoided these shortcomings too. The transition from a centrally planned to the market economy without a well-developed program has aggravated the existing structure and location of the Forest industry, forestry, hence causing the collapse in production in the late 1990s and early 2000s, unprecedented for the whole history of Russia.

The problem of the nature degradation is related to the anthropogenic impact on the forests. First, these are direct impacts (deforestation, forest fires, construction of facilities, tourism, atmospheric emissions). Secondly, these are indirect, when the living conditions change as a result of air and water pollution, the use of mineral fertilizers and pesticides, which leads to changes in the plant composition. Besides that, a new emerging factor in forest and vegetation degradation is radioactive contamination.

Currently, the complexity of forest management and reforestation are due to specific factors. First of all, this is the long period of forest cultivation. The age of large-sized valuable trees is at least 70 years. It is necessary to follow the proportionality of forest use to the scale and timing of its reproduction. The compliance with the principle of "continuous, sustainable forest management" (CSFM) is enshrined in the Forest code [6] and is the main postulate of the sustainable forest management implementation [7].

Another specific factor is the multi-purpose of the forests. Russian forests and the lands which they occupy perform various functions, ensuring the reproduction of resources, commodity and non-commodity products. While using forests as a source of wood, it is necessary to take into account its other benefits noted earlier: protective, recreational, and other. The multi-purpose forest management approach is the basis for sustainable biodiversity conservation, and is consistent with international agreements on forests.

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 [8], 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 of Baikal region [1].

References
[1] Dayneko A, Dayneko D, Peshkov V and Matveeva M 2018 Development of the regional innovation system in the Forest industry of Irkutsk province based on institutional changes, IOP Conf. Ser.: Earth Environ. Sci. 316 012045 DOI: 10.1088/1755-1315/316/1/012045
[2] All about Russian forests [in Russian - Vse o lesah Rosyi] available at:
http://www.forest.ru/rus/problems/news; http://www.forest.ru/rus/news/fires)

[3] Kalyuzhnova N, Dolgov Y and Osipov M 2012 Institutional Economics: General course. Textbook manual [in Russian – Institucionalnaya economica. Uchebnik] (Irkutsk: Izd-vo IGU) pp 45-48

[4] Biyanova N and Barinov V 2004 Nature management: 70 % of the territory of Russia will be privatized [in Russian – Prirodopolzovanie: 70% territory Rossyi budet privatizirovano] (Electronic materials: http://iq.hse.ru/news/177745347.html)

[5] FZ RF About specially protected natural territories: No. 33 March 14, 1995. Collection of legislation of the Russian Federation [in Russian – Ob osobo ohranaymyh prirodnih territoriyah: Federalnyi zakon № 33FZ]

[6] FZ RF Forest Code of the Russian Federation as of March 15, 2012 [in Russian – Lesnoi kodeks Rossiyskoi Federacii]

[7] The official website of the United Nations. Rio Declaration on environment and development 2019 (Electronic materials: http://www.un.org/ru/documents/decl_conv/declarations/riodecl.shtml.)

[8] Dayneko D V and Gustafson E G 2014 Institutional Innovations in the Forest Industry in Russia: A Case Study Of Irkutsk Province Miscellanea Geographica – Regional Studies on Development, (Electronic materials) (Warsaw, Poland) vol 18 No 4