Forestry digital platform of Russia

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Abstract. The article discusses the introduction of digital technologies in the forestry industry of Russia. Forestry of the Russian Federation is significantly inferior to the world forest powers in the field of digitalization of forestry, which makes it necessary to accelerate the transition to digital technologies most demanded at the level of state management of forests and in forest business. Similar to the countries of Europe, a State policy should be developed in the field of forest informatization, as well as the creation of a digital forest platform. The results of the study of the system of state management of forests at the level of regions of Russia for the application of digital technologies are presented. The need to create a digital forestry platform as an important component of the modern digital economy is justified. It has been established that the creation of a single digital forest platform will contribute to the improvement of forest management efficiency, increased openness of information on forest resources of regional systems, simplification of the communication process. The objectives and structure of the digital platform, which includes sub-platforms corresponding to six important forestry subsystems and application modules for various practical tasks, are defined. A sequence of stages of digital platform development is proposed.

1. Introduction

Forestry in Russia is a subsystem of the national economy of important economic, ecological and social importance. The modern information and communication technologies open up completely new opportunities for organization of economic life, contribute to increase of labor productivity, acceleration of information exchange processes.

Today, information and communication technologies determine the level of development of industries and industries, regions and countries, acting as a driver of the economy in the USA, Great Britain, Germany, Japan, etc. [1]. The importance of moving to digital technologies, in developed countries referred to as “Industry 4.0”, is highlighted in the papers of researchers who consider different models of digital transformation of business processes, factors determining its success and problems [2, 3]. The digital technologies in the economies of countries are no longer a separate industry, it is a new basis for the development of the system of public administration, economy, business, social sphere, the whole society, having significant potential and simultaneously carrying new risks [4].
A number of European countries have developed stable legislation and a large number of developments related to the introduction of information and communication technologies, and there are Strategies for the Development of Informatization of Industries [5]. The application of digital platforms in various sectors of the economy and in the spheres of public administration is related to the global trend of the digital economy [6-8]. Digital technologies have significant potential in forestry. Sustainable Internet in European countries and advanced technology provided a breakthrough in the area of forest digitalization.

Digitalization is an important asset and transforms the forest industry by providing unprecedented solutions that make forests more intelligent. The digitalisation is transforming the forest industry, providing unprecedented solutions that make forests more intelligent.

The most developed forest information and communication technology system of the Nordic countries [9]. These countries have created an almost optimal economic environment, a legal regime in which new digital technologies and innovations arise and are organically implemented. MetsäGroup, a Finnish timber company, has developed innovative digital services for forest owners and is an industry leader.

The need to digitalize processes from the business side is assessed as high [10]. However, only digitized information is not sufficient as it needs to be converted into a form that will serve forest users, timber buyers, logging machine operators or for forest planning purposes. For this purpose, the forest industry is constantly improving systems that make the most of data and make better decisions [11].

Russia has launched a process of digitalization of the economy and its industries [12]. In the digitalization of the public sector, Russia has made some progress in developing a reliable national broadband infrastructure, creating electronic governments [13, 14]. More than 83% of Russian organizations already use broadband Internet, 63% - have learned technologies of electronic data interchange [15]. The digital platforms belong to information technology systems and find great application in forest management system [16]. The forest sector of Russia, like no other complex, already feels the need for digitalization [17]. At present, the use of ICT in the forest sector is quite a broad area, which is not limited to the area of forest governance [18, 19].

The introduction of digital technologies into forest management practices is an objective process that has no alternative. The digital technologies make it possible to increase the efficiency of environmental and economic functions of forestry several times due to the possibility to process large amounts of information quickly and without errors, to obtain analytical statistics on forest fund, to process and design forest management measures in large territories as soon as possible [20].

The different approaches to digitalization in forestry are used in the regions of Russia, but it does not solve the problems of effective forest management on the basis of a single automated information system, which allows to receive, process, store and use information on the state and use of forests.

The aim of the study was to assess the possibility of digitalizing the processes of state management of forests from the point of view of improving the quality of state activity for its external beneficiaries – business and population.

2. Methodology
During the study, a comprehensive approach to the study of the application of information and communication technologies in the forest complex of Russia was implemented. Algorithms of calculation, criteria and indicators that allow analyzing the use of information and communication technologies in forestry were investigated [21].

The study was conducted by the method of systematic analysis of data obtained from the review of information available in the media and scientific literature, personal meetings and interviews of representatives of organizations of state forest management and forest business, consultations with IT specialists.

As part of the expert survey, the respondents were representatives of the state forest management bodies of the Russian Federation. The survey questionnaires were sent to the respondents by e-mail. A total of 130 respondents from 35 regions of Russia took part in the study. The survey questionnaire
contained 29 questions. The questionnaires were presented in a matrix form, in which, in one block, logically related questions were formulated with a set of answer options: yes - no - I find it difficult to answer. The study was carried out in stages and included the development of a survey program, questionnaires, drawing up instructions for the respondent, the questioning process itself, and processing the information received.

When processing the questionnaires, statistical methods were used. The consistency of expert opinion was assessed by the value of the concordance coefficient by the equation (1):

$$W = \frac{12S}{n^2(m^3 - m)}$$  \hspace{1cm} (1)

where S is the sum of the squares of the deviations of all rank estimates of each object of examination from the mean, n – number of experts, and m – number of objects of expertise.

Also, an analysis of known methods, models and technical solutions in the field of information systems management was carried out, which made it possible to substantiate the continuity of their application when creating a digital forestry platform.

3. Results and discussion

As the world becomes more and more digital, digital platforms the uniting digital tools and applications which government institutions and business use for communication, management, transfer of knowledge, creation of networks and cooperation. Depending on the functions performed, the following types of digital platforms are identified: instrumental (designed to create software solutions), infrastructure (designed to simplify stakeholder interaction processes) and applied (implementing a specific business model).

A study was carried out on the implementation of digital technologies in the forestry sector, while studying both domestic and foreign experience. The official data of statistical observation (information from Rosstat for the period 2018-2019, data from the Federal Forestry Agency), the results of studies of the use of ICT in the sectors of the Russian economy carried out by the Higher School of Economics were used as an information base for the study. From a forest management perspective, digitalization generates several potential benefits, including forest monitoring, preventive management, forest business support, and effective planning. These benefits are provided by the following digital features: openness and accuracy; automation; Planning and forecasting; Data storage and analysis and efficient interaction. In this regard, the digital infrastructure platform is a suitable form for solving the problems of digital transformation of state forest management in Russia (table 1).

| Table 1. Characteristics of the types of Russian digital platforms. |
|---------------------------------------------------------------|
| **Infrastructure elements** | **Infrastructure digital platform** |
| Main platform-based activity | Provide IT services and information for decision-making |
| Results of activities on the platform | IT service and result of its work - information necessary for decision-making in the field of use, protection, protection and reproduction of the woods |
| Groups of participants | Information providers, platform operator, platform developer, IT service developers, IT service consumers |
| Information processing level | Generation of information for decision-making at the level of region, enterprise, industry |
| Principal beneficiary and its requirements | Federal Forestry Agency, stakeholders, business, public organizations, citizens |

The digital infrastructure platform should technically, programmatically and institutionally ensure interaction between participants - the state, forest business and the population. In technological terms, such a digital platform is an information system for storing, exchanging and managing data in a
structured form, as well as for calling business functions with information systems of platform participants connected to it through technological interfaces.

The rules and procedures for the exchange of information using the platform are determined by the regulator based on the industry data model and the description of business processes. The technological elements of the digital infrastructure platform include: information sources, information delivery means, information storage means, tool digital platform, IT services, tools for development and integration of IT services with the platform and among themselves.

The main activity, which is carried out on the basis of an infrastructure digital platform, is to provide forest users, representatives of state authorities of all levels, citizens, public organizations and other participants with applied solutions for automation of its activities (IT-services) on the basis of access to information of a certain type and results of its processing within the framework of applied solutions. We have conducted a survey of representatives of organizations of state forest management and forest business in order to determine the need for a single digital platform. The results of a survey of forest governance authorities on the potential for digital use in forest management processes are presented in figure 1.

![Figure 1. Impact of digital transformation on forest governance (%).](image)

- The labor productivity will increase
- To become simpler process of communications
- Forest management will be more open
- New investments will be attracted
- New jobs will be created
- Forest management efficiency will grow
- Demand for a single digital platform

Respondents from the state forest management authorities believe that the creation of a single digital platform in the Russian forestry industry will contribute to increasing the efficiency of forest management (78% of respondents), increasing the openness of information about forest resources of regional systems (85% of respondents), simplifying the communication process (64% of respondents). Slightly more than half of respondents believe that the creation of a single digital platform will create new jobs and increase the productivity of management workers. According to 33% of respondents from the state forest administration authorities, digital technologies have little influence on the process of attracting investments in forestry.
The need to create a single digital platform in the forest governance system was expressed by 98% respondents from among the authorities of the forest governance system. Then, we studied the state of regional forest management systems from a digital perspective. According to the results of the study of state forest management sites in the regions of Russia, it has been determined that at the regional level the processes of implementation of information and communication technologies are carried out in an irregular manner and the digitalization of forestry as a whole is fragmented. Information systems of the federal forestry agency are mainly oriented to automation of individual tasks and do not have uniform interfaces of interaction with external information systems. The number of information systems and software developed for selected forest management applications is constantly increasing.

A survey of representatives of the authorities of the forest management system and forest business in 2019 concluded that the greatest application of digital technologies had been found in the field of forest inventory and administration. The most widely used information and communication technologies have been identified as the Forest Inventory segment, which uses modern GIS technologies, as well as various applications for automation of forest resource mapping and database maintenance. Forest Monitoring and Forest Management Administration are the next in terms of information and communications technology implementation.

Least of all the ICT is used in activities for “Protection and protection of the woods” and “Education and promotion concerning steady management of the woods” and also not developed there is a system of the electronic exchange and electronic auctions. Figure 2 shows the directions of the use of digital technologies in state forest management bodies, formed on the basis of the results of a survey of representatives of the authorities of the state forest management system and forest business in 2019.

**Figure 2.** Directions of digital technologies in state forest management bodies (%).

Digital technologies in forest accounting and inventory are used by 77.5% of respondents, in forest monitoring - 72.9%, use of websites for interaction with business - 56.2%. The digital technologies are used in forest planning and forecasting by 48.8% of respondents, and in forest education and promotion digital technologies are used by only 16.2% of respondents.

The lack of a single approved long-term strategy for the digital transformation of forestry in Russia is the primary reason that the formation of the information and telecommunication infrastructure of state forest administration bodies at the federal and regional levels is still carried out in isolation. To solve
the above problems, it is necessary to create an industry-specific digital platform for state forest management based on uniform principles, generally accepted standards and industry-wide reference books. The digital technologies in forestry make it possible to solve a significant number of problems and ensure a qualitative improvement in a number of processes (figure 3).

### ICT in forestry allow:

- To monitor climate change
- To reduce the risk
- To improve the efficiency of the registration and use of forests
- To reduce the cost of forest management, including protection and protection

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**Figure 3.** ICT opportunities in forestry.

The most suitable form for solving the above-mentioned problems is a digital platform, which includes six subplatforms:
- Reforestation and afforestation;
- Protection and protection of forests;
- Forest monitoring, accounting and assessment;
- Public services;
- Forest exploitation;
- Education, education and science (figure 4).

Application modules (APIs) are programmatically attached to each subplatform, which solve certain tasks of subplatform participants.

Participants of the digital infrastructure platform of forestry in Russia are:
- Platform operator, who maintains the platform operability, controls the process of functional development;
- State authorities administering forests;
- Federal Forestry Agency;
- Stakeholders, business, public organizations, citizens;
- Service providers, operators who create functional modules, and who collect information and generate content;
- Regulators monitoring compliance with legal norms.
The process of creating and implementing a unified digital infrastructure platform for forestry in Russia has been decomposed into a number of stages. At the initial stage, the concept of creating a digital infrastructure platform for forestry in Russia will be developed. Then it is necessary to develop and implement a prototype of the digital infrastructure platform of forestry of Russia. It shall include:

- Software product providing operation of digital platform;
- A set of applications (API) in the field of forestry and reforestation, forestry accounting, forest monitoring, which will later form the core of sub-platform applications;
- A set of applications (API) in the sphere of organization of forest management and provision of public services, which will later form the core of applications of sub-platforms.

It is then proposed to create a complete framework of the digital platform. Finally, there is an evolutionary expansion of the digital platform on a commercial basis. The creation of new commercial sub-platforms and applications (APIs) will be led by private timber campaigns and IT companies.
An important point in the implementation of this stage is the creation of a system of continuous training of forestry specialists with targeted competences in the field of digital economy.

The creation of a unified digital platform in the state forest management system in Russia should lead to the following results:
- Improve the implementation of State forest policy measures;
- Improve the quality of monitoring and supervision activities while reducing the burden on forest users;
- Ensure the harmonization and standardization of documents and rules for its provision;
- Ensure transparency of forest management works and services;
- Improve efficiency, including through planning and productivity growth;
- Reduce the time frame for making management decisions, including through the relevance of information;
- Promote openness of information and increase the activity of the population and citizens in forest management processes.

4. Conclusion and recommendations
Digital technologies have significant potential in the management of forests around the world. They can transform the forestry industry and reduce the labor intensity of many processes. Countries using digital technologies in forestry are increasing the competitiveness of forest products and increasing the efficiency of the conservation and management functions of forestry.

The forestry of the Russian Federation is significantly inferior to the world forest powers in the field of ICT, which predetermines the need to accelerate the transition to digital technologies, which are most in demand at the level of state forest management and in the forest business. By analogy with European countries, a state policy in the field of forestry informatization should be developed.

In the forestry of Russia, there is still no comprehensive approach to creating a unified information system for state forest management bodies at all levels. In the regions of Russia, the processes of introducing information and communication technologies are carried out haphazardly and locally. According to the results of the expert analysis, it was found that digital technologies in forestry allow monitoring climate change, reducing the risks of public administration, increasing the efficiency of forest resources accounting and control over the movement of wood. To increase the efficiency of forest management and openness of information about Russian forests, it is necessary to create a unified digital platform based on common principles, generally accepted standards and industry-wide reference books.

The organizational chart of the digital infrastructure platform for forestry in Russia is the starting point for the implementation of information and communication technologies in the regions of Russia.

The most suitable form of digital platform for public forest management purposes is an infrastructural digital platform, which includes six sub-platforms (reforestation and afforestation, forest protection and protection, forest monitoring, accounting and assessment, public services, forest management, education and science.

The creation of a digital forestry platform makes it possible to radically increase the efficiency of the work of state authorities in the field of forest management through the widespread introduction of new digital technologies, including end-to-end technologies and innovative business models of market interaction of these stakeholders, into the processes of state forest management.

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