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Approach to assessment of innovative development of enterprises timber processing complex

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***Abstract*—The timber processing complex of Russia is presented as a set of the industrial branches connected with preparation and processing of tree species. In the territory of the Russian Federation, there is a quarter of all world reserves of wood. The woods occupy about 45% of the space of the territory of the country. The main share of forest-forming breeds is formed of coniferous species: a fir-tree, a pine, a larch and a cedar. The forest fund of the country is divided into three main groups: field-protecting, water protective, reserved and recreational forests.**

Since the beginning of the 1990s, in the branch, the noticeable decline in production has significantly advanced the all-Russian rates of production reduction. The most important problem of the timber processing complex is the high level of wear of fixed assets. Though it corresponds to average figures throughout the industry (about 50%); the wear of an active part of fixed assets (equipment) reaches 80%. Commissioning new capacities is extremely insignificant. The coefficient of updating of fixed assets does not exceed 1,5–1,7% a year. In the world market, the timber of the Russian production is in great demand. The main reason for that is high quality of production. The timber from Siberia and the Northwest region has high durability when processed, and the dense structure is especially appreciated. The small and large enterprises of timber processing complexes of the Russian Federation managed to use this trump when the government has imposed big duties on export of "round timber". So, since the beginning of 2010, the volume of deliveries of coniferous timber from abroad began to grow.

However, in Russia, raw components of the timber processing complex prevail, and woodworking productions have developed insufficiently effectively so far. As machining of wood is accompanied by high specific expenses of raw materials and huge scales of waste, many woodworking enterprises prefer to use ready raw materials.

Keywords*— *Innovative development, timber processing complex, assessment, enterprises.

I. INTRODUCTION

The timber processing complex (LPK) has a rather complex structure. All its branches can conditionally be divided into three big groups:

1. The logging industry responsible for wood preparation.
2. The woodworking industry engaged in processing of wood. The enterprises of this group make furniture, prepare timber and so on.
3. Pulp and paper industry assumes generally chemical processing of a tree. The enterprises of this group produce paper, cardboard, cellulose and other products. Forest chemical industry includes such products as coal, rosin, turpentine, etc. The economy of the forest industry of Branch, LPK of Russia, which is in the structure, takes the 7th place by the outputs and 5th by volumes of export of production. The largest timber processing complexes of Russia are located in such regions as European North, Eastern and Western Siberia and the Far East. Here it concedes only to metallurgy and fuel industry.

Production of wood and products from it is defined by the developed domestic and external demand for production of the Russian timber processing complex. It should be noted that Russian production in general concedes to foreign analogs in view of technologies that are outdated, unsafe for the environment. The high level of moral and physical wear of fixed assets in this connection, the quality standards are not maintained; the resource intensity and power consumption of production increases.

We will consider dynamics and expected values of development of timber processing complex of the country, calculations are presented in table 1.

TABLE I. DYNAMICS AND EXPECTED VALUES OF DEVELOPMENT OF THE TIMBER PROCESSING COMPLEX OF THE COUNTRY, %

№	Name of the production direction	2015 report	2016 assessment	2017	2018	2019	2019 by 2015, %
				Forecast			
1.	Forest raw products	1,2	3,6	2,5	3,0	3,3	13,0
2.	Processing of wood and production of products from a tree	-3,4	1,5	2,0	2,5	2,8	9,1
3.	Forest products, longitudinally sawn or split	-0,4	4,1	3,7	3,9	4,0	16,7
4.	Plates of wood-fiber	6,8	1,9	0,6	1,6	2,1	6,3
5.	Plates of wood-shaving	-0,4	0,6	0,5	1,5	1,8	4,5
6.	Scale board	1,3	2,0	1,9	2,2	2,8	9,2
7.	Pulp-and-paper production	-6,3	2,8	2,0	2,6	2,8	10,6
8.	Commercial cellulose	4,4	4,8	4,4	4,7	4,9	20,2
9.	Paper and cardboard	2,2	4,)	1,2	2,5	2,8	10,9

Now the condition of the timber processing complex is characterized by the shortage of capacities for production of deep processing as at the operating enterprises reserves of these capacities are almost exhausted (in 2015 the Russian Federation used average annual capacities made by production of forest products, which is longitudinally sawn or split - 51,1%; timber - 49,4%; plywood glued - 82,2%; wood chipboards - 81,7%; fiber boards - 80,2%; cellulose wood and cellulose from other fibrous materials - 87,2%; papers - 87,4%; a cardboard - 83,1%.

II. RESULTS AND DISCUSSION

Production capabilities of the timber processing complex are quite comparable to the oil branch. Nevertheless, a contribution of a forest complex to the total amount of industrial production of one quarter as compared to oil industry. The share of a forest complex in gross domestic product makes 0,7%, in the world production of round forest products — 5,4%, in world export of forest products — 17,9%, and in currency proceeds from export — 4,3%. The woods belong to one of key factors of social and economic development of the country. Modern management of them, the level of protection, protection and reproduction of the woods have to conform to social, ecological and economic requirements. The forest sector of national economy needs adaptation to globalization of the markets, development of technologies, emergence of new types of wood production, strengthening of the competition and toughening of ecological requirements.

TABLE II. AN ASSESSMENT SUBSYSTEM OF INDICATORS - CRITERIA OF PRODUCTION FOR INNOVATIVE DEVELOPMENT OF ENTERPRISES OF TIMBER PROCESSING COMPLEX

Indicators criteria	Ratio	Value of an indicator criterion
Level of financial independence (self-reliance) of the enterprise	Ratio of the actual volume of the made production of the enterprises of timber processing complex and demand (An indicator criterion of financial independence Pk_{fn})	$Pk_{fn} \leq 0,3$ – low level; $0,3 < Pk_{fn} \leq 0,7$ – admissible level; $0,97 < Pk_{fn} < 1$ - optimum level.
Degree of satisfaction of consumers with products of timber industry production	Ratio of the actual volume of the made production of the enterprises of timber processing complex and expected values (An indicator criterion of the degree of satisfaction of Pk_{su})	$Pk_{su} \leq 0,3$ – low level; $0,3 < Pk_{su} \leq 0,9$ – admissible level; $0,9 < Pk_{su} < 1$ – optimum level.
Financial availability of timber industry production	Share of the acquired timber industry production of the logging industry (Pk_{lp}); Share of the acquired timber industry production of the woodworking industry (Pk_{do}); Share of the acquired timber industry production of pulp and paper industry (PK_{pp}).	$Pk_{lp} \leq 0,3$ – low level; $0,3 < Pk_{lp} \leq 0,7$ – admissible level; $Pk_{lp} > 0,7$ – optimum level. $Pk_{do} \leq 0,2$ – low level; $0,2 < Pk_{do} \leq 0,5$ – admissible level; $Pk_{do} > 0,5$ – optimum level. $PK_{pp} \leq 0,3$ – low level; $0,3 < PK_{pp} \leq 0,7$ – admissible level; $PK_{pp} > 0,7$ – low level.

Limiting factors of innovative development of the enterprises of the timber processing complex are: undeveloped transport infrastructure of forest exploitation, poor quality of forest resources because of extensive forest exploitation and also the considerable volume of illegally prepared wood and exhaustion of its stocks. Substantially the unstable financial

position of the enterprises of the timber processing complex is caused by high materialo-and power consumption of production at the advancing increase in prices and tariffs for services of natural monopolies.

Taking into account high capital intensity and long payback periods of innovative projects at the enterprises of timber processing complex, it is necessary to create the innovative approaches directed to improvementation of forest infrastructure, modernization of the enterprises and change of regulations on formation of necessary raw material inventories and materials.

For innovative development of the enterprises of the timber processing complex, it is necessary to define indicators criteria of innovative development. The subsystem of assessment of indicators - criteria of production for innovative development of the enterprises of the timber processing complex is presented in table 2.

When finding the value of an indicator in optimum limits, the mark of 3 points, in admissible limits – 2 points, in low – 1-0 points is put down. The offered subsystem of assessment of indicators is criteria of production for innovative development of the enterprises of the timber processing complex, which will allow one to estimate the level of innovative development of this or that enterprise.

One of the main tasks of innovative development of the enterprises of the timber processing complex is a gradual increase in level of innovative activity of the enterprises in the market of the Russian production in comparison with world analogs. This direction should not have the spasmodic form, considering various objective reasons: deterioration in a condition of fixed assets, low level of use of the latest technologies, etc. It should be noted that successful innovative activity provides not only increase in the level of efficiency of the current activity, but also promotes increase in purchasing power of consumers.

In quality, an innovative potential acts as the main driving force of innovative development of the enterprises of the timber processing complex. Innovative potential allows one to estimate degree of readiness of the enterprises to realize the purpose and to carry out tasks of innovative development and also to carry out introduction of innovations in production.

In scientific research, it is defined that innovative development of the enterprises should be considered from positions of assessment of its main directions. Innovative development needs to be considered as a set of scientific and technical, financial and economic and information components, the enterprises providing innovative development and increasing competitiveness. Implementation of innovative development of the timber industry enterprise requires existence of an innovative reserve. In this regard, it is necessary to define methods of assessment of innovative activity. In the majority of the existing techniques of assessment of innovative activity, the use of a limited number of indicators is offered. These indicators are:

- macroeconomic (GDP or VRP, number of the innovative enterprises, etc.);
- infrastructure (the number of the enterprises using information technologies);
- legal (the standard and legal documentation regulating innovative activity, providing tax benefits to the enterprises);
- economic (volumes of the turned-out innovative products).

It should be noted that in the approach to assessment of innovative development of the enterprises considered above the limited quantity of indicators which do not consider various important characteristics of innovative activity is used. In this regard it is offered to apply a subsystem of assessment of indicators - criteria of production of the products for innovative development of the enterprises of the timber processing complex allowing one to reveal innovative reserves of the enterprises of the timber processing complex.

The calculations of indicators of innovative development of the enterprises of timber processing complex received on the basis of calculations of a subsystem of assessment of indicators - criteria of production of products are presented in table 3.

TABLE III. A SUBSYSTEM OF ASSESSMENT OF INDICATORS - CRITERIA OF PRODUCTION OF PRODUCTS

Indicator	2015	2016	2017	2018	2019	Value	Point
Pk_{fn}	0,182	0,213	0,229	0,371	0,464	Low level	1
Pk_{su}	0,521	0,574	0,619	0,728	0,781	Admissible level	2
Pk_{lp}	0,238	0,272	0,217	0,351	0,414	Low level	1
Pk_{do}	0,290	0,317	0,384	0,419	0,493	Admissible level	2
PK_{pp}	0,138	0,391	0,314	0,362	0,392	Admissible level	2

Analyzing the data provided in table 3, it is possible to draw a conclusion that manufacturing enterprises of the timber processing complex provide the needs for production at an average (admissible) level. Production of timber industry practically corresponds to expected values. The total point shows the level of an optimum limit of production of timber industry.

III. CONCLUSION

We will offer the main ways of innovative development of the enterprises of the timber processing

complex from the position of the production direction (figure 1).

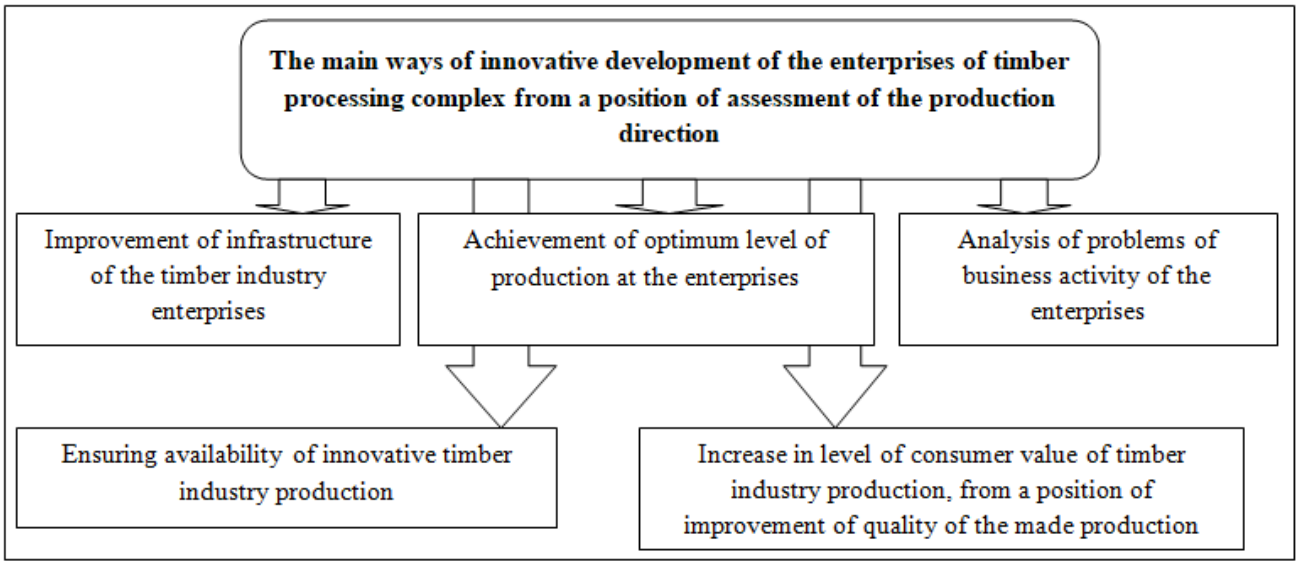

Fig. 1. The main ways of innovative development of the enterprises of the timber processing complex from a position of assessment of the production direction.

Thus, on a basis assessment of current state of innovative development of the enterprises of the timber processing complex, their innovative potential, the authors can draw a conclusion that improvement and considering of the approaches and methods are necessary for the solution of the existing problems at the enterprises:

1) development of innovative approaches according to an economic condition of the timber industry market taking into account price mechanisms, the current needs for production and tendencies of their changes on the basis of use of indicators of economic efficiency;

2) creation of the system of indicators criteria allowing one to estimate the enterprises in the existing competitive conditions to draw conclusions on development of the favorable enterprise environment and development of innovative activity;

3) increase in innovative activity of the enterprises of the timber processing complex;

4) use of the effective personnel policy directed to involvement of competent educated experts to the sphere of innovative developments;

5) increase in the level of economic efficiency of production of timber industry.

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