ANALYSIS OF THE VOLUME OF PRODUCTION AND SALES OF WOOD ASSORTMENTS OF THE FOREST FARM KRAGUJEVAC

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ABSTRACT

Aware of the importance of companies for the use, processing and marketing of wood products in everyday life, as well as for the development of a national economy, the number of SMEs in this sector in Serbia, as well as everywhere in the world, is conditioned by long-term global demand. The objectives of the research are to perform an analysis of wood products and their market prices, as well as an analysis of trade trends (procurement, sales) in the Sumadija district. The purpose of the research is to point out the possibilities for improving the economic efficiency and the existing business policy in the PE "Srbijasume" SG Kragujevac. The subject of research is the financial elements of the production process in order to obtain information on the production and sale of wood assortments by class. The results show that the wood market in the Republic of Serbia has a large imbalance in the built production capacities of wood processors and the potential provided by forests. Since the production potential of the PE is not sufficient to meet the needs of processors, customers engaged in wood processing on the domestic market provide raw materials for production from several sources.

Keywords: production and processing of wood, placement of wood assortments

INTRODUCTION

Forest production and forestry differ significantly from other economic activities in some respects. Ignorance of these peculiarities in the past has caused significant damage not only to forestry, but also to the national economy in general. Knowledge of these characteristics is important in order to avoid the consequences that could result from ignorance of the essence of forests, forest production and forestry, and to harmonize measures and procedures between certain activities and forestry so that they are mutually beneficial [1].It is related to natural laws in forest ecosystems. Natural conditions (altitude, soil fertility ...) have a strong influence on management. Different forms of management provide regular annual forest yields in terms of quantity and value. Changes in the management system are only possible in the long run. Management errors usually appear only after a few years and can be seriously affected. Mainly due to its long-term nature, it is difficult to assess the impact of forestry on the financial success of management.

In agriculture, products ripen naturally, while in forest production this maturity is determined more subjectively in relation to management goals. Therefore, the cutting time, as well as its volume, can be set in relatively wide limits. Unequal natural and production conditions (types of trees, openness of forests ...) lead to unequal conditions in forestry management. Differences mainly affect the financial position of the owner. Another problem is the objective and stimulating rewarding of work in the forest. Forests are a

multi-purpose part of the area and, in the case of sustainable management, forests provide not only direct economic benefits but also general benefits. The high distribution and opacity of the forest area requires a special territorial and organizational division.

Growing wood stocks in the forest represent large capital per unit of forest area, while very little live labor is used to exploit the forest per unit area. Growing trees are a means of production and felled and cultivated trees are already a product. There are different opinions on whether the stock of wood is fixed or working capital. Conway (2009) [2] points out that forest production cannot increase rapidly and cannot increase indefinitely. Unlike industrial production, forest production is influenced by natural laws. Wood as a product is a very bulky and heavy commodity. Transporting wood from the hive to the consumer is a significant part of the production costs. Due to the more difficult natural and different working conditions, it is more difficult to introduce mechanization [3].

The very fact that the forest has several important functions indicates that all its contributions will be assessed in order to comprehensively assess the contribution of forestry to the economy. In some areas, forestry production can make a significant contribution to economic well-being in rural areas. In others, consumption of forest products by enterprises or households may make a greater contribution to the local economy than forestry products [4].

Private forests cover almost half of the forest fund in Serbia. As part of the private economy or household, the private forest has primarily an economic role. The total forest area in Serbia is 2,252,400 ha, which is 29.1% of the total area of the territory of Serbia, while 53% of it is state-owned and 47% is privately owned. Almost two thirds of private forest areas are owned by owners of forests that do not have a farm. Farmers in mountainous areas especially have larger forest areas. The latter form a group of farms (3% of forest owners), where the forest is an important or dominant source of income and represents 25% of the average income of the farm. The share of forestry in the total gross value of production of average private agriculture is relatively small - about six percent [5].

Every year, only a third of private forest owners cut down their forests, and almost a fifth of forest owners do not cut down their forests at all. The frequency of felling increases with the size of the property. The felled wood is used for domestic consumption, for own processing or for sale (market production of forest wood assortments). According to the research of Glavonjić (2019), one sixth of forest owners in Serbia have their own sawmills that annually process 400,000 m3 of wood, of which one third is theirs [5]. The owners sell 70 percent of the total production as forest wood assortments or processed wood. For the realization of production in private forests, the forest owner uses a wide range of possibilities (private use, lease ...). The productivity of forest owners is, as a rule, lower than the productivity of professional forestry workers, and forest owners are also less equipped and less qualified than professional foresters employed in executive forestry companies.

According to the Law on Forests, owner-owned forests are managed on the basis of the forest area development plan and forest management program, and the public forest management company "Srbijasume" is owned by the owners of forests for which the program is adopted (private forests owned by natural persons). persons) provides professional and advisory support. This company has the opportunity to take over the entire management of private forests, individual phases of work in forests, purchase and sale of forest products, mediation in the procurement of forestry equipment and spare parts and technological consulting.

Conditions for cooperation between the forest contractor and the private owner are, in particular, good knowledge of the private sector, individual approach and contact with the owner and the appropriate price (offer). The economic advantage of the forestry contractor compared to other contractors is mainly in the ability to better organize, higher professional skills, higher productivity, better use of working capital capacity, higher quality of work and reliability of performance. Some forest owners have work and technical facilities that they are willing to use as subcontractors to perform forestry work. It is in the interest of the forestry contractor to include them in the forestry works. Since most forest owners have too little land to be able to operate profitably, they are interconnected. There are several reasons for uniting owners, and what they have in common is that they unite for greater economic performance and efficient forest management.

More intensive research in Europe on the impact of certain factors within the socio-economic criteria on the sustainable development of the wood sector has been conducted for the last twenty years. While the economic role of forests is more emphasized in private forests, the ecological and social functions of forests

are more emphasized in state forests. State forests are better preserved and have on average a third more wood stocks than private ones [6]. In some studies, in addition to the situation in the wood sector, its contribution to the overall economic development was analyzed, as well as its social significance, such as the impact on the employment rate [7][8].

Researchers from the FAO (Forest Products and Economics Division, Rome) organization have analyzed the contribution of the wood sector in a number of national economies worldwide [9][10][11]. In addition to the analysis of the current situation in relation to the values of basic indicators, which primarily refers to economic ones, this research provides an assessment of trends in the values of employment, participation in gross domestic product, imports and exports, etc.

Some authors have focused the objectives of their research on employment generated by the wood sector, highlighting the lack of appropriate indicators to assess its social significance [12][13]. Given the fact that social significance changes over time, basic indicators must provide an opportunity to express these changes [14]. The social significance of the wood sector in Serbia has been the subject of recent research in terms of the importance of charcoal production for the rural population [15], as well as the impact of wood-based energy production for rural development in Serbia [16].

When it comes to Serbia, previous research has been mostly focused on monitoring the movement of indicators of participation in gross domestic product, foreign trade balance, number of companies and employment. However, the ways in which they have been monitored so far differ from the monitoring and reporting methodology defined by the United Nations, which assumes a more comprehensive view of the overall socio-economic significance of the wood sector. Kushter (2021) [17] concludes that Serbia has a favorable geographical position, but also great potential when it comes to forestry development, so this sector deserves a deeper analysis of financial performance.

MATERIALS AND METHODS

The analysis of financial indicators was used in the analysis of data on the state and results of the company's operations, as well as pointing out the possibilities for improving the economic efficiency of the company for the use, processing and placement of wood products in the Sumadija district.

Data collected from financial reports will be presented in the form of time series, i.e. series of numerical data, which are arranged in chronological order in successive, equal, time periods (for 2018, 2019 and 2020). These data refer to the amount of income, expenses, cash flows, the average value of purchased raw materials, as well as whether these companies have made a profit or loss in the observed years. The main activities of the Forest Farm Kragujevac are cultivation, maintenance and renewal of forests, production of forest seeds and planting material and erection of new forests and forest plantations, development of programs, projects and bases for forest management, professional work in owner's forests, wholesale and retail, foreign trade and improvement and use of generally useful forest functions.

RESULTS

The production function of the forest, as a renewable natural resource with high biomass production capacity, gives exceptional importance to forestry in the economic development of Serbia. Forests as a traditional source of raw materials, in the conditions of faster depletion of numerous economic resources in the world, are gaining more and more importance.

This is especially important for Serbia because its natural conditions determine the forest as the main user of space. The production of wood assortments has a significant advantage over the production of other materials, because it does not cause environmental pollution, with low energy consumption to obtain sawn timber; wood is a product of the forest which is a renewable resource, so the existence of the forest and the production of wood have a positive impact on the environment. PE "Srbijasume" strives to achieve optimal forest cover with the aim of maximum production of wood (20,000 different types of wood products) and other forest products, as well as achieving goals related to forests and the environment. In 2020, a total of 1,413,306 m^3 of net wood assortments were produced in PE Srbijasume, or 99% compared to the plan for 2020 (1,428,004 m^3).

Production of technical roundwood (technical wood and other technical wood) in 2020 is 512,775 m^3 of net wood assortments or 96% compared to the plan for 2020 (534,804 m^3). Spatial wood in 2020 produced a total of

900,531 m^3 of net wood assortments or 1% more than planned for 2020 (893,201 m^3). In accordance with the Law on Forests, Article 66, in 2020, roads were maintained in the length of 1,277 km or 100% of the plan for 2020 (1,277 km). Since the classes of logs, I, II, III are most represented in beech forests on the territory of SG "Kragujevac", a regression analysis was performed for these three classes of logs.
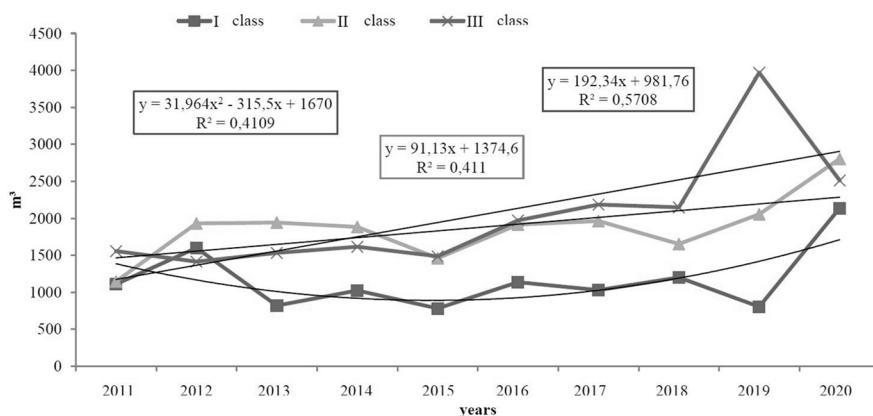

Figure 1. Regression analysis for I, II, III class
Source: Author's calculation

For the II and III class, the linear trend model was used, while for the I class, the second-degree polynomial was used.

Table 1. Elements of regression analysis - I class

Parameter		t	R	F	y = 31.964x^2 – 315.5x + 1670	
a	0,08355	2,016587				
b	0,083482	-2,01714	0,41091	0,156904		
c	0,083413	2,017703				

In the case of class I, there is no significance of the correlation coefficient, nor the parameters, therefore we cannot trust these results.

Table 2. Elements of regression analysis - II class

Parameter		T	R	F	y = 91.13x + 1374.6	
a	0,047532	-2,33843	0,410979	0,045772		
b	0,045772	2,362595				

In class II, a strong correlation relationship (0.641) is observed, as well as the significance of parameters and correlation coefficient.

Table 3. Elements of regression analysis - III class

Parameter		T	R	F	y = 19234x + 981.76	
a	0,011792	-3,24481	0,57083	0,011493		
b	0,011493	3,262				

In class III, a strong correlation relationship (0.755) is observed, as well as the significance of the correlation coefficient and parameters.
In the case of firewood, the second-order polynomial model (Figure 2) was the best fit for the production data.
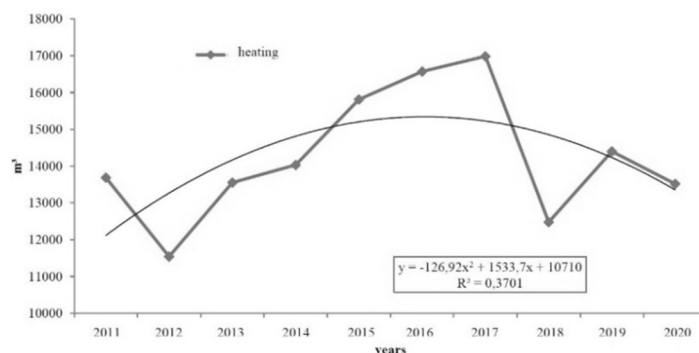
Figure 2. Regression analysis for heating
Source: Author's calculation

Based on the conducted analysis, it was determined that there is no significance of the correlation coefficient, as well as parameters, therefore we cannot trust these results.

Table 4. Elements of regression analysis - heating

Parameter		t	R	F	$y = - 126.92x^2 + 1533.7x +10710$	
a	0,104465	-1,86485				
b	0,104534	1,864399	0,370083	0,198377		
c	0,104611	-1,8639				

Sales through contracting for successive delivery during the business year are usually done for the sale of wood assortments on the forest truck road, for a period not exceeding one year. Wood assortments are cut, made and transported to the point of sale, and the same is done according to the valid price list of the PE. Through the auction sale, technical roundwood is sold twice a year, in accordance with the Instruction issued by the director of the PE.

Retail sales include the sale of wood assortments to individuals, mostly "trees on a stump" according to the current price list of PEs. Preparation for the sale of "trees on the stump" is done by determining the place of felling (farm unit, department), marking trees for felling, remittances, defining activities to be carried out after felling - seduction of forest order, etc.
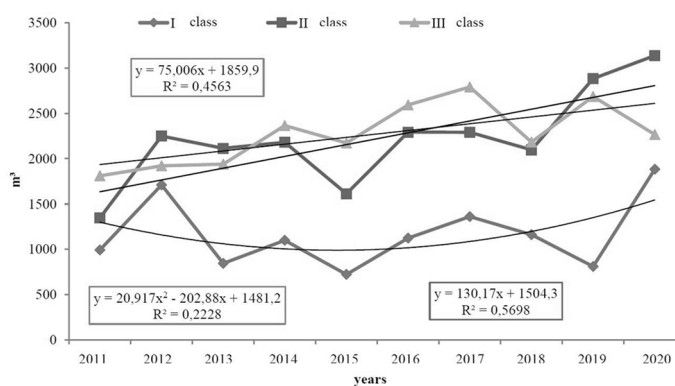

Figure 3. Regression analysis for I, II, III class
Source: Author's calculation

For the II and III class, the linear trend model was used, while for the I class, the second-degree polynomial was used (Figure 3).

Table 5. Elements of regression analysis - I class

Parameter		t	R	F	$y = 20.917x^2 – 202.88x + 1481.2$	
a	0,248382	1,259019				
b	0,248249	-1,25941	0,472017	0,413871		
c	0,248111	1,259817				

In the case of class I, there is no significance of the correlation coefficient, nor the parameters, therefore we cannot trust these results.

Table 6. Elements of regression analysis - class II

Parameter		t	R	F	y = 130.17x + 1504.3	
a	0,0121	-3,22761	0,754856	0,01161		
b	0,01161	3,255202				

In class II, a strong correlation relationship (0.754) is observed, as well as the significance of the correlation coefficient (0.01161) and parameters.

Table 7. Elements of regression analysis - III class

Parameter		t	R	F	$y = 20.917x^2 - 202.88x + 1481.2$	
a	0,034056	-2,55224	0,675516	0,032051		
b	0,032051	2,59125				

In class III, a strong correlation relationship (0.675) is observed, as well as the significance of the correlation coefficient and parameters.
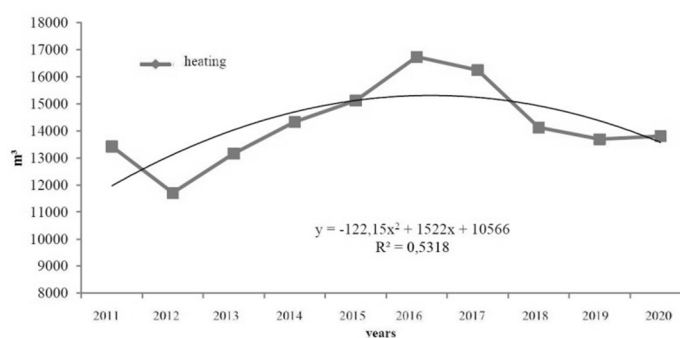

Figure 4. Regression analysis for heating
Source: Author's calculation

In the case of firewood, a second-degree polynomial was used (Figure 4).

Table 8. Elements of regression analysis - heating

Parameter		t	R	F	$y = -122.15x^2 + 1522x + 10566$	
a	0,04451	-2,4438	0,531839	0,070207		
b	0,044564	2,442981				
c	0,044622	-2,44209				

Based on the analysis, it was determined that there is no significance of the correlation coefficient, as well as parameters, therefore we cannot trust these results. The following tables show the structure of the Balance Sheet of PE Srbijasume for 2018, 2019 and 2020, as well as the structure of the Income Statement in the specified period.

Table 9. Balance sheet of PE Srbijasume for 2018, 2019 and 2020 - assets

	Assets	2018	2019	2020
1.	FIXED ASSETS	63.196.598	63.612.666	63.478.310
1.1.	Intangible assets	444.021	490.806	455.555
1.2.	Property, plant and equipment	9.860.387	10.231.260	9.972.303
1.3.	Biological resources	52.792.049	52.783.582	52.952.500
1.4.	Long term investments	108.335	98.313	97.732
1.5.	Long-term receivables	238	273	220
2.	CURRENT ASSETS	1.421.937	1.674.026	1.771.726
	TOTAL ASSETS	64.618.535	65.286.692	65.250.036

Based on the data, it can be seen that the total assets decreased slightly from year to year and that the largest share in the total assets have biological assets, which at the end of 2020 amounted to 52,952,500 dinars, followed by real estate, plant and equipment and current assets. Table 10 shows the balance sheet - liabilities for the period from 2018 to 2020. The share capital of JP Srbijasume increased in 2019, while in 2020 it decreased. Long-term provisions and liabilities also increased in 2019 compared to 2018, while in 2020 there was a decrease. Short-term liabilities increased during the observed period.

Table 10. Balance sheet of PE Srbijasume for 2018, 2019 and 2020 (in thousands of dinars) - liabilities

	Liabilities	2018	2019	2020
3.	THE CAPITAL	60.595.448	60.486.146	60.835.210
3.1.	Basic capital	54.002.629	54.688.230	54.235.857
3.2.	Reserves	6.190.310	5.154.568	6.129.407
3.3.	Retained earnings	402.045	642.943	469.487
4.	LONGTERM RESERVATIONS AND OBLIGATIONS	959.797	1.362.805	1.214.986
5.	DEFERRED TAX LIABILITIES	556.630	805.691	/
6.	SHORT-TERM LIABILITIES	2.506.660	2.632.050	3.199.840
	TOTAL LIABILITIES	64.618.535	65.286.692	65.250.036

Table 11 shows the income statement for operating income and operating expenses. It can be seen from the table that JP Srbijasume had higher operating income than expenditure in all observed years, which means that it operated with operating profit, which in 2019 amounted to 668,618 dinars, and in 2020 it decreased to 584,604 dinars.

Table 11. Income statement of PE Srbijasume for 2018, 2019 and 2020 (in thousands of dinars) -
operating income / operating expenses

	Position	2018	2019	2020
1.	BUSINESS INCOME	6.833.053	6.833.053	7.832.947
2.	BUSINESS EXPENSES	6.023.549	6.164.435	7.248.343
3.	OPERATING PROFIT	467.189	668.618	584.604
4.	BUSINESS LOSS	/	/	/

When it comes to financial income and financial expenses from Table 12, it can be noticed that in 2018, PE Srbijasume recorded higher financial expenses than financial income and operated with a loss from financing of 33,278 dinars.

In 2019, financial income was higher than financial expenses and a financial gain of 4,936 dinars was realized. During 2020, financial expenses were higher than financial revenues, so that PE Srbijasume realized a financial loss of 10,568 dinars.

Table 12. Income statement of PE Srbijasume for 2018, 2019 and 2020 (in thousands of dinars) -
financial income / financial expenses

	Position	2018	2019	2020
1.	FINANCIAL INCOME	23.963	21.000	10.093
2.	FINANCIAL EXPENSES	57.241	16.064	20.660
3.	PROFIT FROM FINANCING	/	4.936	/
4.	LOSS FROM FINANCING	33.278	/	10.568

Table 13. Income statement of PE Srbijasume for 2018, 2019 and 2020 (in thousands of dinars) - other
income / other expenses

	Position	2018	2019	2020
1.	OTHER INCOME	248.576	132.104	8.395
2.	OTHER EXPENSES	97.883	85.543	30.093
3.	PROFIT	150.693	46.561	/
4.	LOSS	/	/	21.698

It can be seen from Table 13 that in 2018 and 2019, JP Srbijasume generated higher other revenues than other expenditures and recorded a profit of 150,693 and 46,561 dinars. In 2020, other expenditures were higher than other revenues, so that a loss of 21,698 was realized.

Table 14. Business activity plan for 2021 - Production and sale of wood assortments

Row. no.	Name	Unit of measure	Plan 2021.
1.	Production (net)	m^3	1.477.622
1.1.	Technical roundwood	m^3	539.415
1.2.	Spacious wood	m^3	938.207
2.	Sales (net)	m^3	1.477.622
2.1.	Technical roundwood	m^3	539.415
2.2.	Spacious wood	m^3	938.207

Table 14 shows the business activity plan for 2021, where the production and sale of (net) wood assortments of 1,477,622 m^3 is expected.

DISCUSSIONS

The offer on the wood market, quantities and assortment structure to a high degree are a reflection of the condition of forests, and according to many authors, the condition of forests in Serbia was assessed as unsatisfactory. According to Aleksić et al (2017) [18], the average values of forest volume per hectare significantly lag behind the estimated optimal for the Republic of Serbia. Also, the presence of sparse (insufficiently overgrown) stand categories in state forests in Serbia, on one third of the area, is one of the basic long-term problems [16]. According to Medarević & Banković (2019) [1], the main reasons for less use of yields are insufficient openness of forests, outdated mechanization and the inability to sell fewer valuable assortments.

Indicators indicate that despite the unsatisfactory condition of forests, there are certain positive trends and that forest management measures can overcome many shortcomings, which should contribute to increasing the production and supply of wood in Serbia in the long run. Based on the available data, it can be estimated that for the Republic of Serbia, the annual volume of permitted felling is about 5.9 million m^3. This includes the yield for state-owned forests, which was obtained on the basis of stand inventories and which amounts to 2.8 million m3 per year. The possible yield for private forests is calculated on the basis of 90% of the current volume increment, determined by the national forest inventory [19] and represents the indicative value.

By analyzing the volume of production and sales of wood assortments of SHG "Kragujevac", the results show that in the case of class I there is no significance of the correlation coefficient, nor parameters, therefore we cannot trust these results. In class II, a strong correlation relationship (0.641) is observed, as well as the significance of the correlation coefficient (0.045772) and parameters (0.047532 and 0.045772). In the case of firewood, it was determined that there is no significance of the correlation coefficient, as well as parameters. When it comes to sales, in the case of class I there is no significance of the correlation coefficient, nor the parameters. In class II, a strong correlation relationship (0.754) is observed, as well as the significance of the correlation coefficient (0.01161) and parameters. In class III, a strong correlation relationship (0.675) is observed, as well as the significance of the correlation coefficient and parameters. In the case of firewood, it was determined that there is no significance of the correlation coefficient, as well as parameters.

The analysis of business revenues for the mentioned period, from 2018 to 2020, shows the growth of planned, but also realized business revenues. The growth of realized operating revenues ranges from 5% in 2019 compared to 2018, from 13% observed in 2020 compared to 2019, to 19% compared to 2020 compared to 2018, while the realization of business revenues was realized in the amounts from 98% to 100% in accordance with the plan. When it comes to realized operating expenses in the observed period, there is a noticeable increase in operating expenses in 2019 compared to 2018 in the amount of 2%, while the growth in 2020 compared to 2019 is slightly higher, in in the amount of 16% (in accordance with the realized business revenues of the observed business year). Operating expenses were realized in accordance with the planned values in a percentage share of 92% to 94%.

Financial revenues in the observed period of three business years were slightly below the planned values, and observed by years, they were followed by a decrease in 2019 and 2020. Financial expenses in the observed period of three business years were realized in accordance with the planned values, and observed by years, they are followed by a decline in 2019 compared to 2018, then an increase in 2020 compared to 2019. Other revenues in the observed period of three business years recorded a decrease in 2019 compared to 2018, as well as in 2020 compared to 2019. Other expenditures in the observed period of three business years were realized in accordance with the planned values, and observed by years, they are followed by a decline in 2019 compared to 2018, and in 2020 compared to 2019.

The wood market in Serbia is small and the ownership structure of forests has a significant impact on the timber trade, which is characterized by almost equal representation of privately and state-owned forests. Private forests in Serbia are more important in terms of production and trade of firewood, while state-owned forest management companies are the main suppliers of wood to the wood industry.

CONCLUSIONS

At the beginning of the transition of the Serbian economy, the primary wood industry was in big trouble, which was reflected in the surplus of employees and excess capacity. Due to technological and organizational backwardness, companies could not quickly move to new demanding markets. In addition, the change of ownership over forests has tightened business conditions, which has led to the fragmentation of the raw material base, and the volume of felling has been reduced. After independence, the development of sawmill production is diametrically opposed to the development of this activity in other Western European countries. The structure of sawmills changed dramatically as their numbers increased and their size decreased. Further development trends are also completely opposite and indicate further closure of larger plants and the establishment of new occasional small plants by private forest owners.

Forestry companies sell forest wood assortments, which as a product of nature within one type of tree are quite homogeneous and differentiation is not possible in principle. In the provision of services in forestry, forestry companies can compete highly based on the differentiation of services. The diversity of the service offer is conditioned by the diversity of the terrain for the realization of the service.

The market of forest wood assortments can be defined as the market of raw materials. Such a market consists of individuals and organizations that procure goods or services to produce other products or services. The market structure of the raw materials market is characterized by acting with fewer and therefore larger customers; the same goes for supply. The geographical concentration of supply and demand appears. A special feature of the raw materials market is the character of the purchase unit (eg wood processing companies). Demand in the industrial market is derived demand because it depends on the demand for the final product. In the case of derived demand, it is possible that the supply of raw materials will increase disproportionately due to increased final demand. As a result, demand for many industrial raw materials is more volatile than consumer demand, and even a small increase in demand can disproportionately increase demand for raw materials (acceleration principle). Given that the quantity and type of assortments that are cut are mostly determined by natural conditions, it is difficult to harmonize the supply of wood to demand, at least in the short term. Thus, the impact of price is of secondary importance and forestry companies only make exceptional use of market conditions at home or abroad. Even the replacement of perfect competition, complete knowledge of the current and future market, is difficult to achieve. The main reason is the temporal and spatial diversification of supply, and less demand. Spatial dispersion mainly influences the creation of local monopolies in both supply and demand. The share of transport costs in the production of forest wood assortments can have a decisive impact on the competitiveness of individual market participants. High levels of uncertainty (long time horizon) and risk (possibility of natural disasters) also have a big impact. Forestry companies have been going through very turbulent times for the last fifteen years. The reorganization of forestry has had the greatest impact on changes in business conditions. The constant fall in wood prices has worsened the situation on the wood market. Forest management must be carefully planned. Individual financial indicators of companies operating in the forestry and wood industry indicate that the situation in forestry is better, but the wood industry is recovering and the situation in forestry is deteriorating. The situation in forestry can be described as average in relation to all companies in the economy.

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