5. FOREST PRODUCTS PRODUCTION AND SALE TRENDS IN CROATIA

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5.1. INTRODUCTION AND PROBLEM MATTER

Natural resources represent common good and wealth. Their use, economic function and evaluation have to be planned directly since they represent the basis of future industrial and economic development. The influence of technological changes and innovations has resulted in lower prices of natural resources, compensating to a certain degree the effect of price increase due to the exhaustion of the resources. Forests are considered renewable natural resources, and the main characteristic of renewable natural resources is that their reserves are not permanent, and they can increase or decrease. However, a renewable natural resource cannot renew itself above the level determined by existing ecosystem's capacity. Sustainable forest management is a continuous process of exploiting increment, in part or whole. Notwithstanding, danger exists should the exploitation rate exceed the natural increase rate, in which case the renewable natural resource could easily perish. Forestry economics encompasses all know-how related to forestry, and with the activities of market elements, it observes how a man and the society act in certain circumstances and conditions. The specific features of forest management are particularly manifested (Figurić, 1996) in the long-term biomass production cycle, the forests' multiple functions and benefits, the fact that many of its values cannot be evaluated directly on the market, long period from the start of works, natural renewal, afforestation, nurture, cleaning, thinning, etc. to economic effects, which exceeds human lifetime.

Forests are important life factor since they provide people with many benefits (timber, fuel etc.). Balancing the people's needs with long-term care for forest resources is the basis of forest resources management. Maintenance of the forests' vitality is crucial for overcoming many challenges caused by climate changes, and for preserving the consistency of plant and animal species, that is, biological diversity (Figurić 1996). The forest sector has an important

influence on the rural development, contributing to poverty decrease, achieving sustainable development and providing different ecological services. The priority of the world as a whole and each country should be to develop appropriate sustainable development strategies which would include special measures for the forests' preservation, sustainability and vitality (Tipurić 2009). On the global level, 31% of the forest surface is intended for production. In Europe, 72% of total forest surface is intended for production (FAO 2011). European forests are primary wood producers in the world. Actually, 23% of industrial logs derive from Europe (excluding Russia), and the European forestland accounts for 5% of total global forest surface. In Croatia, 90% of total forest surface is made up of management forests intended for production (Forest management area plan for the period 2006-2015).

Forestry is an equally important industrial sector in Europe as it is in the Republic of Croatia. The forest sector share in gross domestic product accounted for 1.4% in 2009 (0.5% furniture industry, 0.4% cellulose and paper industry and 0.5% wood and wood product industry). Accordingly, forestry share in gross domestic product totals additional 1% (Motik et al. 2013). Total fall of the real Croatian GDP equalled -2% in 2012, with an inflation rate of 1.9% (Anon 2012).

Total land surface of the Republic of Croatia is 56 594 m², of which 42.4% accounts for forest covered surfaces, while the forests cover 47.5% of the land surface in relation to total forestland. This makes Croatia a densely forested European country (Anon 2006). According to the First National Forest Inventory in the Republic of Croatia (Čavlović, 2010), total forests and forestland area equal 2 580 826 ha, while forested areas account for 2,377,686 ha, of which 77% are state owned and 23% are privately owned. According to that, total growing stock is 552,146,000 m^3 (Čavlović, 2010). The annual cut in state forests is 7 325 000 m^3, and 1 087 000 in private forests (Posavec, S. et al., 2011). Structure of planned allowable cut per main groups of assortment for all forests in the Republic of Croatia is shown in Figure 39.

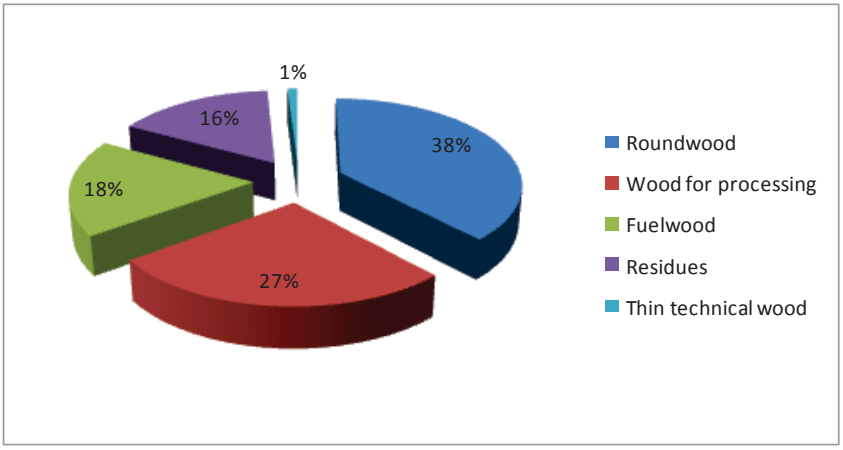

Figure 39. Structure of planned allowable cut per main groups of assortment for all forests in the Republic of Croatia (FAO 2007)

In developed economies, forestry and wood processing achieve direct and indirect multiplicative results. Considering the available forest potential, this sector has a great development potential in Europe. The added value chain consists of three main areas: forestry, consisting of cultivation, landscaping and exploitation; primary wood processing, which includes sawmills, and paper production, processing and drying of sawn timber, production of wall and floor covering; secondary processing encompasses the production of furniture and wood products with high added value. Being informed about the potential of the wood assortment production, in the sense of quality and quantity, as well as the analysis of the demand on the market of furniture and other wood products directly influences the related companies and their future business success. (Motik, 2002, 2013).

5.2. PRIMARY WOOD PRODUCTION

Croatian forests are composed predominantly of broadleaved (62.07%), then coniferous (6.45%) and mixed forests (18.58%), while the rest of forests are young plantations (12.85%). Tree species with the biggest share in growing stock are: beech – *Fagus sylvatica* L. (36.44%), oaks - *Quercus robur* L. (14.83 %) and *Quercus petrea* L. (8.35%), hornbeam – *Carpinus betulus* L. (5.34%), and fir – *Abies alba* Mill. (9.38%). The share of natural or semi natural

forests is 95%, with majority autochthonic tree species (96.35%). In terms of forest types and forest origin, most of them are high forests (57.90%) some belong to coppice (23.56%) and some to mixed forest (15.36%). There are only 0.06% of plantations and 2.65% of cultures in Croatia. The average growing stock in Croatia is 232.22 m^3/ha, in state forests it is 255.84 m^3/ha and in private forests 155.84 m^3/ha. Growing stock for the main forest species and their share is shown in Table 11.

Table 11. Growing stock for the state forests managed by Hrvatske šumeLtd. (Čavlović 2010)

Tree species	**mil. m^3**	**share %**
Pedunculate oak	68,36	14,61
Sessile oak	39,39	8,42
Common beech	174,8	37,35
Ash	17,43	3,73
Common hornbeam	38	8,12
Fir	33,95	7,25
Spruce	12,43	2,66
Other species	83,67	17,77
TOTAL	468,04	100

Croatian forests Ltd. have been FSC certified since 2002. This means the forest is managed in compliance with strict ecological, social and economic standards. This certificate represents internationally acknowledged and certified method of forest management within Croatian forests Ltd. in compliance with strict norms. This is huge recognition for the Croatian forestry as a profession that has been responsibly managing this extremely significant national resource. In the forests they manage, the annual cut of Croatian forests Ltd. is below increment, which ensures sustainable management. The annual cut of Croatian forests Ltd. is 5.5 million m^3 on average, which represent considerable potential for obtaining heating and electric energy from the biomass. Wood, as raw material, is obtained as a sequence of interconnected and mutually dependent actions, that is, cutting and manufacture (phase I) and wood transport (phase II and III). There are three main components: biological, technical and economic. Table 2 shows the produced quantities of wood assortments for the main industrial species for the period 2008-2012.

Table 12. Wood assortments production by species and quantities

	Year				
	2008	2009	2010	2011	2012
SPECIES	**ROUNDWOOD [m³]**				
Pedunculate oak	488.884	455.030	420.496	458.748	451.903
Sessile oak	169.035	161.231	137.478	161.629	171.452
Common beech	802.729	731.707	707.486	852.783	863.014
Ash	130.514	85.580	115.675	132.158	111.149
Common hornbeam	56.878	46.149	77.091	90.776	75.404
Fir/Spruce	374.800	365.209	326.129	422.197	419.076
Other species	234.033	172.609	207.186	205.426	167.803
TOTAL	2.256.873	2.017.515	1.991.541	2.323.717	2.259.801
	THIN TECHNICAL WOOD [m³]				
Oak	6.870	2.975	2.185	3.091	4.159
Common beech	3.640	1.525	1.814	6.674	7.155
Conifers	2.779	3.563	3.163	4.386	2.144
Other species	12.653	6.950	9.100	36.928	21.821
TOTAL	27.666	15.013	12.263	51.079	35.279
	WOOD FOR PROCESSING [m³]				
Oak	125.460	133.065	145.926	111.373	126.766
Common beech	420.766	357.938	409.641	445.973	419.583
Conifers	221.309	187.340	194.465	200.186	177.998
Other species	272.471	239.894	294.299	332.494	278.169
TOTAL	1.040.006	918.237	1.044.331	1.090.026	1.002.516
	FIREWOOD [m³]				
	1.032.016	1.223.391	1.247.314	1.467.708	1.428.436
TOTAL	4.356.561	4.174.156	4.295.449	4.932.530	4.726.032

The wood processing carries the potential of advanced technology use at proper knowledge transfer. It carries the fundamentals for the profitability of forestry. It finds its role in a market economy of material circulation within the over-all view energy-environment-economy-market (Jelačić et al. 1999, UNECE 2012).

The annual cut plan for 2012 was executed within the set framework, achieving 102.3% with increased realisation of cordwood in relation to the plan. The business year 2012 did not bring any significant changes in the production of wood assortments in relation to the year before. Total production stood at 4.823.785 m³, slightly less compared with 2011, the record year of Croatian forests Ltd. since their foundation. It is presumed that every year sustainable management will achieve income from cutting and income from thinnings, and afforestation will be invested in every year, with other administrative and similar costs arising. (Posavec 2002, 2006, 2011).

5.3. WOOD ASSORTMENTS SALE

The market price of wood and cost increase is a significant indicator from the point of view of the long-term horizon of forest production, and consequently long-term planning. The price range in the trade of wood and wood products depends on seasonal and multiannual fluctuations of offer and demand. Forest companies are limited by regulations and time dynamics of cultivation and exploitation in the forest. For this reason, the wood assortment production is of a seasonal character and it cannot meet the increased demand in certain parts of the year. In international trade, forest companies are faced with competition and offer of wood from other parts of the world, which causes price decrease. The global energy crisis has reinstalled the wood's position as an important energy product, which will increase the demand and prices. A more expensive price of the workforce is another significant limiting factor, however, productivity increase, as a response to higher expenses, is limited by biological laws of the forest growth as well as disposal and ownership right. Table 3 shows average prices for basic wood species for the period 2008-2012.

In 2012, Croatian forests Ltd. sold 4.726.032 m³ wood assortments, the total value of HRK1.497.604.367, which is 105.96% in relation to the sales plan. The majority of the logs were sold according to contract, 2.121.581 m³, which accounts for 93.88% of total sale of logs. In relation to total sale of logs, a total of 9.560 m³ or 0.42% was sold at local auctions. At international auctions, the result was 80.329 m³ or 3.55%. A smaller share of logs 48.331 m³ or 2.14% was sold at the cash-desk. Implementation and monitoring of selling wood assortments to the foreign market is performed by the Committee for Implementation of the Directive on

Auctions of Specific Wood Products, consisting of the Representative of the Ministry of Economy, Labour and Entrepreneurship, Customs and Representative of Croatian forests Ltd.

Table 13. Wood assortments sale in average prices by species

	Year				
	2008	2009	2010	2011	2012
SPECIES	**ROUNDWOOD [Eur]**				
Pedunculate oak	130,46	125,3	118,01	125,56	122,78
Sessile oak	80,79	76,82	69,27	74,3	74,7
Common beech	47,81	40,93	40,53	41,46	42,91
Ash	96,29	78,54	75,36	84,77	83,58
Common hornbeam	28,34	27,55	27,28	27,28	27,55
Fir/Spruce	53,11	50,46	49,8	49,93	50,2
Other species	50,73	49,4	52,72	49,4	53,64
TOTAL	70,73	66,23	63,97	64,5	64,9
	THIN TECHNICAL WOOD [Eur]				
Oak	31,66	31,26	31,39	31,26	31,92
Common beech	29,4	30,99	30,33	30,73	29,54
Conifers	47,81	55,1	58,28	52,85	57,09
Other species	27,95	28,08	27,95	29,93	30,73
TOTAL	30,2	31,26	30,86	32,05	32,19
	WOOD FOR PROCESSING [Eur]				
Oak	22,65	21,85	22,65	23,97	21,46
Common beech	32,98	31,39	30,73	30,99	29,4
Conifers	17,09	16,56	18,15	19,74	19,6
Other species	23,44	23,18	23,84	23,97	23,18
TOTAL	25,83	24,77	25,3	26,09	24,9
	FIREWOOD [Eur]				
	16,56	15,89	15,23	16,56	17,75
TOTAL	45,83	41,85	40,66	41,46	41,99

With the purpose of organising and regulating the relations with the wood-processing sector, Croatian forests Ltd. and the representatives of the wood industry with the Croatian Chamber of Economy, with the agreement of the Ministry of Economy and Ministry of

Agriculture, initiated manufacture and organisation of a new sales model of logs. With mutual understanding of the economic momentum and problems affecting the competitiveness of the wood industry, a consensus was reached, which resulted in signing the Letter of Understanding in December 2012. This set a framework which defines the method, conditions, criteria and discount policy of selling logs through multiannual framework (up to 10 years) and annual contracts. Pursuant to the mentioned agreement, imbedded in Articles 20 and 21 of the Price List of the Main Forest Products, Croatian forests Ltd. published the Public Tender for Selling Logs on December 22. This way a new business policy for selling logs was defined, and it will promote the development of the final products' production as well as ensure stable supply of the wood raw material for all interested groups wood processors, from smaller sawmills to big-sized finalists in the forthcoming mid-term period.

On home market, the higher demand was recorded for logs of common beech, pedunculate oak, fir, spruce, ash. Lower interest was recorded for the logs of poplar, hornbeam and chestnut. In the export of beech logs prices were cut and they were higher for the logs of oak and ash. Wood assortments are mainly exported to Italy, Slovenia, Austria, Germany, and some minor volumes into Egypt, and Bosnia and Hercegovina (Motik et al. 2013).

5.4. PRODUCTION PRICES AND TRENDS IN FORESTRY

Production trends during the past decade clearly show a growing trend in the production of roundwood and cordwood, while average prices are in decline (Figure 40). The production growth resulted in larger quantity of goods on the market and changes in the offer and demand relation, which led to lower individual sale price of roundwood and cordwood. The trend of the wood assortments production refers to the increase in the annual cuts on the state level (currently ranging around 5.5 million m^3), which will have a strong impact on the assortments' price. It is important to note that the average price of wood in the Republic of Croatia totals €41.4, given the fact that technical wood reaches an average price of €65.6, and cordwood €25.2. Equal ratio of the produced roundwood and cordwood conditions equal average price on the level of Croatian forests Ltd.Table 14 shows the production of wood assortments for the past five years, while Figure 40 shows the production trend of the past decade.

Logs and thin roundwood are presented together in Figure 2 as Roundwood, than cellulose wood and firewood are joined in Cordwood.

Table 14. Wood assortments production from 2008 to 2012 in m³

Year	Logs	Thin roundwood	Cellulose wood	Firewood	Total
	m³				
2008	2.194.752	62.914	1.040.006	1.115.623	4.413.295
2009	2.128.740	68.116	854.774	1.122.526	4.174.156
2010	1.991.541	12.263	965.528	1.326.117	4.295.449
2011	2.323.717	51.079	1.090.026	1.467.708	4.932.530
2012	2.280.167	15.326	1.002.516	1.428.436	4.726.445

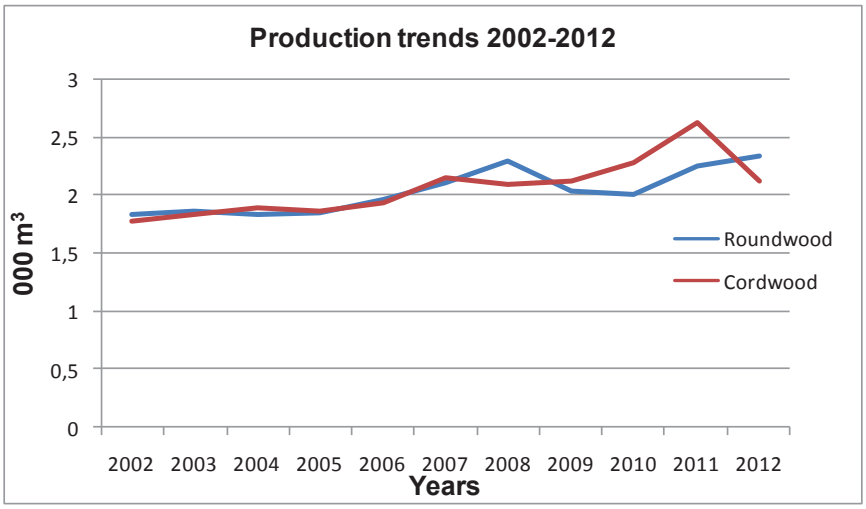

Figure 40. Production trend for roundwood and cordwood

Since the result of cutting (according to the former management basis) for the period 1996-2005 is only 57% of the prescribed cut, and since the demand for firewood ranges from 100 000 to 200 000 m³ per year, and since the long-term management programme for the period 2006-2015 increases the production of cordwood (mainly firewood, branches and residues from cutting and manufacture) by 1.2 million m³ per year, it is estimated that the quantity of the wood biomass as an energy product will total over 2.6 million³ in state forests only. The mentioned quantity should be added up with the biomass in the forests for special purposes, biomass for energy of forests on karst, biomass from the recovery of fire areas on

karst (on average around 70 000 m³ per year), additional investment in degraded forests and raising new cultures for energy purposes, which is envisaged by the development programme of Croatian forests Ltd. 2025. 60% of the estimated quantity of the forest biomass as an energy product can still be used as firewood, and chopped wood as a new product, while 40% (1.0 million m³) of the chips production can be used for energy. Table 5 shows total sales value of the main wood assortments for the past five years, and Figure 3 shows the trend of the sales prices for the past 10 years.

Table 15: Sales value by groups of wood assortments from 2008 to 2012

Year	Logs	Thin roundwood	Cellulose wood	Firewood	Total
	EUR				
2008	155.196.539	1.902.548	26.925.556	18.433.195	202.457.838
2009	137.099.315	2.408.870	20.129.645	17.841.473	177.479.303
2010	123.712.944	438.544	23.300.557	22.355.817	169.807.862
2011	149.888.709	1.639.369	28.420.753	24.325.987	204.274.819
2012	146.793.596	1.137.752	24.994.907	25.431.938	198.358.194

Average prices for the long term period (10 years) have strong variations due to the problems with demand during the last 6 years.

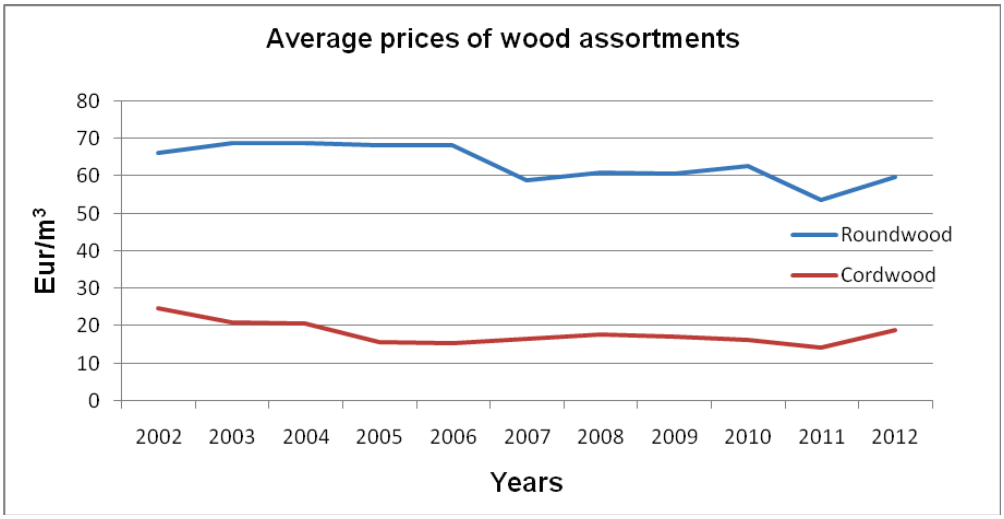

Figure 41. Trends for wood assortments prices for years 2002 - 2012

Even though the value of total sales of wood assortments was high in 2008, the price of the roundwood plummeted in 2007 as a result of the global recession, with a slight recovery visible afterwards, followed by another fall of average prices and increase in total value in 2011. The removals of industrial roundwood in the UNECE region increased by 2.4% in 2011, reaching 970 million m³, recording a higher percentage increase in hardwood logs than softwood logs. Higher demand for logs by sawmills in the UNECE region and a substantial increase in log exports to China, from Europe, North America and the Russian Federation, all contributed to bigger harvests in 2011. Nevertheless, the rate of harvest throughout the region is well below the rate of forest growth. Removals in 2012 and 2013 are expected to remain at the same level. ECE/TIM/2012/

5.5. DISCUSSION AND CONCLUSION

There is no doubt that the Forestry and Wood Processing Sector in the Republic of Croatia certainly has high growth potential and the possibility for creating new work positions, especial in rural areas with the highest unemployment rates. The number of the employed in the Forestry and Wood Processing Sector in the Republic of Croatia totalled around 30 000 in 2009, which is 1.9% of total number of the employed. There are around 9000 people working in forestry, mainly in the state-owned company Croatian forests Ltd. The industries in the EU countries based on forestry represent one of the most important industrial sectors, with an approximate 10% share in creating new added value, that is, employment.

Consumption of forest products in 2011 remained flat in most of the UNECE region, 10% lower than before the global financial crisis. But in the Russian Federation, consumption grew by 9%. In spite of the continuing uncertainty and the difficult economic conditions, the consumption of some forest products showed slight growth in 2011. Forecasts of consumption are for further weakness in 2012 (-0.9%) with a slight uptick in 2013 (0.5%), led by North America (UNECE Timber report 2012)

The industrial wood processing in Croatia has significant comparative advantages. The availability and accessibility of quality raw material, particularly quality oak and beech wood, as a century old tradition in the industrial wood processing, are usually considered as the main comparative advantages of this sector.

The sale of wood raw material has to have the function of finalising wood products. Croatian producers of final wood products have a priority in continuous purchasing of the wood raw material determined by multiannual contracts, considering that they exercise their right proportionally to the finalisation level. Croatian forests Ltd. are obligated to offer the remaining quantities of the raw material for local bidding, while the assortments which lack processors or any interest of the local industry must be offered on an international level.

Wood processing and furniture production of the Republic of Croatia developed on a highly valuable forest raw material, and their work is based on its exploitation, long tradition of wood processing and quality human resources. Therefore, this activity is an important segment of Croatia's economy (Pirc et al.2010). New trends in furniture design and production will cause changes in the demand of certain wood species. Due to predetermined management regulations, conditioned by biological characteristics, forestry companies are unable to give a timely response to the demands of certain trends.

To strengthen the competition and placement on the local as well as international market of the industrial wood processing of the Republic of Croatia, professional help of all interested parties will be crucial. Professional help also includes the related institutions adopting priority development documents.

Contemporary forest systems of developed countries and interconnected systems for wood processing, furniture production, paper production and processing, wood and wood products trade are the generators of complex and cumulative effects of high multiplicative force, significant for economic development.

According to the Forest Resources Assessment (FRA 2011), linkages between the forest industry and the energy, chemicals and food sectors are becoming more evident, while policies that drive renewable energy, climate change mitigation and food security all influence the forest industry, both directly and indirectly.

In the economy of the Republic of Croatia, the significance and role of forestry, wood processing, furniture production, paper production and processing, wood and wood products trade is insufficiently highlighted only with data on their quantitative share. The connection and mutual dependence, especially with chemical industry, metal processing, production of tools and machines for wood processing, as well as transport on the entry side, and construction, trade, science, infrastructural institutions, investment and personal spending as well as export

on the exit side show this economic activity is an important factor of the economic development of the Republic of Croatia.

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