

Mechanical Hardwood Processing Potential in New EU Countries

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Abstract

This paper describes the possibilities in recent associated EU-countries in the area of mechanical hardwood processing. The development potential is based on raw material resources and exploring production capacities. The main stress is focused on the broad-leaved species and the sawing industries. The country review is limited to the most significant ones concerning forestry and mechanical wood processing, therefore, Malta and Cyprus are not included.

The production factors are collected from the European statistical office (Eurostat) and Food and Agriculture Organisation (FAO) databases. The first part of the statistical material is for the years 1998-2004. The 2004 figures were analysed by using a modified type of theoretical model for the timber market which was multiplied by the common sawn timber yield.

The results show that hardwood production has developed in all countries in the last few years. The biggest changes have occurred in the Baltic countries. Latvia and Estonia have developed most rapidly. During the last ten years they have doubled the sawn wood production. According to sawn hardwood production Latvia and Poland are the biggest producers. The biggest possibilities are also in these countries because of current high export figures. Comparing present situation towards reserves the most potential country seems to be Hungary.

Key words: Hardwood resources, transitional countries, development potential

Introduction

On the first of May in 2004 ten countries joined the European Union. This developed the forest areas inside the EU region. The present situation changed a lot, because overall forest areas have grown 24 million hectares as new members united. This increased commercial forest areas circa 31 % (Karjalainen and Enroth 2003). In the new EU countries (so-called transitional countries) the commercial forest share is between 85-95 % from all forests (*Talous ja sosiaalilukometean...* 2000). The enlargement also increased the medium volume per hectare. According to Karjalainen (2004) the medium volume is 2.5 times bigger in transitional countries than in Finland and many of these countries have increased the commercial forest and are still increasing. The association of the new countries have brought also other advantages. Because the new members develop mainly wood processing industries and are export orientated, the EU-25 has become more self-sufficient (Csóka 2003).

In transitional countries the tree species are widely spread. Overall the forests are not spread homogeneously. Coniferous trees are mainly concentrated in

northern Europe, and broad-leaved like oak and beech are more common in Southern Europe (Global land cover... 2005). Generally the line can be located as in the Czech Republic, where the main areas are covered by coniferous trees. In later text these countries are valued as group Central- and East-European countries (CEE-8).

According to the Temperate and Boreal Forest Resources Assessment (TBFRA) made by the UNECE (2000) the most significant country is Poland on the criteria of broad-leaved forests. Because this research is quite old, some figures are modified based on revised researches (Schelhaas *et al.* 2003, NOLTFOX database 2006). As shown in Table 1, in Poland there are over 2 million hectares of broad-leaved forests, which means that circa 7.3 million m³ have been cut down per year. This area makes it the largest feller in the CEE-8. In 2000 Poland harvested circa 74 % compared to the annual increment. The forests are divided into pure broad-leaved forest (15 %), mixed broad-leaved (18 %) and the rest is coniferous (Grzegorz 2000).

The broad-leaved species are more common in the Slovak Republic, Slovenia and Hungary. The most

broadleaved intensive country is Hungary, whose share is almost 80 % of the reserves. According to the European Forest Institute (EFI 2000) Hungary has 10 % mixed forests. This means over 1.3 million hectares is broad-leaved forests. Hungary has the second largest broad-leaved reserves and it is cutting 61 % of its increment. The annual increment per hectare is almost 30 % higher than in Poland (ENRIN 2004). The smallest country Slovenia has around 0.4 million hectare of broad-leaved forest. In this area the most common species are beech (44%), fir-beech (15%) and beach-oak (11%) sites. These sites are usually of a relatively high production capacity (Rozenbergar and Diaci 2003).

Table 1. Forest reserves in CEE-8 in 2000 (UNECE 2000, Schelhaas *et al.* 2003, NOLTFOX database 2006)

Country / factor	CZ	EE	HU	LV	LT	PL	SK	SL
Forest available for supply million ha.	2.60	2.27	1.70	2.70	2.10	8.90	1.70	1.05
Broad-leaves million ha.	0.34	0.40	1.34	1.0	0.59	2.01	0.85	0.39
Annual increment (NC) million m ³	3.27	3.07	8.36	4.63	3.23	6.37	6.50	3.23

The third biggest hardwood reserves are in the Slovak Republic. The composition is circa 58 % broad-leaved, which is mainly beech and oak. The Slovak Republic is harvesting circa 3 million m³ per year. For these three major reserve holders (Poland, Hungary and Slovakia) the expectation is that the amount will be the same in the future even though the forest area has decreased since the 1970's. The reason for the expectation is that at the same time the wood stock has increased (Csóka 1996, Novotny and Fillo 1997, Grzegorz 2000). The beech and oak are the main species when it comes to the use of hardwood. Today's market shows a strong demand for European oak logs and sawn lumber, while the demand for beech continues to decline (*hardwoodmarket.com* 2005). In Baltic countries the major hardwood is birch. The biggest reserves are in Latvia, which has the third or fourth highest rate of annual fellings. In recent years it has achieved third place. According to Bikis (2005) in 2004 the total round logging is around 11 million m³ in Latvia. The cutting is mainly birch, which means circa 3.4 million m³. This seems to be sustainable cutting, because the total average annual increment is around 17 million even the share of harvesting has increased by 85 % since 1995. The different sources show same kind of statistics to Estonia. According to Estonian Forest Industries Association (EFIA 2006) the total felling in 2005 was 7 million m³ and the annual increment is 10-12 million m³. Overall the big change has happened in Baltic countries since the end of 1990, when they approved their own forest policy. These programmes outlined several goals, which included increase in forest land, sustainable forest care, preserve biologi-

cal diversity and the balance of public and forest owner interests. For example the latest promotion and research co-operation NOLTFOX was launched in 2005 (Toivonen and Mäki 1999, Bomersheim 2001, Karjalainen and Enroth 2003, Karjalainen 2004, Toppinen and Toropainen 2004, Baliuckas 2005, EFIA 2006). As the felling figures and forest reserves are discussed there should be noted the meaning of forest ownership and forest policy (Brukas 2004, Mizaras and Mizaraitė 2004, Tarasiuk and Jednoralski 2004). However this article has focused on processing point of view and these factors are not included.

Today there are several different study methods for evaluating development potential. One is the so called comparative development method. Before this theory the forest sector evaluation was mainly based on forest resources. On analysing the sawing industries development potential, the raw resources appear to be the key factor. According to Niskanen *et al.* (2000) this method "comparative development" has focused on advanced production lines, technological development and new product research. Hyttinen *et al.* (1996) has also edited proceedings, which consists of the same development ideas in the forest sector. Hänninen (2004) mentioned that recent research suggests for more open forecast models, since changes occur all the time. Glück *et al.* (1998) also mentioned, that evolving development theories should be used differently at different development stages. This gives the idea to adapt and analyse the development potential in the hardwood industries. These statistical facts are usually collected from primal production figures. It means raw resources (felling) and sawn/pulp/fuel wood production. This leads to more inaccurate facts, but much faster analyses and more focused on the effects from past years. Jaakko Pöyry Consulting (2004) also brings out the fact that primal production will be created through local forest resources. If the evolution method is translated to short-term potential it can be seen as an equation involving the present sawn wood production and annual increment. This gives the basic frame to restriction in the wood processing industry subject to enough employees, capital and available production facilities. According to Tiusanen *et al.* (2004) the investment climate is quite good concerning employees and capital and when capital investment is made as a foreign direct investment it can also consist of production machines. This gives more possibilities to use resources. Tiusanen (2003, 2004a, 2004b) and Bracken-Horrocks (2004) also studied the effects that the EU has on the new EU-countries. These studies show that CEE-8 has attracted investment efficiently. Generally areas are competitive as a result of reserves and low labour costs. An even more

focused proposal was made in the study of Larson and Wikström (2002) where they stated that the economics will continue to grow mainly due to domestic demand, the export will however, suffer weakened external demand.

In this study the countries Czech Republic (CZ), Slovak Republic (SK), Slovenia (SL) Hungary (HU), Latvia (LV), Lithuania (LT), Estonia (EE) and Poland (PL) are analysed. The research measures the relative surplus, which shows possibilities on CEE-8. The results can be used only to certain limitations. The development potential is based on raw material resources and existing production capacities.

Material and methods

The production factors are collected from the European statistical office (Eurostat) and Food and Agriculture Organisation (FAO) databases. The time series is focused on the period between 1998-2004. The material consists of four different statistics. Log production figures show total production of veneer logs plus sawn logs. The sawn wood total production of the primary products is reported, even though a portion may immediately be consumed in the production of another commodity. The import and export figures are not accurate since only the industrial roundwood as a whole is reported, because there are no statistics on the saw log import. The veneer production figure has not been observed, because there are no exact data on non-coniferous plywood and veneer sheets.

The evaluation method is a simple balance calculation. The import figures are added to the log production figures. This import figure includes the total figure of imported non-coniferous logs, so this gives the total supply amount of logs. The sawn wood production is multiplied by the yield factor. This gives the amount of used logs. The yield is the average (2.5) value from the sawmill industries statistics. If only very big logs are sawn the yield can be lower. Because of that this, evaluation yield has counted by using two values 2 and 2.5. It reflects the medium saw productivity level, which is relatively same in every country. When these two factors are counted together the result shows the balance. This so-called “surplus factor” also shows up as a possible log export figure if the statistics are correct.

The reliability of these statistics has been also criticized by researchers. Kärkkäinen (2006) showed that in old statistics some of the numbers was fixed downward, because restriction of production and taxation (also illegal logging). According to Pulkki (1997) the major problems exist in tropical forest areas. This has changed a lot and today’s statistics of

EU region is quite right. Some of the difference comes from different measurement units. This means few of the countries measures different part of the log or they just count the share of non-coniferous wood based on some formula. The FAO statistics has also changed the limitation during time for example Czechoslovakia, which was split in 1992. This material is collected after 1998, so this kind of errors should harm results. Even the statistics are not exactly right the development phenomenon can be analysed.

Results

In recent years the biggest hardwood log producer has been Latvia. It has achieved intensive development and huge improvement since 2001. Latvia has increased its production almost twice in such few years (Figure 1). In 2004 production figure was almost 3.8 million m³. Before year 2001 the biggest producer was Poland, where the development has been started in 2002, but it has not been so aggressive as Latvia. Still the amount of production has been risen over half million m³. The third biggest log producer has been Lithuania or Hungary depending on the year. In 2004 both countries produced circa of 1.4 million m³. According to this statistics the other CEE-8 countries are so-called small players by producing less than one million m³. For example in 2004 Slovenia was producing circa 265,000 m³ and in the Czech Republic the figure was around 600,000 m³. The overall outlook also shows more stable development among “small” producers. When the figures are modified as percentage share of total log production the highest share is in Hungary. Its share in 2004 was 85 %. The second relative biggest log producers are Latvia (48 %) and then Lithuania (40 %). When these figures are compared to felling figures share is around half, which is due to pulpwood. All together most of the hardwood logs are

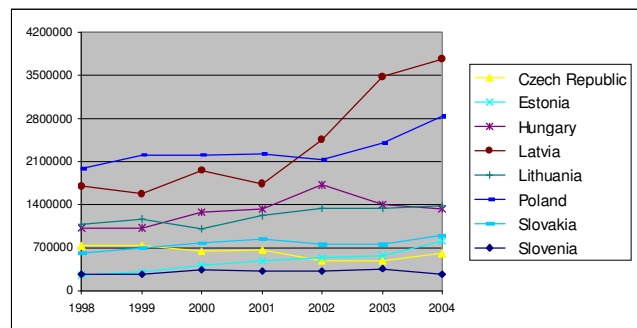


Figure 1. Non-coniferous sawn + veneer logs production (m³) in CEE-8. (FAO 2006)

used directly in the pulp and paper industries. In 2003 the figure was little bigger for pulpwood (11.1 million m³) than in sawn industries (10.8 million m³). For fuel wood the amount was 6.8 million m³ and for the other industrial use 2 million m³.

Overall sawn hardwood production was circa 3.6 million m³ (30 % from EU-25) in CEE-8 in 2004. Behind these statistics here can be mentioned that there was a boom period between 1996-1998. After this period the development has been slower.

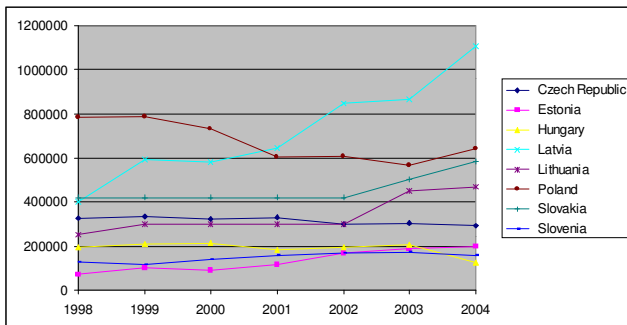


Figure 2. Non-coniferous sawn wood production (m³) in CEE-8 (FAO 2006)

Poland was the biggest producer of sawn wood hardwood production until 2001. After that Latvia took first place. This is mainly due to the constant sawn industry development in Latvia and Poland declining production figures. Figure 2 shows that Latvia was producing 1.1 million m³ of non-coniferous sawn wood in 2004. The transformation has been dramatic. The level of production has almost tripled between 1998 and 2004. This effect has significant influence on trade. In last two years the other bigger production countries (Lithuania, and Slovak Republic) have also increased the production. According to FAO in 2004, the combined sum of these two was over million m³ of sawn hardwood. The smallest producers in CEE-8 are Slovenia, Estonia and Hungary. Each of these are producing around 200 000 m³.

The statistics shows also an interesting result as total production and consumption of lumber development is analysed. The average growth percent of production has been around 6 %. Import of lumber has increased much faster since the average growth has been 16 %. The average change of exports has been

Table 2. Total production, import and export of sawn hardwood in CEE-8 (FAO 2006)

Year / factor	1998	1999	2000	2001	2002	2003	2004
Production (1000 m ³)	2573	2861	2797	2760	3107	3254	3577
Import (1000 m ³)	350	508	577	617	684	652	797
Export (1000 m ³)	1545	1679	1823	1789	1847	1975	1688

only 2 %. Still region CEE-8 is net exporter, because in 2004 the export amount was almost 1.7 million m³ and the import was only 0.8 million m³.

Inside these figures there are big differences. According to FAO (2006) Latvia was importing 13 000 m³ sawn hardwood in 2004 as the export figure was 0.56 million m³. The other CEE-8 countries have kept their production to a constant level, except Poland where sawn wood production has decreased from 1996 and today the number is around 600 000 m³. Although lumber consumption is evaluated, Poland has quite good balance as export and import are compared (the surplus from import 30000 m³).

Obviously the biggest log importer is Poland. It has imported between 300-500 000 m³ per year and in 2004 the milestone on 0.6 million was broken down (Figure 3). The logs are mainly imported from Germany (around 50 % of total import) and major species are oak and beech. The next biggest importer is Slovenia, which has imported around 300,000 m³. Besides from Germany the imports come from Austria and Italy. During the last years the stable increase in import has brought Latvia at same level. The statistics also shows that the same phenomenon has affected other Baltic countries. After huge storms in 1999 the most significant impact was on the Czech Republic. It doubled the amount of import in three years, but after that it has been declining. Other countries are importing less than 200,000 m³. Also the total import has been increasing and it can be consider as the clear mark of the current trend import from Russian Federation.

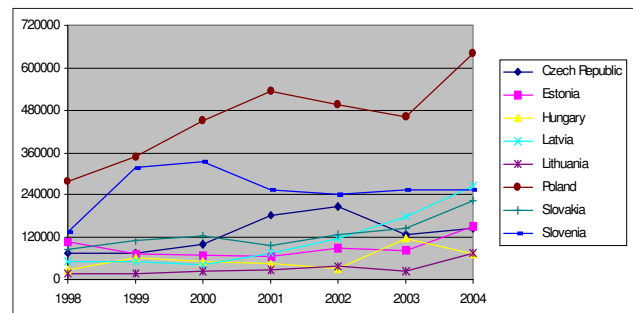


Figure 3. Non-coniferous logs import (m³) to CEE-8 (FAO 2006)

Overall export development has been quite stable. In recent years the big exception has been Latvia, which has increased export from 1.6 million to 2.3 million m³ (Figure 4). Before that the most rapid change has been in Latvia and Estonia. The biggest changes cannot be seen, because they happened between 1993-1998. Over the last few years Estonia has decreased the export. The most evident phenomenon of windthrows in 1999 is the changes of exports from Slovakia. The inside balance has also changed since

Slovakia has begun to supply Poland with hardwood logs and sawn wood in order to supplement what is available from the domestic resource. The interesting feature in export statistics is that Poland has the lowest export amount. The current trend seems to be downward as the total export has been drop over million m³ in recent years. One reason for this has been increasing processing industries investment, which has increased local production and consumption.

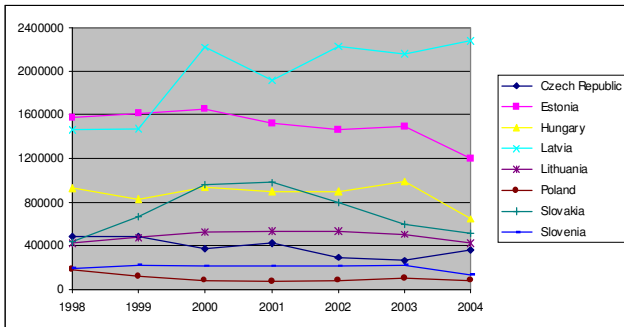


Figure 4. Non-coniferous logs export (m³) from CEE-8 (FAO 2006)

The balance of log consumption shows the reliability of the figures and the possible potential to increase the sawn wood production by decreasing the export. In Table 3, the surplus indicates the amount, which could be exported and under that the percentage figure shows the share from total supply. Under import figure the present shows the share of logs production. To understand the meaning of sawn hardwood supply, there percent under log production, which shows share of total hardwood log production (pulp and paper + fuel logs + sawn veneer logs). This share does not give any exact values how much fellings are directed to sawn logs, but it gives interesting comparison countries, which forest reserves are near each other. For example Hungary and Slovakia, which are most hardwood intensive countries have both 28 % share of sawn logs. Latvia has the best figure, as they are using over 60 %. Table 3 shows that Hungary, Latvia and Lithuania have relatively the lowest import figure. The biggest difference in imports is Slovenia's import factor. This predicts the cheap import logs or insufficient resources. If the sawmilling industry is going to keep the current production level the felling proportion must be increased or the import must be increased.

If Slovenia is depending on import of Poland, the situation can be seen *vice versa*. The biggest surplus is in Poland, which is not surprising since it has increased logs production and decreased sawn wood production. However, Poland has a lot more pulpwood than

other countries and yet it has quite a big import factor considering it is self-sufficient on raw material. In Poland the industrial log export was less than 0.1 million m³. This means that the major part of sawn and veneer logs have been used on plywood manufacturing (in 2004 0.35 million m³) and the rest has gone pulp and paper raw material. In Hungary there is low sawn wood production. Still the surplus in Hungary is almost one million m³, which is equal to the high export figure. The surplus after export and own production can be partly explained by the use of fuel wood. The major part of Hungarian hardwood is used to produce energy and pulp. In other countries the statistics are not easy to open. After comparing the surplus to export figures, the outcome is negative. The main reason is statistics that do not separate pulp and sawn logs.

Table 3. The balance in log use as a result of import log, log production and domestic production of sawn wood in 2004. The numbers are in thousand m³ (FAO 2006, modified)

Country	CZ	EE	HU	LV	LT	PO	SK	SL
Imported logs	145	152	71	266	77	642	224	255
Log production	24%	19%	5%	7%	6%	23%	25%	96%
Sawn wood production	609	800	1337	3767	1385	2839	902	265
Surplus of logs (yield 2)	36%	20%	28%	63%	52%	31%	28%	27%
	292	200	123	1108	470	641	586	157
	24	451	1101	1263	287	1878	-339	128
	3%	47%	78%	31%	20%	54%	-30%	25%
	(170)	(551)	(1163)	(1817)	(552)	(2199)	(-46)	(206)

In Latvia, Lithuania and Slovenia the surplus is quite similar. Currently their surplus has been 20-30 % depending on the year. In Estonia the figure has been a little higher, which presumably is the result from the resent trend in veneer business. The exception is the Slovak Republic, which has a negative balance. This cannot be true, so some statistics is wrong. In the discussion part there is some reason given to why the statistics gives these figures.

Discussion and conclusion

Overall in CEE-8 countries the sawmilling industry has developed a lot and especially in the Baltic zone. Over the last decade, production has increased and the fastest growing countries have been Estonia and Latvia. In addition the Baltic countries have a lot of possibilities, since they have a long border on the Russian Federation. This phenomenon can be seen from results. The conclusion has been also supported by other research. According to Tilli (2005) the import will increase in the Baltic Sea region. The same kind of trend has been pointed out in resent news from EFIA (2006). These results also generally indicate that Slovenia has the highest import rate. The factor be-

hind this is simple, the near location with high export oriented and resourced countries.

In the case of Latvia and Estonia the increased sawn wood production has been outcome of improved sawing techniques. Recent development has also improved this situation, as the sawmills in Poland have invested to new machines. The third biggest lumber producer Slovakia has also challenges to overcome. Those are focused on areas of finding newer veneering facilities and local hardwood sawmills regional integration. Slovenia has quite small hardwood reserves and the import rate is high, so rapid development does not seem very realistic. The high import figure in the Czech Republic also indicates, that the development potential in view of the relative advantage is low. The investment climate seems quite good in all of these countries as the increasing production shows. The same kind of forecast was presented in the European Woodworking magazine (Wildermuth eds. 2005). If these results are compared to study of Hanzl and Urban (2000) lots have changed in better direction. The results of this study support the image that overall the statistics has been improved since 2002.

These results also address that the countries have huge differences in the type of hardwood quality. In Hungary the raw material potential is very high, but the share of fuel wood is huge so the amount of sawn wood is not so high. Another raw material consumer is the pulp factories. This phenomenon may be seen from the statistical point of view as the analyses are made from the Slovak Republic. As the surplus is negative, there can be two reasons for this. The most probably reason is that part of sawn logs has been evaluated as pulp wood that is why the sawn logs production is too small. For example according to Paluš (2003) the possibilities in the Slovak Republic are focused on non-coniferous pulpwood as it consists of 60 % of all forest assortment. There is also a mention that the reason for the statistical figures is mainly a fragment of the production segment.

According to this study, further research should be focused on major hardwood processing regions. As the results mentioned the total hardwood logs production was between 10-11 million m³, which was used to produce 3.6 million m³ of sawn wood, 0.8 million m³ of plywood (including hard and softwood) and other boards. This seems quite high figure if the production processes are controlled well. It is also shown that, in some countries the production of veneer and plywood has a significant role in the evaluation of sawmilling possibilities. For example Latvia's biggest birch veneer manufacturing company is producing circa 130,000 m³ of plywood, which means a consumption at least half a million m³ of logs. In addition there are many other

companies, which manufacture veneer sheets (Ojanperä 2004, *Latvijas valsts Meži* 2005). Therefore, additional research is needed to clarify the share of veneer manufacturing and hardwood lumber in different areas.

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ВОЗМОЖНОСТИ МЕХАНИЧЕСКОЙ ОБРАБОТКИ ЛИСТВЕННОЙ ДРЕВЕСИНЫ В НОВЫХ СТРАНАХ ЕВРОПЕЙСКОГО СОЮЗА

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Резюме

В работе выявлены возможности механической обработки лиственной древесины в новых странах Европейского Союза. Потенциал развития основан на исходном источнике древесины и существующих мощностях производства. Основное внимание направлено на виды широколиственных и древообрабатывающую промышленность. Обзор охватывает данные лесного хозяйства и механической обработки древесины новых стран, за исключением Мальты и Кипра.

Информация продукции собрана из баз данных «Евростат» и ФАО. Первая часть статистического материала датируется 1998-2004 г.г. Материалы 2004 г. анализировались на основе модифицированной теоретической модели рынка древесины, умножая на общий объем пиломатериала.

Результаты показали, что за последние несколько лет продукция лиственной древесины развита во всех странах, и наибольшие изменения наблюдаются в Балтийских странах. Особенно быстро развивались Латвия и Эстония. За последнее 10-летие они дважды увеличили производство. Латвия и Польша лидируют в области заготовленной древесины. Наибольшие возможности в этих странах на фоне высоких показателей экспорта. По сравнительной оценке настоящей ситуации запасов, наивысший потенциал обнаруживается в Венгрии.

Ключевые слова: запасы лиственной древесины, страны переходного периода, потенциал развития