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The Structural Changes and Competitiveness of the Forest and Wood Sector in the Baltic Countries within 1999-2016

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Abstract

The structural changes and the competitiveness of the forestry and wood sector in three Baltic countries – Estonia, Latvia and Lithuania – were analysed within the period 1999-2016. Different concepts of competitiveness are discussed in the introductory part to find a proper approach for empirical analysis. Time series data of international trade from the Eurostat database were used to analyse the development of forestry and wood sectors in the Baltic countries. The relative trade advantage (RTA) index was applied for assessing the relative success of foreign trade, referred to aggregated EU28. The forestry and wood sector of the Baltic countries has mainly oriented to the mechanical wood processing, which formed 68% of Estonian, 64% of Latvian and 59% of Lithuanian total output value in 2015. However, the trends are dissimilar: the expanding of mechanical wood processing was remarkable in Estonia while in Latvia the forestry and logging, in Lithuania the paper and paper products increased their share.

The value of exported goods by the forestry and wood sector has increased more than 200% in Estonia and Latvia, and approximately 500% in Lithuania during the period from 1999 to 2016. At the same time the decrease of RTA index for primary products (forestry and logging) is common for all countries.

Keywords: forestry and wood sector, competitiveness, Baltic countries, relative trade advantage index

Introduction

Improving the competitiveness and above all productivity and profitability of the whole forestry sector are key issues in many European countries (Finnish Ministry of Agriculture and Forestry 2011, Swedish Ministry for Rural Affairs 2011, Latvian Ministry of Agriculture 2006, Ministry of the Environment 2011). The EU Forest Action Plan (Commission of European Communities 2006) declares that improving long-term competitiveness is the objective for EU forestry. Key actions to achieve this objective include studying the main factors influencing the developments of the EU forest sector and research and technological development to enhance the competitiveness of the sector.

The forestry and wood sector is an important part in the economy of the Baltic countries. According to Eurostat, in 2015 the forestry and wood sector formed 4.4% of the total gross value added in Estonia, 4.5% in Latvia and 2.4% in Lithuania. At the same time the contribution of the EU28 forestry and wood sector averaged about 0.8%. The contribution of the sector to employment was 4.5% in Estonia, 4.6% in Latvia and 3.1% in Lithuania (EU28 averaged 1%).

While the forestry sector provides diverse products and services, the assessment of competitiveness is a complex task. Therefore, some theoretical issues have to be discussed in order to choose a proper indicators and methods for empirical research.

There are several ways to define the competitiveness. For example, competitiveness is:

• „... the ability of a country to realize central economic policy goals, especially growth in income and employment, without running into balance of payment difficulties" (Fagerberg 1988);

• „...the ability of a country to create added value and thus increase national wealth" (International Institute for Management Development 1996);

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• „... the set of institutions, policies, and factors that determine the level of productivity of a country" (Sala-i-Martin et al. 2011);

• „... a set of internal characteristics which are important for achieving success competing with other sectors, taking into account the specific conditions of the external environment" (Reiljan and Tamm 2005).

Paul Krugman (1994) equates the concept of competitiveness at the national level with productivity. According to Krugman the increase of the standard of living is tightly connected with the increase in productivity. Michael Porter (1990) also focuses on productivity when defining competitiveness. According to Porter the only meaningful concept of competitiveness at the national level is national productivity. „The true metric of competitiveness is the productivity of resources utilised in that location" (Snowdown and Stonehouse 2006).

In addition to different possibilities for defining the competitiveness, Reiljan and Tamm (2005) point out that competitiveness manifests itself differently in different subjects. McFetridge (1995) suggests defining competitiveness separately at three levels: firm, industry and national levels. The true nature of competitiveness is most easily understood at the firm level when competitiveness of a company is evaluated only by its final economic result – a company without a financial profit is not competitive (Reiljan and Tamm 2005, McFetridge 1995). Measures based on profitability, cost-effectiveness as well market share can be used as indicators for assessing competitiveness at the firm level.

On the one hand, it is possible to define an industry or sector as a set of firms, offering similar goods and services because in reality it is not abstract industries that compete with each other but certain companies. Therefore, it is possible to define sectoral competitiveness as a concept of competitiveness at the firm level (Reiljan 2009). On the other hand, according to the definition proposed by Trabold (cited by Reiljan and Tamm 2005), an industry can be presented as an independent subject, where competitiveness can be determined by the ability to:

• Adapt with varying conditions of the economic environment;

• Compete in both domestic and export markets;

• Compete in factor/resource markets (for labour and investments);

• The ability to earn financial profit (Reiljan and Tamm 2005).

According to widespread understanding, increasing national wealth and living standards are the targets of national economic policy. Furthermore, that is the reason why the real income of inhabitants, or changes in productivity, are used as one possibility to determine national competitiveness. The other possibility to determine competitiveness at the national level is to use trade statistics (McFetridge 1995).

According to Peneder et al. (2009), "Competitiveness is a multifaceted target for which no single and fully comprehensive measure exists". They divide ten indicators into four groups: growth, profitability, foreign trade and foreign direct investments. It seems to be a *mission impossible* to analyse all different sets of indicators in one paper, therefore we focus here on the foreign trade performance of the forest sector. Durand and Giorno (1987), when reviewing the analytical framework used by OECD, stated that the export unit value indices are the most frequently used because data are representative of goods actually competing on foreign markets.

In light of the previously outlined examples of possible definitions of competitiveness, it can be claimed that the assessment of competitiveness can be based in certain circumstances on the theory of foreign trade. Especially in the context when economies are open and rather small in a global scale, and when success of a national economy is remarkably dependent upon foreign trade.

From the macroeconomic point of view, the importance of the forest sector in the Baltic countries reveals a positive foreign trade balance. In 2016 the forest products exported from Estonia exceeded imports into Estonia by 2.63 times, in Latvia the corresponding indicator was 2.83 and in Lithuania 1.32. Abundant forest resources (367 m^3 per capita in Estonia, 340 m^3 in Latvia and 179 m^3 in Lithuania) are creating favourable preconditions for exporting forest and wood-based products. For the EU28, the same figure is 52 m^3 per inhabitant (Eurostat 2018b, authors' calculation). The sector's ability to export goods is the main factor accounting for competitiveness, by applying indices based on foreign trade.

One of the most commonly applied approaches for evaluating competitiveness is Balassa's (1965) revealed comparative advantage (RCA) index:

$$RCA_{ij} = \frac{\frac{x_{ij}}{\Sigma_i x_{ij}}}{\frac{\Sigma_j x_{ij}}{\Sigma_i \Sigma_j x_{ij}}}, \qquad (1)$$

where: X = export value; i = commodity class; j = country.

The RCA index reflects a subject's (firm, industry or a country) success in exporting, relative to a reference group. The RCA index contains all possible subsidies or other incentives, which means that it measures competitiveness rather than comparative advantage (Siggel 2006). The relative importance of a certain good or service in a country's exports compared to its reference group is expressed by Balassa's RCA index.

The main disadvantage of Balassa's RCA index is that it focuses only on exports (Vollrath and Huu Vo 1988). A successful exporter of a certain good can concurrently be a major importer of the same good. Therefore, Balassa's

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RCA index alone does not accurately express competitiveness (Frohberg and Hartman 1997). In addition, Vollrath present the index of „Relative trade advantage" (RTA), which unlike Balassa's RCA index takes into consideration both export and import statistics (Vollrath 1991; Scott and Vollrath 1992).

In Estonia, the competitiveness of the forest industry sector has been previously assessed by Varblane and Ukrainski (2004). They used the cluster approach, evaluating the competitiveness of sub-sectors and analyzing the strengths and weaknesses of exporting ability.

The aim of the current paper is to describe the changes and evaluate the competitiveness of the Estonian, Latvian and Lithuanian forestry and wood sectors, based on foreign trade data. The authors were interested in studying the structural changes in foreign trade, assuming that market share of different products indicates development in the sector. The development from primary products to intermediate and final products indicates the advance in the production and use of technology.

Material and Method

In this study the forestry and wood sector is divided into three subsectors (Figure 1): forestry and logging, manufacture of wood and products of wood, and production of paper and paper products.
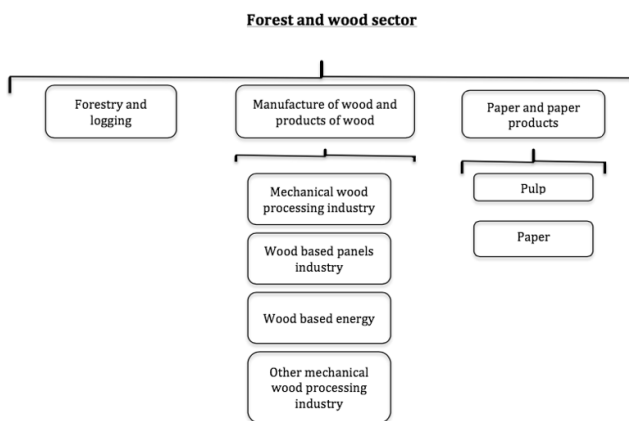
Figure 1. The structure of forestry and wood sectors used in this analysis

The data of international trade at the 4-digit level from the Eurostat database (Eurostat 2018a) were used as a source of time series data for analyzing the competitiveness of the subsectors of the forestry and wood sectors in the Baltic countries within the period 1999–2016. The data on production values by subsectors were available until 2015.

The relative trade advantage (RTA) index, offered by Vollrath (1991), was applied for assessing the relative success of foreign trade in the forestry and wood sectors. The aggregated foreign trade of the EU28 was used as a reference for assessment. The relative trade advantage (RTA) index by Vollrath (Vollrath 1991; Scott and Vollrath 1992) measures a country's exports and imports of a commodity relative to its total merchandise exports and imports, respectively, to the corresponding export and import performance of a group of countries. RTA is calculated as the difference between relative export advantage (RXA) and relative import penetration advantage (RMA):

$$RTA_{ij} = RXA_{ij} - RMA_{ij}, \qquad (2)$$

where: RXA_{ij} – the relative export advantage index; RMA_{ij} – the relative import penetration index.

The relative export advantage index (RXA) is calculated as follows:

$$RXA_{ij} = \frac{\frac{X_{ij}}{\Sigma_i X_{ij}}}{\frac{\Sigma_j X_{ij}}{\Sigma_i \Sigma_j X_{ij}}}, \qquad (3)$$

where: X = export value; i = commodity class; j = country.

The relative import penetration index (RMA):

$$RMA_{ij} = \frac{\frac{M_{ij}}{\Sigma_i M_{ij}}}{\frac{\Sigma_j M_{ij}}{\Sigma_i \Sigma_j M_{ij}}}, \qquad (4)$$

where: M = import value; i = commodity class; j = country.
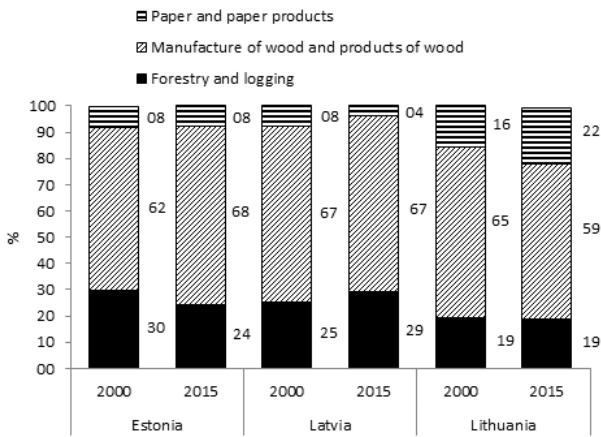
If RTA > 0, then a relative comparative trade advantage is revealed (a sector of a country analysed is relatively more competitive in terms of its trade) (Scott and Vollrath 1992).

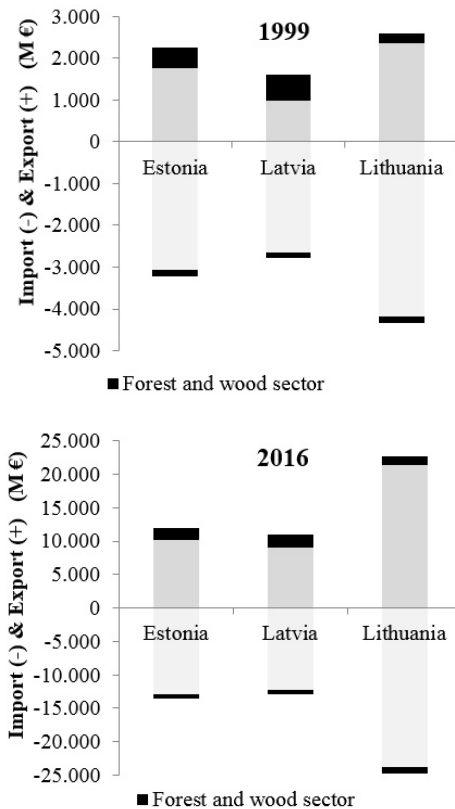## Results

Changes in the production structure

The forestry and wood sectors of the Baltic countries has been mainly oriented to the value of output by mechanical wood processing. In 2015 the manufacture of wood and wood products formed 68% of Estonian, 64% of Latvian and 59% of Lithuanian total output of their forestry and wood sectors (Figure 2).

The characteristic trend line for the Estonian forestry and wood sectors, compared to other Baltic countries has been the increase of the share of mechanical wood processing products among the total production value. At the same time the importance of primary products (forestry and logging) has decreased. On the contrary, the importance of mechanical wood processing among the production value has decreased in Latvia and Lithuania, whilst the importance of the forestry and logging has increased (Figure 2).

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Figure 2. The change of the proportion of subsectors in the total output of the forest and wood sectors (Source: Eurostat 2018a)

The forestry and wood sectors in Estonia, Latvia and Lithuania are oriented to export markets (in 2016 the export value formed respectively 57%, 54% and 58% of the output of the forestry and wood sectors in the Baltic countries); it has been extremely important for offsetting the impact of imports in the trade balance (Figure 3).

The nominal export value of the forestry and wood sectors has increased respectively more than 200% in Estonia and Latvia, and 500% in Lithuania during the period 1999 to 2016 (Figure 4).
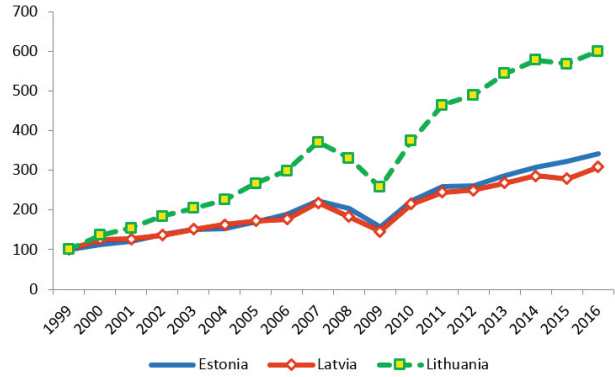
Figure 4. The dynamics of export value of the forestry and wood sectors (1999=100)

There have been similar changes in all Baltic countries, where the importance of roundwood (i.e. forestry and logging) has decreased in export value and the share of other subsectors has increased (Figure 5). The major

Figure 3. Total foreign trade and the forestry and wood sector foreign trade in 1999 and 2016 (in million euros) of the Baltic countries
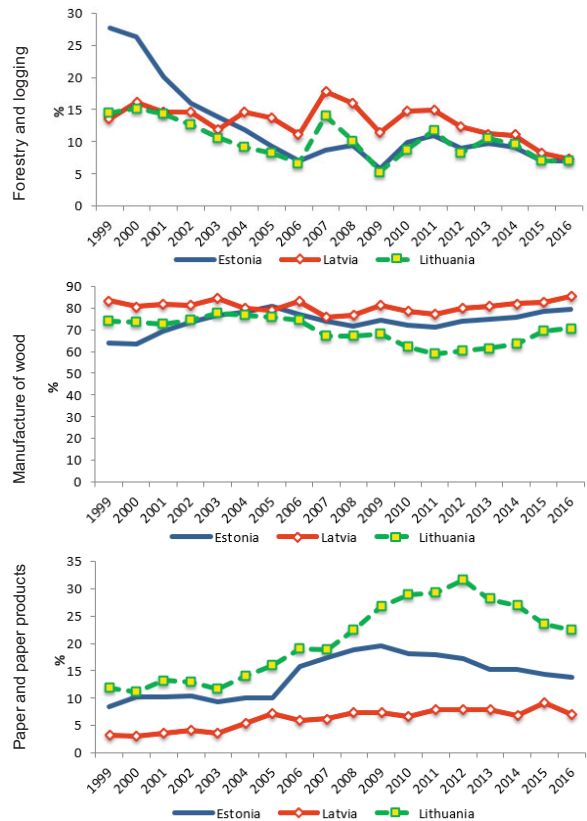
Figure 5. The dynamics of export structure of forestry and wood sectors in the Baltic countries

change in Estonia has been the decrease of roundwood by 20% in export value compared to 1999. At the same time participation of manufactured wood has increased by 16% and paper and paper products (mainly mechanical aspen pulp) by 5%. In Latvia and Lithuania, the share of exported wood products has been rather stable. Paper and paper products have increased their share in all three countries, especially in Lithuania. The structural change in exports is an indication of expanding wood processing in the Baltics and adding value to timber, thus converting step-by-step the export of low-value products to products for final consumption.

Sawnwood was the most important export commodity for all Baltic countries in 1999, forming about 30% from Estonian, 60% from Latvian and 45% from Lithuanian forestry and wood sector exports (Figure 6).

In 2016, sawnwood continued as the main export article for Latvia (about 30% of export value) while in Estonia and Lithuania the products of other mechanical wood processing industry were the most export value (Figure 6).

The main development taking place in the import structure was connected with the increasing share of intermediate products in the total sector's imports. This
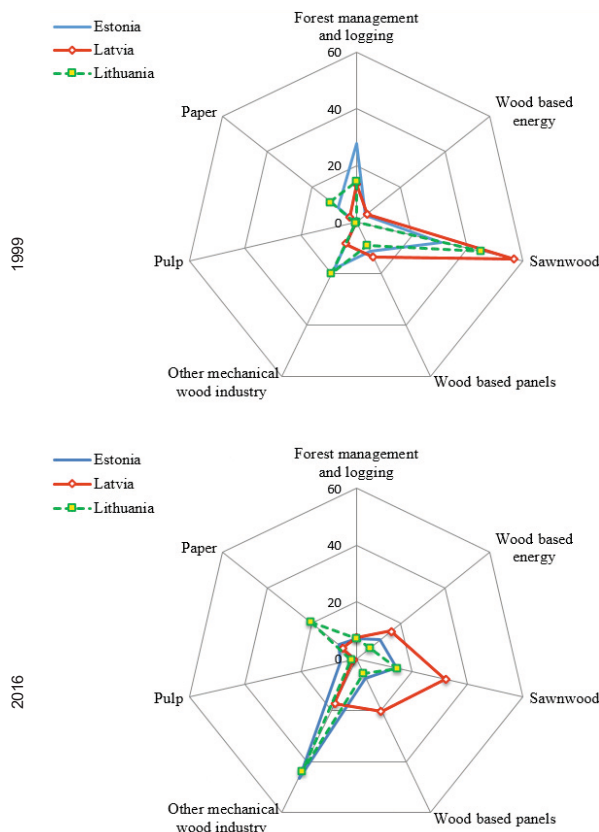
was especially true in Estonia, where the importance of sawnwood increased from 7% in 1999 to 35% in 2016 (Figure 7). The share of pulp and paper in imported products has diminished but still forms the biggest part in all mentioned countries. Since 1999, when the paper and paper products formed 54.5–75.9% in import value, their share in 2016 has decreased to 36.3–44.1%.
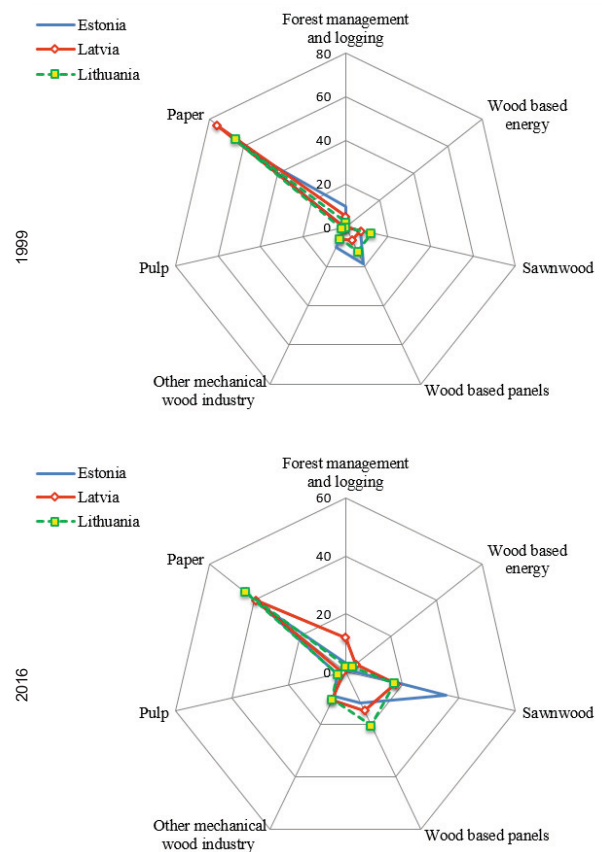

Figure 7. The import structure of forestry and wood sectors in Baltic countries in 1999 and 2016

Relative trade advantage

According to the calculated relative trade advantage (RTA) indices, the subsectors in the forestry and wood sectors (except paper and paper products) in the Baltic countries have a relative trade advantage. Common for all countries was the decreasing trend of RTA for primary products (forestry and logging). The RTA index of the most important subsector for all Baltic countries % manufacture of wood % has been decreasing, especially for Latvia and also for Lithuania. It has been mostly stable for Estonia (Figure 8).

Rather similar progress can be identified inside the subsector manufacture of wood in Estonia and Lithuania. The RTA index of other mechanical wood industry products has increased since 1999, while the rest of the
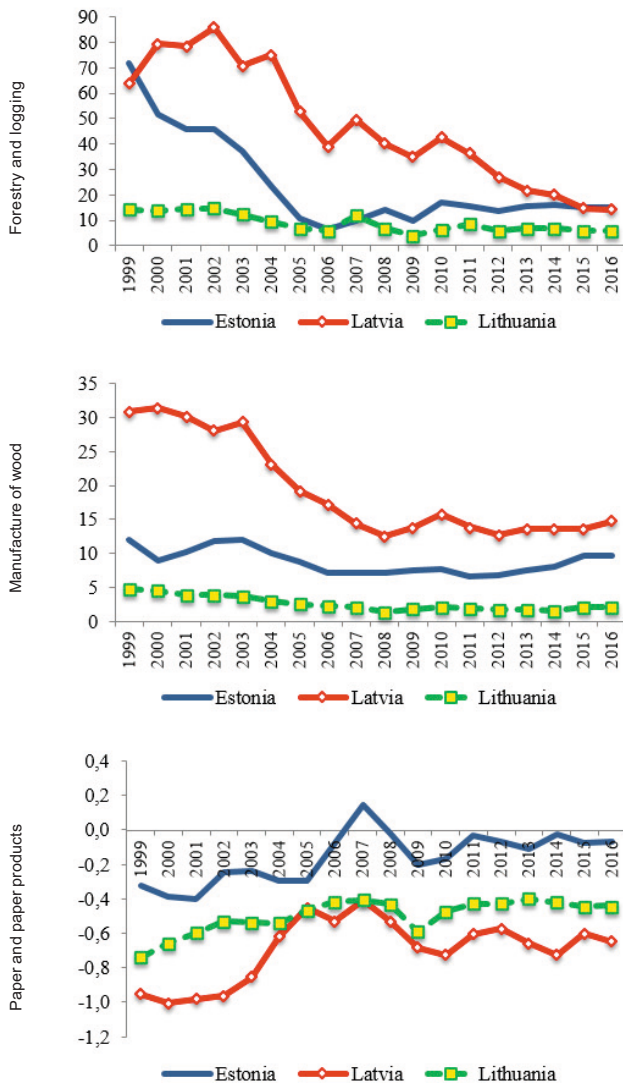

Figure 6. The export structure of forestry and wood sectors in the Baltic countries in 1999 and 2016

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Figure 8. The dynamics of calculated RTA indices of forestry and wood sectors by subsectors

products have declining trend lines. At the same time there has been no major change in Latvia, except for a declining trend of RTA indices for all the products in the subsector (Figure 9).

Discussion

The forestry and wood sectors in Estonia, Latvia and Lithuania has been continuously oriented toward export markets; the nominal value of exported products has doubled in Estonia and Latvian and increased even 500% in Lithuania during the period from 1999 to 2016.

The results of our study confirm the first part of the Hecksher-Ohlin's theorem (Ohlin 1967): a country will export goods that use its abundant factors intensively, and import goods that use its scarce factors intensively.
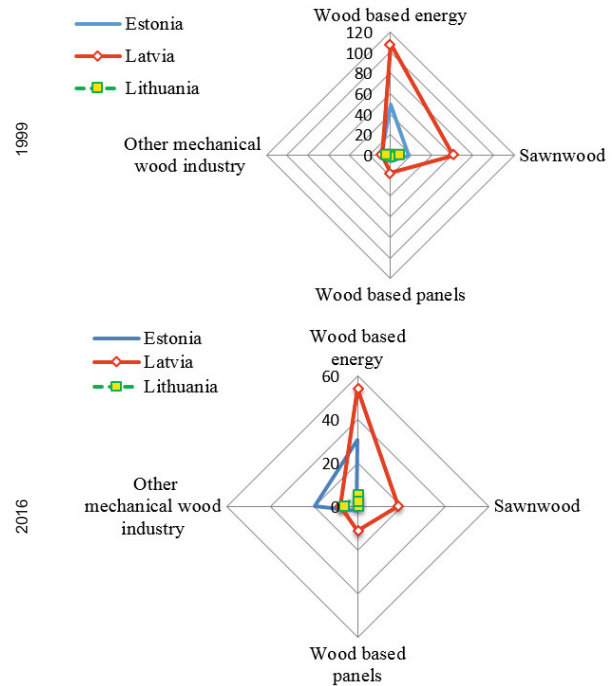

Figure 9. RTA index of the products of the subsector of manufacture of wood

As indicated above, in the Baltic countries the amount of forest resources per inhabitant is remarkably bigger than the average for the EU28.

The results of *ex post* analysis reveal that the forestry and wood sectors in all three Baltic countries is focused first of all on mechanical wood processing. However, the trends are dissimilar by countries. From 1999 to 2015 in Estonia the share of production value of mechanical wood processing increased, while in Latvia and Lithuania the share of forestry and logging expanded. The development in the Estonian forest sector confirms the general logic of manufacturing from simple and low value products to advanced high value products. The reasons need to be studied behind the increased share of primary production in Latvia and Lithuania. In the Lithuanian case, it may be caused by increased harvesting: production of roundwood increased from 5.5 Mm³ in 2000 to 6.4 Mm³ in 2015. But a similar reason is invalid for Latvia, where timber production in 2015 (13.3 Mm³) was lower than in 2000 (14.3 Mm³) (Eurostat 2017).

Blomström and Kokko (2002) found that increased costs of raw-material, labour and capital served as incentives for forest sector enterprises to produce products with higher value added. They also referred to structural changes in the Swedish forestry and wood sector, where in 1970-1990 employment decreased nearly 30% and enterprises increased their productivity and share of high-value added products in their portfolio. Development in the Baltics has been in certain aspects similar

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to Sweden 30 years ago. The aggregated employment in the sector for all three countries decreased by 11.4%.

Despite the fact that the RTA index for Estonian mechanical wood manufacturing has been rather stable (12.00 in 1999 and 9.73 in 2016), inside the subsector drastic change have taken place. Export of sawn timber has largely been replaced by wood products with higher added value, e.g. with prefabricated wooden buildings. As a consequence of manufacturing, the apparent consumption of sawn timber has increased almost three times.

RTA indices indicated the declining competitiveness of forestry and logging and mechanical wood manufacturing in all three countries. There have been similar changes, where the contribution of forestry and logging has decreased and the importance of other subsectors has increased in the export value. This refers to an expansion of wood processing by local enterprises. The slowdown of relative trade advantage can be explained by the advance of prices for the most important production inputs: timber and labour, not by inefficiency and relapse in the forestry and wood sectors. Labour costs are an excellent example of cost growth in a transition economy: during the study period the average gross salary of employees in the Estonian forestry and wood sector increased 4.2 times, in Latvia 2.9 times and in Lithuania 3.3 times, while in the EU28 the increase was 1.4 times. To maintain market share in the face of rising costs, producers have to find ways to diminish the share of labour in the production function.

The authors would like to point out that decreasing values of RTA indices do not directly express diminishing competitiveness, but rather indicate the structural changes in the forestry and wood sectors of the Baltic countries. Instead of exporting roundwood, it is processed in larger amounts into intermediate and final products. Recent developments are in accordance with conclusions and suggestions made by other analysts. For example, the study of the competitiveness of Estonian forestry and wood sector carried out in 2013 (Tiits et al. 2013) stated that increased competitiveness of the Estonian forestry and wood sector could be achieved by increasing the share of final products in the sector's export structure and in value added.

The use of a single RTA index gives a good picture of country's position in a certain market. Dynamic changes in the value of the index refer to causal factors determining competitiveness. The next step for studies would be rigorous analysis of these factors. The authors share the position of Marsch and Tokarick (1994) that "each indicator of competitiveness possesses shortcomings, and no one indicator provides an unambiguous assessment of competitiveness". Competitiveness indicators should be used in conjunction with other indicators in order to obtain an assessment that is as complete as possible.

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