ACTA FACULTATIS XYLOLOGIAE ZVOLEN, 63(2): 175−188, 2021
Zvolen, Technická univerzita vo Zvolene
DOI: 10.17423/afx.2021.63.2.15

ANALYSIS OF INTRA-INDUSTRY MUTUAL TRADE IN THE FURNITURE MANUFACTURING INDUSTRY BETWEEN THE V4 AND THE EU-27 COUNTRIES USING THE GRUBEL-LLOYD INDEX

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ABSTRACT

The purpose of this paper is to present and evaluate the directions of changes in intra-industry trade of selected products in the furniture manufacturing industry. The study covers the results in the intra-industry mutual trade between the V4 and EU-27 countries in four main product groups, i.e. wooden furniture for offices, wooden furniture for kitchens, wooden furniture for bedrooms and wooden furniture excluding offices, kitchens and bedrooms. The research using the Grubel-Lloyd index shows the lowest values of intra-industry trade between Poland and the UE-27. The foreign trade of the Czech Republic, Slovakia and Hungary with the EU-27 was characterised as satisfying intra-industry trade results. In mutual trade between the V4 countries, the Grubel-Lloyd index values fluctuated depending on the analysed product group. The conducted research helps determine the position of foreign trade of each of the V4 countries, making it possible to develop a competitive strategy.

Key words: intra-industry trade, Grubel-Lloyd index, furniture manufacturing industry, competitiveness, Visegrád Group.

INTRODUCTION

The economic development of the European Union Member States is currently focused on the use of renewable resources. One such a natural material is wood – a common, renewable, natural, ecological and biodegradable raw material, valued for its physical and mechanical properties, used as a basic raw material in the wood industry, including the furniture manufacturing industry. The furniture manufacturing industry is an important component of the national economies of individual EU Member States, as well as of the EU economy as a whole.

Among the European Union countries, Germany, Italy and Poland can be mentioned as the largest furniture producers. However, not only the largest producers contribute to the EU economy, so the role of smaller producers is also important (GRZEGORZEWSKA *et al.* 2021). Trade contacts between individual EU countries are a driving force for the development also for smaller representatives of this economic sector.

The Czech Republic, Hungary, Poland and Slovakia are countries that share not only a geographical proximity, but also cultural and historical community. The V4 countries also share similar experiences in the field of economic transformation and the challenges of joining international structures (BRODZICKI 2011). Among the many benefits of membership

in the European Community, the very strong impulse in the development of trade turnover deserves attention. Trade has also been an important mechanism of integration into the European Union's markets (KAWECKA-WYRZYKOWSKA *et al.* 2017). However, opening up the EU market also brings challenges, such as increasing competition (ŁAPIŃSKA 2017).

There are forecasts, stating that furniture consumption will increase significantly in Europe mainly due to a high demand for luxury furniture products (ZION MARKET… 2018). The projected increase in demand for furniture may result in increased market competition. Therefore, furniture manufacturing companies are likely to face many challenges. Due to the growing importance and the need to build a competitive advantage of the product offered, the furniture manufacturing industry has become of interest to modern science.

From the point of view of the national economy (as well as at an individual level), building a competitive advantage through constant development is a key factor.

GRZEGORZEWSKA *et al.* (2020) recognises many factors influencing the competitiveness of enterprises and the furniture manufacturing industry as well dividing them into external and internal. According to SUJOVÁ *et al.* (2015), one of the most important factors is obviously the availability of wood, which is the basic raw material used in production, while the demand for products of the furniture manufacturing industry is factor that is just as important. Other factors influencing competitiveness of the furniture manufacturing industry worth mentioning are: economic and market conditions such as changes in prices of wood raw materials and fluctuations in exchange rates, as well as by changes and consumer preferences. The competitiveness of the furniture manufacturing industry is also influenced by drivers, such as economic growth, urbanisation, trends in housing and construction and family incomes (GRZEGORZEWSKA *et al.* 2021). This subject formed part of the work of WANAT and KLUS (2015) and - using the indicator method – also of RATAJCZAK *et al.* (2008). According to their research, the factors determining the competitiveness of the wood industry sector can be presented in the following groups: institutional (political and legal conditions), natural (environmental conditions and resources specific to the industry, as a natural economy based on wood - a renewable raw material), economic (the economic situation and market processes taking place in it), industrial (relations and interactions of entities - industry participants and sectoral state policy) as well as other conditions (social aspects). According to CVETANOVIĆ *et al.* (2019) the competitiveness is manifested as a company's ability to compete on domestic and foreign markets, as well as the ability to support business. In general, the researchers define competitiveness as the ability of companies, industries, regions or nations to generate high income and employment. In the literature, however, there is no generally accepted definition of the competitiveness of a sector. As a result, macro-scale competitiveness measures are used at the level of sector competitiveness research (SUJOVÁ *et al.* 2015).

The foreign trade balance is a logical basis for measuring competitiveness, as it deals with the analysis of competitive advantage (CVETANOVIĆ *et al.* 2019). As there is no common concept of competitiveness in the literature, this results in there being no single measure of competitiveness of an entire economy or a sector. The most commonly used competitiveness measures are:

a). the Grubel-Lloyd index, which analyses the share of intra-sectoral character of goods in foreign exchange;
b). the Revealed Comparative Advantage index, which comes in several versions and can be used to assess the competitiveness of an entire economy as well as sectors thereof;
c). the Michaely index, which measures the share of a given commodity group in total exports;
d). the Contribution to Trade Balance index, which measures the share of given sectors in the national trade balance (CVETANOVIĆ *et al.* 2019).

These models have most often appeared in scientific research (MISALA 1985, GREENAWAY, THARAKAN 1986, CZARNY 2002, MOLENDOWSKI 2006, MOLENDOWSKI and POLAN 2015). Two main directions of using these indexes for analyses should be distinguished here: literally to measure the intensity of intra-industry exchange at the level of economies and selected industries and as a way to estimate competitiveness.

Scientists have proposed many models for measuring the intensity of intra-industry trade, but most of them are based on Grubel and Lloyd's formula and - despite the passage of time – the Grubel and Lloyd index is still highly appreciated by most researchers (ŁAPIŃSKA 2014). For this reason it was used in the calculations made for the purposes of this paper.

More modern research in this field has been carried out by PLUCIŃSKI (1996) and WYSOKIŃSKA (1995), with the works by MISALA (1985) and MISALA and PLUCIŃSKI (2000) being considered the most complex.

The Grubel-Lloyd index can be used to analyse aggregated goods as proposed by the authors of the formula: either on the basis of the similarity of goods from the point of view of the production process, or on the basis of the substitutability of goods from the point of view of the consumer (GRUBEL 1967, GRUBEL and LLOYD 1975). To avoid mistakes, it is enough to choose the appropriate classification group in foreign trade (the HS or the SITC classification). On the other hand, the increased fragmentation of production processes may cause problems when trying to define a specific sector of industry. The reason for this is the increase in the share of processed semi-finished goods in international trade (KAWECKA-WYRZYKOWSKA *et al.* 2017).

Contemporary international trade is increasingly based on intra-industry trade. The phenomenon of intra-industry trade occurs when exports and imports within the same industry take place at the same time (CZARNY 2002), most often concerns goods that are highly differentiated and substitutable for each other (KLIMCZAK 2016).

The intra-industry trade tends to occur among geographically close rich countries that share a similar economic structure and level of development (OECD ECONOMIC GLOBALISATION INDICATORS 2010). The factors that are most often mentioned as key for the development of intra-industry trade are: processes of differentiation of final goods and differentiation of demand, similar tastes of consumers, similar costs of production factors. Other contributing development of intra-industry trade factors are the proliferation of technological products and processes and absence of obstacles in international trade (MISALA and PLUCIŃSKI 2000).

As shown by empirical research and observation an increasing part of contemporary trade takes place between countries with a similar structure of production and consumption. Higher shares of intra-industry trade are observed between industrialized countries, with similar production factors. This situation is often described in the literature as "North-North" trade type. The growth of intra-industry trade is favoured by similar level of development of the economies and their size, as well as similar level of GDP per capita. In relations between countries with limited industrial production capacities, lower results in intra-industry trade should be observed – the trade will rather be inter-industry, using the complementarity of products, than we are dealing with "South-South" type of trade. On the other hand, in the case of trade relations between countries with different levels of industrial development, we can deal with disproportions in production potential and different consumer behaviours (BRODZICKI 2011, KLIMCZAK 2016).

In contemporary studies on the subject, hypotheses about the development of intra-industry trade between developed and developing countries can be found; some of them predict a decline in the importance of this trade type as a result of its increased liberalization (THARAKAN and KERSTENS 1995, GREENAWAY and THARAKAN 1986).

The research in the field of intra-industry trade concerned entire economies, but also individual sectors, e.g. chemical and agri-food (ŁAPIŃSKA 2014, 2017). The part of the research papers concerned specific regions or selected countries (TALAR 2012, TOPOROWSKI 2013, WYSOKIŃSKA, 1995) or focused on the assessment of the wood processing industry competitiveness (SUJOVÁ *et al.* 2015, PAROBEK *et al.* 2016), or selected sectors of the industry (GRZEGORZEWSKA *et al.* 2020). With the competitiveness of the wood processing industry on a macro scale also dealt HAJDÚCHOVÁ and HLAVÁČKOVÁ (2014).

In recent years, however, there were not many studies dealing with the issue of intra-industry trade measured by the Grubel-Lloyd index for the Visegrád Group countries, especially for specific groups of the furniture manufacturing industry products. The furniture manufacturing industry products are characterised by high added value, which makes them excellent exports products, that can maintain the growing trend of the foreign trade balance. Therefore, it seems reasonable to attempt to assess the size and development of intra-industry exchange for more precisely defined groups of furniture products.

The aim of this paper is to analyse mutual relations in foreign trade balance and attempt to examine the competitiveness of the furniture manufacturing industry of four countries belonging to the Visegrád Group with the use of the Grubel-Lloyd index.

MATERIALS AND METHODS

As the first step in the intra-industry trade research on selected segments of the furniture industry, share of imports of the V4 countries for each of the chosen products was analysed.

The measure of the foreign trade structure of the country is the share of a country's import of a given industry sector or group of products compared to its export, as shown in the formula:

$$T_S = \frac{I_{ij}}{E_{ij}} \cdot 100\% \quad (1)$$

where:
T_S – trade exchange structure index (%),
I_{ij} – import of i^{th} group of products from j^{th} country (USD),
E_{ij}- export of i^{th} group of products to j^{th} country (USD).
If the calculated value exceeds 100, it means that the value of imported goods and services exceeds the value of goods and service sales to abroad consumers in a given country. The obtained results will make possible to indicate which countries are a net importer or net exporter in the analysed product group.

The next step of the research was verifying the intra-industry trade value in each of the analysed countries for individual product groups, and then calculating the intensity of intra-industry exchange for a given product group in the analysed countries.

The most commonly used method for determining the volume of intra-industry trade is the Grubel and Lloyd index, developed in 1975. This measure allows to determine the volume of intra-industry trade between country "j" for sector (or product group) "i" is defined as follows:

$$GL_V = \left(E_{ij} + I_{ij}\right) - \left|E_{ij} - I_{ij}\right| \quad (2)$$

where:
GL_V – Grubel-Lloyd by volume - index of intra-industry trade (USD),
E_{ij}- as above,
I_{ij} – as above.
The volume of intra-industry trade is therefore equal to the total volume of trade within the industry $\left(E_{ij} + I_{ij}\right)$ less net export or import $\left|E_{ij} - I_{ij}\right|$. This quantity is expressed in

absolute terms.
To calculate the intensity of intra-industry trade, the following model is most often used:

$$GL_S = 1 - \frac{|E_{ij} - I_{ij}|}{(E_{ij} + I_{ij})} \cdot 100 \quad (3)$$

where:
GL_S – Grubel-Lloyd by intensity - index of intra-industry trade (%),
E_{ij}- as above,
I_{ij} – as above.

The Grubel-Lloyd index (3) varies between 0 and 100. For example, if a given country only imports or only exports goods or services within a sector, it means that intra-industry trade does not occur – then GL_S index approaches 0. Similarly, if for a given country there are simultaneous exports and imports of goods and services belonging to the same industry sector, then the GL_S index value approaches 100 and intra-industry trade is observed.

The Grubel-Lloyd index (3) values were calculated for the Visegrád Group countries and additionally for the European Union countries in order to compare the results.

The analysis of the intra-industry trade was carried out on the basis of the Grubel-Lloyd index (2) and (3) calculated at the level of 6-digit CN codes in 2015–2020 years for four groups of furniture products, namely:

a CN 940330: wooden furniture for offices (excluding seats),
b CN 940340: wooden furniture for kitchens (excluding seats),
c CN 940350: wooden furniture for bedrooms (excluding seats),
d CN 940360: wooden furniture (excluding offices, kitchens, bedrooms and seats).

All analyses were performed using the LibreOffice package.

RESULTS AND DISCUSSION

Table 1 summarises the values of the trade exchange structure index (1) obtained for the analysed countries of the Visegrád Group. Trade in wooden furniture for offices, kitchens, bedrooms and other wooden furniture with the European Union in the period 2015 to 2020 is analysed.

Tab. 1 Trade exchange structure index values for selected wooden furniture products between Visegrád Group countries and the European Union in the period 2015–2020.

Group of products	Partner	Czech Republic	Hungary	Poland	Slovakia
	Year	Ts [%]*			
Wooden furniture for offices (excluding seats)	2015	70.32	179.40	18.03	33.61
	2016	33.98	107.21	16.95	28.95
	2017	42.92	289.54	29.38	33.09
	2018	36.42	428.93	17.08	47.17
	2019	40.28	547.55	11.90	70.69
	2020	52.20	204.33	11.18	66.70
Wooden furniture for kitchens (excluding seats)	2015	226.07	105.14	18.03	14.37
	2016	210.97	136.64	16.95	24.82
	2017	257.10	133.73	29.38	49.00
	2018	284.90	154.57	17.08	66.73
	2019	281.89	170.53	11.90	78.45
	2020	277.60	148.81	11.18	222.63

Wooden furniture for bedrooms (excluding seats)	2015	61.97	47.22	8.54	74.72
	2016	75.39	41.51	6.12	71.62
	2017	61.30	46.40	6.63	77.43
	2018	67.19	56.97	5.44	66.57
	2019	66.11	69.99	6.18	57.88
	2020	78.15	55.60	6.94	62.16
Wooden furniture (excluding offices, kitchens, bedrooms and seats)	2015	92.27	107.38	8.25	34.01
	2016	96.84	128.08	7.40	35.06
	2017	98.87	164.20	7.48	34.88
	2018	106.46	160.80	7.86	34.18
	2019	171.75	192.09	7.34	43.85
	2020	124.58	321.26	9.16	65.54

* - Trade exchange structure index calculated as imports from the EU-27 to a partner country related to exports from a partner country to the EU-27.

The values of T_S indicate that in foreign trade in the selected years and product groups there are countries whose imports exceed their exports. These are: in the group of wooden furniture for offices and classified to the group of other furniture - Hungary, and in the group of wooden furniture for kitchens - Hungary and the Czech Republic. The analysis also showed values of the index close to or exceeding T_S=100 in the case of other wooden furniture for the Czech Republic. The lowest values of the measure are found in all the studied groups of furniture in Poland, which means that exports prevail in this country.

The next stage of the research is to analyse the values of measures (2) and (3) for selected countries.

The values of intra-industry trade indices (2) and (3) calculated for trade in wooden furniture between the Visegrád Group countries and the European Union in 2015–2020 on the basis of the available ITC database (ITC 2021) are summarised in Table 2.

Tab. 2 Intra-industry trade Grubel-Lloyd indices for selected wooden furniture group of products between Visegrád Group countries and the European Union in the period 2015–2020.

Group of products	Partner	Czech Republic	Hungary	Poland	Slovakia	Czech Republic	Hungary	Poland	Slovakia
	Year	GL_V [million USD]				GL_S [%]			
Wooden furniture for offices (excluding seats)	2015	25.74	10.05	31.47	23.84	82.58	71.58	30.56	50.31
	2016	33.20	20.21	31.23	19.10	50.72	96.52	28.98	44.90
	2017	43.61	7.36	58.51	17.93	60.06	51.34	45.42	49.73
	2018	45.51	6.06	49.70	22.39	53.39	37.81	29.18	64.10
	2019	45.92	4.65	42.37	24.59	57.43	30.89	21.27	82.83
	2020	47.11	11.19	43.00	24.87	68.60	65.72	20.11	80.02
Wooden furniture for kitchens (excluding seats)	2015	39.87	11.37	31.73	22.70	61.34	97.50	40.98	25.12
	2016	53.37	14.20	33.82	31.03	64.31	84.52	41.09	39.76
	2017	43.57	15.73	37.48	24.63	56.01	85.57	49.00	65.77
	2018	46.32	17.48	44.41	36.46	51.96	78.56	37.46	80.05
	2019	46.33	16.79	43.05	37.08	52.37	73.93	36.61	87.92
	2020	50.75	17.83	61.09	17.95	52.97	80.38	40.39	61.99
Wooden furniture for	2015	82.31	32.25	49.40	35.81	76.52	64.15	15.73	85.53
	2016	93.32	34.39	45.47	37.61	85.97	58.67	11.53	83.46
	2017	98.46	39.84	55.22	41.79	76.01	63.38	12.43	87.28

bedrooms (excluding seats)	2018	110.53	46.87	63.00	44.78	80.38	72.58	10.32	79.93
	2019	115.73	52.65	79.05	51.54	79.60	82.35	11.64	73.32
	2020	137.02	54.27	96.72	64.46	87.73	71.47	12.97	76.67
Wooden furniture (excluding offices, kitchens, bedrooms and seats)	2015	246.16	112.09	211.21	114.33	95.98	96.44	15.24	50.76
	2016	286.36	113.92	218.28	127.04	98.40	87.69	13.78	51.92
	2017	307.36	94.32	238.14	141.69	99.43	75.70	13.92	51.72
	2018	311.29	111.33	297.71	145.68	96.87	76.69	14.57	50.95
	2019	291.33	97.22	289.30	148.86	73.60	68.47	13.68	60.97
	2020	436.55	64.89	382.18	204.93	89.05	47.48	16.78	79.18

The analysis of the data presented in Table 2 shows that the foreign trade of the Visegrád Group countries with the EU-27 in 2015-2020 is characterised by a large diversification of GL_V values. This applies to all the analysed product groups. In the case of wooden furniture for offices, in most of the analysed years, the lowest values of intra-industry trade were recorded in Hungary - the values of the mentioned indicator for this country range from USD 7.36 million in 2019 (the lowest value obtained in the analysed period) up to USD 20.21 million in 2016. The highest value of the measure in the discussed product group can be observed in Poland (USD 58.51 million) in 2017; in other years, Poland records equally high values of intra-industry trade, but in the case of the last two years analysed, the highest values of the measure can be observed for the Czech Republic (over USD 45 million). The values of intra-industry trade calculated using the GL_V for Slovakia remain at a similar level throughout the analysed period, amounting to USD 22 million on average.

The wooden furniture for kitchens product group is characterised by similarly low levels of the GL_V index for Hungary's foreign trade with the EU-27 countries. Throughout the analysed period, this country shows the lowest values of intra-industry trade with the EU-27 – according to the GL_V index the values vary from slightly over USD 11 million to almost USD 18 million. According to the index, the Czech Republic had the highest values of intra-industry trade (2) with the EU-27 in this product group in 2015–2019 (approximately USD 46 million on average). Poland enjoyed the highest result in 2020 with an intra-industry trade index GL_V value reaching USD 61 million. In the group of wooden furniture for kitchens, Slovak GL_V index values for intra-industry trade with the EU-27 amount to slightly over USD 28 million on average.

Another product group analysed using the GL_V measure was wooden furniture for bedrooms. As in the previous two groups of furniture manufacturing products, the lowest values of intra-industry trade on the GL_V index are observed for Hungary (on average, in the analysed period they slightly exceed USD 43 million). The values for Slovakia are slightly higher (reaching approximately USD 46 million on average). Contrary to the previous two groups products, the highest values occur in the Czech Republic (on average USD 106 million and an upward trend in value throughout the period). In this product group, in analysed period Poland received a GL_V index value averaging USD 65 million.

In the last of the studied product groups - wooden furniture, not classified elsewhere - the average highest GL_V index value can be observed in the Czech Republic (averaged over all the analysed years: USD 313 million), and the lowest in Hungary (approximately USD 99 million). Poland's average values of intra-industry trade according to the GL_V index, are just slightly lower than those achieved by the Czech Republic (approximately USD 273 million), Slovakia achieved an average value of the GL_V indicator in this product group at the level of USD 147 million.

The second part of Table 2 summarises the results of the study into the intensity of intra-industry trade of the Visegrád Group with the EU-27 countries using the Grubel-Lloyd index (3). When analysing the results obtained in the group of wooden furniture for offices,

it can be noticed that Poland has the lowest intensity of intra-industry trade with the EU-27. The value of the GL_S index decreased to the level of 20.11% in the last year studied. Over the analysed period, the averaged GL_S index for Poland is less than 30%. This situation is caused by large shares of exports and small shares of imports in the country's trade. Other countries recorded similar average values on the Grubel-Lloyd index (3) (for the Czech Republic, Hungary and Slovakia: 62, 59 and 62% respectively).

In the group of wooden furniture for kitchens, Hungary is characterised by a highest intensity of intra-industry trade. It can be said, that this product group demonstrates an almost perfect intensity of intra-industry exchange, with the GL_S index for the country reaching an average score slightly over 83%. The calculation results for the Czech Republic and Slovakia are similar 56 and 60% respectively. Poland notes GL_S index values in the range of 37–49%.

The results of the analysis for the GL_S index for wooden bedroom furniture show a similar tendency to the results obtained in the calculations for the group of wooden office furniture. Again, the lowest intensity of intra-industry trade can be attributed to Poland, which records an average index value of less than 13% throughout the period under review. This result is understandable if we realise that the divergence between the volume of exports and imports continues to increase in this group of products. The average values of the GL_S index for the Czech Republic, Hungary and Slovakia are at a similar level amounting to 81%, 69% and 81% respectively.

In the last analysed group of wooden furniture not classified elsewhere, the lowest GL_S results are also obtained by Poland. On average, values do not exceed 15% in the discussed period. Contrary to Poland, the other analysed countries of the Visegrád Group also recorded high indices of intra-industry trade in this product group, with the highest values for the Czech Republic (over 92%), followed by Hungary (over 74%) and Slovakia (approximately 58%).

Summarising the obtained results, it can be stated that in trade with the EU-27 countries, Poland is a one-sided partner in the analysed groups of products of the furniture manufacturing industry, as exports prevail in its exchange.

The values of the Grubel-Lloyd index (3) for mutual trade between the analysed V4 countries are presented in Tables 3 and 4.

Tab. 3 Values of intra-industry trade Grubel-Lloyd index (3) of wooden furniture for offices and kitchen between Visegrád Group countries in the period 2015–2020 [%].

Partner	Year	Partner			
		Slovakia	Poland	Hungary	Czech Republic
		Wooden furniture for offices (excluding seats)			
Czech Republic	2015	37.71	21.42	88.21	x
	2016	34.36	8.55	11.16	x
	2017	34.98	23.61	2.08	x
	2018	38.91	35.11	23.75	x
	2019	69.40	31.91	49.77	x
	2020	76.74	17.78	61.68	x
Hungary	2015	28.26	0.00	x	0.00
	2016	73.40	0.00	x	1.79
	2017	65.35	3.76	x	0.00
	2018	50.00	0.00	x	0.00
	2019	24.67	0.00	x	0.26
	2020	34.20	0.00	x	5.37
Poland	2015	79.44	x	0.00	3.95
	2016	83.15	x	0.00	10.09

	2017	76.66	x	0.00	8.97
	2018	51.80	x	0.03	7.30
	2019	33.44	x	0.00	4.14
	2020	21.20	x	0.00	3.67
Slovakia	**2015**	x	25.49	70.80	49.97
	2016	x	14.88	14.14	62.97
	2017	x	0.00	14.68	70.34
	2018	x	1.14	9.30	65.82
	2019	x	1.62	0.62	58.07
	2020	x	1.11	0.58	59.48
Partner	**Year**	**Wooden furniture for kitchens (excluding seats)**			
		Slovakia	**Poland**	**Hungary**	**Czech Republic**
		Partner			

Tab. 4 Values of intra-industry trade Grubel-Lloyd index (3) of wooden furniture for bedrooms and other wooden furniture between Visegrád Group countries in the period 2015–2020 [%].

Partner	**Year**	**Partner**			
		Slovakia	**Poland**	**Hungary**	**Czech Republic**
		Wooden furniture for bedrooms (excluding seats)			
Czech Republic	**2015**	59.91	9.71	45.01	x
	2016	63.57	4.28	20.67	x
	2017	61.02	12.11	21.51	x
	2018	81.25	9.55	26.77	x
	2019	84.35	25.03	34.17	x
	2020	69.52	56.57	27.64	x
Hungary	**2015**	89.24	0.00	x	51.55
	2016	26.67	0.02	x	43.09
	2017	2.73	0.00	x	40.89
	2018	32.59	0.00	x	26.08
	2019	11.76	0.00	x	35.94
	2020	12.79	0.00	x	31.79
Poland	**2015**	96.59	x	0.96	4.69
	2016	90.18	x	1.29	5.62
	2017	88.71	x	0.49	6.70
	2018	86.35	x	0.80	4.14
	2019	83.94	x	0.84	4.67
	2020	72.78	x	0.84	5.26
Slovakia	**2015**	x	73.62	91.81	67.11
	2016	x	69.65	38.76	71.64
	2017	x	51.69	21.73	65.61
	2018	x	49.45	5.73	71.41
	2019	x	37.76	12.56	70.06
	2020	x	35.11	26.27	59.38
Partner	**Year**	**Wooden furniture for bedrooms (excluding offices, kitchens and bedrooms, and seats)**			
		Slovakia	**Poland**	**Hungary**	**Czech Republic**
		Partner			

The data analysis presented in Table 3 reveals that, in the group of wooden furniture for offices, the highest values of intra-industry trade are obtained in the Polish trade with Slovakia. The GL_S index values, especially in 2015–2017, exceed 70%, reach in excess of 83% (2016). In the subsequent years, a decline in the intra-industry trade index between these countries is observed, and in the last year, analysed the Grubel-Lloyd index (3) is less than 22%. The structure of these partners' exports and imports is helpful when explaining the values of the GL_S index - in 2015 and 2016, imports in this commodity group from Slovakia to Poland accounted for 140 to 150% of exports, while in subsequent years, the value of imports plummeted to a level of less than 12% of the value of exports in the last analysed year.

On the other hand, reverse tendency can be found from an analysis of intra-industry trade for Slovakia and the Czech Republic. The intra-industry exchange of wooden furniture for offices in 2015–2017 shows a stable level of 35–38%, before recording significant increases in the next three years, up to approximately 77%.

Therefore, a hypothesis can be made that the increase in intra-industry trade between Slovakia and the Czech Republic came about as a result of the decline in the value of intra-industry trade between Slovakia and Poland. In order to verify this hypothesis, in-depth studies of trade exchange between Poland, Slovakia and the Czech Republic in the area of the discussed furniture manufacturing industry product groups would be required.

The intra-industry exchange in Slovakia and Hungary in the sector of wooden furniture for offices, apart from higher values in 2016, 2017 and 2018, caused by greater Hungarian exports, is at a level of up to 35%.

As for the intra-industry exchange of wooden furniture for offices between Poland and the Czech Republic, the highest values of the GL_S index were obtained in 2018 and 2019, though these values are still much lower than those obtained for intra-industry trade between Poland and Slovakia, especially when comparing the results obtained for these trading partners in the last years under analysis.

The results of the study of trade exchange using the Grubel-Lloyd index (3) for Poland and Hungary showed that there is practically no intra-industry trade between the partners in the product group of wooden furniture for offices. The reason for the low values of the GL_S index may be the negligible values of exports and imports in this product group.

In contrast to the trade exchange of products from the group of wooden furniture for offices with Poland, Hungary achieves quite high results in this group of products for intra-industry trade with the Czech Republic. The value of the exchange between these countries is quite variable, ranging from 2% to slightly over 88%.

In the foreign trade of wooden furniture for kitchens, the highest values of the GL_S index are achieved by the exchange between Slovakia and the Czech Republic. The values of intra-industry trade for this product group range from approximately 50% in 2015. to over 70% in 2017. In the subsequent years, the Grubel-Lloyd GL_S index for Slovakia's trade with the Czech Republic fluctuates around 60–66%.

When analysing the value of the GL_S index in this product group between Slovakia and Hungary, the Grubel-Lloyd index (3) results are clearly significantly different from those calculated for these countries in the case of trade in wooden furniture for offices. The Grubel-Lloyd index (3) values of both countries in the first year analysed exceeds 70%, before dropping to between 10 and 20% in the following years, and finally, disappearing completely in the last analysed year. The reason for this situation is decreasing levels of export of kitchen furniture from Hungary to Slovakia on the one hand, and growing exports from Slovakia on the other.

A similar situation occurs in relation to the trade between Slovakia and Poland in wooden furniture for kitchens. Initially, the value of intra-industry trade calculated using the

Grubel-Lloyd index (3) is at the level of several dozen per cent, before dropping dramatically from 2017 and in the last three analysed years. In the trade between these countries, there is also a slight export imbalance in favour of Poland.

Equally low values of the Grubel-Lloyd GL_S index are recorded for the trade in wooden kitchen furniture between Poland and the Czech Republic. The highest result obtained in this case is 10% for 2016. There is no inter-industry exchange in this product group between Poland and Hungary, or between Hungary and the Czech Republic throughout the analysed period.

In the group of wooden furniture for bedrooms, the intra-industry trade measured by the Grubel-Lloyd index GL_S records the highest results for trade between Poland and Slovakia. The intra-industry trade for wooden bedroom furniture for this pair of partners is mostly stable at level of 84 to 97%, only 2020 shows a visible decline in the index values.

The next GL_S index by value is found in trade between Slovakia and the Czech Republic. For these countries, the Grubel-Lloyd index (3) ranges from 60% to 85%. In turn, the lowest values of intra-industry trade are observed for this product group for the Poland-Hungary pairing. The values of the Grubel-Lloyd index for intra-industry trade in wooden bedroom furniture between Hungary and the Czech Republic reach a level from 21% to 45%, and between Hungary and Slovakia the level is from 3% to 33%. There is a negligible level of intra-industry trade between Poland and the Czech Republic.

The last product group tested using the Grubel-Lloyd index (3) was the group of wooden furniture not classified into any of the aforementioned groups. In this group of products, the Czech Republic and Slovakia show the highest average values of intra-industry trade. The GL_S index values for these countries remain stable at the 66 to 72% level throughout all the years analysed, except for the last year, in which the Grubel-Lloyd index results slightly decreased to around 60%. Intra-industry trade in Poland and Slovakia is characterised by similarly high results with the Grubel-Lloyd index values starting the period in excess of 70%, but with a gradual decline observed in subsequent years. Taking into account the average value of the GL_S index calculated for the analysed countries of the Visegrád Group, similar results for trade between Hungary and the Czech Republic as well as Hungary and Slovakia are observed.

Apart from the lowest values of intra-industry trade, again observed in the case of trade between Hungary and Poland throughout the analysed period, it is worth noting the small values of the index GL_S for the exchange between the Czech Republic and Poland. For wooden furniture not classified in any of the other groups, the GL_S values range from about 4% to about 7%.

CONCLUSIONS

Recently, the furniture industry in Central and Eastern Europe has suffered in particular, due to the reduction in trade caused by the COVID-19 pandemics. The slowdown in global demand has also affected economies driven by domestic consumption – these countries have tended to fail to avoid the side effects of regional and global constraints.

The analysis showed that Poland has experienced significant disproportions in foreign trade between export and import, especially in the three analysed groups of furniture, namely: furniture for kitchens, furniture for offices and other furniture (outside of those groups). Poland was a net exporter to the EU-27 – exports in these furniture groups exceeded imports several times. This situation occurred throughout the period under consideration. The furniture for bedroom exports to the EU-27 were characterised by a smaller, but significant advantage, amounting to three or four times the value of imports. This situation

was undoubtedly influenced by Poland's position as one of the leading exporters of furniture - it is estimated that in 2019 about 90% of furniture production was exported. The analysis of the results shows that the imports from the EU in the analysed period has a constant upward trend for all discussed groups of furniture. The worst year for imports to Poland was 2019, while the best for exports in these groups of furniture products – was 2018. Such large disproportions in foreign trade are reflected in the Grubel-Lloyd index values - some of the lowest values in trade with the EU and with other analysed countries were reported by Poland It seems that despite the difficulties related to the COVID-19 pandemic in 2020 and the decline in the furniture manufacturing industry's turnover by 35% compared to 2019, furniture exports from Poland have not changed significantly. The situation of the furniture industry in Poland was probably even improved by a positive impulse, generated by the renovation boom in 2020. An additional factor was an increase in furniture orders and the implementation of government anti-crisis shields.

The Grubel-Lloyd index values calculated for trade between the EU-27 and the analysed countries confirmed that there is a good level of intra-industry trade. They did not show significant disproportions between imports and exports as in the case of Poland. The EU-27 foreign trade with the Czech Republic and with Slovakia was particularly balanced.

In trade relations with the EU-27 Slovakia is also a net exporter for all furniture groups except kitchen furniture.

In contacts between the individual partners from the Visegrád Group in the group of office furniture, the highest indicators of the GL_S index were recorded in Poland's trade with Slovakia and in the Czech Republic's with Hungary. The geographical proximity testifies to the development of trade contacts between these countries. It seems that intra-industry trade between Poland and Hungary does not occur precisely because of the geographical distance, as well as the more limited size of the Hungarian market.

In the group of kitchen furniture, the GL_S index values helped confirm the existence of a well-developed intra-industry trade between close neighbours, such as the Czech Republic and Slovakia. In other cases, the intra-industry trade measured using the GL_S index is unsatisfactory, or simply does not occur.

The GL_S index values for trade of wooden furniture for the bedroom group showed well-developed relations between the Czech Republic and Slovakia, as well as between Poland and Slovakia. Generating positive net export values is the driving force for building a competitive advantage of the industry. Slightly lower trade results in this product group were achieved between the Czech Republic and Hungary.

The analysis of the Grubel-Lloyd index for the last group of furniture showed a similar level of intra-industry trade between Poland and Slovakia, the Czech Republic and Slovakia and the Czech Republic and Hungary.

The calculations performed in this paper, in addition to showing trends in foreign trade between the analysed countries will allow more in-depth analyses of contacts between individual Visegrád Group countries to be carried out in the future, looking at the types of intra-industry exchange and assessing the competitiveness of the furniture industry in the discussed countries.

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