

The trends in employment and labour productivity in the pulp and paper industry in the selected EU countries

JUSTYNA BIERNACKA, EMILIA GRZEGORZEWSKA, IZABELA PODOBAS

Department of Technology and Entrepreneurship in Wood Industry, Institute of Wood Sciences and Furniture, Warsaw University of Life Sciences, Poland

Abstract: *The Trends in Employment and Labour Productivity in the Pulp and Paper Industry.* Despite many challenges, the pulp and paper industry is a dynamically developing branch of industry in the world. It seems that especially growing competition from less developed countries, such as Indonesia, and the falling demand for paper may be reasons for the difficulties of pulp and paper factories, i.e. decreasing profitability of paper production and number of employed in this industry in recent years. From the perspective of the employment volume and related work efficiency, it was interesting to examine and assess employment and the use of human resources in pulp and paper industry, especially in the countries of the Visegrad Group, which economies have been characterized by stable GDP growth in recent years. The paper analyses the value of pulp and paper industry production and its structure in the Visegrad Group countries relative to EU28 countries and employment and age structure of the employed.

Keywords: pulp and paper industry, employment, labour productivity, EU countries

INTRODUCTION

Forests are increasingly valued for their environmental functions, such as protecting the water quality of headwaters and rivers and regulating its quantity over time, preventing soil erosion, protecting human settlements from avalanches, filtering airborne pollutants, harbouring biodiversity and providing space for recreation (Agriculture, forestry and fishery statistics... 2018). However, forests are still the primary source of raw material used in the wood industry and pulp and paper industry.

The pulp and paper industry is one of the largest industries in the world (Bajpai 2014; Rizk et. al 2004). It is also a dynamically developing industry in the world consisting of nearly 5000 pulp and paper mills around the world with annual production capacity of almost 400 million tons of paper (Vaez, Ziloue 2020). It is dominated by North American, Northern European and East Asian countries. Latin America and Australasia also have significant pulp and paper industries. Over the next few years, it is expected that both India and China will become the key countries in the industry's growth (Bajpai 2014). The European pulp and paper sector has undergone significant consolidation since the turn of the century. European producers are facing increased competition from Asia, which is sometimes driven not only by market fundamentals, but also output and employment targets (Roh et al. 2016). Challenges, such as increasing competition from low-income countries such as Brazil and Indonesia, an increase in the use of digital media communications leading to a decline in paper demand, as well as EU environmental policy have led to stalled growth and a decline in profitability in recent years of this industry, which in turn resulted in a 30% decrease in the number of companies in Europe in the years 2000–2017. These problems have an impact on the employment rate in the European pulp and paper industry – it is estimated that since 2000 the number of employees has decreased by 37% (Brunnhofera et. al 2020).

As compared to other European countries, Slovakia, Czech Republic and Poland have relatively large timber resources. The forest coverage of these countries amounts to 40.3, 34.5 and 30.8% (Forestry 2018). Hungary showed the lowest forest cover among the analysed countries. The area of forests in this country is 1940 thousand ha, which is 22% of the land area. However, mentioned above countries belonging to the Visegrad Group are characterized

by stable GDP growth year-to-year, which was an important premise for an attempt to analyse the situation of pulp and paper industry companies in terms of possible improvements in fields of employment and labour productivity (IMF 2018).

The upward demand for the pulp and paper industry products, both in relation to the domestic consumers and foreign buyers, means that companies in this industry have to face challenges relating to the development of production potential (Grzegorzewska, Stasiak-Betlejewska 2019). From this point of view, not only the production potential which results from the available raw wood material and owned machine park is important. Increase of competitiveness of individual countries on the international market also results directly from an effective use of labour resources. Achieving high labour productivity contributes to reducing costs, increasing the supply of cheaper goods and services, and thus translates into an increase in the purchasing power of societies, their wealth and competitive abilities (Gołaś, Kozera 2008).

MATERIALS

The main objective of the research was to analyse selected aspects of employment and work efficiency in the pulp and paper industry in the countries belonging to the Visegrad Group (i.e. the Czech Republic, Poland, Hungary, and Slovakia). The comparative analysis was carried out against the background of all EU countries (EU28), as well as the group of countries that joined the European Union after 2003. (EU13). The temporal scope of the research was adopted for the years 2010–2017. During the research a horizontal analysis was carried out, allowing to determine the dynamics of selected economic and financial categories, as well as a vertical analysis, determining the importance of individual countries in creating the value of sold production of pulp and paper industry and jobs in this industry. In order to determine the level of relative differentiation of the studied characteristics, the coefficient of variation was used, which is the relation of standard deviation and the average value of a given characteristic, taking into account the whole period covered by the research. Further part of the research focused on the analysis of employment in the pulp and paper industry and investigated the profile of employment by calculating the number of men employed in this industry and referring this value to the total number of employees in this sector. In order to make the analysis of employment more detailed, the percentage of men employed in the pulp and paper industry was examined, ranking the employed with regard to age to the adopted groups, namely: 15–39 years of age, 40–59 years of age and over 60 years of age.

RESULTS

According to Eurostat data, in 2010 the sold production of the pulp and paper industry in the EU28 countries amounted to 159.8 billion euro, of which only 8.4% was produced in the new Member States (Table 1). This confirms the much greater importance of the EU15 countries in the sold production of paper and paper products. Among the analysed countries of the Visegrad Group, Poland was the largest producer of paper and paper products. The value of sold production of the pulp and paper industry in this country in 2010 was as follows 6.1 billion euro, which accounted for 3.8% and as much as 45.6% respectively of the value of the production of this industry produced by the EU28 and EU13. The Czech Republic should be mentioned as the next largest producer of the pulp and paper industry among the analysed countries.

The value of sold production of paper and paper products in 2010 amounted to 2.3 billion euro, which constituted 1.4% of the value of production of this industry produced by all EU Member States and 17.2% of the production achieved by the countries included in the EU13. At the beginning of the analysed period, a significantly lower value of sold production

of the pulp and paper industry was observed in Slovakia (1.2 billion euro) and Hungary (1.2 billion euro). The share of these countries in creating the value of sold production in this industry was equal and amounts to 0.8%.

Table 1. Production sold and employment in the pulp and paper industry in selected EU countries in the years 2010–2017

Itemisation	2010	2011	2012	2013	2014	2015	2016	2017	2017/2010	V*
Production value [billion euro]										
UE-28	159.838	169.528	165.020	164.973	166.753	173.593	171.806	180.000	112.6	3.7
UE-13	13.395	14.680	18.570	15.562	16.182	17.397	17.976	19.449	145.2	12.3
Czechia	2.257	2.375	2.347	2.343	2.432	2.665	2.713	3.011	133.5	10.2
Hungary	1.231	1.332	1.289	1.304	1.375	1.480	1.586	1.653	134.2	10.7
Poland	6.105	6.918	7.074	7.610	7.981	8.519	8.564	9.498	155.6	13.9
Slovakia	1.195	1.210	1.312	1.287	1.184	1.268	1.265	1.267	106.0	3.7
Structure of production value [%]									2017–2010	V*
UE-28	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	0.0
UE-13	8.4	8.7	9.0	9.4	9.7	10.0	10.5	10.8	2.4	9.0
Czechia	1.4	1.4	1.4	1.4	1.5	1.5	1.6	1.7	0.3	6.6
Hungary	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.1	7.3
Poland	3.8	4.1	4.3	4.6	4.8	4.9	5.0	5.3	1.5	10.8
Slovakia	0.8	0.7	0.8	0.8	0.7	0.7	0.7	0.7	-0.1	4.5
Number of persons employed [thousand]									2017–2010	V*
UE-28	649.1	655.9	649.5	639.4	641.1	643.5	649.1	660.0	101.7	1.1
UE-13	129.9	129.1	128.7	130.0	132.3	138.9	142.0	146.4	112.7	5.1
Czechia	19.5	19.2	19.4	19.3	19.0	20.1	20.6	21.2	108.3	3.9
Hungary	11.3	11.0	10.8	11.3	11.5	14.2	14.9	14.9	131.9	14.7
Poland	53.8	54.8	54.1	55.0	56.9	57.8	58.1	60.9	113.0	4.3
Slovakia	7.7	7.2	6.9	6.7	6.8	6.9	7.0	7.3	94.1	4.6
Structure of persons employed [%]									2017–2010	V*
UE-28	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	0.0
UE-13	20.0	19.7	19.8	20.3	20.6	21.6	21.9	22.2	2.2	4.8
Czechia	3.0	2.9	3.0	3.0	3.0	3.1	3.2	3.2	0.2	3.5
Hungary	1.7	1.7	1.7	1.8	1.8	2.2	2.3	2.3	0.5	14.3
Poland	8.3	8.4	8.3	8.6	8.9	9.0	8.9	9.2	0.9	4.0
Slovakia	1.2	1.1	1.1	1.0	1.1	1.1	1.1	1.1	-0.1	4.9

*V – Coefficient of variation

Source: own elaboration based on Eurostat.

Between 2010 and 2017, the sold production of the pulp and paper industry in the EU countries increased by 12.6% and at the end of the analysed period amounted to 180.0 billion euro. Such a slight increase within a seven-year period was caused mainly by a decrease in the dynamics of the discussed phenomenon in the years 2012-2013. In 2017, the share of the EU13 countries in the production of pulp and paper industry was 10.8%, i.e. 2.4 p.p. higher than at the beginning of the analysed period. This resulted from a higher growth rate of the value of sold production of the pulp and paper industry in this group of countries than in the EU15 (10.8 compared to 9.6%). It should be noted, however, that it is still the member states that joined the EU before 2004 that played a greater role in creating the sold production of

paper and paper products, although the difference between the distinguished groups of countries decreased. The highest increase in the production of the pulp and paper industry in terms of value was observed in the case of Poland – by 55.6% to the level of 9.5 billion euro. Favourable economic tendencies in this country caused an increase in its importance in creating the value of sold production of paper and paper products in the EU (from 3.8 to 5.4%). The Czech Republic was ranked next in terms of the value of production of paper and paper products among the Visegrad Group countries (3.0 billion euro), which recorded an increase in this indicator (33.5%).

In the case of other Visegrad Group countries of lesser importance for the creation of EU pulp and paper industry production, the situation was diversified. A significant increase (by 34.2%) in the value of sold production of paper and paper products was observed in Hungary, which at the end of the analysed period amounted to 1.7 billion euro. In Slovakia, on the other hand, there was a significantly smaller increase (by 6.0%), which contributed to a decrease in the importance of this country in creating the EU value of sold production of the pulp and industry. The highest level of the coefficient of variation in the value of sold production of this industry, which shows the relative diversity of this feature, was observed for the Polish pulp and paper industry (13.9%), and the lowest for Slovakia (3.7%).

In 2010, as shown in Table 1, the pulp and paper industry in the EU28 employed 649.1 thousand persons, of which 129.9 thousand in the group of new member states, which constituted 20.0% of the total employment in this industry in the European Union. Again, among the Visegrad Group countries, the first place was taken by Poland, where 53.8 thousand persons found employment in the production of paper and paper products, which constituted 8.3% of the employed in the EU28 and as much as 41.4% of the employed in the EU 13. The level of employment in the Czech Republic was three times lower than in Poland and in 2010 amounted to 19.5 thousand persons, which constituted 3.0% of the employed in the pulp and paper industry in all the EU member states. Significantly lower employment was observed in Hungary (11.3 thousand persons) and Slovakia (7.7 thousand persons). The share of these countries in the creation of jobs in the EU pulp and paper industry was 1.7 and 1.2%, respectively.

Between 2010 and 2017 employment in pulp and paper industry in the EU increased by slightly 1.7% and at the end of the analysed period was at the level of 660.0 thousand persons, 146.4 thousand of whom were employed in companies located in the EU13. In this respect the significance of the new member states increased by 0.2 p.p. to the level of 22.2%. Among the analysed countries of the Visegrad Group, with the exception of Slovakia, an increase in the number of employees was observed. This led to the slightly increasing role of Poland in creating jobs in the pulp and paper industry. In other countries covered by the analysis the employment level decreased by 15.0% in Slovakia, 12.1% in the Czech Republic and 11.1% in Hungary. The highest rate of the variation coefficient of the number of employees, which determines the relative diversity of the feature, was observed for the Hungarian pulp and paper industry (14.7%), and the lowest one for the Czech Republic (3.5%). The highest growth rate of employment was observed in Hungary (by 31.9%), followed by Poland (13.9%) and the Czech Republic (8.3%), however, the importance of these countries in creating jobs in the pulp and paper industry did not change significantly.

One of the basic measures of work efficiency is the value of production per employee. As can be seen from the data presented in Figure 1 at the beginning of the analysed period, it amounted to 246 thousand euro on average in the EU member states, and at the same time for the EU13 countries it was more than twice as low. This proves that the labour productivity in the pulp and paper industry in the EU13 countries is lower than the average in the EU member states. It should be emphasized, however, that in all analysed countries this indicator was at a higher level than the average in the group of EU13.

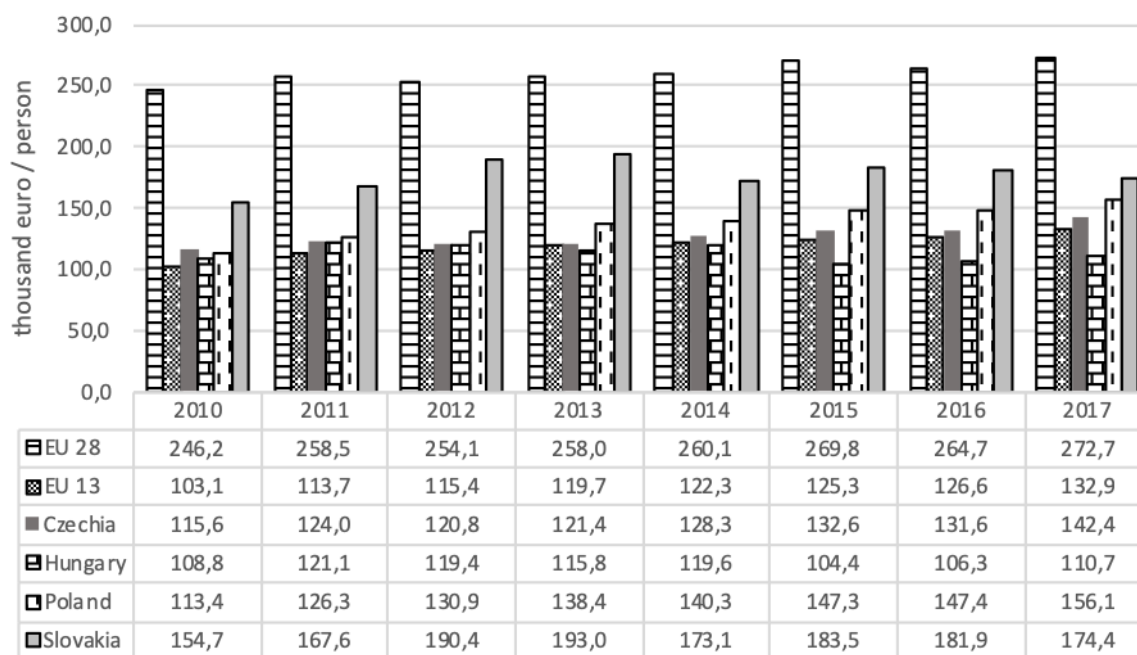


Chart 1. Value of sold production of pulp and paper industry per employee in selected EU countries in 2010–2017

Among the countries that are members of the Visegrad Group, the highest value of sold production per employee in pulp and paper industry was reached by Slovakia (154.7 thousand euro). It resulted from the lowest value of sold production in pulp and paper industry accompanied with the lowest employment rate. These conditions resulted in the best labour productivity rate among the analysed countries. Lower values of this indicator were recorded in the Czech Republic (115.6 thousand euro) and Poland (39.0 thousand euro).

Between 2010 and 2017, the value of sold production of pulp and paper industry per employee in the EU 28 increased by 10.6% to 272.2 thousand euro. In the new member states, this indicator increased by 28.9% and at the end of the analysed period was at the level of 132.9 thousand euro, but it was still significantly lower than the average in the EU28. Among the countries covered by the analysis, the highest labour productivity was recorded Slovakia. The abovementioned rate increased by 12.7% to 174.4 thousand euro. Poland (64.7 thousand euro) ranked next in terms of labour productivity of the pulp and paper industry measured by the value of production per employee. Significantly lower rates were observed in Hungary (110.7 thousand euro), where the growth rate of the value of sold production in pulp and paper industry per employee was clearly lower than in other countries of the Visegrad Group.

The next stage of the research was the study of employment structure by determining employees' belonging to the appropriate age group. Data regarding the classification of men employed in the pulp and paper industry companies to particular age groups was presented in Table 2.

The share of men employed in pulp and paper mills in the EU28 in all age groups remained at a similar level throughout the entire analysed period. In the age group of 15–39 years old, in the years 2010–2017 men employed in pulp and paper factories constituted from 71.7% to 76.5% of the total number of employees, so the value of coefficient of variation for this age group was not very high at 3.0%. The age group of 40–59 years old had even more stable levels of male participation in the total number of employees. In these age limits, the share of male employees ranging between 71.2–75.2% was observed. A slight decrease of 0.5 p.p. in the share of employed men in the discussed age group in 2017 compared to 2010 was

observed. The highest variability in the share of men in the total number of employees was observed in the group of employees over 60 years of age. The coefficient of variation reached the value of 7.2% in the discussed group.

Table 2. Employment of men in the pulp and paper industry by age groups in selected EU countries in 2010–2017

Itemisation	Age group	2010	2011	2012	2013	2014	2015	2016	2017	2017–2010	V*
UE-28	15–39	71.7	73.2	70.5	73.4	75.7	72.8	76.2	76.5	4.9	3.0
	40–59	71.7	72.7	73.1	73.4	75.0	72.6	75.2	71.2	-0.5	1.9
	60 or over	74.7	78.5	77.4	74.9	76.7	75.8	61.7	77.5	2.8	7.2
UE-13	15–39	64.9	66.3	64.7	71.7	68.8	68.9	71.3	69.5	4.6	4.0
	40–59	49.8	56.6	56.5	57.7	57.6	58.9	63.5	55.7	5.9	6.6
	60 or over	62.2	72.5	87.8	69.4	70.3	74.0	68.6	75.7	13.5	10.2
Czechia	15–39	52.9	67.6	54.2	59.6	60.0	62.2	58.4	66.3	13.4	8.6
	40–59	52.5	52.8	50.6	58.9	48.5	46.0	45.9	46.2	-6.3	9.0
	60 or over	71.4	85.7	88.9	64.3	100.0	85.7	100.0	75.0	3.6	15.4
Hungary	15–39	60.0	58.2	70.0	71.7	61.1	59.6	68.0	66.2	6.2	8.2
	40–59	12.2	50.5	37.0	49.4	50.5	34.6	23.3	41.4	29.2	37.1
	60 or over	33.3	25.0	60.0	81.0	33.3	50.0	33.3	56.3	23.0	40.3
Poland	15–39	81.0	69.8	70.9	72.4	75.4	72.6	79.2	70.6	-10.4	5.6
	40–59	52.8	61.3	65.5	63.8	60.6	69.7	76.3	63.1	10.3	10.7
	60 or over	64.3	83.3	99.5	68.8	77.8	77.3	80.0	72.7	8.4	13.7
Slovakia	15–39	65.8	74.3	73.0	70.7	76.3	83.7	78.7	77.7	11.9	7.2
	40–59	73.0	73.7	19.7	53.1	69.5	55.0	63.6	63.3	-9.7	29.8
	60 or over	100.0	100.0	99.9	100.0	100.0	100.0	100.0	99.8	-0.2	0.1

*V – Coefficient of variation

Source: own elaboration based on Eurostat.

It was interesting to verify whether the share of employed men in EU13 corresponded to the levels observed for all EU countries. Discussed phenomenon data for the EU13 were presented in the subsequent rows of Table 2. In the group of youngest employees, the share of men ranged from 64.7–71.7% and was characterized by the smallest degree of differentiation among all employees age groups. The highest variability was observed, similarly to the EU28, in the group of persons over 60 years of age – the observed value was even higher and reached 10.2%. The share of men classified to the middle age group in the EU13 reached from 49.8% in 2010 to 63.5% in 2016.

An analysis of the share of employed men in the total employment in the Visegrad Group countries shows, that the highest values differences were noted in the group of the oldest employees. The highest observed share of men employed could be found in Slovakia – in this country, in most of the analysed years, men constituted for almost 100% of employed. This means that in this age group employed women constituted just a symbolic percentage.

Even small fluctuations in the share of women in all employed, especially when the number of all employed persons is relatively small, may be responsible for the observed high variability of the discussed indicator in the age group over 60 years. In the Czechia, Poland and Hungary, analysed oldest age group of employees also noted a high share of men in all persons employed in the pulp and paper industry.

The analysis of the share of classified in the 40–59 age group men showed, that in all the Visegrad Group countries, values of analysed indicator were on average lower than the values

recorded in the EU-28 countries. The highest average values of the share of men in this age group were recorded in Poland (values higher than average in EU13), in the remaining countries the analysed indicator was lower, which indicated a higher share of working women in this age group.

CONCLUSIONS

The research allowed to define the following conclusions:

1. Among analysed countries of the Visegrad Group, Poland played a leading role in production value and jobs creating in the pulp and paper industry. The value of Polish pulp and paper companies production accounted for almost half of EU13 production. Of all employed in the pulp and paper industry in EU13 countries, almost 42% were employed in Polish companies. Employment in other EU13 countries reached levels from around 5% of the EU-13 level in Slovakia, to around 10% of employed in Hungary and almost 15% of employed in the Czechia.
2. The value of industrial production per person employed in the pulp and paper industry in the EU13 countries accounted for less than 11% of the EU28 countries industrial production, which indicated a significantly lower degree of labour resources usage. The highest productivity measured by the value of sold production per employee was recorded in Poland, labour productivity in Hungary and Slovakia reached similar level.
3. The high share of men in particular age groups employed could have been the result of the specificity of the pulp and paper industry. The Czechia, Hungary and Poland were characterized by the largest variability in the percentage of employed men in total employed in the age group over 60 years old.
4. The 40–59-year-old age group working in pulp and paper industry in the Visegrad Group countries was characterized by a lower share of employed men in relation to the total employed than average in EU28.
5. The share of men in each of the analysed age groups in EU28 countries remained at a similar level. EU13 was characterized by on average lowest level of men share in all age groups employed than in EU28.
6. On average, the highest share of employed women in relation to the total employed was observed in the 15–39 and 40–59 age groups in the Czechia, Hungary and Slovakia. In Poland the average share of employed women in all employed in all age groups was within 22–36%.

REFERENCES

1. BAJPAI P., 2014: Recycling and Deinking of Recovered Paper, Recycling and Deinking of Recovered Paper, Elsevier Insight; pp. 1–19.
2. BRUNNHOFERA M., GABRIELLA N., SCHÖGGL J., STERNIC T., POSCH A., The biorefinery transition in the European pulp and paper industry – A three-phase Delphi study including a SWOT-AHP analysis, Forest Policy and Economics 110 (2020)
<https://www.sciencedirect.com/science/article/pii/S1389934118303691?via%3Dihub>
3. EUROSTAT 2018: AGRICULTURE, FORESTRY AND FISHERY STATISTICS, <https://ec.europa.eu/eurostat/documents/3217494/9455154/KS-FK-18-001-EN-N.pdf/a9ddd7db-c40c-48c9-8ed5-a8a90f4faa3f> (20.10.2019)
4. EUROSTAT 2018: Annual enterprise statistics for special aggregates of activities (NACE Rev. 2)[sbs_na_sca_r2];
https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_sca_r2&lang=en

5. GOŁAŚ Z., KOZERA M., 2008: Strategie wydajności pracy w gospodarstwach rolnych, *Journal of Agribusiness and Rural Development*, Vol. 1 (7), pp. 73–87.
6. GRZEGORZEWSKA E., STASIAK-BETLEJEWSKA R., 2019: The production potential of the pulp and paper industry – the case of Poland; 12th International Scientific Conference WoodEMA “Digitalisation and Circular Economy: forestry and forestry based industry implications”; Varna, Bulgaria September, 11th–13th, 2019; pp. 257–262.
7. IMF 2018: <https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/download.aspx> (9.10.2019).
8. MARTIN J., HAGGITH M., 2018; The state of the global paper industry, *Environmental Paper Network*; pp. 1–89.
9. RIZK N., MARTEL A., D’AMOURS S., 2004: Production Planning in the Pulp and Paper Industry, *Research Consortium on e-Business in the Forest Products Industry*, Kanada; pp. 1–17.
10. ROTH S., ZETTERBERG L., ACWORTH W., KANGAS H.L., NEUHOFF K., ZIPPERER V., 2016: The pulp and paper overview paper. Sector analysis for the Climate Strategies Project on Inclusion of Consumption in Carbon Pricing, *Climate Strategies*; pp. 2–43.
11. STATISTICAL YEARBOOK OF FORESTRY, 2018: Zakład Wydawnictw Statystycznych, Central Statistical Office, 2018; https://stat.gov.pl/files/gfx/portalinformacyjny/en/defaultaktualnosci/3328/12/1/1/statistical_yearbook_of_forestry_2018.pdf (5.10.2019)
12. VAEZ E., ZILOUEI H., 2020: Towards the development of biofuel production from paper mill effluent, *Renewable Energy* 146 (2020); pp. 1408–1415; <https://reader.elsevier.com/reader/sd/pii/S0960148119310791?token=1739F8E03271AB9F676B4091685A585165285D02343D88727EBE2EDBFD87924ED1E185B8EB45C48905860565DDEAB113>

Streszczenie: *Tendencje zmian w zatrudnieniu i wydajność pracy w przemyśle celulozowo-papierniczym w wybranych krajach UE.* Przemysł celulozowo – papierniczy jest, pomimo wielu wyzwań, dynamicznie rozwijającą się gałęzią przemysłu na świecie. Wydaje się, iż zwłaszcza rosnąca konkurencja ze strony krajów słabiej rozwiniętych, takich jak Indonezja oraz spadek popytu na papier mogą być przyczyną trudności zakładów celulozowo-papierniczych, tj. spadku rentowności produkcji papieru oraz zmniejszenia się w ostatnich latach liczby zatrudnionych w tej gałęzi przemysłu. Z punktu widzenia wielkości zatrudnienia i związanej z nią wydajności pracy interesującym jest zbadanie zatrudnienia i ocena wykorzystania zasobów ludzkich w zakładach przemysłu celulozowo-papierniczego, szczególnie w krajach należących do Grupy Wyszehradzkiej, których gospodarki w ostatnich latach charakteryzuje stabilny wzrost PKB. W pracy przeanalizowane zostały: wartość produkcji przemysłu celulozowo-papierniczego oraz jej struktura w krajach Grupy Wyszehradzkiej w odniesieniu do krajów należących do UE28, a następnie zatrudnienie i jego struktura związana z przynależnością do danej grupy wiekowej.

Corresponding author:

Justyna Biernacka
Institute of Wood Sciences and Furniture
Warsaw University of Life Sciences - SGGW
159 Nowoursynowska str.; 02-776 Warsaw, Poland
justyna_biernacka@sggw.pl

ORCID ID:

Grzegorzewska Emilia	0000-0002-7532-9287
Biernacka Justyna	0000-0003-3407-1280
Podobas Izabela	0000-0001-8315-0386