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The competitiveness of manufacturing in Poland and the other V4 countries against the backdrop of digital transformation challenges

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Abstract. Competitiveness is most frequently defined as an economy's ability to cope with international competition and to ensure high employment and returns on production factors employed. Considering the importance of manufacturing in the economies of the Visegrad (V4) countries, is seems justified to examine the competitiveness of the economic sector, particularly in the perspective of the ongoing digital transformation. The article aims to present research findings regarding developments in the competitive position of manufacturing in Poland as compared to the V4 countries and to identify those countries' preparedness for implementing changes resulting from the assumptions of the Industry 4.0 concept. The most significant inferences to be drawn from the analysis are discussed in the Conclusions section. Although the issue of competitiveness has been addressed by various economists and scholars, the existing body of publications still lacks investigations of manufacturing and the Visegrad countries. The analysis presented attempts to fill in the gap in that regard.

Keywords: competitiveness, digital transformation, manufacturing, Visegrad Group.

JEL Classification: F60, L50, L60.

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INTRODUCTION

The directions of manufacturing transformation processes are primarily determined by the necessity to adapt to dynamic developments in the international environment, including mega-trends such as the automation and digitisation of economic activities. The ubiquity of technology, with its penetration into all sectors of the economy, results from the ongoing digital transformation and has become the norm. Additionally, the importance of socio-economic development premises, following from technological developments, has been accentuated during the COVID-19 pandemic, perceived as an accelerator of digital change (Qureshi & Woo, 2022). A key role in this process is played by digitisation, narrowly identified with digitalisation (Verhoef et al., 2021); in a broad sense, it encompasses measures using digital tools for boosting productivity and speeding up economic growth through the following:

- process optimisation, allowing reduced consumption of resources, improved efficiency and the application of automation;
- market development through increased access to niche customers and global markets;
- innovative products – competitive pressure stimulates efficiency improvements in research and development processes and the creation of new business models;
- increased labour market participation and opportunities for remote working and specialisation in new technologies (Kowalczyk, 2018).

Digital transformation processes affect the whole economy, gradually turning it into a digital economy, with characteristic connectedness and datafication (the ongoing process of creating digital representations of further areas of the real world). Consequently, the functioning of the factor market and of the goods and services markets changes. It is possible due to general purpose technologies which can be broken down into: (1) enabling technologies: the smartphone, the Internet and the computer; and (2) enhancing technologies: cloud computing, the Internet of Things, artificial intelligence, robotisation and blockchain technology (Śledziewska & Włoch, 2020). The presented analysis defines digital transformation as the penetration of digital technology into and its implementation in all human activities. Furthermore, digital transformation in industrial production should also be identified with the concept of Industry 4.0, integrating technologies used into a uniform cyber-physical system. It makes production faster and smoother, thus boosting productivity (Wang et al., 2016). The term Industry 4.0 is interchangeably used with that of the Fourth Industrial Revolution; therefore, it is perceived as the next stage of the socio-economic evolution triggered by breakthrough scientific and technological achievements (Nawracaj-Grygiel & Ulbrych, 2021). In comparison with the previous industrial revolutions, the changes observed occur exponentially, whereas their scope foreshadows the transformation of the whole production and management systems, changes in demand and the playing field for businesses (World Economic Forum, 2016; Dalenogare et al., 2018). The conditions described emphasise both the need for and ability to respond to the changing environment, which becomes an indispensable component of strategic economic policy. To grow further, national economies as well as their economic agents must take actions to improve their ability to compete.

Theoreticians and practitioners have been continuously concerned with national economic competitiveness issues due to changes in international competition conditions, such as the globalisation of the world economy, technological progress and the increased importance of transnational corporations (Wziątek-Kubiak, 2004; Pilarska, 2017; Molendowski & Żmuda; 2016; Olczyk, 2008). Researchers have been seeking to answer the question about the characteristics of a national economy successful in the international market. The interest has resulted in studies by authors such as Porter (1990), Dunning (1993), somewhat revised by Aiginger (2006), Grilo and Koopman (2006), Kohler (2006), Ketels (2006), Siggel (2006), Stone and Ranchhod (2006). Views on the subject have been evolving from competitiveness determined by cost advantages and factor endowments, to qualitative factors (the ability of an economy to invest and to innovate) to outcome-based competitiveness.

In the context of the analysis presented in article, it is also worth distinguishing between two concepts: the international competitive ability and the international competitive position. The former is identical with the international competitive advantage and determines the potential and possible benefits of participation in the international division of labour (factor-based competitiveness). The latter specifies the result of competing, being referred to as outcome-based competitiveness (Molendowski & Żmuda, 2016).

Considering the importance of the industrial sector to the economic and employment stability of the Visegrad Group (the Visegrad or V4 countries)[1], a major challenge in this context becomes speeding up the development of manufacturing and improving its competitiveness. The article aims to present research findings regarding developments in the competitive position of manufacturing in Poland as compared to the other V4 countries and to identify those countries' preparedness for implementing changes resulting from digital transformation. The first part of the examination relies on the United Nations Industrial Development Organisation (UNIDO) statistics concerning the period following the accession of the V4 countries to the EU, i.e. 2004–2019. The other issue is investigated based on the Eurostat data covering the years 2016–2020, due to the availability of comparable data.

THE POTENTIAL AND INTERNATIONAL COMPETITIVENESS OF MANUFACTURING IN THE V4 COUNTRIES

The assessment of the potential and international competitiveness of manufacturing in the V4 countries is based on statistics provided by the United Nations Industrial Development Organisation (UNIDO). Defining the competitiveness of manufacturing as the economy's ability to expand the presence of its manufacturing sector in the domestic and international markets while developing activities characterised by higher value added and more technologically advanced (Correa & Todorov, 2021), two essential elements must be borne in mind. One concentrates on expanding production, whereas the other concerns the type of goods produced. The production of goods involving technological advancement usually entails a greater ability to innovate, which is correlated with foreign trade performance and higher economic growth (Verspagen, 2001).

The UNIDO proposes a composite measure for assessing the industrial potential of an

economy, referred to as the Competitive Industrial Performance (CIP) Index. It is calculated based on eight sub-indicators grouped into three dimensions:

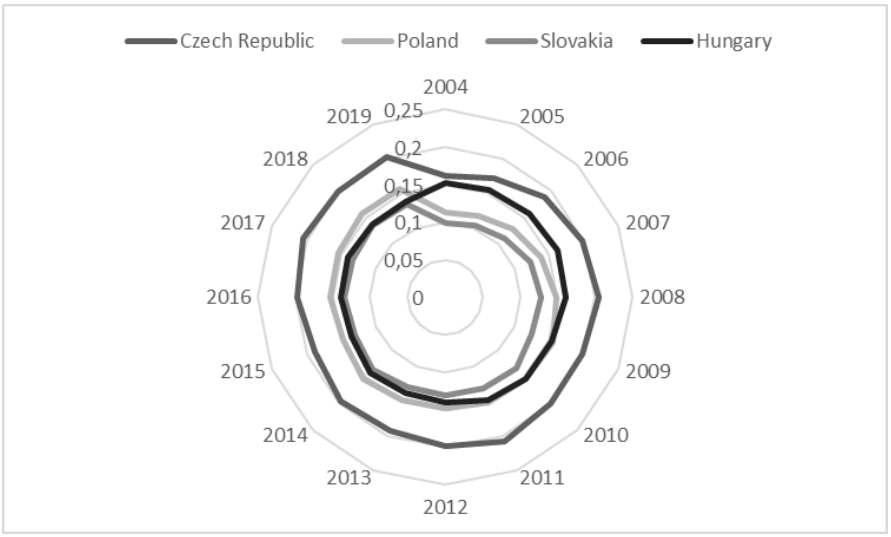
- capacity to produce and export;
- technological deepening and upgrading;
- world impact (in terms of production and trade).

Each indicator is weighted on a scale from 0 to 1 and the most recent 2021 report covers 152 countries.

[1] Manufacturing value added as a percentage of GDP is, respectively, 25.4% for the Czech Republic;,18.7% for Hungary, 17.2% for Poland and 19% for Slovakia. Manufacturing also generates jobs; the sector accounts for 26.1% of total employment in the Czech Republic, 21.2% in Hungary, 19.4% in Poland and 24.9% in Slovakia (UNIDO, 2021).

Figure 1

CIP scores of the V4 countries, 2004–2019

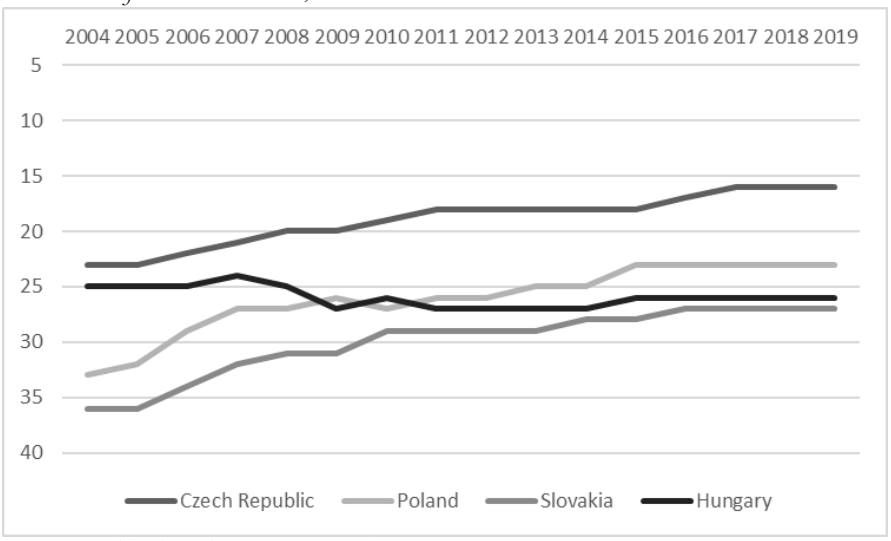


Note. Prepared by the author (UNIDO, 2022).

Three of the economies under examination, i.e. the Czech Republic, Poland and Slovakia, noted higher values of the composite measure in 2019 than in 2004. Hungary's index was on the rise until 2010 and then began to fall (Figure 1).

Figure 2

CIP ranks of the V4 countries, 2004–2019



Note. Prepared by the author (UNIDO, 2022).

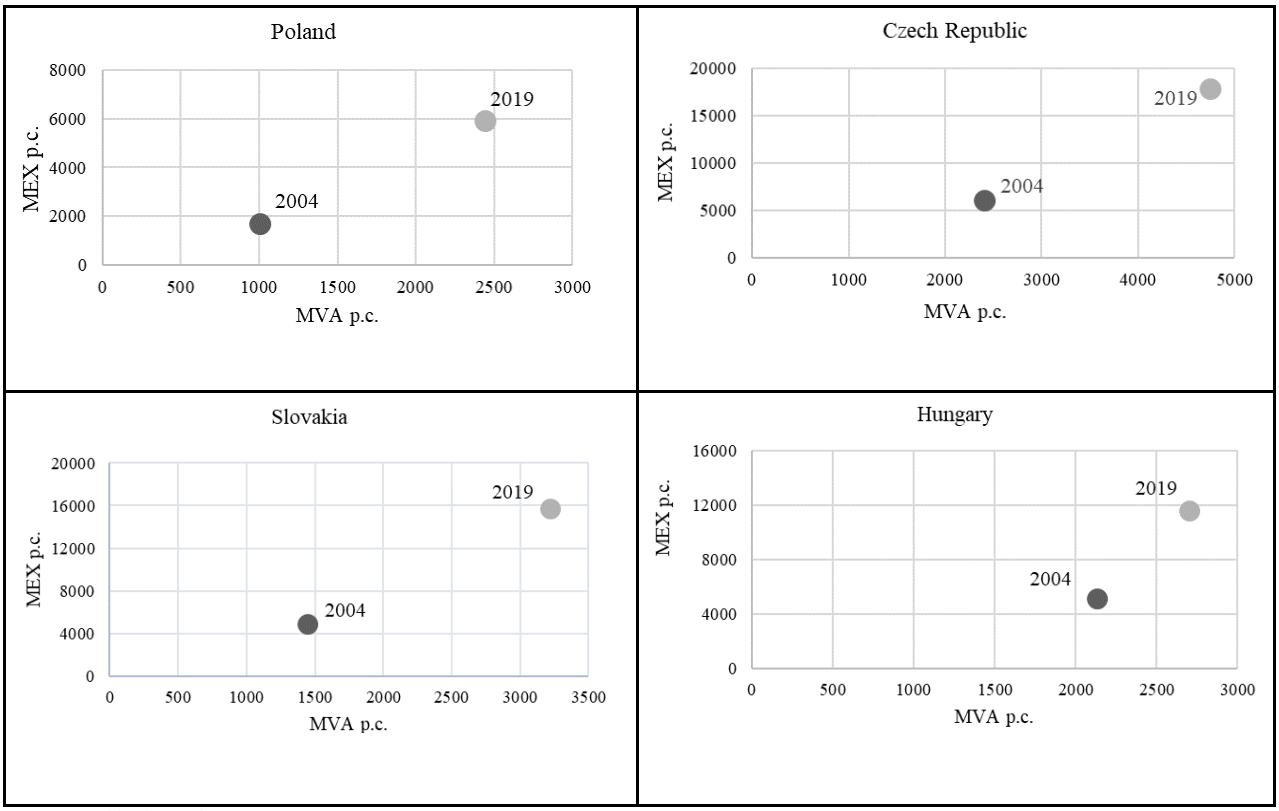
Those favourable changes resulted in higher CIP ranks of the economies under analysis, with the exception of Hungary (Figure 2). As assessed by the UNIDO, in 2019, the country distinguished by the most competitive manufacturing in the group in question was the Czech Republic (ranked 16th), followed by Poland (23rd), Hungary (26th) and Slovakia (27th). At the same time, it is worth pointing out that Poland noted the most significant

advancement (up by 10 spots) between 2004 and 2019. In order to determine the reasons for those movements, one must deconstruct the index; on account of the objective of the analysis, the size of the economies in question and their marginal impact on world production and trade (measured by the share of domestic MVA in global MVA and the share of domestic exports in global exports of manufactured goods), the examination covers the first two dimensions.

The capacity to produce and export is estimated on the basis of USD-denominated manufacturing value added per capita (MVA p.c.) and manufacturing exports per capita (MEX p.c.). Due to the number of variables in the period under examination, the aggregation of relevant statistics concentrates on 2004 and 2019. An analysis of the data presented in Figure 3 shows higher values of the indicators in all the four countries. In 2019, on average, MVA p.c. was nearly double the 2004 level, with the most impressive growth noted in Poland (by USD 2,336) and the least significant increase recorded by Hungary (by USD 571). As regards MEX p.c., it must be pointed out that its value for Poland (USD 5,908) was considerably different from those for the other V4 countries, noting an average of USD 15,020 in 2019. Further, MEX p.c. showed significantly greater dynamics against the base year than MVA p.c. In 2019, on average, exports were triple the figure for 2004.

Figure 3

The capacity to produce and export manufactured goods in the V4 countries, 2004 and 2019



Note. Prepared by the author (UNIDO, 2022).

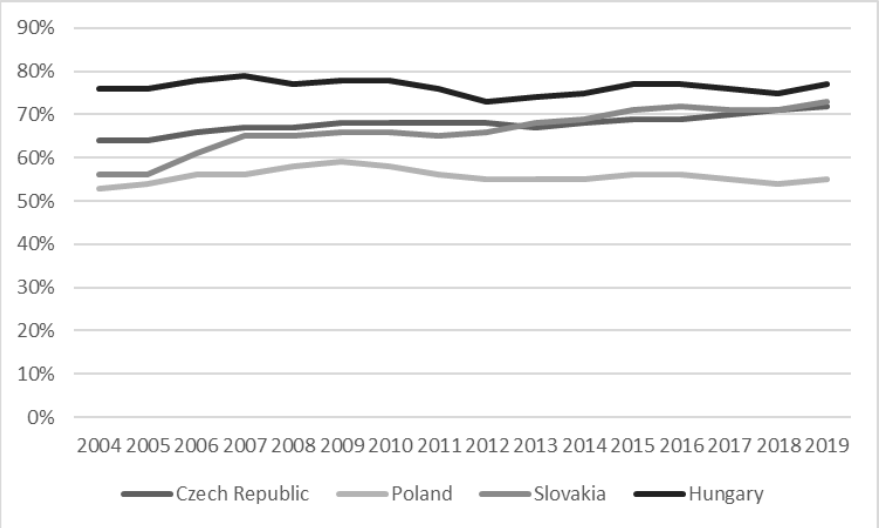
But considering the direction of the EU's development, based on stimulating innovation industry growth, particular attention must be given to the second dimension of the UNIDO's composite measure, i.e. the technological deepening and upgrading of manufacturing. This dimension comprises two indicators: export quality and industrialisation intensity, measured by the following sub-indicators: the share of manufacturing exports in total

exports, the share of medium- and high-tech manufacturing exports in total manufacturing exports; the share of MVA in GDP, the share of medium- and high-tech MVA in total MVA. The share of manufacturing exports in total exports in all the economies covered was high throughout the period in question, with the respective data for 2019 as follows: 89% in Poland, 92% in Hungary, 95% in the Czech Republic and Slovakia. Different conclusions are to be drawn from measurements regarding the role of manufacturing in GDP generation; in Poland, Slovakia and the Czech Republic higher values were noted in 2019 than in 2004 (by 4.4 pps, 5.2 pps and 7.9 pps respectively). The situation of the Hungarian economy was dissimilar as in 2019 its MVA accounted for 18.7% of PKB, whereas the 2004 figure was 19.8%.

From the point of view of the research issue addressed, it seems particularly interesting to examine the next two indicators, as presented in Figures 4 and 5.

Figure 4

Medium- and high-tech export share in total exports in the V4 countries, 2004–2019

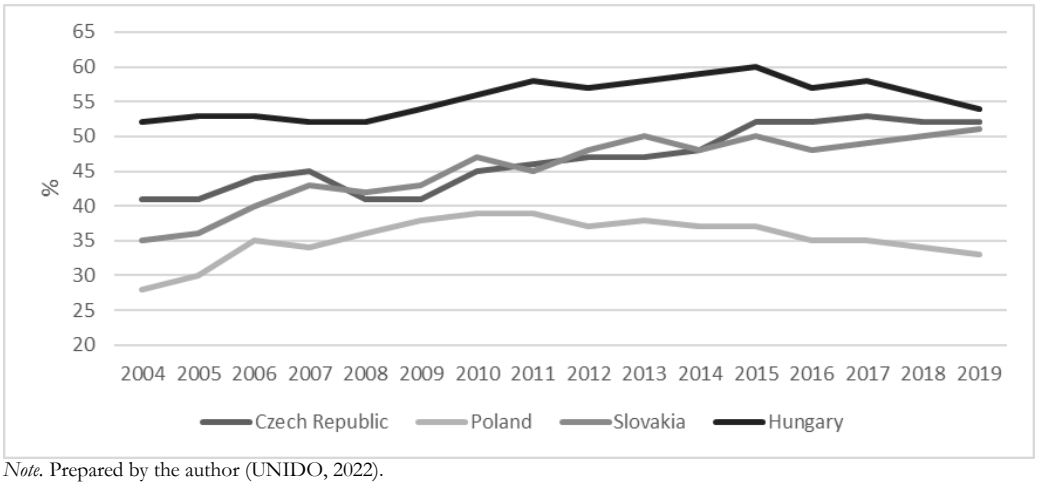


Note. Prepared by the author (UNIDO, 2022).

Considering changes in the share of medium- and high-tech manufacturing exports in total manufacturing exports, it is worth mentioning a steady increase in the indicator in Slovakia and the Czech Republic, by 17 pps and 8 pps respectively. In the other two V4 countries, the indicator in question rose in the first half of the period under analysis and then showed a decline. Additionally, there was a marked difference between Poland, with a mere 55% of total manufacturing exports representing medium- and high-tech manufacturing exports, and the other V4 countries (whose respective figures exceeded 70%).

Figure 5

Medium- and high-tech value added in total MVA in the V4 countries, 2004–2019



Note. Prepared by the author (UNIDO, 2022).

In 2019, the share of medium- and high-tech manufacturing value added in manufacturing value added in the V4 economies was an average of 47.5%. However, as in the previous case, with its 33% share, Poland significantly lagged behind the other economies under examination where more than half of MVA was generated by medium- and high-tech manufacturing.

Bearing in mind the above, it seems essential to establish for the economies covered the degree of preparedness for implementing digital transformation solutions, indirectly and directly driving competitive improvements in manufacturing competitiveness.

THE METHOD OF MEASURING THE EU'S INDUSTRIAL POLICY EFFICIENCY AS THE STARTING POINT FOR ANALYSING DIGITAL TRANSFORMATION

Digital transformation and changes in national economies resulting from the Fourth Industrial Revolution represent key action areas for the European Union's industrial policy. The current basis for the EU's policy in that regard is the strategy published by the European Commission in March 2020 and entitled A New Industrial Strategy for Europe (COM(2020) 102 final). Due to subsequent modifications, stemming from the COVID-19 pandemic announced by the World Health Organisation, 2021 saw Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery (COM/2021/350 final), accompanied by a report containing key performance indicators for the European Union's new industrial policy. Those include, in particular, indicators concerning industrial competitiveness, industry's contribution to the green and digital transition, the Union's resilience and strategic autonomy while preserving an open economy.

The key performance indicators for assessing the efficiency of industrial policies pursued by individual European Union Member States are divided into four broad groups: (1) headline indicators (showing the main trends of the EU economy and benchmarking against other countries); (2) short-term indicators (describing the condition of the EU economy in the light of the crisis caused by the COVID-19 pandemic); (3) indicators characterising each of the

14 ecosystems defined by the European Commission[2]; and (4) thematic indicators, allowing to examine areas such as: economic resilience, digital transition, climate neutrality and circular economy, Single Market integration, SMEs and the international dimension. Table 1 lists the indicators broken down into groups, together with their determinants.

THE PREPAREDNESS OF POLAND AND OF THE OTHER V4 COUNTRIES FOR DIGITAL TRANSFORMATION CHALLENGES

Particular groups of indicators represent important instruments for studying current challenges and trends in the economies of the European Union Member States; however, due to the limited size of the article, it only discusses the results of analysing the thematic indicators for digital transformation in the V4 countries in 2016–2021. The investigation relies on the Digital Economy and Society Index (DESI) published by the European Commission, with four broad categories (referred to as dimensions) of indicators:

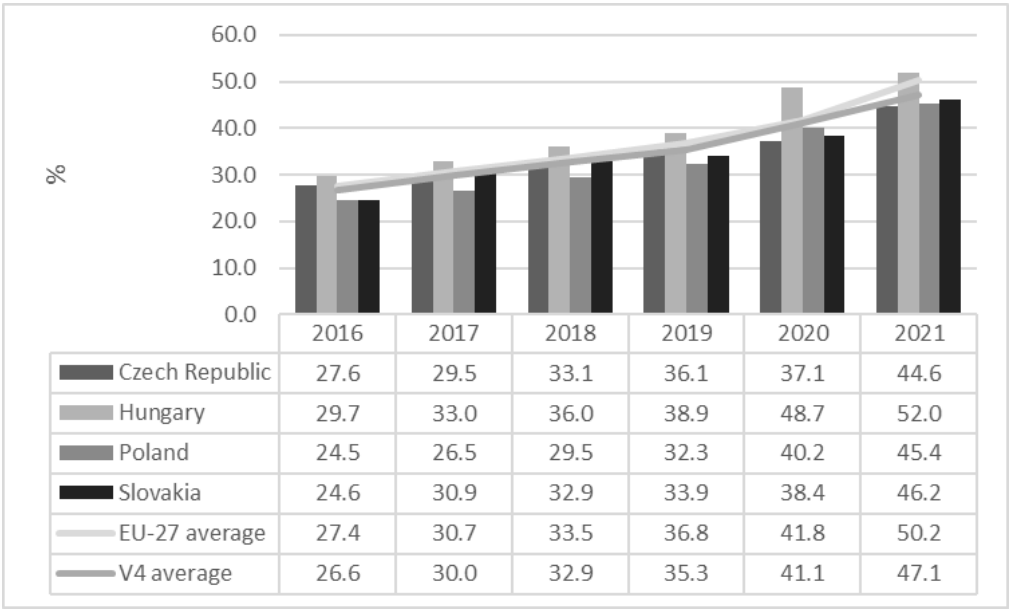
- Human capital – Internet user skills, advanced skills and development;
- Connectivity – fixed broadband take-up, fixed broadband coverage, mobile broadband, broadband prices;
- Integration of digital technology – digital intensity, digital technologies for businesses, e-commerce;
- Digital public services – e-government (European Commission, 2021).
- The three dimensions are described by a total of 33 indicators. Each of those is attributed an appropriate weight to calculate scores for specific dimensions.

In the period in question, the V4 countries made considerable advancements in the four DESI dimensions, but without improving their ranks among all the EU Member States. The scores obtained by the economies concerned were still below the EU average. Figures 6 to 11 present the scores for particular countries in each of the DESI dimensions between 2016 and 2021.

[2] In 2020, the European Commission developed an approach based on industrial ecosystems, with a view to analysing major economic areas in the EU. Those are as follows: the Tourism Ecosystem; the Mobility – Transport – Automotive Ecosystem; the Aerospace and Defence Ecosystem; the Construction Ecosystem; the Agri-Food Ecosystem; the Energy-Intensive Industries Ecosystem; the Textile Ecosystem; the Cultural and Creative Industries Ecosystem; the Digital Ecosystem; the Energy – Renewables Ecosystem; the Electronics Ecosystem; the Retail Ecosystem; the Proximity, Social Economy and Civil Security Ecosystem; the Health Ecosystem. The industrial ecosystems encompass all players operating in a value chain, whereas the concept of ecosystems comprises a complex combination of linkages and interrelations between sectors and businesses pursuing economic activities in each of the EU Member States (European Commission, 2021).

Figure 6

DESI dimension: Connectivity, V4 countries, 2016–2021



	2016	2017	2018	2019	2020	2021
Czech Republic	27.6	29.5	33.1	36.1	37.1	44.6
Hungary	29.7	33.0	36.0	38.9	48.7	52.0
Poland	24.5	26.5	29.5	32.3	40.2	45.4
Slovakia	24.6	30.9	32.9	33.9	38.4	46.2
EU-27 average	27.4	30.7	33.5	36.8	41.8	50.2
V4 average	26.6	30.0	32.9	35.3	41.1	47.1

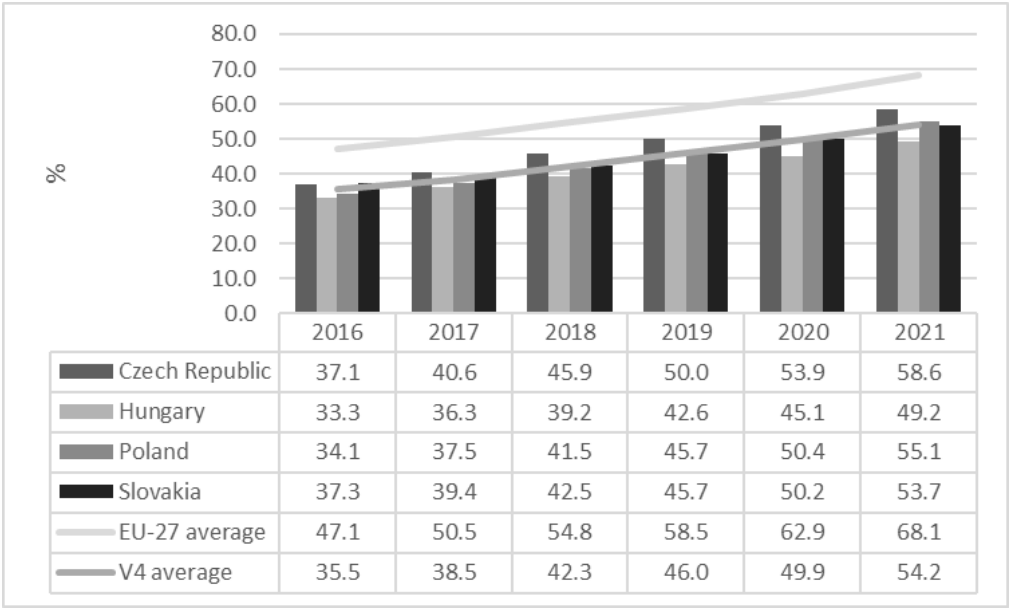
Note. Prepared by the author on the basis of information from the Digital Agenda EU (2022).

It follows from the data shown in Figure 6 that Slovakia was the best performer in the Connectivity dimension in the Visegrad Group throughout the period covered. That V4 country obtained the highest scores both at the beginning and at the end of the period, with an average score of 39.7%. Therefore, it exceeded the EU-27 average of 36.7% and the V4 average of 35.5%. As regards growth in the index, the most dynamic increase, by 88%, was recorded by Hungary, ahead of the Czech Republic and Slovakia – by 85% and 75% respectively, with the least significant improvement in Poland– by a mere 61%. It is worth emphasising that Hungary's advantageous score was fuelled by fixed broadband coverage, fixed broadband take-up by households and improved broadband speed.

The DESI score in Digital public services is determined by the number of e-government users, pre-filled forms available at e-government platforms, digital public services for citizens and businesses and the availability of open data. Figure 7 presents detailed scores for the V4 countries in the dimension concerned.

Figure 7

DESI dimension: Digital public services, V4 countries, 2016–2021



	2016	2017	2018	2019	2020	2021
Czech Republic	37.1	40.6	45.9	50.0	53.9	58.6
Hungary	33.3	36.3	39.2	42.6	45.1	49.2
Poland	34.1	37.5	41.5	45.7	50.4	55.1
Slovakia	37.3	39.4	42.5	45.7	50.2	53.7
EU-27 average	47.1	50.5	54.8	58.5	62.9	68.1
V4 average	35.5	38.5	42.3	46.0	49.9	54.2

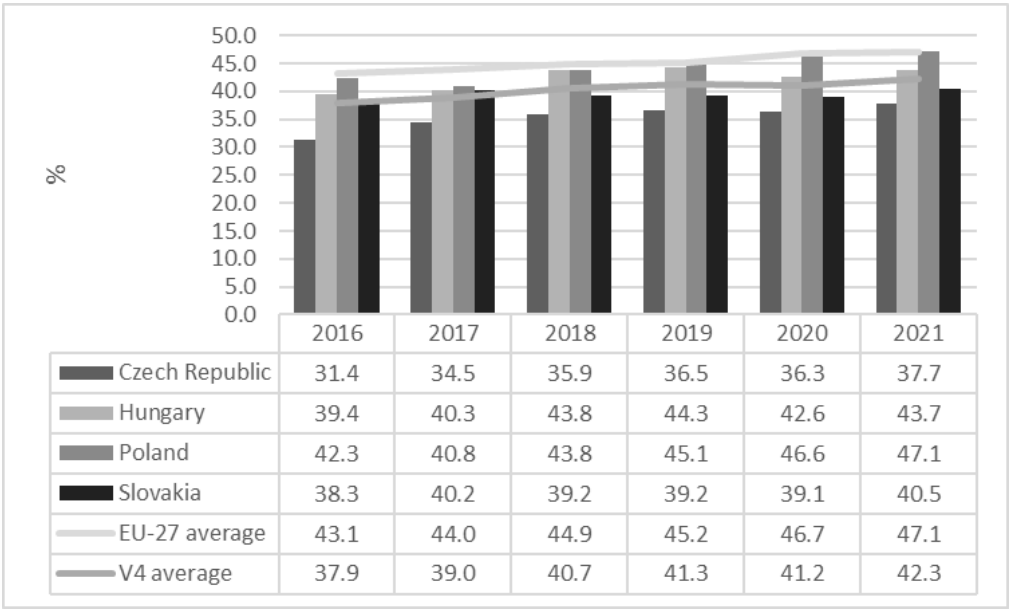
Note. Prepared by the author on the basis of information from the Digital Agenda EU (2022).

Throughout the period covered, the availability and quality of digital public services was 44.4% in the V4 countries; despite the improvement in score, it remained distinctly below the EU-27 average (56.9%). In 2016, the highest and the lowest scores for the dimension in question were noted by Slovakia and Hungary respectively. In 2021, however, the top performer was the Czech Republic, whereas Hungary continued to perform poorly. Between 2016 and 2021, the most significant progress was made by Poland, whose score jumped by 58%.

According to the indicators used for the DESI calculation, the quality of human capital is determined by the percentage of individuals with basic and above basic digital skills and at least basic software skills, the number of ICT specialists broken down by sex, the number of ICT graduates and the number of enterprises having provided training in ICT to their personnel. Figure 8 illustrates the DESI scores in the dimension in question for the V4 countries in 2016–2021. The economies under examination obtained scores below the EU average, with the exception of the Czech Republic's score in 2021, equal to the EU average of 47.1%.

Figure 8

DESI dimension: Human capital, V4 countries, 2016–2021



	2016	2017	2018	2019	2020	2021
Czech Republic	31.4	34.5	35.9	36.5	36.3	37.7
Hungary	39.4	40.3	43.8	44.3	42.6	43.7
Poland	42.3	40.8	43.8	45.1	46.6	47.1
Slovakia	38.3	40.2	39.2	39.2	39.1	40.5
EU-27 average	43.1	44.0	44.9	45.2	46.7	47.1
V4 average	37.9	39.0	40.7	41.3	41.2	42.3

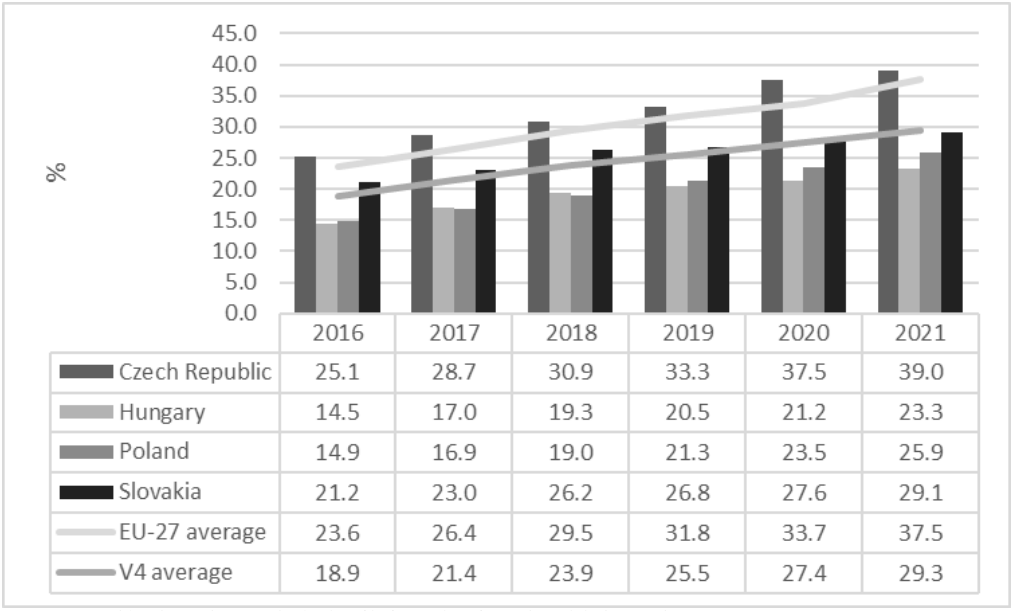
Note. Prepared by the author on the basis of information from the Digital Agenda EU (2022).

As regards the Human capital dimension, Poland was the worst performer throughout the period covered. Poland's average score, a mere 35.4%, was considerably lower than the EU average (45.2%) and the respective V4 figure (40.4%). It is worth highlighting that – although Poland reached the EU average of ICT graduates in 2021 – the persisting shortage of specialists significantly affected the take-up of digital technologies by enterprises. Therefore, Polish businesses, especially SMEs, were in no position to fully use the digital economy potential (European Commission, 2021).

The Integration of digital technology dimension concerns business activities, with a particular focus on SMEs. The relevant indicators include cloud computing, artificial intelligence, big data, using social media, electronic information sharing, e-invoices, selling online and e-commerce turnover, selling online cross-border and the share of SMEs with at least a basic level of digital intensity. Figure 9 shows scores for the V4 countries in the dimension in question. In the period under examination, the Czech Republic outperformed the rest of the Visegrad Group and obtained a score of 32.4%, above the EU-27 average (30.4%). In comparison with the other V4 countries, outstanding performance characterised not only the Czech Republic but also Slovakia (with a score of 25.6%, against the V4 average of 24.4%). Although Poland made the most dynamic advancement in score – up by 74% – it was ranked next to last (with the 2021 score at 20.2%), ahead of Hungary. In spite of the relatively robust improvement over the period in question, by 61%, the Hungarian economy was characterised by the lowest scores, in both 2016 and 2021.

Figure 9

DESI dimension: Integration of digital technology, V4 countries, 2016–2021



	2016	2017	2018	2019	2020	2021
Czech Republic	25.1	28.7	30.9	33.3	37.5	39.0
Hungary	14.5	17.0	19.3	20.5	21.2	23.3
Poland	14.9	16.9	19.0	21.3	23.5	25.9
Slovakia	21.2	23.0	26.2	26.8	27.6	29.1
EU-27 average	23.6	26.4	29.5	31.8	33.7	37.5
V4 average	18.9	21.4	23.9	25.5	27.4	29.3

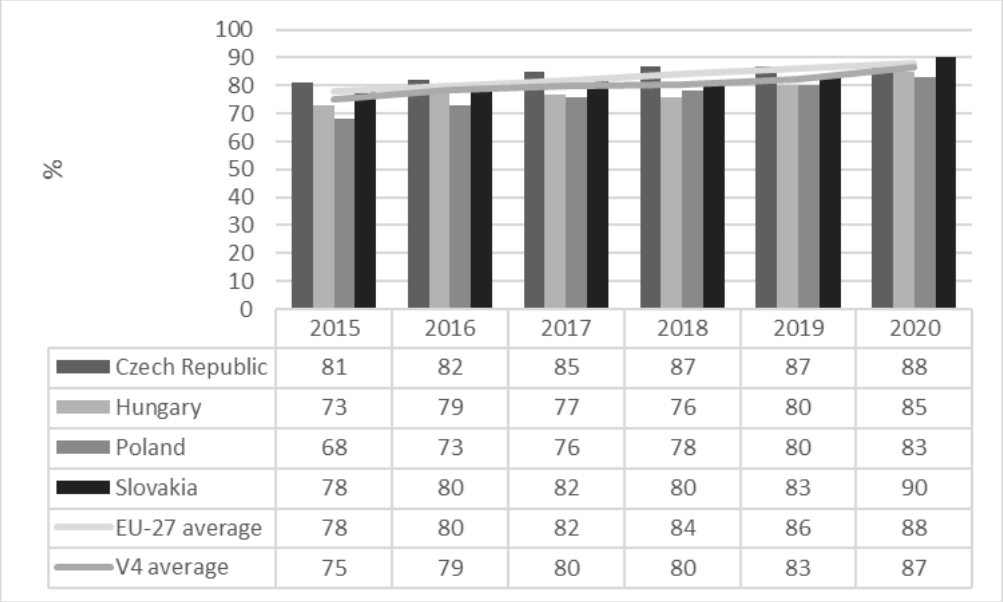
Note. Prepared by the author on the basis of information from the Digital Agenda EU (2022).

But it is worth stressing that in the period under analysis, according to studies conducted (European Commission, 2021), advanced technologies were increasingly implemented in Polish enterprises; in 2021, 15% of firms relied on cloud computing services, whereas 18% used artificial intelligence technologies for business purposes. However, scores for all the relevant indicators lagged significantly behind the EU average.

Nevertheless, the fundamental indicator for digital transformation assessment is the use of Internet, with the relevant data presented in Figure 10. In the period concerned, the average score for the V4 countries was 80.5%, 2.54 pps below the EU-27 average. In 2015, Poland obtained the lowest score of 68%. In 2020, despite the most buoyant growth (by 22%), Poland was still ranked last, with a score of 83%. Among the countries covered, Slovakia obtained the highest 2020 score, having developed a 15% increase. It is worth emphasising that the only V4 country whose average share of individual Internet users exceeded the EU-27 average was the Czech Republic (85%).

Figure 10

Individual Internet users, V4 countries, 2015–2020



	2015	2016	2017	2018	2019	2020
Czech Republic	81	82	85	87	87	88
Hungary	73	79	77	76	80	85
Poland	68	73	76	78	80	83
Slovakia	78	80	82	80	83	90
EU-27 average	78	80	82	84	86	88
V4 average	75	79	80	80	83	87

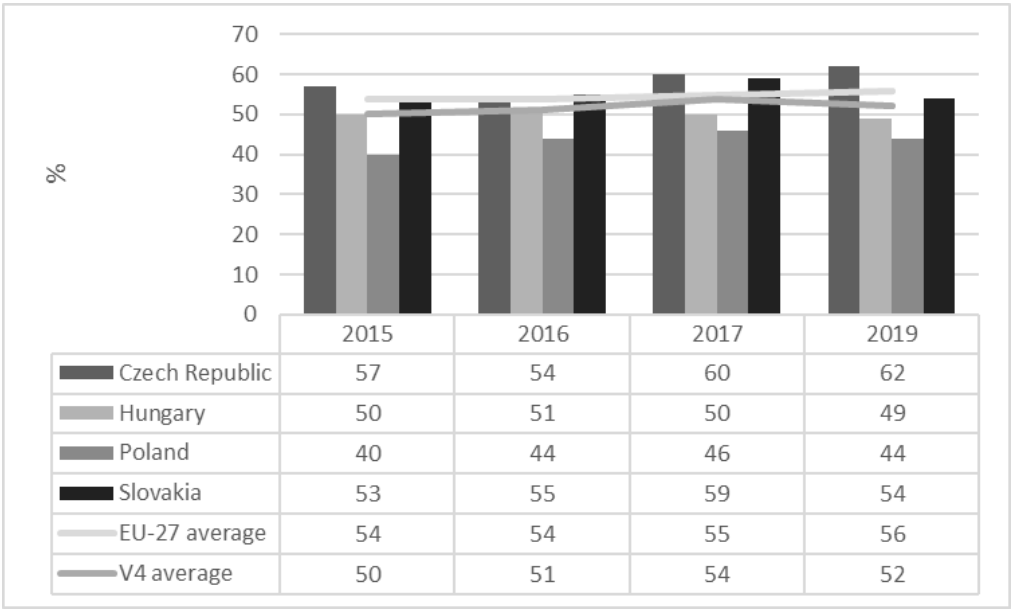
Note. Prepared by the author on the basis of information from the Eurostat (2021).

Another determinant of digital transformation is the percentage of individuals with digital skills. Its calculation is based on a survey of four dimensions of skills used during the previous 3 months (preceding the survey concerned). Those are as follows: information, communication, problem solving and software for content creation. The relevant performance of the V4 countries in the period covered[3] is shown in Figure 11.

[3] Due to data availability, the relevant scores were presented for the period 2015–2019.

Figure 11

Individuals with 'basic' or 'above basic' digital skills, V4 countries, 2015–2019



	2015	2016	2017	2019
Czech Republic	57	54	60	62
Hungary	50	51	50	49
Poland	40	44	46	44
Slovakia	53	55	59	54
EU-27 average	54	54	55	56
V4 average	50	51	54	52

Note. Prepared by the author on the basis of information from the Eurostat (2021).

Among the V4 countries, in the period under examination, the highest average levels of digital skills characterised the Czech Republic and Slovakia, 58.3% and 55.3% respectively. The two scores exceeded the V4 average (51.8%) and the EU-27 average (54.5%). In 2015–2019, the poorest performer was Poland, with a score of 43.5%; in spite of the most dynamic rise (10%), it was still 8.25 pps lower than the V4 average and 11.25 pps lower than the EU-27 average. According to the European Commission data for 2021, the level of digital skills in Poland was below the EU average. In Poland, a mere 44% of individuals aged between 16 and 74 years had at least basic digital skills and only 21% of those surveyed had above basic digital skills (European Commission, 2021). It is worth noting that the country with no advancement in score was Hungary (with respective scores of 50% and 49% at the beginning and in the last year of the period in question).

CONCLUSIONS

The currently observed transformation of manufacturing results from strong global economic trends, such as the automation and digitisation of operations. Another accelerator of those developments is the crisis caused by the SARS-CoV-2 pandemic, having hit the world economy in 2020. Digital transformation in manufacturing can be identified with the concept of Industry 4.0 or the Fourth Industrial Revolution. Its scope remains unprecedented and foreshadows the transformation of the whole production and management systems, changes in demand and the playing field for businesses. The developments observed do not remain unaddressed by the European Union, stressing the need for transforming the whole national economies with the aim of improving competitiveness and building the Community's strategic autonomy.

The article attempts to fill in the still existing gap as regards challenges faced by manufacturing in the V4 countries in the context of digital transformation. The issue is of particular importance, considering the fact that the industrial sector plays a vital economic role in the countries under analysis, both in GDP generation and job creation. The assessment of the international competitiveness of manufacturing in the V4 countries must take note of the improved CIP ranks of the Czech Republic, Poland and Slovakia, whereas the Hungarian economy maintained its

26th place after 2015. Those favourable changes were presumably determined by increased manufacturing potential, attributable to higher levels of MVA p.c. and MEX p.c. However, the technological deepening and upgrading level remains problematic, particularly in Poland, with regard to both manufacturing production and manufacturing exports. It gives rise to certain concerns about the continuation of the current upward trend of its competitive position.

The examination of the Visegrad Group's advancements in digital transformation unambiguously demonstrates that in 2016–2021 the V4 countries made significant progress in that regard. It is reflected in the development of relevant indicators.

The Visegrad countries' efforts to catch up with the EU were the most successful in the Connectivity dimension, whereas the most significant distance remained in Digital public services. The V4 countries still had shares of individual Internet users and of individuals with basic and above basic digital skills below the EU average levels. Within the Visegrad Group, the highest scores in three out of the four DESI dimensions were noted by the Czech Republic, only outperformed by Hungary in the Connectivity dimension. As in the case of the indicators measuring the percentage of individual Internet users and digital skills, the Czech Republic proved to be the most successful.

At the same time, Poland was the country to have made the most dynamic progress in the DESI dimensions as well as in the other two indicators. However, despite the strong improvement in performance, in the period concerned Poland was no leader in the Visegrad Group, with scores below the EU-27 average and the V4 average.

The considerations presented in the article will be the starting point for further research, involving a detailed analysis of the efficiency of the industrial policy implemented, pursuing the objectives described in the new industrial strategy for Europe. Although the issue has been addressed by European economists, the body of published studies still lacks investigations regarding the Visegrad countries. The analysis presented attempts to fill in the gap in that regard.

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