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THE KEY TO INCREASING COMPETITIVENESS IS INVESTING INTO HUMAN RESOURCES

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INTRODUCTION

This paper focuses attention on the fact that the V4 (Visegrad) countries in general are poorly prepared to capitalize on the opportunities offered by the fourth industrial revolution, and less protected against the risks created by it. First of all economic structural indicators prove that the economies of the V4 countries are still not knowledge based, and can be characterized by low value added activities. In some cases Poland stands out with slightly better results, but all in all V4 countries lag behind the economically more advanced countries for all the analyzed indicators. Secondly these countries do not invest enough into their human resources. The article suggests that unless the V4 countries start putting stronger emphasis on developing human skills and local knowledge they will lose a historic opportunity for becoming successful nations which are able to benefit from the ongoing processes of the fourth industrial revolution by moving up on the value chain.

AIM AND METHOD

The aim of the article is to focus attention on the development problems of the V4 countries in comparison with the more advanced countries of the EU. The article uses a wide range of information basis and background research papers to prove that the V4 countries are not doing enough in terms of developing their knowledge base for being ready to capitalize on the opportunities of the fourth industrial revolution. It these countries remain the cheap production basis of the multinational companies of the advanced EU

countries then the EU itself will lose because the knowledge capabilities of the V4 countries remain underutilized and underdeveloped. This will undermine the innovativeness of the EU on the longer run in comparison with the rapidly developing Asian countries.

THE V4 COUNTRIES AS PRODUCTION CENTERS

A recent OECD report [Nedelkoska and Quintini 2018] has warned that in a sample of 32 countries 14% of the present jobs will perfectly disappear, and another 33% will be dramatically changed. The OECD report has found that the highest risk of job automation will happen in the Eastern European and Southern European countries due to the large proportion of low-skilled manufacturing jobs in their economies. Within the V4 countries Slovak, Hungarian and Czech jobs are at high risk of automation, as the share of manufacturing in value added is high, and out of this a significant proportion represents the typical screwdriver operations of foreign manufacturing affiliates. Figure 1 and Figure 2 underline this OECD forecast. Scandinavian and UK jobs are at the lowest risk, due to the low percentage of easily automatable manufacturing jobs, which are mostly created by the affiliates of foreign companies in the V4 countries.

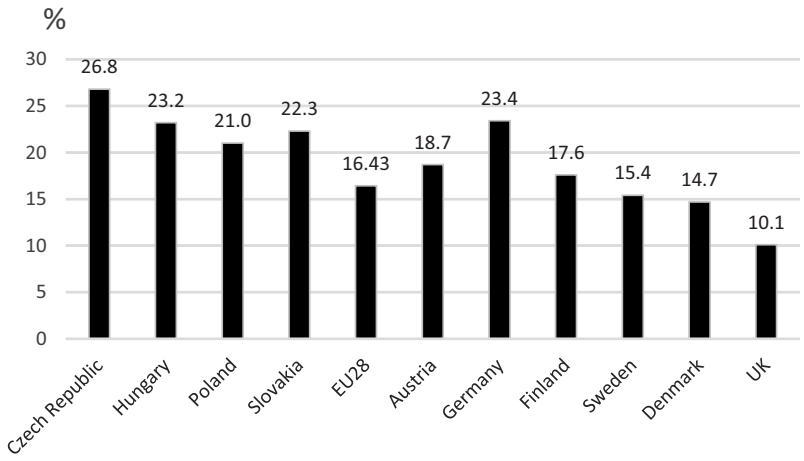


FIG. 1. Share of manufacturing in value added (2017)

Source: The Author based on OECD data.

Figure 3 shows the problem of short value chains and assembly operations. Domestic value added is low and import content is high in the manufacturing activity in the case of the V4 countries. In accordance to the OECD report [Nedelkoska and Quintini 2018] the lowest value added characterizes the Czech, Slovak and Hungarian manufacturing sector.

Figure 4 proves that percentage of value-added of typical knowledge-based sectors like info-communication and professional, science and support services are lower than the percentage of manufacturing value added in the V4 countries due to the large proportion of manufacturing in their economies. It is worth considering how different this proportion is in the advanced countries. For example in the UK the proportion of value

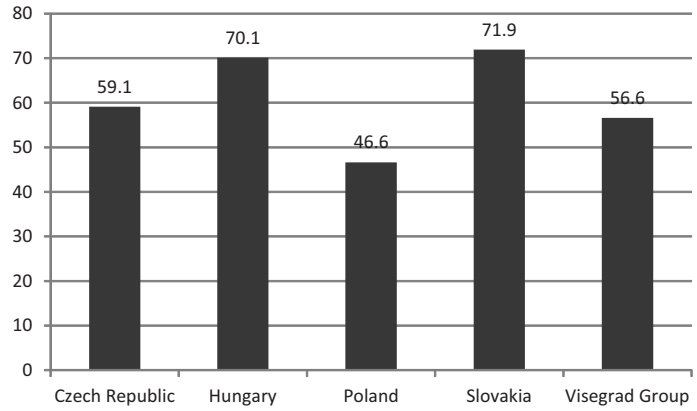


FIG. 2. Share of foreign manufacturing affiliates in value added (at factor cost, 2015)

Source: The Author based on Eurostat data.

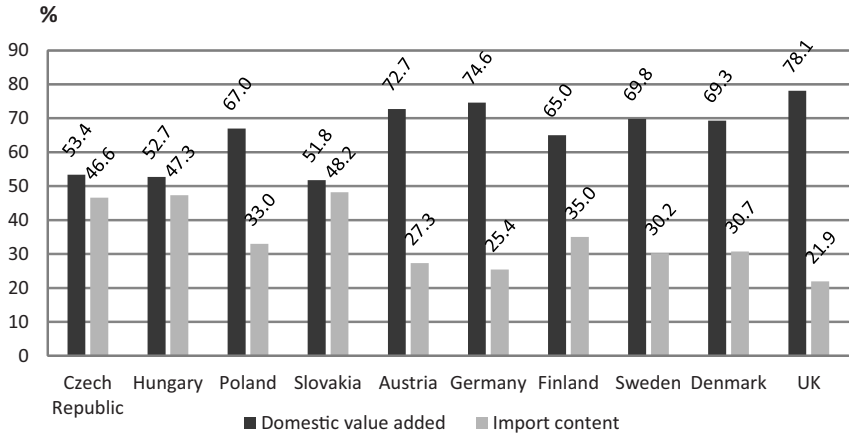


FIG. 3. Domestic value added in and import content of export (in %, 2014)

Source: The Author based on OECD data.

added created by professional, science and support services is 23.5% higher than that of manufacturing. (In absolute terms in the UK the contribution of manufacturing value added to the total is 10.12%, and that of the professional services is 12.5% in 2017). We can also see the GDP per capita (PPS) as the percentage of the EU total on Figure 4 (in brackets). This number is higher in the more knowledge-based economies of the EU, and lower in the V4 countries.

To become more knowledge-based countries need skilled human resources and they also have to spend more on knowledge creation, like R&D and innovation. Therefore governments and businesses are responsible for creating new and complex education and training systems to prepare not only the future workforce, but the present working

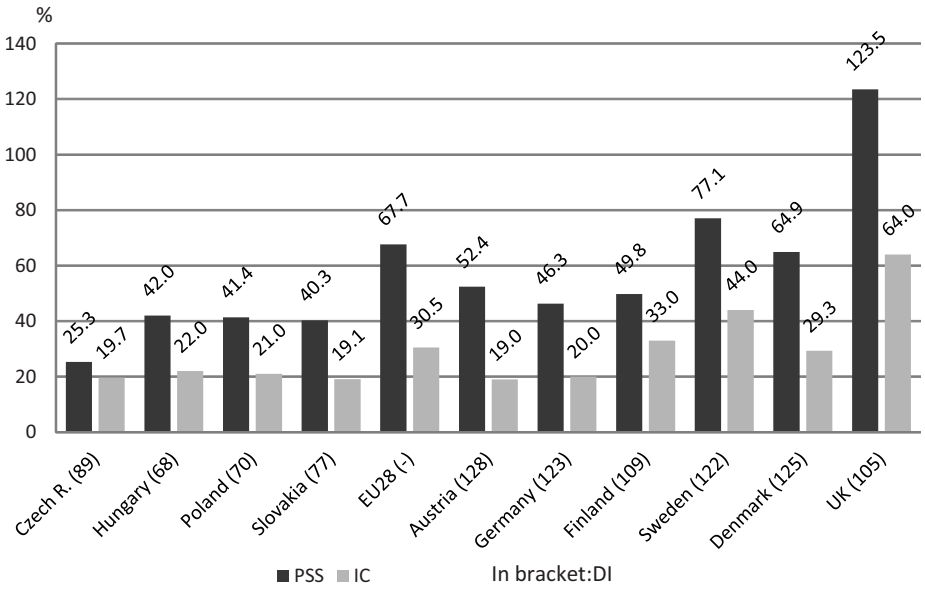


FIG. 4. The share of value added of info-communication (IC) and professional, scientific and support services (PPS) as percentage of the share of manufacturing value added (in %, 2017) measured against the development indicator (DI) (GDP per capita / PPS/, EU = 100)

Source: The Author based on Eurostat data.

population, as well, to meet the knowledge and skills requirements of not only the present but also the future. Those countries which will fail to adjust human resources in time will find themselves to be left out, and left behind: they will be in the position to wonder what has happened around them. This paper also presents a comparative analysis of the V4 countries in term of how prepared their human and knowledge resources are for the fourth industrial revolution. The human resource characteristics of these countries will also be measured against a few more advanced countries in the EU.

The economic indicators of Austria and Germany are especially important because of their strong economic relationships with the V4 countries. The paper concludes by proving that unless the V4 countries will invest a lot more into education, lifelong learning and reskilling their population they will lose economic vitality, the ability of becoming a successful economic player in the European economy and also in the world economy. Consequently their living standards will also deteriorate.

WHAT DO WE MEAN BY THE FOURTH INDUSTRIAL REVOLUTION?

Industrial revolutions bring landslide changes in how not only production, but also society will be organized and performed. The first industrial revolution (end of the 18th century) introduced water and steam power to speed up production operations. During

the second one (start of the 20th century) electric energy was utilized for mass production processes improving productivity tremendously. Then the third (the beginning of the 1970s) started automating production with the help of electronic and information technology. And now we are in the process of the fourth industrial revolution, which will bring digitalization, automation, artificial intelligence, machine learning and many more sophisticated technologies into our business and everyday life. The great question is: how to adjust to, how to take advantage of these disruptive technologies? The key challenge will probably be how to offer efficient and timely education, training, retraining and reskilling to the largest possible segment of society. Without such a mass investment into the new knowledge and skills the population will lose employability, which will create tremendous economic and social troubles. Especially if all the warning forecasts will turn out to be correct. One of the most pessimistic forecast comes from Guthrie-Jensen Consultants [WWW 1] who believe that by 2020 about 5 million jobs will be replaced by automated machines. Also disruptive changes will create new markets, and also new jobs that didn't exist before. The authors emphasize the best solution the following way: to be prepared for the new opportunities requires proper skills, capabilities and attitudes, which can be achieved by investing in intangibles: human, psychological and organizational capabilities.

THE EFFECTS OF THE FOURTH INDUSTRIAL REVOLUTION ON DEMAND FOR NEW KNOWLEDGE AND SKILLS

Different studies suggest that the highest probability of easy automation can be found in those sectors of industry which mainly employ low-or medium skilled employees performing manual and routine tasks. Therefore OECD (2018) predicts that the highest probability of job losses can be expected in manufacturing, agriculture, mining and quarrying. It is less likely that jobs requiring creativity, human and social skills, like healthcare, education, legal, accounting, computer and information services or management consultancy will be automated soon. However these types of jobs will also be undergone changes that will require a new set of skills and capabilities soon, and more pronouncedly from the workforce of tomorrow.

Different studies try to describe those typical soft skills which will be in high demand. One of the institutions heavily involved in research related to the effects of the fourth industrial revolution is the World Economic Forum (WEF) [Gray 2016.] has listed the 10 most important skills which will be needed to thrive in the fourth industrial revolution. These are the following:

– complex problem solving
– critical thinking
– creativity
– people management
– coordinating with others
– emotional intelligence
– judgement and decision-making

– service orientation
– negotiation
– cognitive flexibility

But of course the question is: are the present educational systems prepared to offer these soft skills? Are educators themselves properly trained and empowered to create innovative learning experiences for students and adults? Are they able and willing to follow Alfred Einstein's (1879–1955) philosophy who once said: I never teach my pupils, I only provide the conditions in which they can learn. Of course, as it was said before, continuous adult education (lifelong learning) will also be in high demand. An interesting study by the Economist Intelligence Unit (EIU) [WWW 2] stresses the different problems in the various educational fields. It argues: in an age when technological changes have strong, sometime even fundamental impact on how individuals work, lifelong learning for everyone may be a crucial element of the solution.

EIU also calls attention to the importance of proper basic education, including early education programs, 21st century skills programs and modern technology and data literacy education programs.

Improving the quality of vocational and on-the-job training is also of great importance. It can enable employees, especially workers, younger and older ones as well, to participate in reskilling programs. Becker [1964], a representative of human capital theory points out that on-the-job training is an important future oriented investment into human resources. However companies may be hesitant to spend money on workers who are employed in jobs that will be automated in the near future. Therefore governments should also be responsible for offering training to these people, and also to those who need upgrading of skills in any segment of society. Needs for learning and unlearning will also be present at the same time.

Alvin Toffler [1970] writer and futurist summarized the essence of learning requirements quite early in the following way: the illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn.

Therefore the most important task of business along with government should be to invest in human resources. The different studies all direct attention to the same issues: success or failure of economies and societies will be determined in the age of the fourth industrial revolution based on how much they will invest in human knowledge, skills and innovation. Earlier competitiveness studies mostly concentrated on measurable economic and financial indicators. Nowadays countries have to change their understanding of how they should measure competitiveness. Soft factors, investments into intangibles will determine their success or failure in the future. Haskel and Westlake [2018, pp. 3, 35] explain this the following way: "Economy does not run on tangible investment alone. Intangible investment has become increasingly important. It is related to the changing balance of services and manufacturing in the economy, developments in IT, and management technologies". The typical investment into intangibles are related to investing into education, training, lifelong learning, R&D and innovation. In the following points we measure the achievements of the V4 countries in terms of how much they invest into the most important intangibles compared to some advanced countries and the EU28 average.

THE ACHIEVEMENTS OF THE V4 COUNTRIES IN INVESTING INTO INTANGIBLES

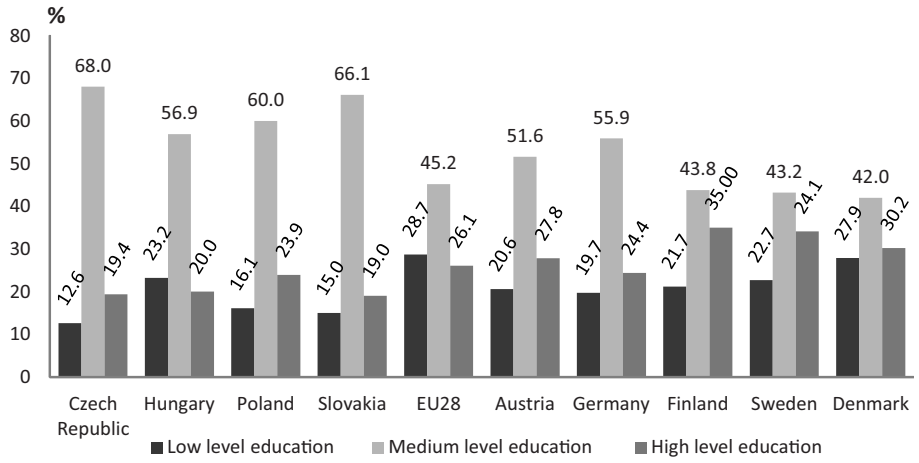
Figures 1 and 2 illustrate a very important weakness of the V4 economies, which is the large proportion of manufacturing, and within it a strong share of value added created by affiliates of foreign manufacturing enterprises. If we compare these characteristics with those of the Scandinavian countries and the UK, we will experience considerable differences. UK has the lowest proportion of manufacturing, followed by Denmark, Sweden and Finland. These countries are – in this order – 8th, 10th, 9th, and 11th position on the WEF 2018 competitiveness ranking list (out of 140 countries) [Schwab 2018]. The most important reason can be that these countries are already knowledge-based economies competing with high value-added innovative economic activities. They also have a strong knowledge sector, like info-communication and professional services. And how are the V4 countries performing? Poland is in the best position with 21% proportion of manufacturing, and the Czech Republic has the worst one with 26.8%. However we cannot make an educated conclusion about the V4 numbers without analysing the share of foreign manufacturing affiliates in the value added. Figure 2 offers the results of this. The highest share can be found in Slovakia, Hungary and the Czech Republic. These foreign affiliate operations are basically easily automatable assembly lines. Again Poland is in the best position in this respect. However the average value of the second indicator (Fig. 2) is not too good for the V4 countries in general: the share of foreign manufacturing affiliates is rather high, 56.6% in value added. This establishes vulnerability for the group, unless they are ready to invest in those people who will lose their jobs, and also into the young generations and basically into the entire population in order to make them fit for the new jobs, new opportunities. This would facilitate moving up on the value chain for them. Now let us examine a few characteristics of knowledge achievements in different countries.

Figure 5 shows the proportion of population by educational attainment level in the V4 countries and 5 advanced EU countries in 2016 in the age range of 15–74 years.

Within the V4 countries the Czech Republic has the lowest proportion of the population with low level education, which is at the same time the lowest level for all the countries analysed, and Poland has the highest proportion for tertiary education. But there are much higher values for the population with tertiary education in the Scandinavian countries. This may indicate again the knowledge-based nature of the Scandinavian economy. As far as the V4 countries' profile is concerned the low proportion of the population with tertiary education can be a serious disadvantage. For moving towards knowledge-based economies they should do more to increase this number. It is also interesting that the German and Austrian values are also quite low. However these countries take advantage of brain drain from the V4 and Southern European countries.

As we argued before the fourth industrial revolution requires highly trained workforce. Among them graduates in science, mathematics, engineering and computing (SMEC) are in especially high demand. Figure 6 shows the proportion of SMEC graduates aged 20–29 in year 2015.

Among the V4 countries Hungary and Slovakia are in the worst position, and Poland has the best position. However for this indicator the V4 countries do not lag too far be-



Low level education – less than primary, primary and lower secondary education; Medium level education – upper secondary education; High level education – tertiary education

FIG. 5. Population by educational attainment level (2016, 15–74 years, in %)

Source: The Author based on Eurostat data.

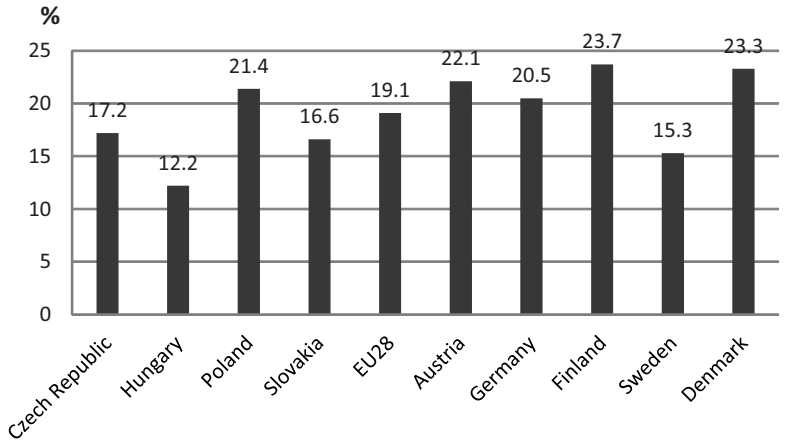


FIG. 6. Graduates in tertiary education in science, mathematics, engineering, computing (SMEC) (per 1000 of population aged 20–29, 2015)

Source: The Author based on Eurostat data.

hind the analysed advanced countries. If we consider another indicator, people who have a tertiary education and work in a science and technology occupation as a percentage of the total labour force, than we experience big differences again. (Fig.7.) The Slovak data is the worst, followed by the Czech and Hungarian.

But the Polish number is higher than the EU average and the German value. And Scandinavian countries are again much ahead of the other countries. These data reinforce what

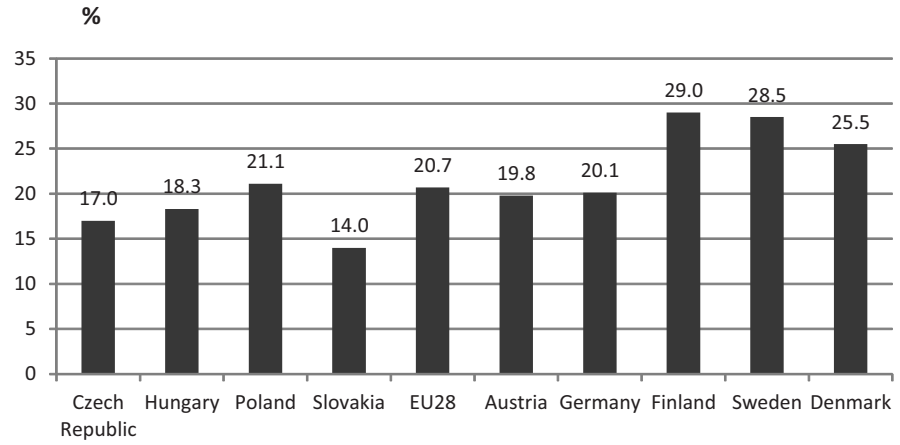


FIG. 7. People with tertiary education and working in science and technology occupation as a percentage of total labour force (15–74, 2016, in %)

Source: The Author based on Eurostat data.

was said before: the economic structure of the V4 countries is dominated by manufacturing, mostly assembly line jobs, which are at the highest risk of automation. At the other end we see the knowledge-based, service-oriented Scandinavian countries, where due to the nature of jobs wages are also much higher than in the V4 countries, so people may be able to spend more on their own education. But how much people really care about their continuous education? This can be measured by checking lifelong learning numbers.

On Figure 8 adult participation (Lifelong learning) as a percentage of population aged 25 to 64 (2017) is demonstrated.

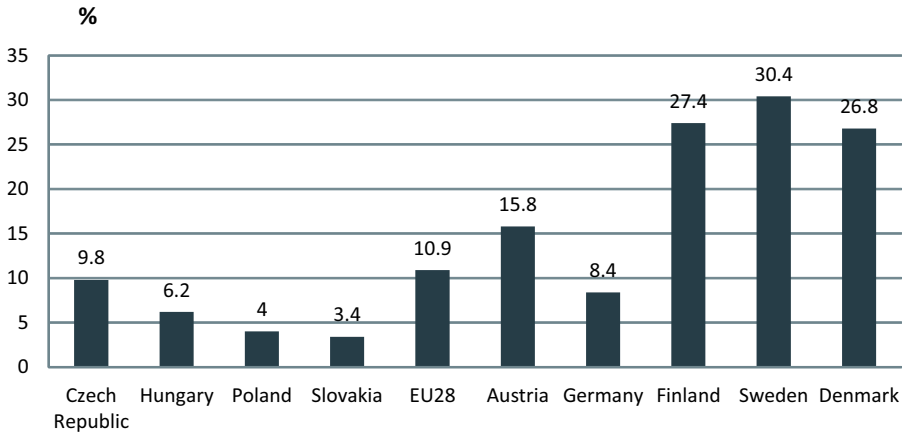


FIG. 8. Adult participation in lifelong learning as a percentage of population aged 25 to 64 (2017)

Source: Thehe Author based on Eurostat data.

It looks like the V4 countries, where automation will probably displace a great proportion of the workers are not yet aware of the potential danger. Slovakia, the country highlighted by OECD as the most threatened one has the lowest proportion of adults participating in lifelong learning. But the other V4 countries are also in bad position. Again Scandinavian countries show outstanding achievements. This is a serious warning sign we have to direct attention to. German and Austrian positions are also weaker than the Scandinavian ones. The German number is for example lower than the EU average. One reason can be the well-developed apprenticeship system these countries have, although it has been recently heavily criticized for not being any longer appropriate for developing flexible labour force needed in the future.

And how involved governments are in preparing human capital and the economy for the future? Let us see a few crucial numbers.

INVESTMENT INTO INTANGIBLES: BASIC RESEARCH, EDUCATION, TERTIARY EDUCATION AND R&D IN THE V4 COUNTRIES IN INTERNATIONAL COMPARISON

Investing into intangibles can help upgrading the knowledge and skills of human resources. In the age of the fourth industrial revolution multidimensional skills are needed, which should be offered within the entire educational system. Pre-primary and primary education is exceptionally important in order to give a good start to children. Developing human and social skills start already at that level. Spending enough money on early age education is therefore crucial. The Scandinavian educational system is famous of offering a balanced combination of human and social skills and also analytical, as well as cognitive ones. Again, based on Eurostat data Scandinavian countries spend the most on early age education as a percentage of GDP (Sweden 4.2, Denmark 3.1%), while V4 countries spend less. (Czech Republic 1.0, Hungary 1.3, Poland 1.8, Slovakia 1.4%).

Figure 9 illustrates the total government expenditure on basic research, education, tertiary education and R&D as percentage of GDP.

The V4 countries spend less on basic research and R&D, and roughly the same on education as the EU average. The advanced countries on the other hand spend more. And again Scandinavians lead. Interestingly enough concerning education Germany and Austria are behind the Scandinavians. Looking at the educational attainments examined in the previous point (Fig. 5) this amount will probably not be enough to lower the proportion of people with low level of educational attainment, and in general to build a competitive human capital in the V4 countries. Also if we consider those people who will be freed up from the automated sectors and therefore need further education and retraining obviously a lot more spending on education will be needed. Tertiary education spending in percentage of GDP is again the highest in the Scandinavian countries. But here we can observe the special position of Poland with the 1.2% value for tertiary education, which puts Poland into the Scandinavian group for this data. This correlates with the data we can see on Figure 5 indicating that within the V4 countries Poland has the highest proportion of people with high level education.

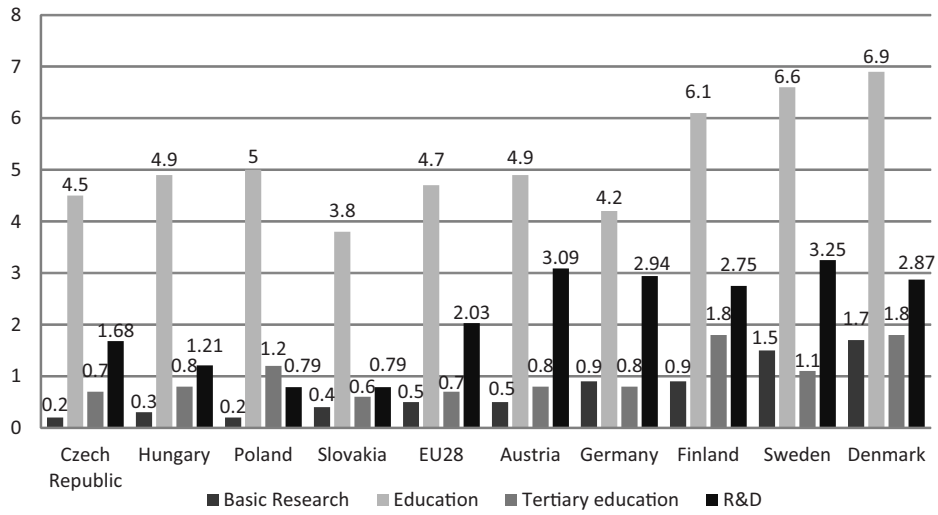


FIG. 9. Total government expenditure on basic research, tertiary education and R&D as percentage of GDP (in %, 2016)

Source: The Author based on Eurostat data.

Also, in order to change and modernize economic structures, to be able to increase the share of knowledge and innovation based activities countries have to invest in basic research, and R&D in general. For both data V4 countries lag behind the advanced countries, and also the EU average. In terms of R&D spending all V4 countries demonstrate very poor results. This suggest a real danger for them in terms of how to be able to move up on the value chain. Figure 10 shows the R&D expenditure as a percentage of GDP (business and government combined), and separately the R&D spending by the government and higher education sector.

The business sector is not highlighted, as we focus on how well prepared governments are to handle the necessary changes triggered by the rapid technological changes.

Then Figure 11 demonstrates another important indicator: how much is spent, in euro, per inhabitant in the selected countries on R&D in total, and especially in the government and the higher education sector.

Both figures demonstrate the same phenomenon explained earlier: the V4 countries spend less on R&D both as a percentage of GDP and per inhabitant in all highlighted sectors. These facts may be really worrying if we are considering the question whether investments today will guarantee future development based on knowledge and innovation in the V4 countries.

Taking the knowledge investments all together we have to conclude that the V4 countries lag behind quite considerably in investing into knowledge-related intangibles in spite of the fact that they are less well equipped with the necessary human resources needed in the future, and also their economic structure needs to be transformed into a more agile, innovation- and knowledge-based one. It is especially worrying if we consider how de-

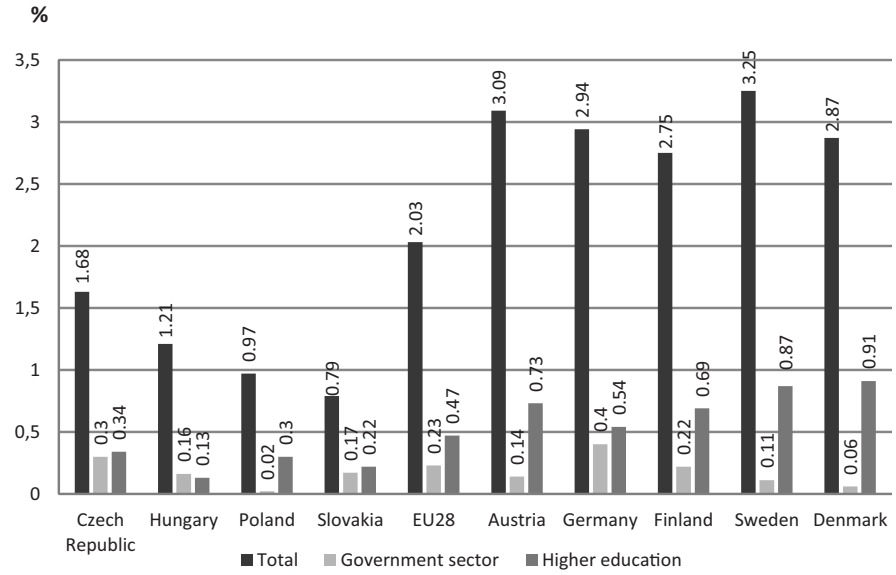


FIG. 10. R&D expenditure as percentage of GDP by sectors (in %, 2016)

Source: The Author based on Eurostat data.

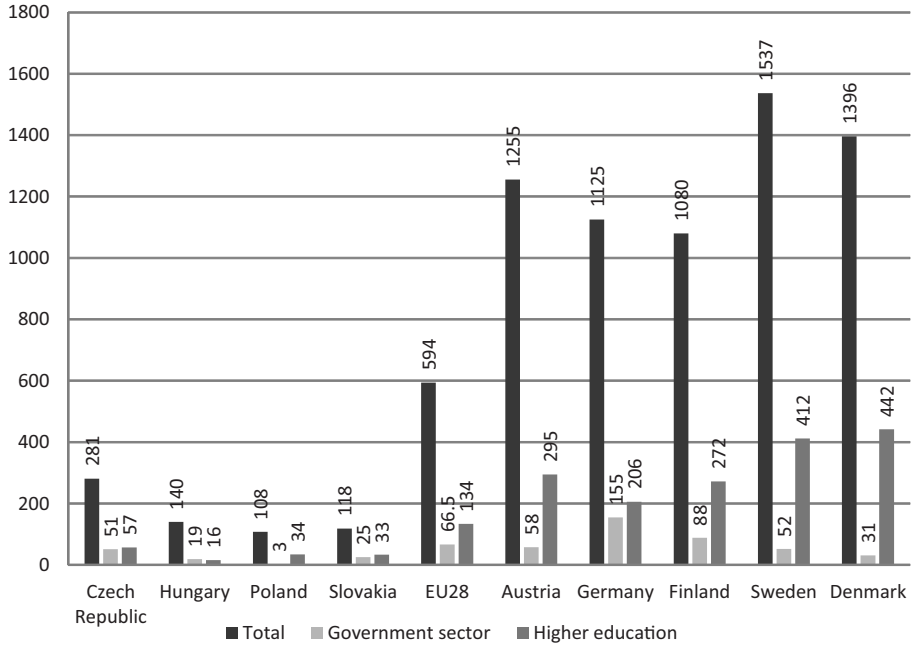


FIG. 11. R&D expenditure (GERD) per inhabitant by sectors (in EUR, 2016)

Source: The Author based on Eurostat data.

veloped these countries are at present compared to the EU average. One indicator which measures this is the GDP per capita as a percentage of EU 28 average. We can observe these data on Figure 12.

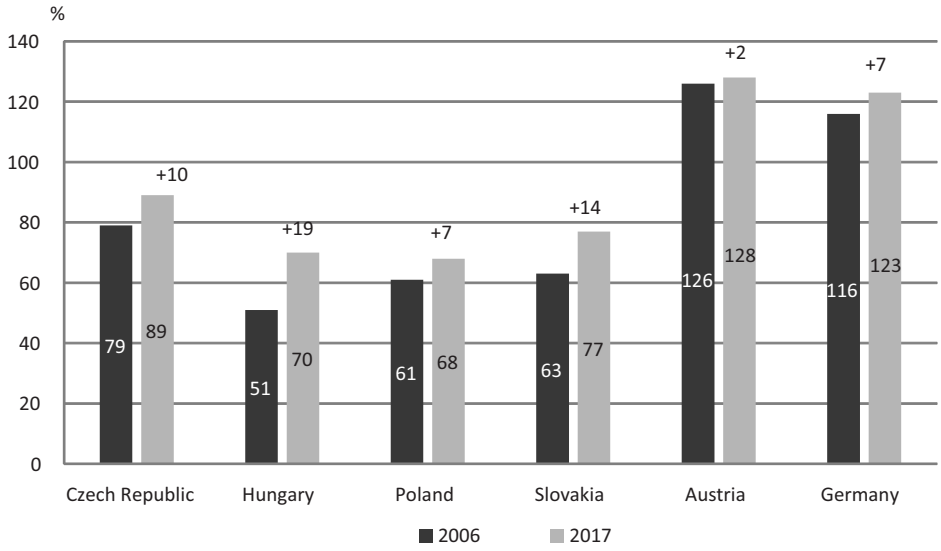


FIG. 12. GDP per capita (PPS) EU28 = 100 (%)

Source: The Author based on Eurostat data.

These data show that although the V4 countries are slowly closing the gap in terms of development with the advanced countries, they need to do much more, especially because of the rapid technological changes, which can put them at serious disadvantage if they are not rapid enough in investing into knowledge and skills. It is also interesting to observe that the rapidity of closing the development gap is very different for the V4 countries. Poland has made the largest progress and Hungary the lowest.

CONCLUSIONS

Disruptive changes requires timely, game changing, sometimes revolutionary solutions. The V4 countries have been famous of their highly trained and disciplined human resources for a long time. However recently they seem to have been slow with developing their human resources, which could put them at a serious disadvantage compared to those countries the V4 countries had planned to catch up with when joining the EU in 2004. Poland's achievements in some areas are better than that of the rest in the V4 group, however compared to those of the advanced countries it is also too little. Human resources, R&D and innovation are and will be the key to competitiveness and social well-being. ThereforeV4 countries should reconsider their human resources and innovation strategies

in order to guarantee that they will not be left behind in the ongoing revolutionary technological development processes. Of course the indicators covered in this article are not sufficient to draw an absolute convincing picture. We could include further indicators and search for correlation among them. Cause and effect analysis could also further clarify the situation.

But the selected indicators are important enough to trigger further debates and investigations into the methods and policies of how the V4 countries could better utilize their human and creative talents in order to speed up their economic and social development in comparison to the presently more advanced countries.

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Summary. This paper focuses attention on the fact that the V4 (Visegrad) countries in general are poorly prepared to capitalize on the opportunities offered by the fourth industrial revolution, and less protected against the risks created by it. First of all economic structural indicators prove that the economies of the V4 countries are still not knowledge based, and can be characterized by low value added activities. In some cases Poland stands out with slightly better results, but all in all V4 countries lag behind the economically more advanced countries for all the analysed indicators. Secondly these countries do not invest enough into their human resources. The article suggests that unless the V4 countries start putting stronger emphasis on developing human skills and local knowledge they will lose a historic opportunity for becoming successful nations which are able to benefit from the ongoing processes of the fourth industrial revolution by moving up on the value chain.

Key words: fourth industrial revolution, industrial structure, value chain, human resources, education, life-long learning, multidimensional skills

JEL: O11, E22

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