ACTA HUMANA • 2024/3. 29–47. • DOI: 10.32566/ah.2024.3.2

The Limitations of Building Circular Economies in the EU Considering Present Structural Indicators: Country Cases

MAGDOLNA CSATH[1]

This paper summarises the essence of circular economy, as a desired future position of economies for building sustainability. Next it introduces indicators, which can measure the position of economies along the way to becoming circular. Based on the indicators the paper compares the situation of a few European Union (EU) countries in terms of their present development position for these indicators. In conclusion, the paper calls attention to the great differences among the examined countries, and suggests strategic actions to narrow down development gaps.

Keywords: circular economy, sustainability, productivity-efficiency indicators, development gap, value added

"The EU Circular Economy Action Plan
will make circularity the mainstream in our lives and
speed up the green transition of our economy."
Circular Economy: The European House, ENEL Foundation, 2020

Introduction

We live in an age of diminishing resources. Economic growth is hindered by energy and material shortages, in some countries by human resource shortages, as well. Researchers and economic policy leaders alike are looking for solutions to keep growth aspirations while limiting input for growth. One suggestion is to change economies into circular ones, which would help minimise necessary inputs and – at the same time – create sustainable growth. The majority of circular economy definitions – as we shall see from the literature review – focuses on decreasing input and waste, and puts less emphasis on increasing efficiency of the processes through which inputs are transformed into outputs and outcomes. The benefit of improving input quality, like investing into knowledge and skills is also not widely researched.

1 DSc, Private Professor, Ludovika University of Public Service.

This paper focuses on demonstrating the importance of increasing process efficiencies – human and capital ones alike – in order to increase chances of achieving a circular economy status.

The paper also argues for the importance of investing into input qualities through increased research and development commitments. Emphasis is also put on highlighting the role of economic structures, as sources of efficiency enhancement with special focus on the role environmental products and services can play in turning economies into a more circular one.

The paper concludes by calling attention to the great differences among EU countries in being able to turn their economies into circular, and the potential reasons why these differences will not be easy to overcome. The EU, as an entity, therefore does not seem to be in the position to become a circular economy in the near future. This is why the quotation at the beginning of the article seems to be too optimistic. Of course there are options open for narrowing gaps, however it depends on political will, as well whether European leaders and key business sectors will be able and willing to embark on introducing the necessary changes, which may be against present business interests of the key economic and political actors.

Methodology

The methodology of measuring how well prepared a country is for transforming its economy into a circular one has not been well established yet. Several approaches have been elaborated, but they mostly focus on measuring how input materials and energy along with output waste can be decreased. The efficiency level of turning input to output processes is less investigated, also the knowledge and skills improvement element, which is important for any type of efficiency enhancement is not in the focus of research interests.

In this paper, 12 indicators are examined, which can be grouped into three main types: productivity-efficiency (4 indicators), structural-environmental (3 indicators) and knowledge-skills enhancement ones (5 indicators). Based on data availability, the value of indicators is examined in different years and different countries. The number of countries differs depending on the importance of a given indicator for a particular country group. Special focus is put on the so-called less developed V4 – Visegrad 4 – countries, which can be considered as "an emerging region" within the EU. The reason why this region is especially interesting is that it is the so-called "manufacturing location" of businesses from the developed EU countries, among them with a dominance of German ones. This is why in some cases Germany is also included in the sample. This dominating manufacturing position, however seems to push these countries into a development gap situation, which may render it more difficult for them to transform their economies into a circular one. The reason is that only the lowest value added stage of the manufacturing value chain is present

in the economies of these countries, therefore they are not in the position to decide about the efficiency enhancement of the entire production process. Also, because low value added activities are overrepresented in the economy, less money is produced for investing into more efficiencies made possible through knowledge and skills enhancement. The research findings of this paper should be further developed in a later stage by searching for relationships among the selected indicators, and trying to forecast future consequences if present tendencies continue. The relevance of the selected indicators may also be further tested. This enhanced research coverage however needs longer time and more research resources.

Literature review

The literature sources on how to determine and describe a circular economy are continuously growing, and the subject also moves to the centre of climate debates. Finding a generally accepted methodology, however, for measuring how far an economy is from becoming a circular one is still under investigation. One reason is that a clear description of how a future circular economy should look like is also missing. Some early approaches focus on the essence of a circular system. Braungart et al.[2] talk about a "cradle-to cradle" holistic model that strives for an essentially waste-free operation.

Weetman[3] determines circular economy the following way: instead of the "take, make and waste" approach, the circular economy focuses on circulating resources instead of using them up. Jakobsen et al.[4] remind us that the idea of circular economy comes from how Nature works. They say: biocycles are the realm of Nature, which are circular by evolution: waste becomes food for others as long as mankind respects Nature's limitations. The overall point of a circular economy is therefore to change the economy from the take, make and dispose position to an economy in which resources that are already in use are kept in use as long as possible. But this would need innovation at all levels of society.

Innovation is also useful for eliminating structural deficiencies and creating a new development model. Preston et al.[5] focus on this issue by pointing out that a circular economy offers a promising alternative strategy for industrial development and job creation to the traditional manufacturing-led growth pathway. It can also provide new opportunities for economic diversification, value creation and skills development. Creating new development models is especially important for the less developed countries, but it is not easy.

2 Braungart et al. 2007.
3 Weetman 2021.
4 Jakobsen et al. 2021.
5 Preston et al. 2019.

Schröder[6] argues that the current linear model is characterised by inefficient use of resources, large amount of waste and missed opportunities to retain the value of materials and products. The transition from a linear to a circular economy therefore is essential, but it requires a lot of efforts. It will be especially difficult in the low and middle income countries, as their economic structure has to be upgraded, otherwise they will be left behind.

The transformation is difficult because of low business interest, too. Businesses want profit, therefore they pursue production growth. Jaeger and Upadhyay[7] found during their field research that businesses very often understood circularity as it was only about recycling and waste reduction. The population is also keen on more consumption. But resources are limited as Clugston[8] warns us: humanity's industrial lifestyle paradigm is enabled almost exclusively by enormous and ever-increasing quantities of non-renewable natural resources. But supplies, consequently, are becoming increasingly scarce.

In his next book[9] he also points out that the level of development and well-being in wealthy industrial countries are achieved largely through highly resource-intensive patterns of consumption and production, which is not sustainable. It is therefore urgent to minimise not only resource input and waste output of production, but also to improve efficiencies throughout the entire process. For the less developed countries, on the other hand, structural changes and knowledge investments are also urgent requirements for being able to transform economies into a more circular one.

Analysis: indicator selection

As it was mentioned before, 12 indicators were selected for analysing how well prepared some countries in the EU are for transforming their economies into circular. The indicators are organised into 3 groups. The first group includes productivity-efficiency type indicators, which can give an overall picture related to resource utilisation. The second group tries to highlight structural characteristics. The third group includes quality-related indicators, which show the efforts countries make in order to acquire more skills and knowledge for becoming more circular.

Productivity-efficiency indicators: human productivity

Two types of indicators are selected for measuring how efficient the production processes are in terms of utilising inputs: labour and capital productivity.

6 Schröder 2020.
7 Jaeger–Upadhyay 2020.
8 Clugston 2012.
9 Clugston 2019.

Figure 1 and 2 present labour productivity data.

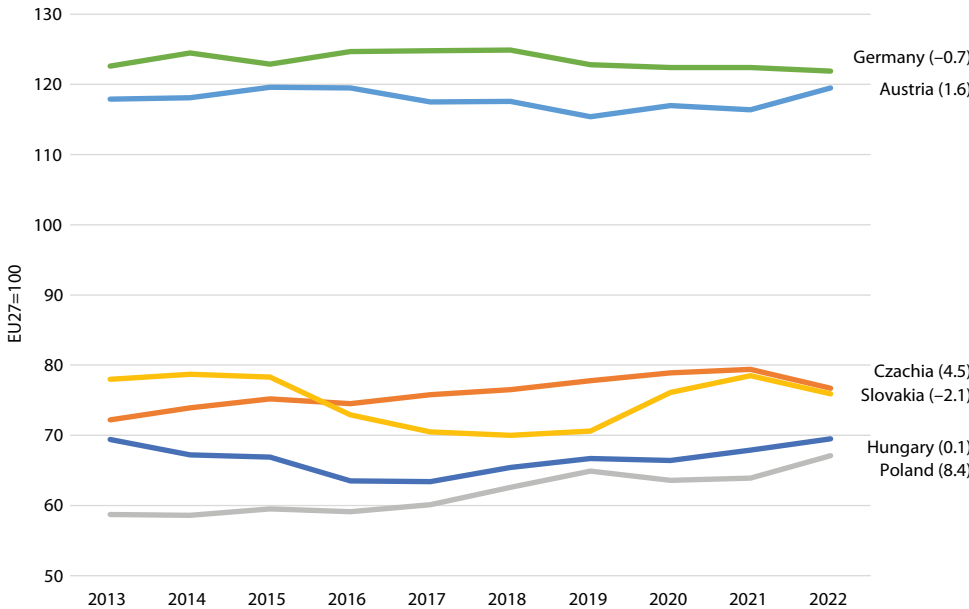

Figure 1: Nominal labour productivity per hour worked (Percentage of EU27, PPS, 2015–2022. (In brackets: change from 2013 to 2022, percentage points difference)
Note: Nominal labour productivity per hour worked for the total economy over a given time period is calculated by dividing GDP in current – nominal – prices by hours worked. PPS: Purchasing power standard: is an artificial currency unit. Theoretically, one PPS can buy the same amount of goods and services in each country. However, price differences across borders mean that different amounts of national currency units are needed for the same goods and services depending on the country.
Source: Eurostat, 10 January 2024

On Figure 1, productivity change as percentage of EU27 is measured for 6 countries over 10 years. On Figure 2, productivity improvement from 2015 (2015 = 100) to 2022 measured by real labour productivity per hour worked can be seen for 6 EU countries for four sectors over 7 years. Productivity depends on many things, among them on the type task workers have to perform. It is also influenced by managerial and organisational characteristics. It is also worth noting that, of course, it is easier to improve a lower value than an already high one.

By observing the data on Figure 1, we see considerable differences among the two developed and the four less developed countries. The other observation is that with the exception of Poland, improvement from 2013 to 2022 is very slow. The good Polish result is partially due to the lower 2013 value. For Hungary the improvement is a nuance of 0.1 percentage point. This shows the very slow catching up process and also the higher basis value. Low productivity means waste of an important input: human

capacity. Difference between Hungary and Austria is as large as 50 percentage points. Czechia is in the best position within V4, still it is also behind Austria by 42.8 percentage points. The reason for the gaps can partially be explained by structural differences. The economy of the less developed countries is mainly characterised by low value added activities, posing real constraint against raising productivity more rapidly.

The German case is also interesting. Although German productivity is 21.9 percentage point higher than the EU average in 2022, but this value is slightly lower than the 2013 one was. One of the reasons often mentioned is the role of immigrants with low skills entering the labour market in recent years. The Slovak productivity position has also worsened among the EU countries by 2022, but it is still higher than the Hungarian and the Polish one.

As mentioned earlier, structural characteristic may be behind the low productivity numbers in the V4 countries. Figure 2 goes into further details by focusing attention on sectoral productivity differences.

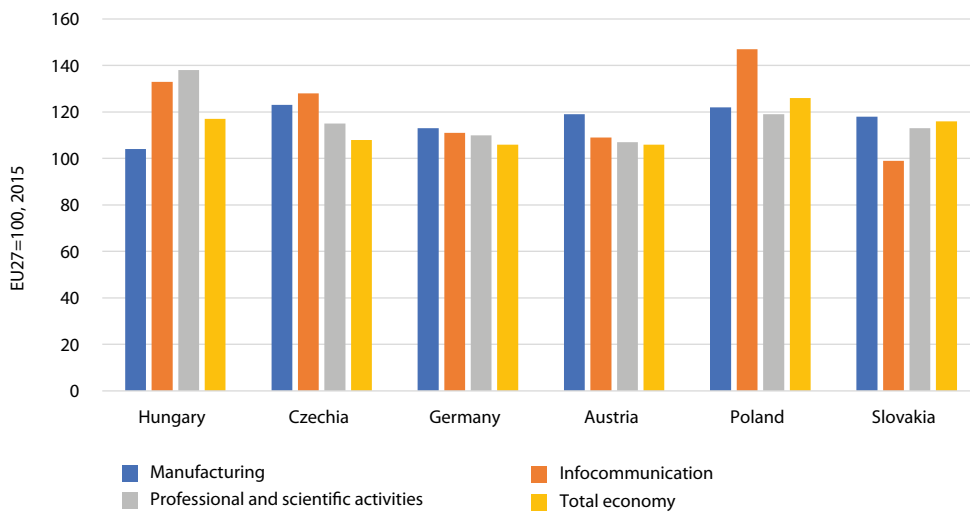

Figure 2: Real labour productivity per hour worked in 2022, in different sectors and in the total economy (EU27 in 2015 = 100)
Note: Real labour productivity measures per hour worked for the total economy over a given time period is calculated by dividing GDP in chain-linked volumes by hours worked.
Source: Eurostat 21 December 2023

Figure 2 demonstrates data for 3 key sectors and the total economy for 2022. Sectoral differences for real labour productivity, especially in the case of the less developed countries, underline the earlier observations: the nature of task can influence labour productivity. Info-communication and professional–scientific activities are mostly high value added ones, so employees can produce more value in these types of jobs during a given time than in low value added manufacturing jobs. It is worth mentioning

that high value added activities make up a larger proportion of the economy in the highly developed countries than in the less developed ones. More employees are, therefore, in the position to create higher value, and this way work more productively. The two indicators are linked to the creation of a circular economy, as labour is an input of the production process. This way its higher utilisation level by high value added employment can contribute to establishing circular economies.

We should also remember that manufacturing activities also require much more material and energy inputs than the knowledge-based high value added service-type activities. That way decreasing the high proportion of low value added manufacturing activities – a priori – helps countries create more circular economies.

Productivity-efficiency indicators: capital efficiency

Table 1: Gross value added per unit of net fixed assets in different sectors (Percentage change on previous period)

Countries, sectors	**2018**	**2019**	**2020**
Manufacturing			
Hungary	–2.4	–4.1	–11.2
Czechia	–1.1	1.2	–11.8
Germany	–1.4	–3.5	–8.2
Austria	1.5	–2.1	–8.4
Poland	1.2	1.6	–7.1
Slovakia	10.1	3.8	–13.8
Info-communication			
Hungary	10.9	10.0	7.2
Czechia	4.7	7.1	1.9
Germany	5.8	–0.2	–0.8
Austria	4.9	3.6	–2.7
Poland	13.5	7.2	4.1
Slovakia	1.9	1.1	1.0
Professional and scientific activities			
Hungary	7.5	1.2	0.0
Czechia	2.9	–0.6	–2.4
Germany	0.2	–4.2	–3.5
Austria	–0.5	0.3	–5.5
Poland	7.5	–0.3	0.0
Slovakia	–4.5	–22.7	4.1

Source: Eurostat 20 December 2023

Table 1 presents capital productivity[10] change data measured by gross value added per unit of net fixed assets in a few sectors. This indicator is very important from a circular economy point of view, as it measures how efficiency of capital investments in machinery, buildings and infrastructure is changing over time. Decreasing efficiency of capital utilisation means lost value and waste. It also calls attention to important structural differences in the different countries. The data in Table 1 shows that utilisation efficiency in manufacturing is declining by the time in every country. The largest fall happened in 2020, probably because of the closedowns due to the pandemic. The largest decline happened in Slovakia, Czechia and Hungary. Losses are more moderate in the info-communication and professional-scientific sectors. It means that in those countries in which manufacturing plays a significant role, losses have been more considerable hampering opportunities for transformation to a circular economy. This argument is also verified on Table 2.

Table 2: Total fixed (net) assets in different sectors as percentage of total fixed assets in all NACE activities (million euro, 2020, %)

Sectors Countries	**Manufacturing**	**Info-communication**	**Professional and scientific activities**
Hungary	16.1	3.3	1.8
Czechia	3.6	2.4	2.1
Germany	8.4	1.6	1.8
Austria	8.6	1.6	1.4
Poland	15.4	2.5	1.6
Slovakia	16.4	2.0	1.8

Notes: Fixed assets consists of a subset of produced assets, mostly machinery, equipment, buildings and other structures.
NACE: Statistical classification of economic activities in the EU (comes from the French definition, Nomenclature statistiques des activités économiques dans la communauté européenne).
Source: calculation of the author based on Eurostat 20 December 2023

Table 2 contains important information concerning opportunities for moving towards a circular state of economy in the selected countries. Data illustrate the proportion of fixed assets invested in the selected sectors as percentage of all invested fixed assets in all the economic activities. We see the dominant role of manufacturing in the V4 countries, the highest proportion – 16.4 percent – being in Slovakia. Referring back to previous arguments, this also proves the dominating role of low value added activities in these countries. This situation may create obstacles to redirect processes

10 Capital productivity: Gross value added per unit of net fixed assets: a capital productivity indicator. It shows how many output are produced with a unit of capital stock (input). It is calculated by dividing gross value added by net capital stock (both in chain-linked volumes).

towards more circular operations in these countries, as total operational responsibility lies with the headquarters of these businesses located in Western Europe.

It is of course not easy to draw conclusions based on four indicators. Further research would be necessary in terms of using larger sample and analysing over longer time horizon. The key objective of this paper, however, is to focus attention on less researched fields, like the role of productivity differences in creating circular economies. Already based on the selected four indicators, one can establish some correlation among human and capital productivity and its improvement chances, as well as sectoral characteristics in the case of four less developed and two developed economies. This raises awareness of the potential difficulties for the V4 countries to move toward more circular operations. Next we focus on further structural issues to strengthen earlier mentioned arguments.

Structural-environmental indicators

As mentioned earlier, economic structure strongly influences value added capabilities. Table 3 demonstrates net turnover per 1000 persons employed in different sectors in 2022. In order to better understand the relevance of the indicator, this table is more detailed in terms of economic branches in general, and more specifically in manufacturing subsectors.

Table 3: Net turnover (million euro) per 1000 persons employed in different economic sectors (NACE) and manufacturing subsectors, 2022 in 5 EU countries and in the EU in general (where EU data are available)

Countries, Sectors	**Hungary**	**Czechia**	**Poland**	**Slovakia**	**Austria**	**EU**
Manufacturing	197.6	188.1	178.1	210.1	370.5	326.3
Food products	167.5	174.2	206.3	140.8	323.3	–
Chemical products	481.7	559.4	285.0	369.0	957.6	–
Manufacture of basic pharmaceutical products	240.0	239.0	183.0	89.0	328.6	–
Plastics products	127.9	141.5	142.1	135.2	260.0	–
Manufacture of computers, electronics and optical products	340.3	443.5	184.7	329.0	366.4	–

Countries, Sectors	Hungary	Czechia	Poland	Slovakia	Austria	EU
Manufacture of motor vehicles, trailers and semitrailers	327.4	338.0	247.2	455.0	496.1	–
Construction	89.1	117.9	100.4	78.5	192.7	155.8
Transportation, storage	106.1	114.0	107.2	117.8	245.4	177.4
Accomodation and food services	40.4	50.0	59.0	42.2	75.0	60.2
Info-communication	90.6	155.8	106.2	111.3	205.3	224.8
Professional, scientific and technical activities	50.3	88.4	64.0	75.3	126.1	132.9

Note: Net turnover: the total revenue generated from the sale of products and services deducting sales discounts, value added tax, and any other taxes directly associated with the revenue.
Source: calculation of the author based on Eurostat 11 December 2023

The data in Table 3 are the results of own calculations based on Eurostat. We see the data of 6 major NACE sector and 6 manufacturing subsectors. The data are an indicator of structural performance by showing in which sectors the employed people can create more value. German data were not fully available, therefore Germany is left out, but available EU averages are listed.

It is not easy to comprehend the essence of the data, but it looks obvious that – again – differences among countries are considerable. Comparing basic NACE activities, manufacturing in general seems to create greater value per head than the other sectors. But the differences are great. Austria shows the highest value, larger than the EU average (370.5 million euro per 1000 employees). The Hungarian value (197.6 million euro per 1000 employees) hardly exceeds 50 percent of the Austrian one (53.3 percent). The obvious reason is that while in the Hungarian manufacturing sector low value added assembly operations dominate, in the Austrian one high value added research, development and customer services operations are also present. This is especially the case for the manufacture of motor vehicles, food products and chemicals. In the case of Hungary, only the pharmaceutical and the computer sectors are in better position. Value added in these sectors reaches 73 and 92.9 percentage of the Austrian value. The explanation is simple: these sectors spend more on research and development. The infocommunication and professional-scientific sectors are interesting cases. These sectors are not too material – or energy-intensive – but in terms of net turnover, they underperform. This phenomenon needs further investigation. The accommodation and food services sector is an interesting case as well. This one also seems to create low results in all countries, and in the EU in general. This is an environmentally intensive

sector because of the long-distance tourist journeys that characterises it. The general conclusion we can draw from this table is that people employed in different sectors in different countries create different values because of economic structural differences. The different value creation capabilities definitely influence how fast countries can achieve a circular economy status. We have analysed the well-known, traditional economic sectors, so far. New environmental sectors, however, can considerably improve chances for circular transformation. Let us examine how different countries perform in terms of value added and export of environmental goods and services.

Figure 3 demonstrates gross value added of the environmental goods and services sector as percentage of GDP in 2020 in a few countries and in the EU in general. Denmark is now included, as this country in general presents very good environmental performance.

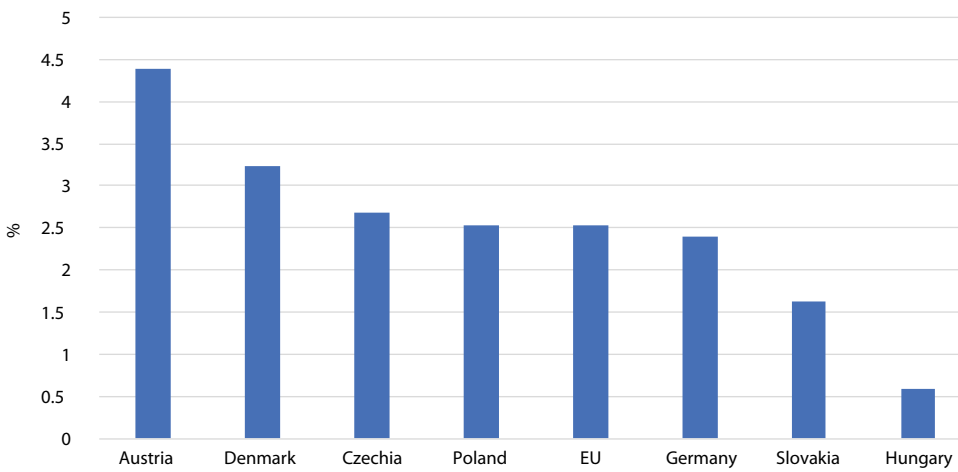

Figure 3: Gross value added of the environmental goods and services sector as a percentage of GDP, 2020
Source: Eurostat 28 April 2023

We see dramatic performance differences among the selected countries. The Austrian value is more than 7 times higher, and the Danish is more than 5 times higher than the Hungarian one. The Slovak value is also very low. We have to recall that Hungary and Slovakia are countries, which are the key low value added manufacturing locations of Western, mostly German car manufacturing companies. State resources are also directed towards manufacturing job creation by providing free resources to businesses to set up new, or expand present low manufacturing jobs.[11]

The considerable amount of money spent on strengthening traditional manufacturing operations decreases the chances of creating new, high value added and

11 It has to be added as well that recently not only German but also Chinese car and battery manufacturing companies enjoy generous state support if they locate their plant in Hungary.

circularity friendly sectors, which could increase high value added export. This can be seen on Figure 4.

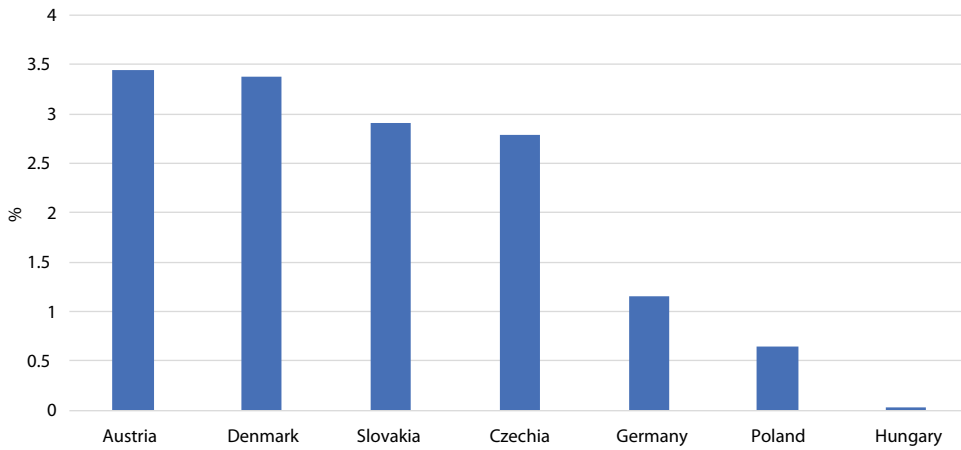

Figure 4: Export of environmental goods and services as percentage of GDP, 2020
Source: Eurostat 28 April 2023

As Figure 4 shows, Austria benefits more than hundred times more from environmental goods and services export than Hungary in terms of percentage of GDP. The Polish value is also very low. The German value is surprisingly low as well compared to the Austrian and the Danish one, even worse than the Slovak and the Czech value. We have to remember though that Germany still emphasises the car industry, which is the highest contributor – based on the cheap V4 operations – to the German export. In conclusion, we can draw attention to the importance of structural characteristics, the nature of local jobs and the role of new environmental activities as key issues for turning economies into circular ones. One can of course warn again: further investigations, examination of more indicators would add to the understanding of the interrelationships highlighted so far.

Now we turn to the third indicator group, which examines knowledge and skills status (stocks) and investments (flows).[12]

Knowledge and skills enhancement indicators

First we have to differentiate between stock and flow type of indicators. We will examine 2 stock and 3 flow indicators, which are: population by two types of educational

12 Stock and flow indicators: stock type indicators refer to values of assets, while a flow indicator is related to transactions, like expenditures on education or R&D. In general, the stock value is measured at a specific time, while the flow value can be measured over a longer time horizon.

levels (stock indicators), R&D expenditures per GDP and per capita, and adult education (flow indicators).

Flow indicators mean input resources, while stock indicators are the results demonstrating created values. These indicators offer some understanding concerning the size of human knowledge and skills investments. They also point to the fact that circular transformation cannot be successful without knowledge and skills enhancement.

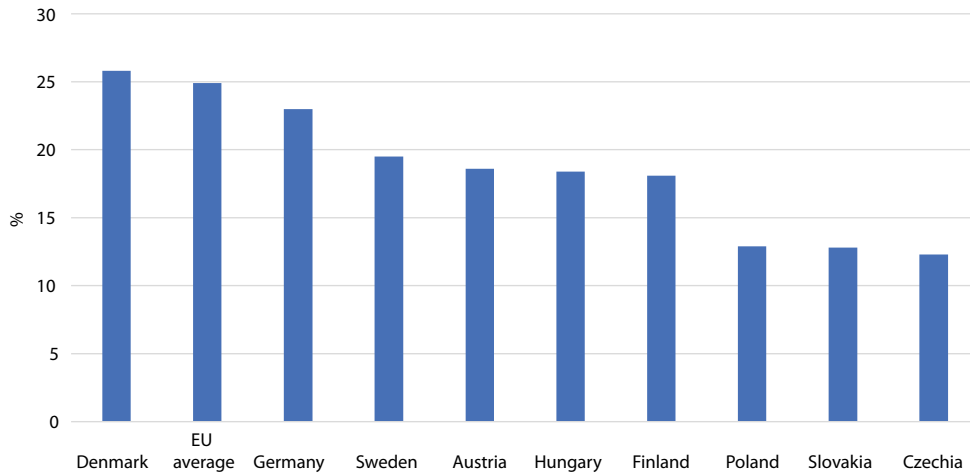

Figure 5: The percentage of population of less than primary, primary and lower secondary level education in the total population 15–64 ages, 2022
Source: Eurostat 14 September 2023

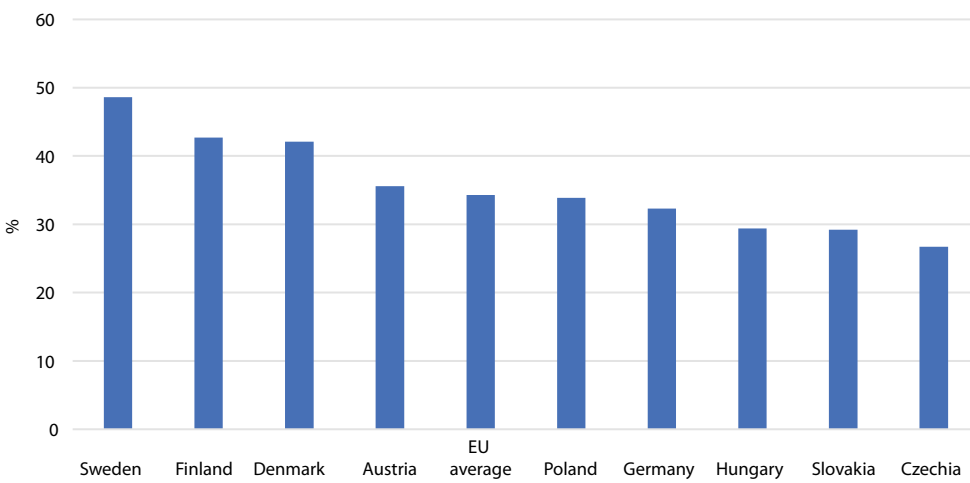

Figure 6: The percentage of population of tertiary education level in total population, 25–64 ages, 2022
Source: Eurostat 14 September 2023

Figure 5 shows the percentage of population having less than primary, primary and lower secondary educational level in a few EU countries in 2022.

Figure 6 demonstrates the percentage of population acquired tertiary education in the total population in the same countries in 2022. Again, differences among more and less developed countries are evident. High proportion of population of low level education is quite high, in general. The V4 countries are performing similarly for this indicator.

The high level is surprising for Germany and Denmark. It is also worth observing how high the EU average is. The official explanation for this is the high number of immigrants with low educational level in these countries. It would require further investigation, for example into values in different age groups to see whether this explanation can be fully accepted or not. Figure 6 points to another important sign. Here we can observe that 3 countries out of the V4 group have a very low proportion of population with higher level education (tertiary education). Higher level education achievements would help countries to renew economic structures, launch new, innovative, like environmental, businesses. The high level in the selected Scandinavian countries may prove the importance of this idea: they are all very innovative and leaders in the EU as far as environmental products and exports are concerned.

On Figure 7, 8 and 9, we see flow indicators: investments into skills and knowledge. Figure 7 and 8 shows R&D expenditures, in euro per inhabitant and as a percentage of GDP, over 10 years.

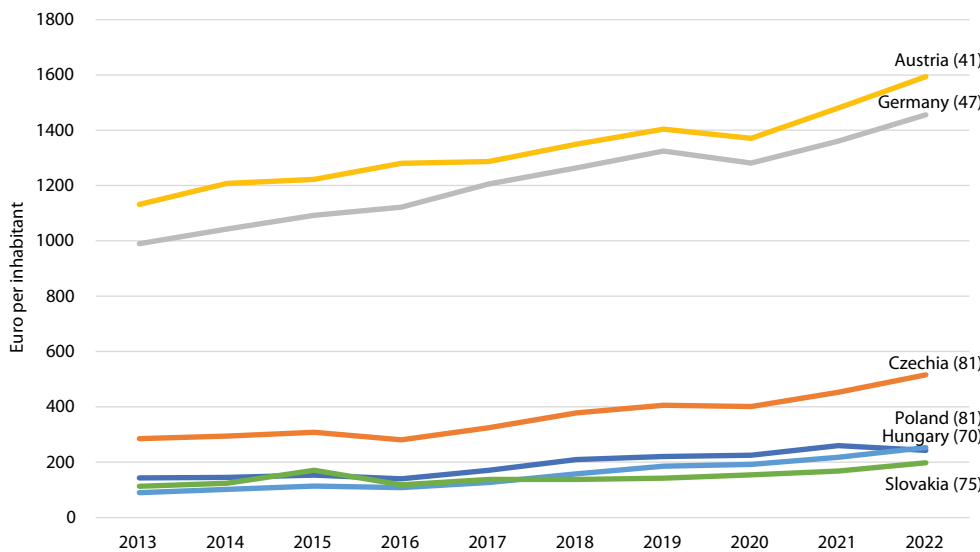

Figure 7: R&D expenditure, euro per inhabitant (in brackets: change from 2013 to 2022 in percentage)
Source: Eurostat 6 December 2023

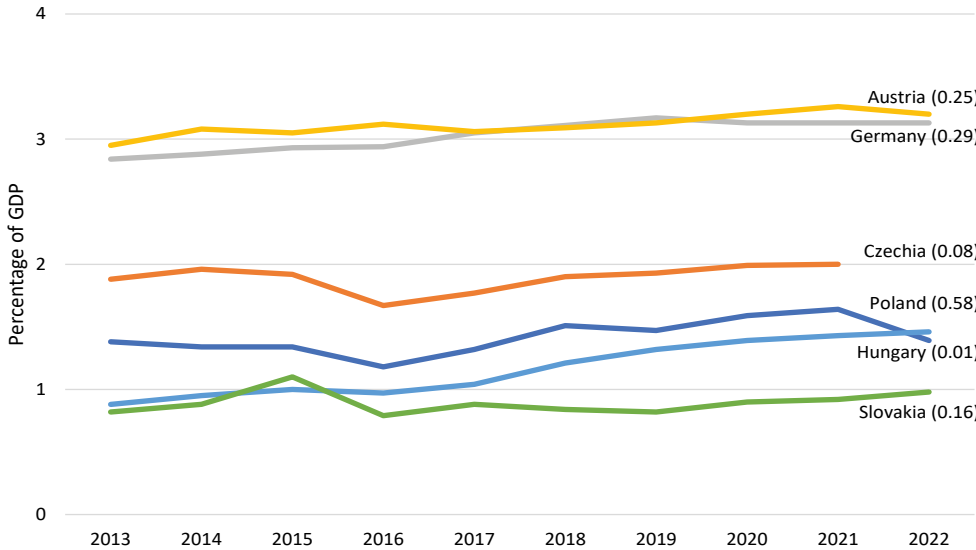

Figure 8: R&D expenditure as percentage of GDP (in brackets: change from 2013 to 2022 in percentage point value)
Source: Eurostat 6 December 2023

For both values, the differences are striking. Hungary for example spent 15 percent of what Austria spent on R&D per capita in 2022. The largest improvement of spending over the 10 years can be found in Poland and Czechia (81 percentage). Still, their value is low compared to the German and Austrian one.

As far as the percentage of GDP data is concerned (Figure 8), the gap between the highly developed and less developed countries is also considerable. While Hungary spent 1.39 percentage of the GDP on R&D in 2022 with a 0.01 percentage point improvement from 2013 to 2022, Austria and Germany spent 3.2 and 3.13 percentage, with 0.25 and 0.29 value improvement from 2013 to 2022. This is again a further indication of what has been mentioned before: businesses from highly developed countries perform R&D in the headquarters at home and locate low value added manufacturing activities to the less developed countries, which – this way – will remain probably less developed for a longer time. From our research perspective, they are also in a worse position in terms of changing their economic structure to a more circular one. Finally, let us turn to another important indicator: the participation rate in education and training in the working age (25–64 ages) population. Data for this indicator are available for a longer time horizon, but we now focus only on the latest, 2022 one. The importance of this indicator is explained by the fact that people only learn if they can – consequently – move up to higher levels of employment. If proper high value added jobs are not available, then they are not motivated to upgrade their skills and knowledge, unless they are planning to leave the country for better jobs in a more developed EU country.

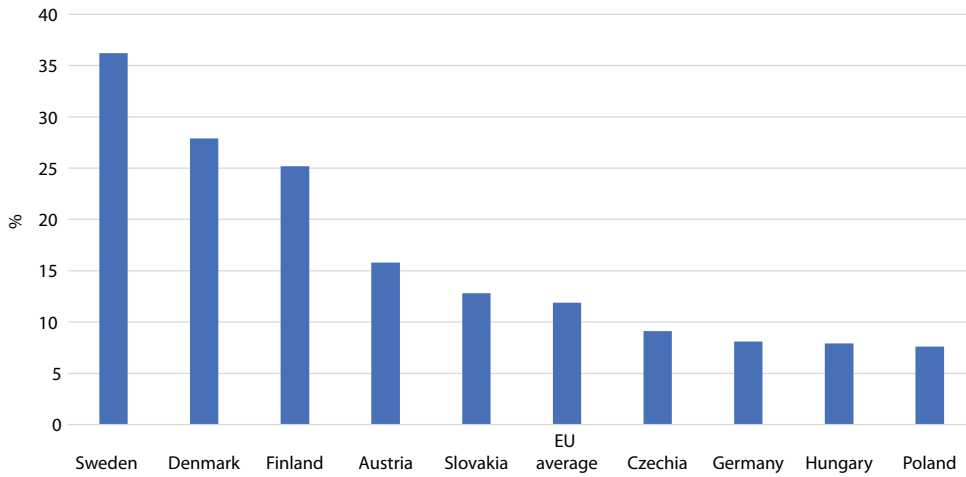

Figure 9: Participation rate in education and training, 25–64 ages, 2022
Source: Eurostat, May 2023

Figure 9 shows striking differences in knowledge and skills enhancement practices in the selected countries. Again, the three Scandinavian countries stand out with very high level of knowledge upgrading practices, and the V4 countries perform very poorly. It is interesting how low the German value is. Some research findings explain this by the highly trained employees leaving the Eastern European region because of lack of opportunities to take high value added jobs, e.g. in Germany. This may partially explain why Germany may need lower level local adult education. Data, however, to verify this argument so far have not been available in acceptable quality and quantity. The high Scandinavian data, however again explain the excellent environmental innovation data in these countries, and also the structural problems of low value added manufacturing dominance in the V4 countries.

In lack of continuous learning, training, reskilling and knowledge upgrading, however, it is very unlikely that the less developed countries will be able to transform their economies into a circular one soon, as it would need a lot of new knowledge and skills throughout the society. In conclusion, we can establish the fact that knowledge and skills stock and flow indicators are not favourable for the V4 countries, and this may put them at danger of falling behind in transforming their economies into a less material- and energy-intensive and a more knowledge-intensive, circular one.

This highlights another interesting issue: how the EU as an economic and political entity can achieve harmonious and holistic, environmentally responsible development if there are several countries which will be unable to implement the necessary changes rapidly enough?

Summary and conclusions

This paper focuses attention on the importance of a less researched subject field, which is how economies with different structural characteristics could transform to a more circular status. The paper introduces indicators, which describe productivity and efficiency, structural-environmental and knowledge-skills enhancement results of selected countries with a special focus on the V4 countries. The argument behind selecting these indicators is that in order for becoming more circular, it is obviously important to improve the productivity and efficiency of input – human and capital alike – to output processes, as well as investing in knowledge and skills, which are required for supporting necessary innovation for transformation success. The paper presented 12 indicators, which seem to prove the importance of improving input utilisation levels, as well as investing in knowledge and skills for supporting necessary innovation for transforming economies into circular ones. The data presented called attention to the fact that because of lower productivity and less knowledge investments, less developed economies might have more difficulties along the transformation process. This may present a development problem for them, as they may not be able to capitalise on opportunities opening up in the rapidly changing technological environment. A report,[13] which was issued at the Davos Conference of the World Economic Forum in January 2024, emphasised this problem the following way: 94 percentage of economists believe that due to rapid technological changes, considerable productivity gains are expected in the next five years in the high income economies. But only 53 percentage think that also lower income economies will benefit from these technological changes in the form of productivity enhancement. This foreshadows falling behind for the less developed countries. In order to avoid this situation, resistance should be strengthened in the less developed countries by structural changes, and boosting investments into knowledge and skills would be crucial. To support shifting to higher added upstream economic activities would also be absolutely urgent. It is also required to decrease the proportion of simple assembly activities performed in local subsidiaries of businesses from the highly developed countries. The structure of investments also has to be changed from a dominant proportion of tangible, machinery and building related ones towards intangible human, organisational and knowledge ones. With these suggested types of changes, less developed countries may also become beneficiaries of technological changes, which will manifest in a quicker transformation to more resilient and sustainable circular economies. These changes on the other hand will also help economies to prepare for resources shortages and the negative impacts of climate change. Finally, focus has to be put on decreasing the gaps among regions within countries, as well. Transforming economies into more circular ones through enhanced local knowledge creation and productivity increase may help to create a locally more balanced, more

13 Chief Economists Outlook. January 2024. World Economic Forum, Geneva.

inclusive development model, which serves not only business interests but also society as a whole by empowering local communities (selected remarks from the report).

It is of course necessary to find the best methodology for measuring how circular a particular economy is, and how successfully it progresses towards earlier established circularity goals. This article is an attempt to find relevant indicators to demonstrate key characteristics, which should be probably useful in such a research initiative. Resistance by businesses has to be taken into consideration and measured as well, as short term profit maximisation goals may be a strong force against creating circular economies.

The subject is therefore very interesting and also important, it offers further intellectual challenges as well for interested researchers. The author would like to encourage colleagues to immerse themselves into this subject and come up with further original, creative methodological suggestions and findings.

References

Braungart, Michael – McDonough, William – Bollinger, Andrew (2007): Cradle to Cradle Design: Creating Healthy Emissions – A Strategy for Eco-effective Product and System Design. *Journal of Cleaner Production,* 15(13–14), 1337–1348. Online: https://doi.org/10.1016/j.jclepro.2006.08.003

Clugston, Christopher O. (2012): *Scarcity: Humanity's Final Chapter?* Port Charlotte, Florida: Booklocker.com, Inc.

Clugston, Christopher O. (2019): *Blip. Humanity's 300 Year Self-Terminating Experiment with Industrialism.* St.Petersburg, Florida: Booklocker.com, Inc.

Jaeger, Bjoern – Upadhyay, Arvind (2020): Understanding Barriers to Circular Economy: Cases from the Manufacturing Industry. *Journal of Enterprise Information Management,* 33(4), 729–745. Online: https://doi.org/10.1108/JEIM-02-2019-0047

Jakobsen, Siri – Lauvås, Thomas – Quatraro, Francesco – Rasmussen, Einar – Steinmo, Marianne eds. (2021): *Innovation for a Circular Economy.* Cheltenham: Edward Elgar. Online: https://doi.org/10.4337/9781800373099

Preston, Felix – Lehne, Johanna – Wellesley, Laura (2019): *An Inclusive Circular Economy. Priorities for Developing Countries.* London: Chatham House. The Royal Institute of International Affairs.

Schröder, Patrick (2020): *Promoting a Just Transition to an Inclusive Circular Economy.* Research Paper. London: Chatham House The Royal Institute of International Affairs. Online: www.chathamhouse.org/sites/default/files/2020-04-01-inclusive-circular-economy-schroder.pdf

Weetman, Catherine (2021): *A Circular Economy Handbook* (2nd edition). London: Kogan Page.

Appendix

Definition of terms used by Eurostat

Capital productivity: Gross value added per unit of net fixed assets: a capital productivity indicator. It shows how many output are produced with a unit of capital stock (input). It is calculated by dividing gross value added by net capital stock (both in chain-linked volumes).

Fixed assets consists of a subset of produced assets, mostly machinery, equipment, buildings and other structures.

NACE is the European standard classification of productive economic activities. The acronym comes from the French: Nomenclature statistique des activités économiques.

Net turnover: the total revenue generated from the sale of products and services deducting sales discounts, value added tax, and any other taxes directly associated with the revenue.

Nominal labour productivity per hour worked for the total economy over a given time period is calculated by dividing GDP in current – nominal – prices by hours worked.

PPS: Purchasing power standard: is an artificial currency unit. Theoretically, one PPS can buy the same amount of goods and services in each country. However, price differences across borders mean that different amounts of national currency units are needed for the same goods and services depending on the country.

Real labour productivity measures per hour worked for the total economy over a given time period is calculated by dividing GDP in chain-linked units by hours worked.

Stock and flow indicators: stock type indicators refer to values of assets, while a flow indicator is related to transactions, like expenditures on education or R&D. In general, the value of stock is measured at a specific time, while that of a flow may be measured over a longer time horizon.