Polish
Economic
Institute

AUGUST 2020

WARSAW

ISBN 978-83-66306-90-5

The Responsible Development Index – version 2.0

Warsaw, August 2020
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ISBN 978-83-66306-90-5

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159 countries are covered by the Responsible Development Index

5 Sweden, Denmark, Norway, Switzerland and Finland – the top five performers in the responsible development ranking. The dominance of the Scandinavian countries results from their balancing the economic, social and environmental dimensions of development

32nd Poland's rank in the responsible development ranking. It is 8 spots higher than its rank in terms of GDP *per capita*

27 per cent the reduction in CO_2 emissions per unit of global GDP in 1998–2018. However, it is still insufficient to stop the negative consequences of climate change

10 years the period for the unemployment rate in the European Union to return to the 2008 (pre-crisis) level. A slow recovery of jobs is a major threat in the aftermath of the crisis caused by the COVID-19 pandemic

Key findings

Gross domestic product (GDP) – the most frequent measure of the level of country development – excludes certain vital aspects affecting the assessment of societies' well-being, such as inequalities in the distribution of value created in the economy or environmental degradation. **The Responsible Development Index is an alternative measure of well-being, aimed at combining various dimensions of socio-economic development.** The RDI covers 159 countries and relies on four pillars of development: current well-being, creating future well-being, non-wage well-being and climate responsibility.

One of the most important postulates of the RDI is to incorporate global climate responsibility into measures of a country's development. A further rise in global average temperature, caused by excessive CO_2 emissions, may lead to a significant deterioration of the quality of life in many regions of the globe in several decades (IPCC, 2014). Therefore, assessments of countries' development should not only focus on current indicators, but also take account of a country's contribution to the future quality of life on earth.

According to the analysis conducted, ***GDP per capita* tends to significantly overstate the development levels of countries rich in natural resources and tax havens.** At the same time, the ranking in terms of GDP *per capita* takes no account of the positions of countries taking care of sustainable socio-economic development and investing in the improvement of the future well-being of citizens.

The Scandinavian countries lead the way in responsible development. Apart from relatively high average wealth (measured by consumption *per capita*), the countries in question are also characterised by low income inequalities, high investments in the future and taking care of non-wage factors – air quality, security and public order as well as citizens' health. High scores obtained in the above-mentioned areas are accompanied by efforts to improve global climate – low CO_2 emissions and a large scale of emission reduction in the last 20 years.

In terms of responsible development, Poland ranks higher than with regard to GDP *per capita*. The areas improving Poland's RDI rank include low income inequalities and high internal security. A further improvement in our country's rank requires increased research and development expenditure, significant reduction in air pollution and taking measures to improve citizens' health. Poland's weaknesses include the still high CO_2 emissions, even though the rate of decreasing the carbon intensity of the Polish economy has been for the past 20 years.

Global CO_2 emissions per unit of GDP are on the decline, but the pace of reduction is too slow to stop climate change. Advanced economies are characterised by lower emission intensity and faster emission reductions as compared to developing countries. In the 40 most developed economies, today's CO_2 emissions are lower than in 1998 (the year following the signing of the Kyoto Protocol). Poland ranks among the countries characterised by relatively high CO_2 emissions, but the pace of reducing emissions has been fast in the last 20 years.

In connection with the economic crisis caused by the COVID-19 pandemic, the following issues has been raised in the economic debate:

- Experiences from prior crises show that the phase of recovering from the crisis may involve the phenomenon of a ***jobless recovery*** – GDP bouncing back relatively quickly, but without an equally fast upswing in the labour market;

- The crisis may result in **increased inequalities**: development inequalities between advanced economies and developing countries, income inequalities between high- and low-income citizens in particular countries and between men and women;
- In spite of high GDP *per capita*, **it is difficult for the United States to balance the various aspects of socio-economic development,** which has indirectly led to social unrest and mass protests in the US.

Introduction

One of the most important issues in the modern economic debate is the correct measurement of country development. In recent years, the most popular indicator used for that purpose – gross domestic product (GDP) – has been increasingly called into question. The criticism of the measure intensified especially after the financial crisis of 2008 and 2009 when **rising income inequality as well as the climatic and environmental impact of economic development** became top priority items on the economic debate agenda. Neither GDP growth nor GDP *per capita* shows how the value created in the economy is distributed between poor and wealthy social groups or what externalities are generated by economic growth. Joseph Stiglitz, awarded the 2001 Nobel Memorial Prize in Economics, has been among those actively stimulating the discussion. As pointed out by Stiglitz, the sole focus on the output of goods and services in measuring well-being **makes society ever more materialistic.** In his opinion, the measurement of well-being should take account of areas such as health, education or the environment (Stiglitz, Sen, Fitoussi, 2009; Stiglitz, Fitoussi, Durand, 2018; Stiglitz 2018).

In 2019, the Polish Economic Institute contributed to the debate by creating the Responsible Development Index (RDI). **The primary objective of the RDI is to combine various aspects of socio-economic development in a single measure.** In its first published version, the RDI was composed of three pillars – current well-being, creating future well-being and non-wage well-being – comprising eight indicators. The main difference between this year's version of the RDI and the 2019 version is an addition of a fourth pillar: climate responsibility. The RDI version 2.0 covers 153 countries and includes four pillars composed of nine indicators.

Counteracting climate change may be the world's most important challenge of the 21st century. A further rise in global average temperature, caused by excessive CO_2 emissions, may trigger disastrous social and economic effects in several decades (IPCC, 2014). Therefore, **measures of country development should take account of the degree to which individual countries contribute to changes in CO_2 emissions worldwide.** This study proposes the use of two indicators: CO_2 emissions per unit of GDP generated and the scale of reduction in CO_2 emissions in comparison with 1998 (the year following the completion of the Kyoto Protocol negotiations).

Owing to the exceptional economic situation caused by the COVID-19 pandemic, this year's study also raises selected development-related issues connected with the current crisis. **Most analyses of the impact of the crisis focus on showing the effects on GDP change, whereas distinctly less attention is given to sustainable development aspects:** a possible rise in income inequality or long-term adverse influence of the crisis on the labour market (much longer than the duration of falling GDP). Furthermore, the crisis has revealed the weaknesses of certain countries – primarily the United States – in satisfying various aspects of socio-economic development.

The publication is composed of four chapters. Chapter 1 presents the structure of the RDI; Chapter 2 describes key RDI scores (including Poland's rank); Chapter 3 focusses on the new pillar of the RDI – countries' global climate responsibility; finally, Chapter 4 provides insights into three selected development-related aspects connected with the crisis caused by the COVID-19 pandemic. The study concludes with a summary and a methodological annex explaining in more detail the process of creating the RDI.

Chapter 1. Structure of the Responsible Development Index

The Responsible Development Index version 2.0 is composed of four pillars:

- **Current well-being** – the pillar representing the material (tangible) dimension of well-being. Its components include the value of consumption *per capita* in the country concerned (at purchasing power parity, i.e. adjusted for price differences between countries). The indicator illustrates the value of consumption per person, irrespective of consumption disparities between low-income and wealthy social strata. Therefore, the consumption indicator in pillar I is accompanied by the income inequality index – the Gini coefficient.
- **Creating future well-being** – long-term social prosperity depends not only on current well-being, but also on how today's socio-economic development contributes to the well-being of future generations. That aspect is reflected in pillar II of the RDI, comprising indicators showing the share of a country's GDP spent on research and development as well as on education. According to scientific studies, the most crucial determinants of long-term development of a country include expenditure on research and development and on quality education (Fagerberg, Srholec, Verspagen, 2010; Mansfield, 1972; McMahon, 1984; Ozturk, 2001; Romer, 1986; Saidi, Mongi, 2018).
- **Non-wage well-being** – pillar III exemplifies the fact that the quality of life goes far beyond material (tangible) factors. Increasingly frequent discussions on the significance of non-financial indicators suggest that the satisfaction of basic human needs – e.g. the sense of security – should be taken into consideration in the assessment of a country's development level. The pillar is composed of three variables: the number of intentional homicides relative to the population as a measure of the security of living in the country concerned; life expectancy, reflecting the state of public health; and air pollution, illustrating the state of the environment in particular countries.
- **Climate responsibility** – the pillar is not directly related to the current quality of life in the country concerned, but it comprises factors showing the country's responsibility for the future quality of life around the globe. In several decades, the climate change caused by carbon dioxide emissions from human activities may lead to a significant deterioration of living conditions in many regions of the world (IPCC, 2014). In this case, we consider both a country's current CO_2 emissions and efforts to reduce them to be important. The benchmark adopted for the assessment of the scale of reduction in CO_2 emissions was 1998, i.e. the year following the completion of negotiations of the Kyoto Protocol, the first document signed at the global level and pointing to the need for reducing CO_2 emissions. By taking into account not only the current emissions, but also the scale of their reduction over time, we incorporate the fact that countries started from different levels when the need arose to make appropriate efforts to achieve the goal. The emission level and the scale of emission reduction is calculated per unit of GDP. In our opinion, climate

protection measures may not necessarily lead to a decrease in global output, which would be particularly harmful to countries in which a major share of citizens suffer extreme poverty. Rather, their purpose should be to make every unit of global output less detrimental to global climate.

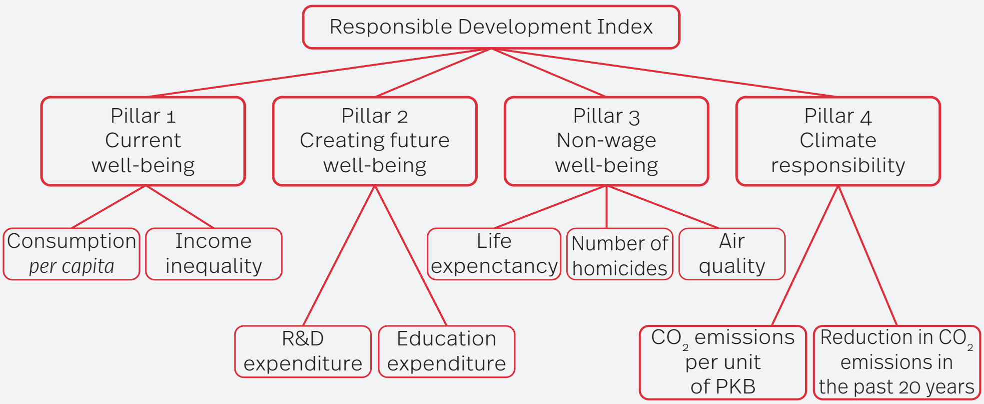
Two modifications to the first version of the Responsible Development Index were introduced. One change was to add pillar IV – climate responsibility; the other was to modify the structure of pillar II, where two variables – spending on PhD students and the number of trade marks – were replaced with one: expenditure on education. Detailed reasons for making those changes are presented in the Methodological annex.

An important characteristic of the RDI is its universality – it covers as many as 159 countries. Their selection was based on data availability and the population (countries with populations below 0.5 million were excluded). To a certain degree, the willingness to cover as many countries as possible determined the selection of components of specific pillars.

Another significant aspect of the construction of the RDI is its compact nature – the limitation on the number of the variables used to nine was intentional. The goal was to obtain a picture exhaustively presenting the main components of country development and simultaneously not blurred by an excessive number of indicators.

For most of the variables, the source of data was the World Bank database. Data on air quality were retrieved from the World Health Organisation database, whereas data on CO_2 emissions – from the Global Carbon Project database. Owing to the existence of certain gaps in time series, we estimated some of the data. The quality of the variables was tested statistically for excessive correlation and the validity of using them in the creation of the RDI – we verified correlations between the variables. The results of the aforementioned procedures, a description of the method of estimating missing data, detailed information on their transformations and the creation of the RDI are presented in the Methodological annex.

↘ Scheme 1. RDI structure



Source: prepared by the PEI.

Chapter 2. The RDI scores

2.1. The leaders in responsible development

The Scandinavian countries lead the way in responsible development. The highest RDI score was obtained by Sweden, ahead of Denmark and Norway. The other two countries from the top five were Switzerland and Finland.

The high ranks of the Scandinavian countries result from their balancing the economic, social and environmental dimensions of development. For example, despite leading the overall ranking, Sweden was not the best performer in any single pillar. In pillars II, III and IV, it was among the top five, whereas in pillar I it ranked 9th. Due to a good rank in every pillar, it took first place in the overall ranking.

In particular, the Scandinavian countries dominate the third pillar of the RDI, i.e. in terms of non-wage well-being. With regard to the measure in question, Sweden and Norway jointly obtained the highest scores. The two countries as well as Finland ranked among the top ten in terms of clean air (Finland – 2nd, Sweden – 3rd, whereas Norway – 6th). A similar situation was found in pillar II: all the three Scandinavian countries and Finland ranked among the world's leaders in public expenditure on education (with the whole Scandinavian Peninsula in the top four), ranking high in research and development expenditure (the best performer – 4th in the world – being Sweden). The countries concerned have developed social welfare systems and quality public services, including good public education (particularly in Finland). However, one cannot neglect the high ranks of the northern regions of Europe in pillar I, describing the economic reality – with regard to the measure in question, only Denmark was behind the top ten, ranking 13th.

The Scandinavian countries and Finland prove that reducing inequality does not necessarily involve limiting wealth or economic development. All of them obtained very good values of the Gini coefficient, a measure of income stratification in society. As regards the indicator in question, they ranked between 10th (Finland) and 22nd (Sweden), at the same time obtaining similar or higher ranks in consumption *per capita*.

European countries dominated in the top thirty of the ranking. The top ten included as many as 7 European countries, whereas the top twenty – 13 (Table 1). As many as 21 of the top thirty places were taken by European countries. Eight countries from our continent were behind the top fifty (from Bulgaria, ranked 51st, to Bosnia and Herzegovina, ranked 110th); among those, Bulgaria was the only European Union Member State. European countries tend to be characterised by broad access to public services of relatively good quality, e.g. health care. Furthermore, a distinct policy orientation in Europe is reducing inequality – the value of the Gini coefficient was lower in comparison with non-European RDI leaders. For example, Israel, 6th in the overall ranking, ranked as low as 94th in that aspect, whereas the USA, with the 8th RDI score in the world, took 107th place in that regard. Therefore, it seems that Europe performs best in terms of balancing economic development against social factors and broader living comfort. Doubts may only be raised by issues related to innovation and climate responsibility in certain European countries.

↘ Table 1. **The top fifty in the RDI ranking, together with scores obtained in specific pillars**

Country	Rank	Pillar I	Pillar II	Pillar III	Pillar IV	2018 RDI
Sweden	1	5.86	6.50	7.61	6.48	66.10
Denmark	2	5.77	6.27	7.44	6.44	64.81
Norway	3	6.32	5.65	7.61	6.29	64.66
Switzerland	4	6.22	5.58	7.56	6.42	64.44
Finland	5	5.93	5.76	7.57	6.32	63.93
Israel	6	4.83	6.78	7.26	6.29	62.91
Austria	7	5.93	5.55	7.41	6.26	62.89
United States	8	6.61	5.06	7.27	6.21	62.87
Belgium	9	5.94	5.50	7.37	6.33	62.83
South Korea	10	5.56	6.32	7.00	6.09	62.42
Germany	11	5.83	5.18	7.39	6.29	61.73
France	12	5.55	4.86	7.45	6.36	60.56
Netherlands	13	5.82	4.62	7.42	6.28	60.36
United Kingdom	14	5.75	4.37	7.43	6.42	59.91
Japan	15	5.48	4.73	7.57	6.17	59.86
Australia	16	5.72	4.49	7.59	6.11	59.77
Canada	17	5.81	4.20	7.55	6.16	59.30
New Zealand	18	5.42	4.38	7.59	6.28	59.16
Slovenia	19	5.64	4.27	7.29	6.31	58.77
Czech Republic	20	5.50	4.50	7.22	6.27	58.72
Luxembourg	21	6.08	3.47	7.49	6.31	58.37
Portugal	22	5.07	3.87	7.53	6.27	56.83
Ireland	23	5.47	3.21	7.56	6.49	56.81
Hong Kong	24	6.74	2.92	6.64	6.41	56.79

Country	Rank	Pillar I	Pillar II	Pillar III	Pillar IV	2018 RDI
Singapore	25	4.97	3.78	7.34	6.54	56.58
Italy	26	5.26	3.50	7.40	6.30	56.15
Spain	27	5.07	3.53	7.56	6.30	56.14
Estonia	28	5.04	3.95	7.37	6.08	56.10
Cyprus	29	5.02	3.79	7.26	6.21	55.71
Hungary	30	4.96	3.83	7.01	6.36	55.41
Slovakia	31	5.48	3.16	7.06	6.38	55.19
Poland	32	5.23	3.55	7.02	6.26	55.16
Greece	33	4.93	3.37	7.31	6.19	54.51
Croatia	34	4.84	3.39	7.12	6.27	54.03
Lithuania	35	4.86	3.20	7.07	6.43	53.89
Belarus	36	5.20	3.27	6.84	6.21	53.81
Malaysia	37	4.42	3.83	7.02	6.12	53.49
Latvia	38	4.70	3.17	6.99	6.43	53.23
Moldova	39	4.79	3.26	6.79	6.39	53.07
Uruguay	40	4.32	3.19	7.13	6.31	52.38
Tunisia	41	4.31	3.94	6.52	6.11	52.20
Costa Rica	42	3.52	3.96	6.94	6.33	51.89
Romania	43	4.68	2.51	7.06	6.46	51.77
Macao	44	5.37	2.17	6.60	6.56	51.77
Mauritius	45	4.49	3.07	7.02	6.12	51.75
Argentina	46	4.09	3.47	7.06	6.08	51.73
Ukraine	47	4.61	3.40	6.65	5.99	51.62
Russia	48	4.51	3.27	6.71	6.10	51.50
Chile	49	4.03	3.31	7.03	6.23	51.50
Thailand	50	4.09	3.34	6.77	6.16	50.89

Source: prepared by the PEI.

2.2. The Responsible Development Index and GDP *per capita* – who wins, who loses?

The main idea behind the creation of the RDI is that socio-economic development cannot be measured exclusively by the output of goods and services. It is true that the RDI leaders are actually the wealthiest countries in terms of GDP *per capita*, but their exact positions differ from those in the GDP ranking. Therefore, this section presents selected cases of the most significant changes in rank between the two measures (for the 159 countries covered, Table 2).

GDP *per capita* tends to overstate the development levels of countries abundant in natural resources (Chart 1). The countries showing the most abrupt decreases in the RDI ranking as compared to the ranking in terms of GDP *per capita* include: Bahrain (100 spots), Qatar (98 spots), Saudi Arabia (68 spots), the United Arab Emirates (60 spots) and Kuwait (48 spots). Despite high output, the countries in question invest a minor share of their GDP in research and development or education, being characterised by relatively significant inequalities. Neither do they perform well in pillar 3 of the RDI, representing non-wage well-being.

In addition, GDP *per capita* overstates the development levels of tax havens. Some countries regarded as European tax havens – Ireland, Luxembourg and the Netherlands (Sawulski, 2020) – rank higher in terms of GDP *per capita* than with regard to the Responsible Development Index. Capital flows through those countries artificially increase the value of the production of goods and services, but their contribution to greater social well-being is limited (Garcia-Bernardo et al., 2017; Cobham, Garcia-Bernardo, 2020; Tørsløv, Wier, Zucman, 2020). This is also the case for small Asian countries such as Singapore and special administrative regions of China: Hong Kong and Macao. Excessive artificial capital flows are also indicated for the countries concerned (Garcia-Bernardo et al. 2017; Cobham, Garcia-Bernardo, 2020).

The ranking in terms of GDP *per capita* understates the ranks of countries taking care of sustainable socio-economic development. It holds true, especially, for the Scandinavian countries and Finland. The quality of life in the above-mentioned countries is appreciated not only by our RDI, but also by other development rankings alternative to GDP. As regards the 2018 Human Development Index, Norway ranked 1st and Sweden – 8th (United Nations, 2019). In the Global Competitiveness Index ranking, the respective ranks of Sweden, Denmark Finland and Norway were 9th, 10th, 11th and 16th (World Economic Forum, 2018). All the four countries described above are also top performers in terms of the Social Progress Index, led by Norway, ahead of Denmark (4th) and Finland (5th), followed by Sweden in 11th place (Social Progress Imperative, 2018).

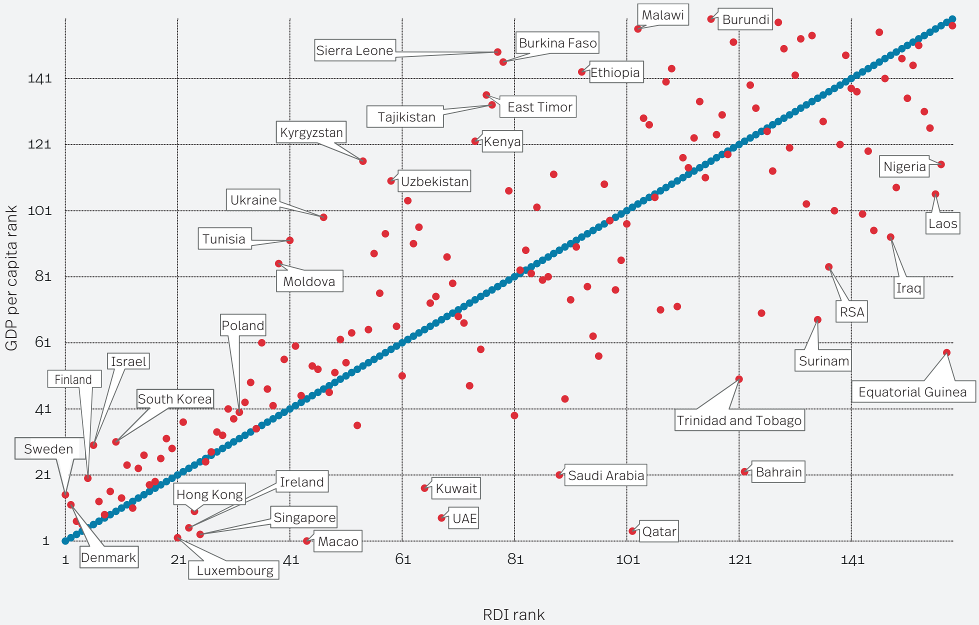
Neither does GDP *per capita* take account of countries' investments in their future development. In particular, it concerns Israel and South Korea, characterised by relatively high spending on education and the world's highest research and development expenditure. The two countries ranked 1st and 3rd, respectively, in pillar II of the RDI, focussed on creating future well-being. As a consequence, they gained in the RDI ranking relative to the ranking in terms of GDP *per capita*: Israel – as many as 24 spots; Korea – 21 spots.

↘ Table 2. Comparison of the ranks of selected countries in the rankings in terms of the Responsible Development Index and GDP *per capita*

Country	Pillar I	Pillar II	Pillar III	Pillar IV	RDI rank	Rank in terms of GDP *per capita* at purchasing power parity	Difference
Countries rich in energy raw materials							
Bahrain	4.06	1.95	5.77	6.02	122	22	-100
Qatar	4.31	2.48	5.36	6.15	102	4	-98
Saudi Arabia	4.13	3.56	5.41	5.68	89	21	-68
United Arab Emirates	5.13	2.03	6.55	5.95	68	8	-60
Kuwait	5.35	2.45	5.95	5.97	65	17	-48
Conduit countries (tax havens)							
Luxembourg	6.08	3.47	7.49	6.31	21	2	-19
Ireland	5.47	3.21	7.56	6.49	23	5	-18
Netherlands	5.82	4.62	7.42	6.28	13	11	-2
Northern European countries							
Sweden	5.86	6.50	7.61	6.48	1	15	14
Denmark	5.77	6.27	7.44	6.44	2	12	10
Norway	6.32	5.65	7.61	6.29	3	7	4
Finland	5.93	5.76	7.57	6.32	5	20	15
Small Asian countries							
Macao	5.37	2.17	6.60	6.56	44	1	-43
Singapore	4.97	3.78	7.34	6.54	25	3	-22
Hong Kong	6.74	2.92	6.64	6.41	24	10	-14
Other selected countries							
Israel	4.83	6.78	7.26	6.29	6	30	24
South Korea	5.56	6.32	7.00	6.09	10	31	21
Poland	5.23	3.55	7.02	6.26	32	40	8

Source: prepared by the PEI.

↘ Chart 1. Comparison of country rankings in terms of the Responsible Development Index and of GDP *per capita*



Source: prepared by the PEI; data on GDP *per capita* retrieved from the World Bank database.

2.3. Poland's rank in the RDI

According to the RDI ranking, Poland was the world's 32nd most developed country (out of the 159 countries under analysis). Thus, Poland outperformed Russia or China, but remained behind all the Western European countries. Within the European Union, the group of Member States ranked lower than Poland included Greece, Croatia, Lithuania, Latvia, Romania and Bulgaria. **In the Responsible Development Index ranking, Poland ranked 8 spots higher than in terms of GDP *per capita*.** Countries with GDP *per capita* higher than Polish GDP at purchasing power parity but behind Poland in the RDI ranking included: United Arab Emirates, Bahrain or Lithuania. In contrast, the country to outperform Poland in the RDI despite lower GDP *per capita* was Hungary.

Poland's position was the strongest in pillar I – current well-being. In the category concerned, it ranked 27th. A vital determinant of Poland's high rank in that regard was relatively low income inequality. The Gini coefficient values higher than that of Poland were obtained by many countries from the top twenty in the RDI ranking, e.g. Germany, France, Switzerland, Japan, the United Kingdom or the United States. However, it is worth noting that the leaders in the factor in question included the Czech Republic and Slovakia, the best performer being Slovenia.

In pillars II and III (creating future well-being and non-wage well-being respectively), Poland ranked low in the top forty. One reason was relatively low research and development expenditure. It represented 1.03 per cent of GDP, the 35th score worldwide (thus lower than Poland's overall RDI rank). Such a low value, especially in comparison with the economies leading in the RDI, may hinder catching up with them.

As regards detailed RDI indicators, Poland ranked the highest in the measure of security – the number of intentional homicides relative to the population. In 2018, it was 0.77 per 100,000 inhabitants, the 23rd score in the world. In that regard, Poland has made significant progress in the past three decades; in the early 1990s, the number of intentional homicides in Poland was about triple the current figure.

An interesting observation concerns life expectancy. It was nearly 78 years in Poland in 2018, having remained virtually unchanged in 2016–2018; however, in 2016 such a score was 39th globally, whereas in 2018 it meant dropping to 42nd place. Therefore, in that case, the absence of growth in life expectancy (no improvement) in fact implied a deterioration relative to the rest of the world.

High air pollution in Poland is a major problem; inhabitants of as many as 75 countries (out of the 159 covered) breathed cleaner air. Higher ranks than that of Poland in the category characterised Russia, Japan or the USA as well as all the European Union Member States. Only four European countries had worse air quality than Poland. Reflected in phenomena such as urban smog, the problem considerably affects the living comfort, primarily health.

Poland performed the worst in pillar IV, related to climate responsibility – ranking 53rd out of the 159 countries under review. But Poland's rank results from extremely different scores in the two indicators analysed in the pillar. As regards the current level of CO_2 emissions per unit of GDP, Poland – 126th out of the 159 covered – ranked among the countries having the most detrimental influence on global climate. At the same time, however, in 1998–2018 the scale of emission reduction in Poland was impressive: 52 per cent (per unit of GDP), ranking our country 18th worldwide in the category concerned. This issue is discussed in more detail in Chapter 3.

Poland against the backdrop of the Visegrad Group countries

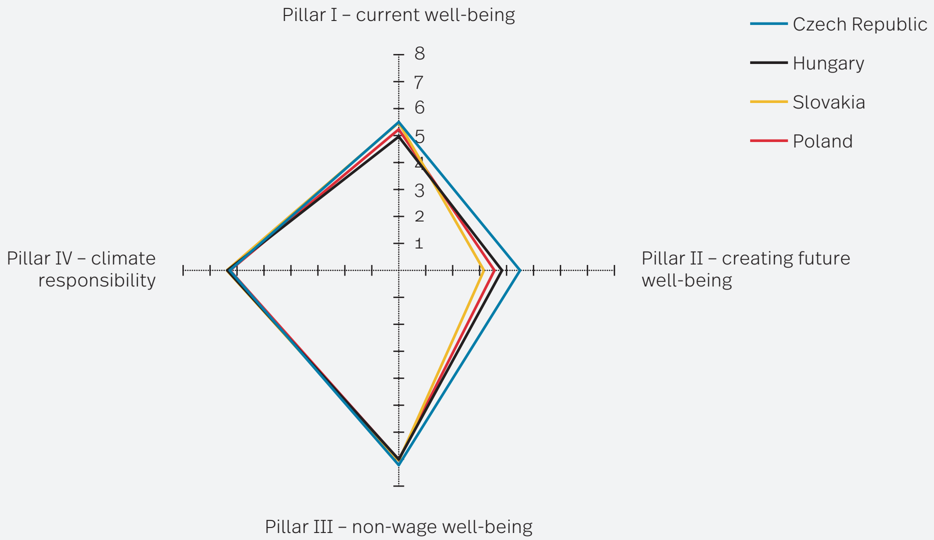
Against the backdrop of the neighbouring Central and Eastern European countries, Poland doesn't deviate from others – just behind Slovakia and Hungary (ranked 31st and 30th respectively). In the Visegrad Group, the RDI leader was the Czech Republic, ranked 20th (Table 3). The fundamental difference between the Czech Republic and the rest of the Visegrad Group was in pillar II (Chart 2). It provides the potential of the Czech economy to grow relatively fast in the future. As regards the other pillars, the Visegrad countries – including Poland – obtained similar scores.

↘ Table 3. Scores obtained by the Visegrad Group countries in specific pillars

Country	Pillar I	Pillar II	Pillar III	Pillar IV	RDI_2018	RDI rank
Czech Republic	5.50	4.50	7.22	6.27	58.72	20
Hungary	4.96	3.83	7.01	6.36	55.41	30
Slovakia	5.48	3.16	7.06	6.38	55.19	31
Poland	5.23	3.55	7.02	6.26	55.16	32

Source: prepared by the PEI.

↘ Chart 2. Comparison of scores in specific pillars



Source: prepared by the PEI.

An analysis of particular indicators in the Visegrad countries allows to draw the following conclusions:

- Poland had the highest consumption *per capita* in the Visegrad Group, but at the same time the most polluted air and the highest CO_2 emissions per unit of GDP (Table 4);
- Poland was characterised by relatively low research and development expenditure, in particular as compared to the Czech Republic;
- On the one hand, Poland had distinctly greater life expectancy and a lower number of intentional homicides than in Hungary; on the other hand, research and development expenditure in Poland was clearly lower, air quality was worse and CO_2 emissions were higher;

Table 4. Values of selected indicators in the Visegrad Group countries

Country	Pillar I		Pillar II		Pillar III			Pillar IV	
	Consumption *per capita*	Gini coefficient	Research and development expenditure as a percentage of GDP	Expenditure on education as a percentage of GDP	Number of homicides per 100,000 inhabitants	Life expectancy	Air quality	CO_2 emissions per unit of GDP	Change in CO_2 emissions from 1998 (in per cent)
Czech Republic	14,930	25.2	1.8	5.6	0.62	79.0	84.9	0.30	-51
Hungary	13,106	30.5	1.4	4.7	2.36	75.8	84.4	0.18	-50
Slovakia	15,081	25.6	0.9	3.9	1.28	77.2	82.5	0.21	-60
Poland	15,938	30.4	1.0	4.6	0.77	77.8	79.5	0.31	-52

Source: prepared by the PEI.

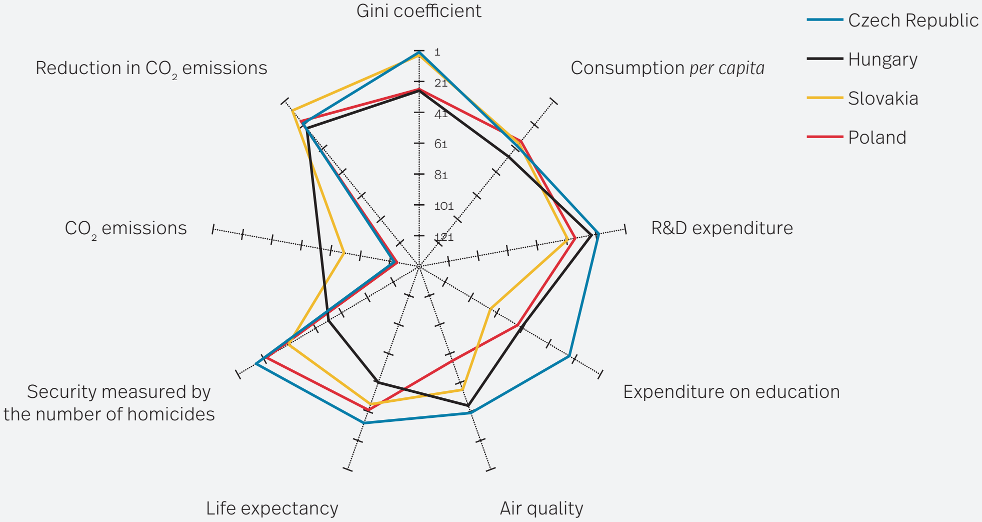
Table 5. Global ranks of the Visegrad Group countries in selected categories

Country	Pillar I		Pillar II		Pillar III			Pillar IV	
	Consumption *per capita*	Gini coefficient	R&D expenditure	Expenditure on education	Air quality	Life expectancy	Security measured by the number of homicides	CO_2 emissions	Reduction in CO_2 emissions
Czech Republic	39	2	19	25	40	33	15	124	20
Hungary	48	27	24	62	45	61	71	74	24
Slovakia	37	4	40	86	56	46	40	90	9
Poland	35	26	35	65	76	42	23	126	18

Source: prepared by the PEI.

- All the Visegrad Group countries were characterised by relatively low income inequalities, with the Czech Republic and Slovakia ranking among the world's top five in that regard (Table 5);
- For all the Visegrad Group countries, the situation concerning climate responsibility was similar to that of Poland – high CO_2 emissions accompanied by significant emission reductions in the last 20 years (Chart 3).

Chart 3. Global ranks of the Visegrad Group countries in terms of detailed indicators



Source: prepared by the PEI.

Where can Poland be in a decade? A positive development scenario

In a positive development scenario, assuming improvements in Poland's indicators in the nearest decade, the following representatives of the 'old' EU are five and six spots away from Poland today: Spain and Italy (ranked 27th and 26th respectively, Table 6). The two countries show similar performance in individual pillars and Poland is not far behind. Our country performed better than Spain in pillar I and led the way in pillar II. The main difference between Poland and Spain and Italy concerned pillar III – non-wage well-being; Poland lagged significantly, especially behind Spain.

The main reasons for Poland's lower rank than those of the two countries mentioned above were lower life expectancy and poor air quality. Spain and Italy ranked among the countries characterised by relatively high life expectancy – approximately 5 to 6 years longer than in Poland (Table 7). Both countries are among the top 10 in the world (although the effects of the COVID-19 pandemic on that statistic remain unknown). The comparison with Spain and Italy again highlights Poland's problem with air quality. Resolving the issue of urban smog and improving health care quality in Poland would certainly contribute to significantly moving Poland's RDI rank towards those of the two countries in question.

Table 6. Comparison of Poland, Spain and Italy in terms of the overall RDI score and pillar scores

Country	Pillar I	Pillar II	Pillar III	Pillar IV	RDI_2018	RDI rank
Italy	5.26	3.50	7.40	6.30	56.15	26
Spain	5.07	3.53	7.56	6.30	56.14	27
Poland	5.23	3.55	7.02	6.26	55.16	32

Source: prepared by the PEI.

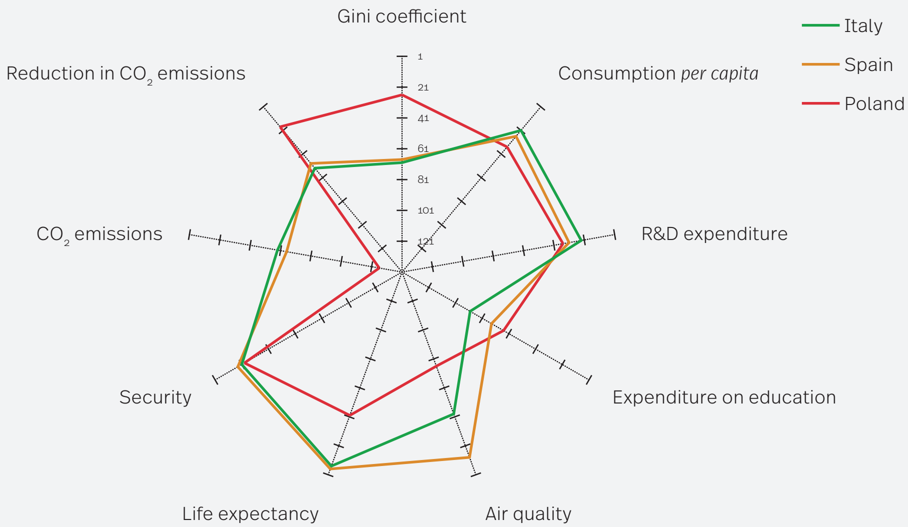
Table 7. Values of detailed indicators in Poland, Spain and Italy

Country	Pillar I		Pillar II		Pillar III			Pillar IV	
	Consumption *per capita*	Gini coefficient	Research and development expenditure as a percentage of GDP	Expenditure on education as a percentage of GDP	Number of homicides per 100,000 inhabitants	Life expectancy	Air quality	CO_2 emissions per unit of GDP	Change in CO_2 emissions from 1998 (in per cent)
Poland	15,938	30.4	1.0	4.6	0.77	77.8	79.46	9.69	-52
Spain	17,777	35.2	1.2	4.2	0.67	83.3	90.52	9.84	-34
Italy	20,187	35.6	1.4	3.8	0.734	82.9	84.72	9.84	-33

Source: prepared by the PEI.

Comparisons of other factors do not produce such unambiguous results. Among the three countries under review, Poland spent the most on education but the least on research and development (Table 7, Chart 4). It was also the case in pillar I: our country showed the lowest income stratification, but also the lowest consumption *per capita*. Italy's advantage over Poland (and – to a lesser degree – over Spain) is the current well-being and the ability to efficiently create well-being in the future. Consumption *per capita* in Poland was slightly more than 20 per cent lower than in Italy. A similar disproportion was found in the case of research and development expenditure. Therefore, in order to catch up with the two countries in terms of well-being, it will be crucial – in addition to improving non-wage factors – to increase innovation-oriented investments as well.

Chart 4. Global ranks of Poland, Italy and Spain in terms of detailed indicators



Source: prepared by the PEI.

Chapter 3. Climate responsibility as a pillar of responsible development of countries

3.1. Why should economics take account of climate responsibility in measures of well-being?

The impact of activities of our civilisation on ongoing climate change has been widely addressed in the scientific literature. Buoyant growth in scientific discoveries, the development of medicine and the introduction of innovation in various industries have been observed since the mid-18th century. Economic development involves increased demand for raw materials and energy, being additionally fuelled by the world's rising population. The willingness to satisfy those needs has pushed up emissions of greenhouse gases, mostly of carbon dioxide (CO_2), methane (CH_4) and nitrogen oxide (N_2O). Since the beginning of the industrial era, more than 2,000 Gt of CO_2 have been released into the atmosphere. Ca. 40 per cent of these emissions have remained in the atmosphere, whereas the rest has been stored on the surface of the earth and in the oceans (IPCC, 2014). **At the same time, atmospheric concentrations of greenhouse gases have been closely related to rising global mean surface temperature** – anthropogenic global warming from the pre-industrial period to 2017 is estimated at ca. 1° C (IPCC, 2018). Should the temperature rise continue at the same pace, we may expect global mean temperature to increase by 1.5° C above pre-industrial levels in 10 to 30 years (IPCC, 2018).

We have already experienced the effects of rising temperature: there has been an increase in the annual average number of warm days and nights (accompanied by a declining number of cold days and nights); many regions have begun to experience heavy precipitation combined with long periods of drought and a greater frequency of floods and coastal flooding due to the sea level rise. As mentioned above, the carbon dioxide emissions stored in the oceans have led to ocean acidification[1], posing a risk to marine ecosystems (IPCC, 2018).

Climate change will affect the functioning of the whole planet, with certain regions experiencing faster and more intensive effects on the climate. Among those, Sub-Saharan African countries are particularly exposed as they show faster temperature increases than other regions of the world. Significant changes have also been observed in the Mediterranean, on account of an increased risk of drought, as well as in all countries dependent

[1] It refers to ca. 30 per cent of total anthropogenic emissions of CO_2. Ocean pH has decreased by 0.1 on the pre-industrial level. As emphasised by the Intergovernmental Panel on Climate Change (abbreviated as the IPCC), it is unprecedented in the last 65 million years (IPCC, 2018).

on aquaculture and fisheries since marine species diminish due to seawater acidification (IPCC, 2018).

According to scientific research, global warming of 1.5°C or 2°C will intensify the above-mentioned phenomena and their adverse effects on both ecosystems and social systems. Therefore, it is necessary to incorporate greenhouse gas emission control as a component of assessments of country development. In December 1997, the world's first international treaty on reducing emissions of gases responsible for global warming was adopted in Kyoto. To date, the document has been signed by 192 countries. Bearing in mind the milestone of completing the Kyoto negotiations, we adopted 1998 as the base year for noting changes in CO_2 emissions. It allows us to analyse two decades of developments in this area (in 1998–2018).

3.2. Country scores in terms of climate responsibility

Generating GDP does not necessarily involve high CO_2 emissions. Countries vary widely in their CO_2 emissions per unit of output. Globally, CO_2 emissions per unit of GDP range from 1.1 kg in the worst performing country to 0.029 kg (29 g) in the leader.

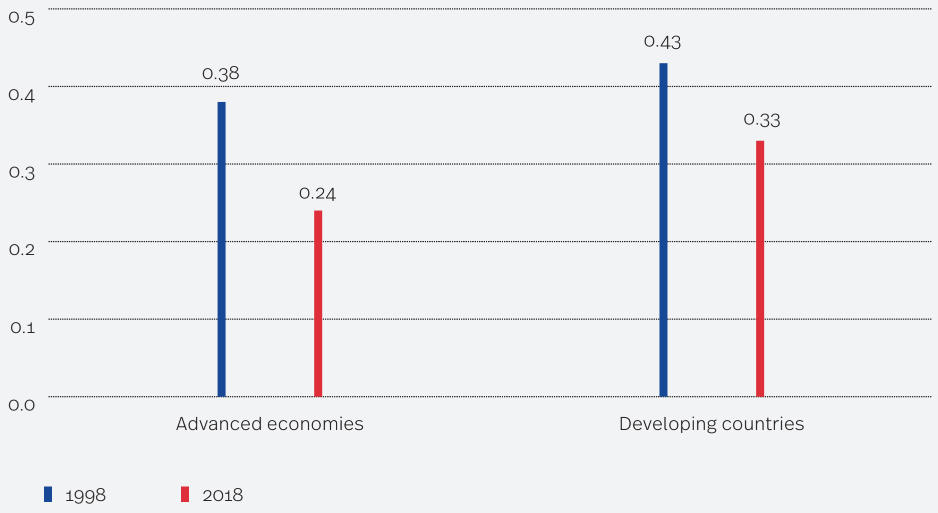
In 2018, CO_2 emissions per unit of GDP were 27 per cent lower than in 1998. Emission reductions had been achieved by 108 out of the 159 countries covered. All of the 51 countries having failed to reduce their emissions are developing countries. The steepest rise in emissions – almost by a factor of six – was noted for Laos; in 10 years Equatorial Guinea increased its CO_2 emissions per unit of GDP more than five times, whereas the third worst performer – Afghanistan – over three times. In contrast, the most significant emission reductions were observed in Uzbekistan (down by 78 per cent), Azerbaijan (77 per cent) and Singapore (70 per cent).

Advanced economies are characterised by lower emission intensity per unit of GDP and faster emission reductions as compared to developing countries. In 2018, the average CO_2 emissions per unit of GDP in developed countries were 0.242 kg, whereas in developing countries – 0.327 (Chart 5). The former group reduced their emissions from 1998 by 36 per cent, the latter – by 24 per cent. The developments are consistent with so-called environmental Kuznets curve. It suggests that countries considerably increase their carbon intensity at a very early stage of development (with low GDP *per capita*). But once a certain threshold has been reached, carbon intensity begins to decrease steadily (Stern, 2004).

Although most countries have been reducing their emissions per unit of GDP, it is still insufficient to stop climate change. For years, global emissions of carbon dioxide have been rising steadily – according to the Global Carbon Project data, in 2018 the world's total CO_2 emissions into the atmosphere were 36,573 million tonnes, or slightly above 12,000 million tonnes more than in 1998. As estimated by the IPCC, only those greenhouse gases that have already been released as a result of human activities will not cause further warming of more than 0.5°C over the next few decades. However, if net global anthropogenic emissions of carbon dioxide are not reduced to zero as soon as possible, whereas global warming continues at the same pace, around 2040 the average temperature rise will exceed 1.5°C above the pre-industrial level. Reducing net CO_2 emissions to zero by 2055 accompanied by keeping the Earth's energy balance will allow to stabilise global warming at 1.5° C and to stop its extreme effects for decades (IPCC, 2018).

All the countries from the top 40 in the RDI ranking recorded a fall in emissions per unit of GDP in comparison with 1998. The highest initial (1998) levels of CO_2 emissions were noted mainly by former Eastern Bloc countries – Belarus, Estonia, Poland, the Czech Republic and Moldova. Relatively high emissions also characterised Australia and Canada. Although in the following 10 years Estonia and Belarus managed to decrease their CO_2 emissions by half, in 2018 the two countries still noted the highest values in the group of countries in question (Chart 6). Similar dynamics of reducing CO_2 emissions per unit of GDP were recorded by Poland and the Czech Republic. Previously an inglorious leader in CO_2 emissions, Moldova appeared to be the country to have cut its emissions the most (down by nearly two-thirds). The CO_2 emission reductions observed in Australia, Canada and South Korea were not as dynamic; therefore, the countries in question – close behind Estonia and Belarus – ranked among the largest emitters of CO_2 per unit of GDP among advanced economies.

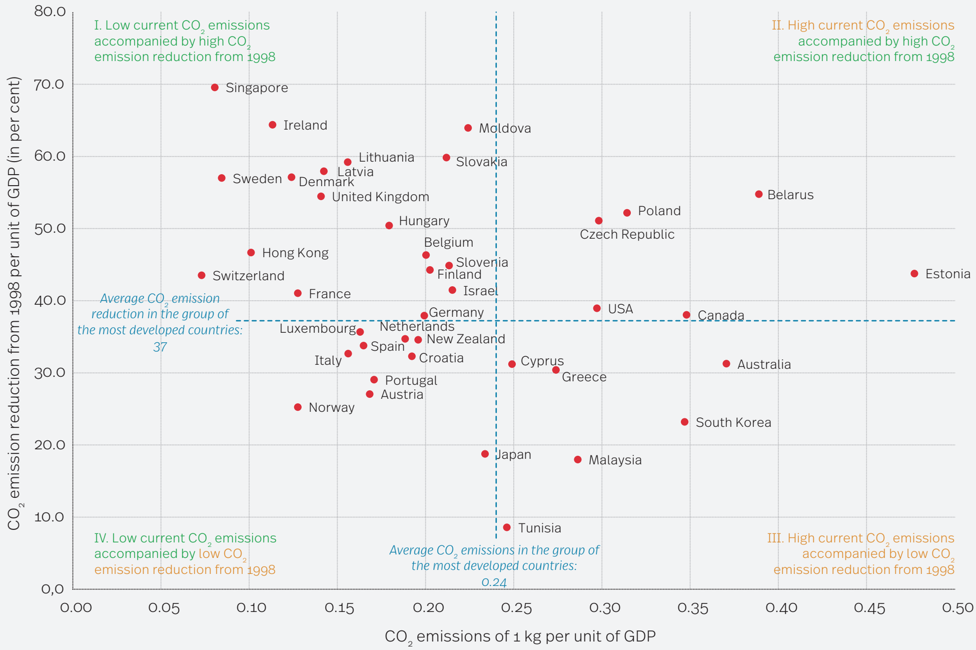
↘ Chart 5. Average CO_2 emissions per unit of GDP in advanced economies and developing countries (in kg)



Note: advanced economies include the top 40 countries in the RDI ranking on the basis of pillars I, II and III. All the other countries covered by the RDI are classified as developing countries.
Source: prepared by the PEI.

The countries to note the lowest current emissions and to achieve the most significant decreases in CO_2 emissions were Singapore and certain European countries: Ireland and the United Kingdom, Sweden and Denmark as well as Lithuania and Latvia. Definitely the sharpest declines in CO_2 emissions were recorded for Singapore (by 70 per cent), Ireland and Moldova (by 64 per cent). The worst performers included Tunisia, Malaysia, Japan, South Korea and Norway (Chart 6). Norway's rank in that regard may come as a surprise as it is an advanced and environment-oriented economy. However, a closer look at the 1998 emissions shows that as early as the base year Norway had no major problems with high CO_2 emissions per unit of GDP (Chart 6).

Chart 6. Positions of advanced economies in terms of CO_2 emissions in 2018 and the scale of emission reductions from 1998



Source: prepared by the PEI.

Poland ranked among countries characterised by high CO_2 emissions and steep decreases in emissions from 1998. A very close neighbour – not only geographically and culturally, but also with regard to climate responsibility – was the Czech Republic. The situation of Anglo-Saxon countries – the USA, Canada and Australia – was similar to that of Poland and the Czech Republic, but the former achieved less impressive emission reductions (Chart 6).

The countries with the world's highest CO_2 emissions per unit of GDP include relatively poorly developed economies and former Eastern Bloc countries in Europe. The highest carbon dioxide emissions per unit of GDP were noted for Trinidad and Tobago; high emissions were also found in three Central Asian countries – Turkmenistan, Mongolia and Kazakhstan. The fifth highest CO_2 emissions characterised the Republic of South Africa.

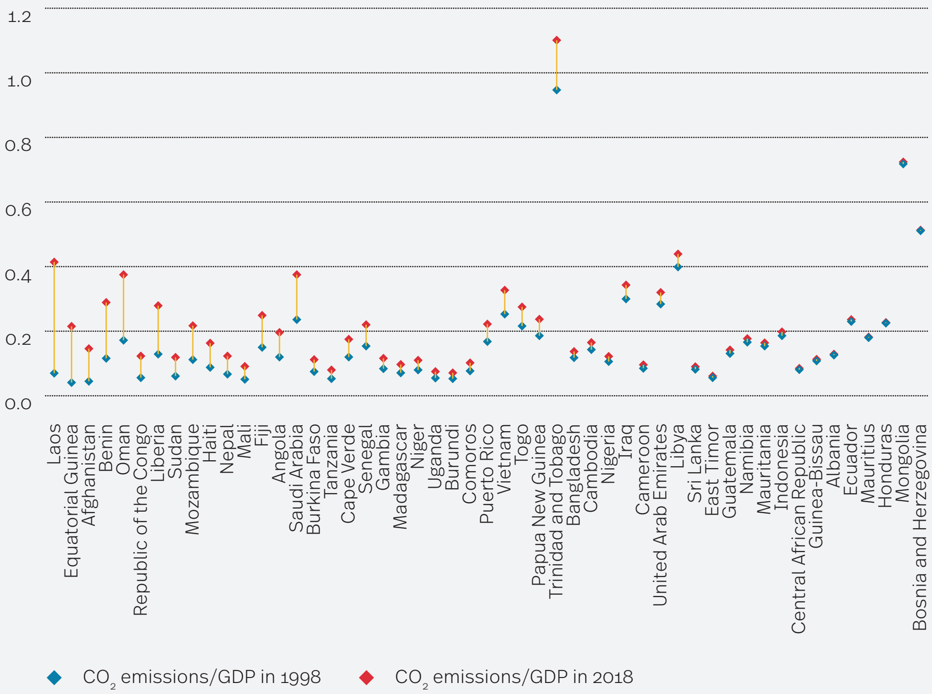
The ‘top ten’ carbon dioxide emitters included a number of European countries. Those were mostly Eastern European countries – Ukraine, Bosnia and Herzegovina, Kosovo and Estonia (Table 8 and Chart 7).

Table 8. Countries characterised by the highest CO_2 emissions per unit of GDP

Country	CO_2 emissions (in kg)	Change in emissions from 1998 (in per cent)	RDI rank
Trinidad and Tobago	1.101	16	121
Turkmenistan	0.797	-51	125
Mongolia	0.724	1	100
Kazakhstan	0.712	-31	61
Republic of South Africa	0.666	-28	137
Ukraine	0.649	-56	47
Bosnia and Herzegovina	0.513	0	110
Kosovo	0.478	-49	58
Estonia	0.477	-44	28
Bahrain	0.471	-30	122

Source: prepared by the PEI.

↘ Chart 7. CO_2 emissions per unit of GDP at purchasing power parity – countries with increased emissions only (in kg)



Countries in descending order of percentage change in emissions.
Source: prepared by the PEI.

Chapter 4. Selected development aspects related to the economic crisis caused by the COVID-19 pandemic

4.1. A jobless recovery – a possible problem in the phase of recovering from the crisis

A major challenge in the phase of recovering from the crisis is the phenomenon of a *jobless recovery* – an economic bounce-back with no improvement in the labour market. It was observed several times during prior recessions, in particular in the 21st century (Jaimovich, Siu, 2020; Schreft, Singh, 2003). The phenomenon of a *jobless recovery* is mostly reflected in an asymmetric disruption of the relationship between the general economic situation and the labour market (Khemraj, Madrick, Semmler, 2006).

In the case of a macroeconomic shock, such as that observed in connection with the COVID-19 pandemic, GDP falls and unemployment rises. One might expect that overcoming such a crisis – when GDP begins to increase again – would translate into the labour market: unemployment should decline and the situation of workers should improve. But it is not always the case. A macroeconomic shock hits GDP and the labour market at the same time, but the subsequent recovery from such a slowdown may be asymmetric. In such an event, GDP returns to its growth path, whereas unemployment remains at the crisis level (Kolesnikova, Liu, 2011). A *jobless recovery* means that the labour market situation does not begin to improve until a longer time from the overall economic recovery. It takes more time for the labour market conditions to become favourable again.

For example, the phenomenon of a *jobless recovery* was observed in the European Union after the financial crisis of 2008–2009 (particularly in certain eurozone countries). The European Union Member States' GDP showed a marked fall in 2009 (by more than 4 per cent), but the downward trend of economic growth was reversed as early as 2010 and 2011 (Chart 8). In 2011, EU GDP was nearly the same as in 2008 (at 99.4 per cent of the 2008 level – at constant prices). However, in 2010 and 2011 the labour market situation continued to deteriorate. In 2011, the number of persons employed was almost 3 per cent lower than in 2008. In 2008–2011, the unemployment rate went up from 7 per cent to nearly 10 per cent, the level prevailing for around 5 years. The EU's GDP surpassed 2008 GDP (at constant prices) in 2014, whereas the number of persons employed did not exceed the pre-crisis level until two years later and the unemployment rate did not fall to the 2008 level until four years later – in 2018.

Chart 8. Changes in GDP, the number of persons employed and the unemployment rate in the European Union in 2008–2016

Source: prepared by the PEI on the basis of Eurostat data.

The phenomenon of a *jobless recovery* is important as from the social point of view the labour market situation frequently determines individual well-being more than the growth rate of GDP. Despite rising GDP, those affected by unemployment suffer relative poverty, which may have serious social consequences – reduced development opportunities for children and labour market entrants, a higher crime rate or even worse eating habits in certain social groups. Furthermore, high unemployment undermines the bargaining position of employees in relation to employers, driving down salaries and wages and deteriorating working conditions (Kolesnikova, Liu, 2011).

The literature points to the following reasons for a *jobless recovery*:

- **After a crisis, some jobs are replaced by automation or offshoring** (the relocation of jobs to countries offering lower labour costs) (Burger, Schwartz, 2017). In certain cases, the recession is a catalyst for structural changes in various economic sectors (Groshen, Potter, 2003). The notion is understood, among other things, as the materialisation of technological progress – including labour automation – and other uses for production factors (such as the offshoring of certain activities). Thus, the economy sheds low- and medium-paid jobs based on routine tasks (Cortes et al., 2020).
- **Digital technologies weaken the ties between the firm and its employees.** The occurrence of a jobless recovery may be related to the development of the Internet and other digital technologies. Those make hiring workers and remote business management easier; the firm also has access not only to the local workforce, but

its demand for labour can be satisfied in a much larger market. As a consequence, the ties between the employees and the employer become weaker. It is also easier to dismiss a new employee. Managers may expect that in the days of new technologies they will encounter no problems with finding a replacement if necessary. Therefore, in a period of robust economic growth enterprises may have a certain surplus of labour that they can readily eliminate to cut costs in a crisis. They anticipate that once the economy bounces back, they will have no difficulties with restoring larger employment. In the pre-Internet era, the ties between the employee and the employer used to be stronger and undertakings were more reluctant to make decisions on lay-offs. It is indicated as one of the reasons for a more frequent occurrence of jobless recoveries after the crises observed in the 21st century (Rajan, 2012).

→ **Firms launch measures allowing to make better use of the labour resources they already have.** As a result, the initial GDP growth following a crisis is driven by increased productivity of the capital and labour already used, whereas the labour market – in a sense – 'fails to keep up'; its conditions do not improve until a certain time has passed (Burger, Schwartz, 2017). Some solutions leading to such a phenomenon include the deregulation of working time (e.g. allowing reduced rest periods for employees) or permitted forms of employment (Kattah, Welbeck, 2020). The initial bounce back results from longer or more efficient work of persons employed. Such a situation provides no incentives for firms to increase employment as they can achieve the same results by economising on labour costs. Only after a certain period, growing demand stimulates the labour market to restore pre-crisis conditions (Burger, Schwartz, 2017).

All of the above explanations may materialise in the current crisis. One of its main symptoms is unemployment. It has hit, especially, lower-skilled workers (Evans, Dromey, 2020). Such individuals also encounter more problems with finding new employment, whereas their vacant jobs are more susceptible to automation and offshoring. In addition, the scale of the crisis is anticipated to be very large. According to the International Monetary Fund, it may be 'the worst economic downturn since the Great Depression' (Gopinath, 2020); as early as the beginning of April, the Bank of England forecast a recession of 14 per cent for the United Kingdom (the most abrupt fall in 300 years) (www1).

4.2. The pandemic and inequalities between countries, citizens and the sexes

The effects of the COVID-19 pandemic on economic inequalities can be examined in three dimensions:

1. Inequalities in economic development between advanced economies and developing countries;
2. Income inequalities between the wealthy and the poor within countries;
3. Income inequalities between men and women.

There are many indications that the crisis caused by the pandemic will aggravate inequalities in all the three areas.

Firstly, the pandemic is likely to increase the gap between advanced economies and developing countries. The health care problems caused by the virus are multiplied in countries whose health care systems were inadequate even in normal conditions. As estimated by the UN Development Programme researchers, developing countries (accounting for 55 per cent of the world's population) will suffer income losses of USD 220 billion (www2). Although the first spread of the pandemic beyond China mainly affected advanced economies – the EU Member States and United States – ultimately developing countries are projected to be hit much harder by the pandemic. The reasons for the above include: political instability, chronic underinvestment in health care, the shortage of hospitals and medical personnel, the lack of infrastructure for remote working and learning, deficiencies in basic protective equipment (e.g. face masks) and overpopulated areas of poverty. As a consequence, the economic situation in poorer regions of the world may deteriorate, with ensuing humanitarian crises, e.g. famine (Laborde, Martin, Vos, 2020). As estimated by the World Bank, **owing to the pandemic, 100 million people may be hit by extreme poverty** (Lanker et al., 2020). It would be the first increase in the number of extremely poor persons worldwide in years.

Secondly, the pandemic is likely to widen income disproportions between the poor and the rich within societies. The current crisis may be a catalyst for negative developments observed in the labour markets of certain countries in recent years (Florczak, 2020). Due to rising unemployment, the employer will enjoy a much more favourable bargaining position than the employee. The crisis may drive down salaries and wages, deteriorate working conditions and increase precarious employment, especially for young entrants (Blustein et al., 2020). Those were already serious problems before the pandemic, as pointed out by the International Labour Organisation (International Labour Organisation, 2020).

Experiences suggest that pandemics hit low-income groups the most. Furceri, Loungani and Ostry (2020) have analysed the consequences of five pandemics from the past: SARS (2003), H1N1 (2009), MERS (2012), Ebola (2014) and Zika (2016). Their observation is that each time income inequalities augmented. The Gini coefficient – used in our Responsible Development Index as well – increased by an average of 1.5 per cent in a post-pandemic period of five years. The main reason was a significant disproportion in how the labour market situation translated into individual situations of persons with varying educational attainment levels – **a lower level of education implied a higher risk of losing one's job as a result of the crisis caused by the pandemic.** Basically, prior pandemics had no effect on the employment of university-educated persons, whereas as many as 5 per cent (on average) of those with primary education lost their jobs. **The findings are corroborated by the first labour market data from an early phase of the crisis.** In the United States, the unemployment rate rose from 4.4 per cent in March to 14.7 per cent in April, whereas dismissals were markedly more frequent in the case of persons without university education and precarious workers (www3; Coibion, Gorodnichenko, Weber, 2020; Blustein et al., 2020).

One explanation of the phenomenon is that the possibility of remote working is treated as a privilege of those better paid and better educated. Whereas higher-skilled workers may count on fully paid 'home office' solutions applied on a full-time basis, persons in lower-skilled jobs are dismissed more often or have reduced working time in normal conditions. It is relatively rare for lower posts to offer opportunities for remote working; e.g. in the Netherlands, in the period of total lock-down, only ca. 30 per cent of such personnel worked from home in any form (von Gaudecker et al., 2020). Furthermore, on account of limited or no savings, low-income individuals cannot afford to take unpaid sick leave, which may be one reason for a faster spread of the virus in that part of the population (Berg, 2020). **In particular, the problem of growing income inequalities may affect countries without general health care systems** – expensive tests and possible treatment may absorb a major share of incomes of poorer households. The most economically disadvantaged citizens may give up testing and treatment at all. In the United States, the hospitalisation expenses related to COVID-19 transmitted by a non-insured patient may even exceed USD 70,000.

Thirdly, women are more vulnerable than men to adverse effects of any pandemic. They are estimated to account for as much as 70 per cent of the world's workforce in health care and social welfare systems, which makes them more exposed to the risk of becoming infected (Hall et al., 2020). It is also more frequent for women to take care of senior or more vulnerable members of their families (outside their households), which increases the number of contacts and thus the risk of infection – as shown by other epidemics in the 21st century (Wenham, Smith, Morgan, 2020). In addition, women more often take care of the children, have more responsibilities related to e-learning, which may push down their labour productivity (Alon et al., 2020).

More women work in industries hit harder by lock-down measures, e.g. in retail trade, food- and beverage-serving services, tourism and hospitality, which may result in a disproportion between the sexes in the post-pandemic unemployment crisis (GUS, 2018). Companies are less willing to dismiss full-time employees with permanent employment contracts in comparison with part-time and temporary workers, which also tends to disadvantage women (Adams et al., 2020). For example, in Poland more than 10 per cent of female employees work on a part-time basis, within the respective figure for males is only 4 per cent (data for 2018) (GUS, 2018). Therefore, women will be more frequently forced to seek new jobs in a crisis. It may have long-term implications consequences: persons entering the labour market during a recession tend to have permanently lower pay, also after the economic slowdown (Davis, von Wachter, 2011).

4.3. The economic background of the protests in the United States

The immediate cause of the protests observed in the United States since late May was the killing of George Floyd, a black man, by a white police officer in Minneapolis. The scale of George Floyd protests – the number of participants, skirmishes with the police, damage to property and looting – suggests that the mass social unrest is rooted more deeply. Some protestants probably object to the system which – in spite of high GDP *per capita* – provides relatively limited well-being and living conditions to certain groups of inhabitants of the United States.

The United States ranked eighth in the Responsible Development Index ranking. Among the seven better performers, only one has higher GDP *per capita* (Norway). Why did as many as six countries outperform the United States despite lower GDP *per capita*?

In spite of high GDP *per capita*, it is difficult for the United States to balance the various aspects of socio-economic development. The country is characterised by the world's highest average consumption *per capita* (at purchasing power parity) and high spending on research and development, but accompanied by very high income inequality. Although the average level of citizens' wealth is high, with regard to the number of intentional homicides per 100,000 inhabitants the United States ranked next to the poorest countries in the world – the 2017 figure was 5.3. For comparison, the average for the EU Member States was four times lower – 1.3. Air quality in the United States measured by concentrations of fine particulate matter (PM2.5) was relatively good, but CO_2 emissions per unit of GDP were among the highest globally.

The non-balanced economic model of the United States is illustrated by a comparison with the leader in the RDI ranking – Sweden (Chart 9). A particularly significant difference between the two countries can be seen in the measure of income inequality, i.e. the Gini coefficient. Sweden seems to maintain a good balance between creating well-being and a possibly fair distribution thereof in the population, ranking 21st in the world in the aspect concerned. The same cannot be said about the United States – 107th place is a rank behind two-thirds of the countries covered. Sweden's advantage over the United States is also clear in terms of the inverse of the number of homicides (31st and 101st, respectively, in the world) and life expectancy, ca. 4 years longer in Sweden than in the USA.

However, the greatest disproportion concerns one component of the climate pillar – CO_2 emissions per unit of GDP. In that regard, Sweden ranked 15th globally, as many as 108 spots ahead of the USA. Neither do the Americans seem to compare to the Swedish in terms of CO_2 emission reduction over the last two decades. In the period in question, the USA decreased emissions by less than 40 per cent, whereas Sweden managed to cut them by 57 per cent.

↘ Chart 9. Ranks of the USA and of Sweden in all the RDI categories

Source: prepared by the PEI.

The inequalities in the United States have a largely racial dimension. The differences between the black and white populations can be seen, among other aspects, with regard to health. According to data for 2017, life expectancy at birth for black citizens was 3.5 years shorter than for white people (Arias, Xu, 2019). Considering the lack of a public and general health care system, the difference in the state of health may result, at least partially, from economic disparities – 9.7 per cent of African-Americans have no health insurance, whereas the share of non-insured white people is 5.4 per cent. White and black citizens spend 11 per cent and 20 per cent, respectively, of their annual incomes on medical services. The disproportion is attributable to income differences between the two groups (Berchick, Barnett, Upton, 2019; Taylor, 2019; Carlson, 2020). The worse health situation of African-Americans in the USA has been further highlighted by the coronavirus pandemic. Among black citizens, the COVID-19 mortality rate was nearly 66 persons per 100,000 inhabitants, compared to 28.5, below half the figure, noted for white persons (data as at 24 June 2020) (APM Research Lab, 2020).

Ethnic minorities in the United States are characterised by a relatively high unemployment rate, low incomes and wealth. Immediately before the outbreak of the COVID-19 pandemic, the unemployment rate for black citizens was around double the figure for white people. The pandemic has not changed that proportion, but it has hit hard the Hispanic-American population – in the group in question, unemployment has risen at a higher rate than for white citizens (Fairlie, Couch, Xu, 2020). Wealth inequalities between various ethnic groups in the United States are enormous. Median wealth (total assets less total liabilities) was ca. USD 3,600 for African-American households, USD 6,600 for Hispanic-American households and more than USD 145,000 for white households – data for 2016 (Collins et al., 2019). Income stratification is also significant. In the case of households with annual income of up to USD 200,000, the average annual income was around USD 61,000 for the white population. It was nearly double the respective amounts for black and Hispanic-American citizens – slightly above USD 32,000 and ca. USD 34,000 (data for 2014). Statistical data demonstrate that the highest-earning citizens (10 per cent, 1 per cent and 0.1 per cent of the population) are over-represented by white people in relation to their share in the total population; the opposite is also the case, i.e. the under-representation of white people in the lowest-earning 10 per cent and 1 per cent of the population (Akee, Jones, Porter, 2019).

Summary

Discussing appropriate measures of development is currently a major issue in the economic debate. The development measurement methods are frequently determined by the economic policy objectives set and by a defined understanding of successes or failures.

Gross domestic product – the most frequent measure of development – has specific and material drawbacks. First and foremost, it is materialistic in nature – it identifies development with the output of goods and services. It fails to take into account whether a rise in such output improves the quality of life, how the value of products is distributed in the population or what influence economic growth has on the environment and global climate.

The Responsible Development Index attempts to show broader development, comprising economic, social and environmental aspects thereof. We find it particularly vital to include the influence of countries on global climate in the indicators used to measure their development since further disregard for the problem of climate change may lead to disastrous economic and social effects in the future. This year's report also shows that analyses of effects of the economic crisis caused by the COVID-19 pandemic should address issues far beyond projections of GDP changes for the next few years.

Our investigation has led to the following major conclusions:

- GDP *per capita* distorts the development levels of high-income economies, countries rich in natural resources, tax havens as well as of countries investing in future development and taking care of sustainable socio-economic development;
- the Scandinavian countries manage to keep an optimal balance between the economic, social and environmental dimensions of development; whereas some countries find it hard to achieve, e.g. the United States, which may have indirectly led to social unrest and the protests in the US;
- Poland is characterised by relatively low income inequalities and a high level of internal security, but there is room for improvement in terms of investment in research and development, air quality, citizens' health and high CO_2 emissions;
- CO_2 emissions per unit of GDP are on the decline, but the pace of reduction is too slow to stop climate change. Both advanced economies and developed countries contribute to decreasing emissions, but the former cut their emission intensity faster;
- restoring the number of jobs after the economic crisis caused by the COVID-19 pandemic may take much longer than recovery in terms of GDP. The crisis is also likely to widen inequalities between the high- and low-income countries, between the rich and the poor citizens and between men and women.

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Full RDI scores

Country	Rank	Pillar I	Pillar II	Pillar III	Pillar IV	2018 RDI
Sweden	1	5.86	6.50	7.61	6.48	66.10
Denmark	2	5.77	6.27	7.44	6.44	64.81
Norway	3	6.32	5.65	7.61	6.29	64.66
Switzerland	4	6.22	5.58	7.56	6.42	64.44
Finland	5	5.93	5.76	7.57	6.32	63.93
Israel	6	4.83	6.78	7.26	6.29	62.91
Austria	7	5.93	5.55	7.41	6.26	62.89
United States	8	6.61	5.06	7.27	6.21	62.87
Belgium	9	5.94	5.50	7.37	6.33	62.83
South Korea	10	5.56	6.32	7.00	6.09	62.42
Germany	11	5.83	5.18	7.39	6.29	61.73
France	12	5.55	4.86	7.45	6.36	60.56
Netherlands	13	5.82	4.62	7.42	6.28	60.36
United Kingdom	14	5.75	4.37	7.43	6.42	59.91
Japan	15	5.48	4.73	7.57	6.17	59.86
Australia	16	5.72	4.49	7.59	6.11	59.77
Canada	17	5.81	4.20	7.55	6.16	59.30
New Zealand	18	5.42	4.38	7.59	6.28	59.16
Slovenia	19	5.64	4.27	7.29	6.31	58.77
Czech Republic	20	5.50	4.50	7.22	6.27	58.72
Luxembourg	21	6.08	3.47	7.49	6.31	58.37
Portugal	22	5.07	3.87	7.53	6.27	56.83
Ireland	23	5.47	3.21	7.56	6.49	56.81
Hong Kong	24	6.74	2.92	6.64	6.41	56.79
Singapore	25	4.97	3.78	7.34	6.54	56.58
Italy	26	5.26	3.50	7.40	6.30	56.15
Spain	27	5.07	3.53	7.56	6.30	56.14
Estonia	28	5.04	3.95	7.37	6.08	56.10
Cyprus	29	5.02	3.79	7.26	6.21	55.71
Hungary	30	4.96	3.83	7.01	6.36	55.41
Slovakia	31	5.48	3.16	7.06	6.38	55.19

Country	Rank	Pillar I	Pillar II	Pillar III	Pillar IV	2018 RDI
Poland	32	5.23	3.55	7.02	6.26	55.16
Greece	33	4.93	3.37	7.31	6.19	54.51
Croatia	34	4.84	3.39	7.12	6.27	54.03
Lithuania	35	4.86	3.20	7.07	6.43	53.89
Belarus	36	5.20	3.27	6.84	6.21	53.81
Malaysia	37	4.42	3.83	7.02	6.12	53.49
Latvia	38	4.70	3.17	6.99	6.43	53.23
Moldova	39	4.79	3.26	6.79	6.39	53.07
Uruguay	40	4.32	3.19	7.13	6.31	52.38
Tunisia	41	4.31	3.94	6.52	6.11	52.20
Costa Rica	42	3.52	3.96	6.94	6.33	51.89
Romania	43	4.68	2.51	7.06	6.46	51.77
Macao	44	5.37	2.17	6.60	6.56	51.77
Mauritius	45	4.49	3.07	7.02	6.12	51.75
Argentina	46	4.09	3.47	7.06	6.08	51.73
Ukraine	47	4.61	3.40	6.65	5.99	51.62
Russia	48	4.51	3.27	6.71	6.10	51.50
Chile	49	4.03	3.31	7.03	6.23	51.50
Thailand	50	4.09	3.34	6.77	6.16	50.89
Bulgaria	51	4.04	3.12	6.92	6.25	50.83
Botswana	52	2.87	5.02	6.23	6.20	50.81
Puerto Rico	53	3.78	3.61	6.95	5.94	50.69
Kyrgyzstan	54	4.20	3.34	6.69	6.02	50.60
Serbia	55	4.09	3.12	6.81	6.17	50.50
Algeria	56	4.34	3.05	6.58	6.17	50.36
Azerbaijan	57	4.61	2.07	6.82	6.45	49.88
Kosovo	58	4.78	2.39	6.63	6.11	49.77
Uzbekistan	59	3.88	3.08	6.60	6.34	49.74
Macedonia	60	4.22	2.52	6.71	6.38	49.57
Kazakhstan	61	4.94	2.13	6.93	5.82	49.54
Morocco	62	3.49	3.53	6.67	6.10	49.45
Bhutan	63	3.73	3.48	6.34	6.22	49.43
Jordan	64	4.12	2.90	6.56	6.18	49.38
Kuwait	65	5.35	2.45	5.95	5.97	49.32
Brazil	66	2.85	4.33	6.37	6.18	49.32

Country	Rank	Pillar I	Pillar II	Pillar III	Pillar IV	2018 RDI
Georgia	67	4.03	2.68	6.79	6.16	49.15
United Arab Emirates	68	5.13	2.03	6.55	5.95	49.13
Ecuador	69	3.25	3.22	6.98	6.07	48.80
Albania	70	4.25	2.04	7.07	6.15	48.79
China	71	3.74	3.41	6.25	6.12	48.77
Lebanon	72	4.69	1.91	6.73	6.13	48.65
Turkey	73	4.10	2.79	6.37	6.19	48.61
Kenya	74	3.24	3.61	6.25	6.29	48.47
Mexico	75	3.64	3.22	6.32	6.20	48.45
East Timor	76	3.97	2.54	6.62	6.19	48.30
Tajikistan	77	3.76	3.03	6.18	6.34	48.29
Sierra Leone	78	3.50	3.67	5.91	6.19	48.17
Burkina Faso	79	3.67	3.81	5.83	5.95	48.15
Vietnam	80	3.75	2.98	6.66	5.86	48.11
Panama	81	3.53	2.30	7.04	6.37	48.08
Armenia	82	4.11	2.16	6.59	6.34	48.01
Indonesia	83	3.67	2.55	6.87	6.08	47.92
Peru	84	3.60	2.49	6.68	6.26	47.58
Swaziland	85	2.67	3.88	6.06	6.40	47.50
Sri Lanka	86	3.81	1.88	7.07	6.16	47.28
Paraguay	87	3.34	2.40	6.87	6.25	47.16
Nicaragua	88	3.13	2.71	6.76	6.22	47.05
Saudi Arabia	89	4.13	3.56	5.41	5.68	46.95
Oman	90	3.77	3.03	6.57	5.40	46.94
Colombia	91	3.15	2.87	6.47	6.27	46.89
Egypt	92	4.37	2.98	5.20	6.17	46.82
Ethiopia	93	3.51	2.99	5.95	6.26	46.79
Republic of Fiji	94	3.69	2.45	6.76	5.76	46.66
Dominican Republic	95	3.79	1.76	6.70	6.38	46.60
Montenegro	96	4.19	1.26	6.92	6.26	46.57
Cape Verde	97	3.48	2.99	6.23	5.92	46.56
Guyana	98	3.10	3.20	6.24	6.01	46.37
Libya	99	4.63	1.86	6.14	5.86	46.22
Mongolia	100	4.13	2.61	6.00	5.66	46.02
Jamaica	101	3.53	3.07	5.66	6.13	45.95

Country	Rank	Pillar I	Pillar II	Pillar III	Pillar IV	2018 RDI
Qatar	102	4.31	2.48	5.36	6.15	45.77
Malawi	103	2.85	2.76	6.30	6.38	45.75
Senegal	104	3.24	3.19	5.95	5.89	45.68
Yemen	105	3.39	2.93	5.70	6.23	45.63
Philippines	106	3.27	2.12	6.54	6.28	45.52
Gabon	107	3.59	2.45	5.90	6.24	45.47
Mali	108	4.10	2.65	5.61	5.83	45.45
Rwanda	109	2.98	2.69	6.03	6.46	45.41
Bosnia and Herzegovina	110	4.35	1.16	6.82	5.84	45.41
Myanmar	111	3.83	1.76	6.12	6.45	45.40
Ghana	112	3.12	2.79	6.05	6.19	45.38
Cambodia	113	3.55	1.90	6.56	6.07	45.22
Tanzania	114	3.17	2.79	6.15	5.98	45.21
India	115	3.60	2.91	5.43	6.14	45.21
Burundi	116	3.22	2.97	5.75	6.07	45.01
Côte d'Ivoire	117	3.20	2.71	5.71	6.36	44.94
Zimbabwe	118	3.00	2.72	6.14	6.10	44.89
Pakistan	119	3.95	2.27	5.55	6.10	44.69
Togo	120	3.02	3.24	5.70	5.91	44.69
Trinidad and Tobago	121	4.31	2.24	5.98	5.27	44.51
Bahrain	122	4.06	1.95	5.77	6.02	44.49
Guinea	123	3.66	1.96	5.99	6.18	44.49
Nepal	124	4.01	3.17	4.77	5.79	44.33
Turkmenistan	125	3.13	2.14	6.54	5.85	44.16
Mauritania	126	3.87	1.98	5.66	6.11	44.05
Honduras	127	2.56	3.30	5.64	6.08	43.98
Niger	128	3.80	2.84	4.91	6.01	43.91
Madagascar	129	3.00	2.22	6.30	6.02	43.85
Bangladesh	130	3.84	1.74	5.77	6.09	43.59
Gambia	131	3.65	2.01	5.76	6.00	43.58
Liberia	132	3.56	1.97	6.39	5.49	43.53
Guatemala	133	3.08	2.12	6.07	6.12	43.48
Mozambique	134	2.19	3.36	6.17	5.65	43.44
Surinam	135	3.51	1.00	6.51	6.33	43.37
Zambia	136	1.88	2.96	6.13	6.34	43.31

Country	Rank	Pillar I	Pillar II	Pillar III	Pillar IV	2018 RDI
Republic of South Africa	137	2.13	3.95	5.38	5.85	43.25
El Salvador	138	3.74	2.49	4.80	6.23	43.14
Papua New Guinea	139	3.10	1.74	6.40	5.95	42.96
Haiti	140	3.12	2.04	6.28	5.74	42.95
Lesotho	141	2.97	3.47	4.72	6.01	42.93
Comoros	142	2.91	1.93	6.25	6.04	42.84
Bolivia	143	3.32	1.12	6.58	6.08	42.74
Sudan	144	3.67	2.07	5.62	5.72	42.70
Namibia	145	2.43	2.43	5.89	6.10	42.11
Democratic Republic of the Congo	146	2.98	1.87	5.44	6.47	41.90
Afghanistan	147	3.73	2.52	5.40	5.08	41.84
Iraq	148	4.27	1.04	5.51	5.92	41.82
Angola	149	2.50	2.30	5.94	5.81	41.41
Uganda	150	2.98	2.08	5.35	6.04	41.14
Benin	151	2.65	2.51	5.94	5.33	41.08
Guinea-Bissau	152	2.46	1.80	5.91	6.16	40.81
Chad	153	2.95	2.08	4.87	6.40	40.74
Republic of the Congo	154	2.54	2.36	5.71	5.62	40.56
Cameroon	155	2.83	2.18	5.00	6.14	40.34
Laos	156	3.65	2.13	6.28	3.62	39.20
Nigeria	157	3.09	1.10	4.98	6.10	38.18
Equatorial Guinea	158	3.90	1.82	5.44	4.09	38.12
Central African Republic	159	2.00	1.41	4.62	6.18	35.54

Note: the highest scores are highlighted in green, medium scores – in yellow, the lowest scores – in red.
Source: prepared by the PEI.

Methodological annex

Information on the variables used

The RDI is composed of 9 variables:

1. Private consumption *per capita* at purchasing power parity.
2. The inverse of the Gini coefficient.
3. Research and development expenditure as a percentage of GDP.
4. Public expenditure on education as a percentage of GDP.
5. The inverse of intentional homicides (per 100,000 people).
6. Life expectancy at birth.
7. The inverse of air pollution.
8. The inverse of CO_2 emissions per unit of GDP.
9. Percentage change in CO_2 emissions per unit of GDP from 1998.

1.

The variable was created by retrieving from the World Bank (WB) database the variable named '*Household final consumption expenditure, PPP (constant 2011 international $)*'[2] and dividing the values for specific countries by their respective populations (taken from the WB database as well)[3] in the year concerned. It was necessary to use this variable at purchasing power parity (PPP) in order to ensure comparability between countries.

2.

Data regarding the Gini coefficient come from the WB database where they are collected as the '*GINI index (World Bank estimate)*'[4].

The Gini coefficient ranges from 0 to 100. A value of 0 means fully equal income distribution; the higher the coefficient, the greater the income inequality in the country concerned. Therefore, the variable is a destimulant, which means that its higher values have a negative effect on the explained variable. Since pillar I is intended to model well-being, we assumed that greater income inequality would deteriorate that well-being. Hence, it was necessary to transform the variable into a stimulant, or a variable whose higher values are positively correlated with the explained variable. To this end, we prepared an appropriate transformation consisting in subtracting each number from 100. Thus, countries characterised by the greatest income inequalities ranked the lowest after the transformation.

3.

Research and development (R&D) expenditure is presented as a percentage of GDP and comes from the WB database where it is referred to as '*Research and development expenditure (% of GDP)*'[5].

4.

Government expenditure on education (as a percentage of GDP) is derived from the WB database where it is named '*Government expenditure on education, total (% of GDP)*'[6].

[2] NE.CON.PRVT.PP.KD
[3] SP.POP.TOTL
[4] SI.POV.GINI
[5] GB.XPD.RSDV.GD.ZS
[6] SE.XPD.TOTL.GD.ZS

5.

The number of intentional homicides is named in the WB database as ‘*Intentional homicides (per 100,000 people)*’[7]. It is one of variables published with significant delay. However, the variable is a good proxy for the sense of security incorporated into the RDI. Therefore, we assumed that its variation would be limited, thus – its values should not radically change in a year. As the variable is also a destimulant, it needed to be inverted; we obtained its inverse as in the case of the Gini coefficient.

6.

Life expectancy is included in the WB database as ‘*Life expectancy at birth, total (years)*’[8]. The indicator allows to assess life expectancy at birth on the assumption that the mortality rates for newborns would remain the same in their lifetime.

7.

Data regarding air pollution (referred to as ‘*Concentrations of fine particulate matter (PM2.5)*’) come from datasets of the World Health Organisation (WHO). The reason for selecting this variable (as in the previous year) was its reliable source and the availability of data for all the countries covered. One may also assume that the variable shows no significant changes in a year; therefore, it can be easily copied for subsequent periods in the absence of current data. It is a destimulant that needed to be inverted to fit the other data in the model.

8.

CO_2 emissions come from the Global Carbon Project (GCP). The variable was divided by GDP at purchasing power parity[9] in order to obtain ‘CO_2 emissions per unit of GDP’. Since the variable is a destimulant, it needed to be inverted.

9.

We calculated changes in emissions by comparing emissions (variable 8) in the year under analysis with the 1998 emissions. Since the variable is a destimulant (a positive value suggests an increase in emissions in relation to 1998), it needed to be inverted.

Correlations between variables

Correlation analysis provides no basis for rejecting any of the variables used in the construction of the RDI. High correlations between consumption and life expectancy as well as between consumption and R&D expenditure may raise doubts. The variables concerned depend on a country's wealth but – simultaneously – each of them shows a different dimension of development: R&D expenditure reflects investment in future well-being, whereas life expectancy is largely a derivative of health care. Neither the former nor the latter is pre-determined as high in high-income (thus high-consumption) countries; however, both indicators result from specific policy decisions of the country concerned.

The quality of the variables was first assessed by analysing correlations between pairs of variables for point data for 2018 for all the countries covered. If the majority of the variables should be correlated to a significant degree, it would mean that the number of variables should be limited or that their composition should be modified. The results of the correlation analysis are presented in the table.

[7] VC.IHR.PSRC.P5
[8] SP.DYN.LE00.IN
[9] NY.GDP.MKTP.PP.KD

↘ Table 9. **Correlations between variables**

	Consumption	Gini coefficient	R&D	Education	Homicides	Life expectancy	Air quality	CO_2 emissions	Change in CO_2 emissions
Consumption	1	-0.25	0.69	0.23	-0.24	0.79	-0.33	0.07	-0.33
Gini coefficient	-0.25	1	-0.31	-0.04	0.43	-0.35	0.04	-0.10	0.13
R&D	0.69	-0.31	1	0.35	-0.25	0.59	-0.31	-0.03	-0.28
Education	0.23	-0.04	0.35	1	0.06	0.21	-0.31	-0.02	-0.15
Homicides	-0.24	0.43	-0.25	0.06	1	-0.22	-0.07	0.10	0.04
Life expectancy	0.79	-0.35	0.59	0.21	-0.22	1	-0.34	0.11	-0.39
Air quality	-0.33	0.04	-0.31	-0.31	-0.07	-0.34	1	-0.01	0.25
CO_2 emissions	0.07	-0.10	-0.03	-0.02	0.10	0.11	-0.01	1	0.00
Change in CO_2 emissions	-0.33	0.13	-0.28	-0.15	0.04	-0.39	0.25	0.00	1

Source: prepared by the PEI.

The other correlations are low or very low. Thus, there are no situations where several variables would explain the same phenomenon and should be eliminated in order to prevent disrupted scores. In particular, it means that the selection of variables should be considered appropriate and correct as those variables are not mutually dependent.

Modifications to the RDI version 1.0 (the 2019 publication)

Apart from adding a pillar – climate responsibility, as justified in Chapter 1 of this study – we also modified pillar II. Two variables – 'spending on PhD students' and the 'number of trade marks' – were replaced with one: 'expenditure on education'. The reasons for introducing the above changes are as follows:

- part of spending on PhD students is included in the variable 'R&D expenditure';
- the number of trade marks depends on non-uniform national regulations (as pointed out by the World Bank in its description of the variable);
- expenditure on education as a percentage of GDP shows a country's effort to guarantee quality education to its citizens.

Filling in data gaps

A major problem we faced in the construction of the RDI was to fill in data gaps, especially for less developed countries. We used various methods to obtain missing data, depending on the type of variable and the type of data gap (no data only in the year concerned, no data for several preceding years, no information at all).

One method to filling in data gaps was to copy the last available value. It proved useful for variables with limited variation between years (e.g. R&D expenditure) and/or with data from the recent past. Where prior periods provided abundant data, we also used weighted average values from three or two periods. A three-period weighted average was based on the following weights assigned to the three previous observations: 0.6 (to the most recent one), 0.3 and 0.1 (to the least recent one) respectively. For a two-period weighted average, the respective weights were 0.65 and 0.35. In most cases, it is a better method than copying values since it includes data from previous years, which makes the result closer to the truth, assuming that the variable concerned evolves over time. For continuous past data following a marked trend, the trend analysis method was applied as well.

In more than ten cases, there were no data for particular countries and specific variables. In such situations, we compared data for the relevant macro-region, e.g. Sub-Saharan Africa. Therefore, data for certain countries were estimated as an appropriate percentage of the macro-region concerned. However, those were rare cases.

Standardisation

For the results of our work to be fully comparable, we needed to make sure that the RDI was computed in a universal manner, i.e. that its values (and the components of the final score) were within the same range and that higher values should translate into a higher overall score. The above-mentioned assumptions are fulfilled by the so-called standardisation.

In order to ensure the standardisation of the variables, first we calculated the minimum and maximum values for each of them. They were intended to determine the lower and upper limits for scores obtained by all the countries covered. Having determined the aforementioned values, we applied basic data transformations which resulted in the standardised values (in general) ranging between 0 and 10.

That presentation of values allowed to take further steps in the computation of the RDI. Each pillar was calculated as the arithmetic mean of values of the variables included in the pillar concerned. Next, we computed the arithmetic mean of values for all the pillars and multiplied it by 10. After such an operation, the RDI score would range from 0 to 100, whereas higher values would imply a higher score. In addition, such a transformation guaranteed the comparability of the scores obtained by particular countries in the year concerned; furthermore, comparisons were possible not only for the overall score, but also for each pillar.

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The Polish Economic Institute

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