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SDGs PATTERNS ACROSS THE GLOBE: FROM THEORY TO PRACTICE

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SDGs PATTERNS ACROSS THE GLOBE: FROM THEORY TO PRACTICE.

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Definition

In the present chapter SDGs patterns are defined in terms of the country performance on the Sustainable Development Goals Index provided by the United Nations Index and Dashboards. The latter index is adopted to analyze how sustainable development, based on the average performance on the seventeen Sustainable Development Goals, has evolved during the last four years both at global as well as at the European level in order to explore whether any patterns emerge. Indeed, findings indicate that the Nordic countries are the best performers, shifting the attention to Europe. Thus, special attention is paid to the case of the European member states.

1. Introduction

This introductory chapter is about the concept of sustainable development aiming to put it in perspective since its first introduction as a notion in 1982, to its gradual formation in the Sustainable Development Goals of the new era. Therefore, it is an opportunity to trace the strands of research that have shaped the current consensus around the topic by demonstrating selective but representative studies in the field. Furthermore, the current picture in terms of country performance is provided both universally as well as at the European level using empirical data collected through official sources. Finally, some of the case studies regarding the Sustainable Development Goals implementation in developing countries are presented.

The chapter unfolds as follows. Section 2 is a timeline on the progress of the concept of sustainable development during the last 30 years or so, Section 3 includes a compact literature review on sustainable development and its measurement, Section 4 presents a descriptive analysis of the Sustainable Development Goals Index across the globe with a focus on Europe for the last few years while Section 5 presents selected case studies about how SDGs have been implemented in practice.

2. Brief history of the UN SDGs initiative

In this section the timeline, including the intermediate milestones, of the United Nations' efforts to set the world into a sustainable orbit is presented, until the launch of the Sustainable Development Goals initiative in 2015. In what follows, the chronological order of the events to understand how the term Sustainable Development has emerged is traced. More precisely:

- **1982:** during the World Charter for Nature in 1982 ([United Nations-UN, 1982](#)), the term sustainability appears.

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- **1987:** the influential Brundtland Report ([WCED, 1987](#)) sets the foundations of the concept of sustainable development and triggered a burgeoning literature on the topic (e.g. [Barbier 1987](#); [Pezzey and Toman 2002](#)).
 - **1992:** during the [Earth Summit in 1992 \(UN, 1992\)](#) the term was further discussed in the Agenda 21, a lengthy report including forty chapters.
 - **1995:** The World Summit on Social Development held in Copenhagen ([UN, 1995](#)) focused on the the social dimension of sustainability.
 - **2000:** The Millennium Development Goals (MDGs) derived from the Millennium Declaration during the Millennium Summit ([UN, 2000](#)). The new agenda was comprised by eight goals and twenty-one targets to be achieved for the next fifteen years, i.e. 2000-2015.
 - **2002:** The World Summit held in Johannesburg in 2002 ([UN, 2002](#)), embraced the social dimension of sustainability in practice.
 - **2012:** The Conference in Rio de Janeiro in 2012 ([UN, 2012](#)), endorsed the outcome of 2002 Summit placing additional attention on the social dimension of sustainable development.
 - **2014:** The Open Working Group (OWG) of the UN General Assembly proposed the Sustainable Development Goals (SDGs) in July 2014 ([UN, 2014](#)).
 - **2015:** The SDGs agreed and adopted in September 2015 ([UN, 2015](#)), including 17 goals and 169 targets to be achieved by 2030.

The MDGs served their purpose until 2015 and from that point onwards, the era of the SDGs begins. As mentioned, the MDGs comprised by a set of eight goals (Eradicate extreme hunger and poverty, Achieve universal primary education, Promote gender equality and empower women, Reduce child mortality, Improve maternal health, Combat HIV/AIDS, malaria and other diseases, Ensure environmental sustainability and Develop a global partnership for development) and 21 targets. The SDGs however embrace seventeen goals such as End Poverty in all its forms (1); Zero Hunger (2); Good Health and Well-Being (3); Quality Education (4); Gender equality and women's empowerment (5); Clean Water and Sanitation (6); Affordable and Clean Energy (7); Decent Work and Economic Growth (8); Industry, Innovation and Infrastructure (9); Reduced Inequalities (10); Sustainable Cities and Communities (11); Responsible Consumption and Production (12); Climate Action (13); Life Below Water (14); Life on Land (15); Peace, justice and strong institutions (16); Partnerships (17), instead of eight. The target set concerns a broader spectrum of reality by including 169, instead of 21, while there are a few hundreds of indicators as opposed to 60 under the MDGs.

It can be argued that two of the main features that highlight the mentality of the SDGs are (i) those have a universal orientation that is concern all nations not just fragments of those e.g. poor, rich, developing, industrialized not just on the lower end of the developing countries and (ii) that the designing of the goals is now a combined effort including the member states, academic institutions, civil society along with a variety of other stakeholders. Additional differences between SDGs and MDGs can be found along the lines of deeper gender integration, social justice, focus on the quality of education and learning, the monitoring of the data as with MDGs the implementation process was difficult even impossible to monitor due to data unavailability. In addition, the SDGs constitute an effort to rationalize and treat the deficiencies of their precedents ([Joshi et al. 2015](#)) as the effectiveness of the MDGs has been controversial and ambiguous from many aspects of their content (e.g. [Clemens et al. 2007](#); [Nelson 2007](#); [Easterly 2009](#)).

3. Recent endeavors on sustainability literature

Despite the widespread use of the term, sustainability does not hold a clear definition (Holden et al. 2014). This is partly attributed to the fact that nowadays, it has been augmented to include not only the environmental, economic, and social dimension but also encapsulates the cultural foundation of the nations, justice, and intergenerational equity, among others. Although its major importance for societies around the globe has been acknowledged, it is hard to be achieved (Lafferty 2006), not to mention that its complex nature and diverse meaning has also been subject to criticism (e.g. Redclift 2005). Early criticism on the SDGs initiative has also emerged based on the grounds that the latter neglects for aspects such as intergenerational equity, externalities, capability of the people among others, meaning to suggest that the vision of OWG about sustainability will fail (Horton 2014). Moreover, the term has sparked vivid discussions about the roots of sustainable development and what sustainability economics entails eventually. The literature is rich in studies approximating the term from different angles, focusing on different aspects and thus drawing alternative conclusions (e.g. Bartelmus 2010; Baumgärtner and Quaas 2010; Van den Bergh 2010). Nevertheless, the topic remains open to discussion and debate.

The definition of a term pairs with the way it materializes in empirical terms. The interest in measuring sustainable development is not newfound. Nations and authorities have made continuous efforts in developing measures to quantify the progress towards the much-desired end of achieving sustainability. From an empirical standpoint, measuring such performance can be quite demanding and rather complex as the conclusions heavily draw upon the aspect that each indicator aims to capture. Pursuing this train of aspiration, numerous indices have been proposed meaning to capture aspects of sustainability to proceed to benchmarking employing a wide spectrum of measures from single, partial, uni-dimensional to more synthetic, composite, and multi-faceted ones. The common feature of them all is that the interest is in embracing three main aspects of reality namely the environment, economy, and society. Revisions of the indices have taken place, the methods of calculation are subject to slight alterations as well but the overarching goal is to document the progress of nations, compare and contrast the latter in order to draw useful inferences from the best practices, explore the international mosaic of performance as well as achievements and, if possible, to identify any gaps and deficiencies that challenge the course towards the much desired sustainable trajectory.

In this line, the most used measure of development progress has been the Human Development Index (HDI) and the Ecological Footprint capturing the impact of human activity on the biosphere (Moran et al. 2008). Those two have been used to capture the human well-being and environmental dimension of sustainable development by framing the problem within ecological bounds. The authors used a survey of 93 countries in 2003 and by setting thresholds on those indices found that most countries did not manage to meet the specified thresholds. Instead, findings indicated that some of the low-income countries decreased their Ecological Footprint and increased the HDI while the opposite was observed for the high-income ones. Finally, they argue that sustainable development is mainly a policy goal. However, the use of the ecological footprint has been criticized as having limitations (Nourry 2008).

Apart from the use of established measures, Dahl (2012) emphasizes the necessity to develop indices beyond the national level, as sustainability entails an ethical challenge mapping onto the dimensions of justice and equity which should also be reflected on the relevant indices. It could be argued that this piece forebodes the SDGs and more precisely the use of the SDG index as it is mentioned that appropriate measures of sustainability need to surface to offer an accepted benchmark towards achieving sustainability. The author offers a conceptualization of sustainability as they consider

it an outcome of many indicators and complex relationships. They also envisage the potential of sustainability indicators at the lowest level of aggregation that is individuals and villages. This has partly been achieved by now with the launch of the SDGs for cities by the UN.

The influential Brundtland Report (safeguarding long-term ecological sustainability, satisfying basic needs, promoting intra- and inter-generational equity) has led to research proliferation on issues surrounding sustainability. [Holden et al. \(2014\)](#) turn back to the dimensions outlined therein to define indicators and assign thresholds for these aspects. They use the HDI and the Gini index. They argue that Gini index is about equality corresponding to quality whereas equity represents quality, as framed by the Brundtland Report. They compare the performance of 167 countries using those indicators and thresholds to find that those are not met by any of the countries considered however they appear to be optimistic that the technological achievements and behavioral changes will lead countries towards achieving progress by 2030.

It should be mentioned that systematic attempts have been made to review tools and methods employed in the literature to measure sustainability rather than focusing on individual indices to explore patterns of it across the globe ([Evans et al. 2015](#)). The authors provide a classification of measures based on weak and strong sustainability which could be further analyzed in measuring sustainable development via indicator sets such as the ecological or environmental footprint, the capital approach, the green national net product, the genuine savings. Another way of quantifying it, is using measures of welfare such as the genuine progress indicator, the indicator of sustainable economic welfare and the greener version of HDI. The authors conclude by turning the spotlight on the lack of a single and commonly accepted methodology to evaluate progress on sustainability.

In the same line, recently [Diaz-Sarachaga et al. \(2018\)](#) offered a comprehensive review of the indices recruited to quantify global sustainable development but they also provide a classification based on what those capture and the period they had been introduced. The authors begin enlisting the Human Development Indices where the most prevailing of all is the HDI which is a geometric mean of three normalized sub-indices and was launched in 1990. Ever since, it has experienced several modifications to accommodate numerous aspects such as the inequality HDI, the gender development index, the gender inequality index and the multidimensional poverty index ([UNDP, 2016](#)). The environmental sustainability development indices contain the Ecological Footprint launched in 1990, the Living Planet Index in 1970, the Environmental Sustainability Index in 2000 which after 2005 renamed to Environmental Performance Index. Another method of sustainability assessment is the Well-Being method combining the HDI, Ecosystem Wellbeing index, Wellbeing index and Wellbeing-Stress index.

Another strand related to the sustainable development measurement is that of the sustainability through what the ecosystems services could provide. In this direction, there is a developed body of literature that is growing bigger attracting more attention as time goes by. This is particularly relevant in the era of sustainable development as natural resources such as water, have come to the center of the worldwide attention. In this line, efficient water management has been the core of the Water Framework Directive at the European level including all kinds of water such as inland, coastal, and transitional just to mention a few. In this line, [Koundouri et al. \(2016\)](#) suggest a three-step interdisciplinary approach to assess the total economic value of water services and meets the EU directives at the same time. [Navarro-Ortega et al. \(2015\)](#), under the GLOBAQUA project, study the linkages between the stressors threatening the quality of water in six river basins while [Akinsete et al. \(2019\)](#) under the same project link the water ecosystem services to the human wellbeing. [Dávila et al. \(2017\)](#) focusing on the Asopos river basin in Greece, study how the sustainable river management is evaluated using choice experiment along with a ranked ordered logistic regression including many socio-economic factors affecting choices. Recent evidence also covers additional topics on water management

(Pistocchi et al., 2017), while others focus on preserving the bio diversity (e.g. Birol et al. 2009), the marine and coastal ecosystems mitigation measures against climate change (Remoundou et al. 2009; Remoundou et al. 2015), oceans (Koundouri and Giannouli 2015; Koundouri 2017) and seas (Remoundou et al. 2014; Stuver et al. 2016; Van den Burg et al. 2016; Zagonari et al. 2018). It is evident that it is a rapidly growing literature and any attempt to include all the contributions would be unintentionally incomplete.

A recent contribution by the United Nations in quantifying sustainability is the city development index measuring the urban sustainability (UN, 2017) following the City Prosperity index and the Wheel of Urban Prosperity in 2012 (UN-Habitat, 2012) and the City Prosperity Initiative (UN-Habitat, 2015b). The Economic Sustainability indices include the Measure of Economic Welfare (Nordhaus and Tobin 1972) which was the basis for the calculation of the Index of Sustainable Economic Welfare (Daly and Cobb 1989). The latter was followed by the Genuine Progress Indicator in 1995. In 1999 the Genuine Savings Index appeared (Hamilton and Clemens 1999). International organizations and agencies such as the statistical office of the European Union (Eurostat), Organization for Economic Co-operation and Development have also produced related indices capturing a broad spectrum of dimensions. Among other frameworks, one may find the Mediterranean Strategy for Sustainable Development by the Barcelona Convention and the Baltic Action Plan for 2030.

Nevertheless, using single measures to proxy sustainability improvement can be misleading in some cases to the progress being made in other aspects of the well-being. Such problems could be treated with the use of the SDG index which takes into consideration the performance of the countries in all the SDGs. The SDG index was introduced in 2015 by the Sustainable Development Solutions Network (SDSN) in cooperation with Bertelsmann Stiftung as a common benchmark encapsulating the same dimensions for all the countries, facilitating cross-country comparisons based on the performance of each country on the SDGs progress the latter exhibit. It is therefore a multi-faceted index, as the average of the country performance on the SDGs. Nowadays the index incorporates 17 SDGs embracing 169 targets (Sachs et al. 2019). However, other approaches have been suggested to overcome the problems attached to the use of arithmetic and geometric means (Guijarro and Poyatos 2018).

The introduction of the SDGs has triggered a growing wave of studies focusing on selected goals such as gender (e.g. Esquivel and Sweetman 2016; Fukuda-Parr 2016; Stuart and Woodroffe 2016), life below water (Singh et al. 2018) while others focus on the SDGs as a system. For instance, Le Blanc (2015) focusing on SDGs 10 and 12 argues that SDGs are a more coherent system compared to the MDGs and using network analysis finds that targets under other SDGs e.g. the SDG 6 are associated with other SDGs and targets as well. This is a supporting finding in favor of the SDGs as it reflects the co-operation and spillover effects between the goals. This finding is consistent with the synergies and trade-offs among the SDGs in the form of positive and negative associations respectively, as Pradhan et al. (2017) argue.

Regarding the use of the SDG index in the empirical literature, only a few pieces have surfaced employing it. Therefore, there is no systematic attempt to explore the patterns of the SDG index at a worldwide scale. However, only a few studies exist up until now. Wackernagel et al. (2017) use the index and acknowledge its limitations as they find a strong correlation between the performance of the country in the SDGs with the demand for nature, as such finding implies that low income individuals are exposed to insecurity. However, they support that the index is a significant attempt to global sustainability measurement. Also, there have been surfaced attempts to explore the patterns of SDG index in conjunction with other measures of sustainability to create a combined index (Costanza et al. 2016). The authors link those with a systems dynamic model that may lead to important policy suggestions. The study of Diaz-Sarachaga et al. (2018) uses the SDG index scores in 2016 and 2017 to

explore its patterns around the globe. Findings indicate that geography matters in achieving higher scores and that comparisons should be made with caution, as those are subject to minor changes annually. They also highlight the need for further statistical development in the way of calculating the index as more information is revealed and more data become available.

4. Patterns of SDGs across the globe; a descriptive presentation

In this section the focus is on the Sustainable Development Goals index (SDG-i) to explore its patterns across the globe. Data are collected from the official site of the Sustainable Development Index and Dashboards using all the available information covering a 4-year period, that is from 2016 through 2019. Individual datasets that become available every year have been matched and combined to devise a panel of 773 observations. This includes 193 countries worldwide over four years. After the necessary data management, 45 countries were excluded due to missing data on the overall Sustainable Development Goals index on at least one of the years included. Therefore, the final dataset is a balanced panel including 148 countries for 4 years, that is 592 observations in the panel dimension.

The presentation that follows is a descriptive analysis of the Sustainable Development Goals index throughout the period of study to highlight how country economies perform in the implementation of the SDGs, on average. The SDG-i is measured in percentage points, ranging from 0 to 100, while higher values indicate a greater extent of the SDGs implementation and thus performance.

Figure 1 below (Fig. 1) illustrates the distribution of the SDG-i for the period of study for all the countries in the dataset. The distribution is slightly left-skewed indicating that most of the countries are characterized by a score greater than the mean score.

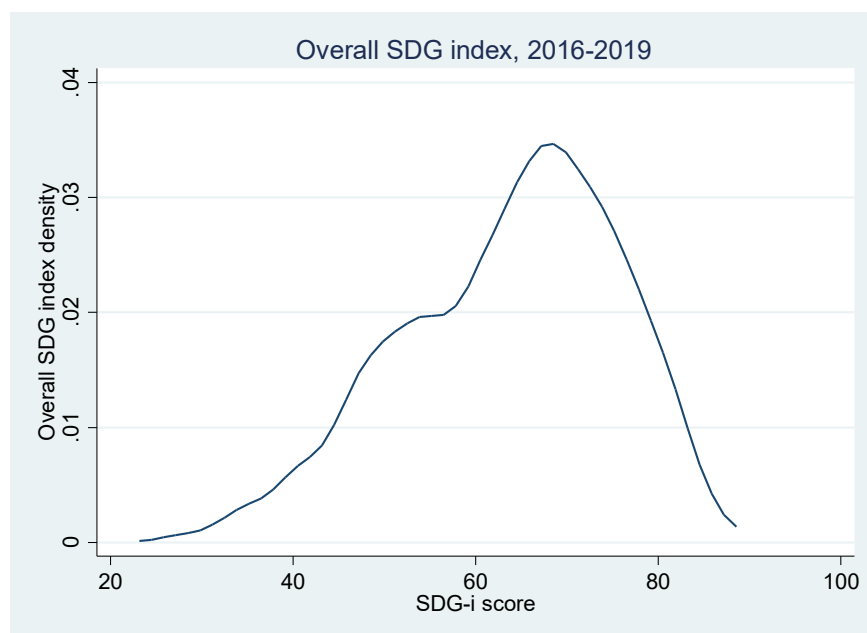


Fig. 1. Empirical distribution of the Sustainable Development index, 2016-2019

Source: Own construction.

Table 1 below presents the basic descriptive statistics (mean, standard deviation-St.Dev, minimum, maximum) of the SDG-i for every year and the whole period of study as well. For instance, in 2016, the average SDG-i score globally was 58.43 per cent while in 2019 the average score raised to 66.26 per cent. That is to say that countries with higher values perform better compared to those with a lower SDG-i. The SDG-i is increasing throughout the period of study, on average, accompanied with a

declining standard deviation. This indicates that the SDGs gain ground as time goes by and their implementation is expanding. Another encouraging indication is that the minimum and maximum values are both progressively increasing pointing towards improved performance achievement, globally. More precisely, the minimum score in 2016 was 26.10 per cent in contrast to 2019 where the corresponding value is 39.08 per cent. Likewise, the maximum score in 2016 was 84.53 per cent in whereas in 2019 it changed to 85.22 per cent.

Year	Mean SDG index	St. Dev	Min SDG index	Max SDG index
2016	58.43	13.84	26.10	84.53
2017	64.94	10.97	36.70	85.60
2018	65.04	10.32	37.70	85.00
2019	66.26	10.22	39.08	85.22
Whole period	63.67	11.81	26.10	85.60

Table 1. Basic descriptive statistics for the Sustainable Development index, 2016-2019.

Source: Own construction.

Table 2 below presents the countries with the highest and lowest SDG-i score on an annual basis. It is noticeable that every year the Nordic countries (Norway, Sweden, Finland, Denmark) have the highest scores while countries of Africa appear to attain the lowest score.

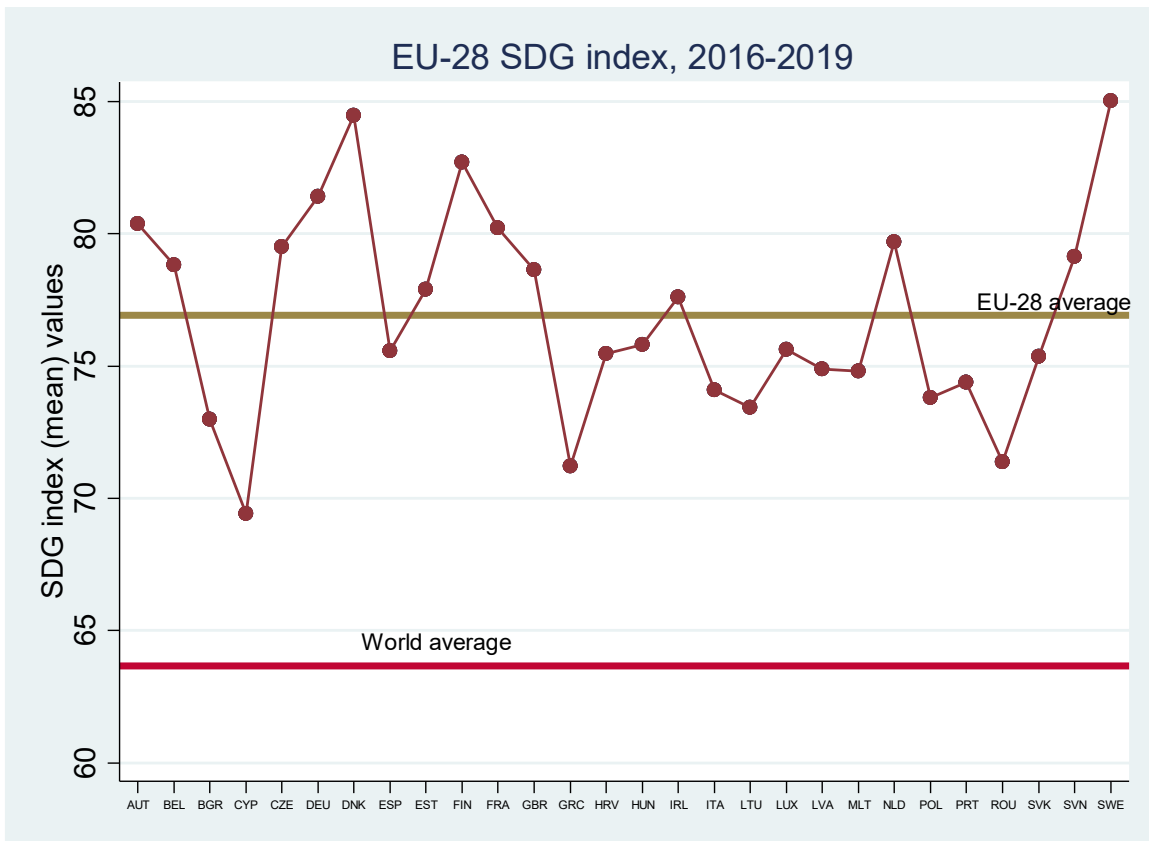
Year	Top 3		Bottom 3	
	Country	SDG-i	Country	SDG-i
2016	Norway	82.31	Central African Rep.	26.10
	Denmark	83.88	Liberia	30.49
	Sweden	84.53	Congo, Dem. Rep.	31.29
2017	Finland	84.00	Central African Rep.	36.70
	Denmark	84.20	Chad	41.50
	Sweden	85.60	Congo, Dem. Rep.	42.70
2018	Finland	83.00	Central African Rep.	37.70
	Denmark	84.60	Chad	42.80
	Sweden	85.00	Congo, Dem. Rep.	43.40
2019	Finland	82.82	Central African Rep.	39.08
	Sweden	84.99	Chad	42.79
	Denmark	85.22	Congo, Dem. Rep.	44.95

Table 2. The edges of SDG-i performance

Source: Own construction

As far as the latter argument is concerned, it is useful to focus on the rest of the European countries to get the overall picture. Graph 1 below displays the average SDG-i score for each of the twenty-eight countries in the European Union for the period of study. The top 3 performing countries are Sweden (85.03), Denmark (84.47) and Finland (82.70) while the countries with the lowest performance are Romania (71.39), Greece (71.20) and Cyprus (69.42). It is noticeable that the world SDG-i average 63.67 while the European is 76.92 for the period of study.

As regards the EU-28 performance and based on the fluctuations of the index, it is apparent that there are differences or in other words heterogeneity among the European countries, as there are countries with high, medium, and low performance within the EU. Moreover, it seems that there are two sub-groups of countries based on the SDG-i average score. More precisely, 46.42% of the EU countries (13 out of 28), that is Sweden (85.03), Denmark (84.47), Finland (82.70), Germany (81.40), Austria (80.39), France (80.22), The Netherlands (79.68), Czech Rep. (79.52), Slovenia (79.13), Belgium (78.83), United Kingdom (78.63), Estonia (77.90) and Ireland (77.59) perform better than the average while the rest 53.58% (15 out of 28) that is Hungary (75.81), Luxembourg (75.64), Spain (75.56), Croatia (75.48), Slovak Rep. (75.35), Latvia (74.88), Malta (74.81), Portugal (74.38), Italy (74.10), Poland (73.81), Lithuania (73.43), Bulgaria (72.98), Romania (71.39), Greece (71.20) and Cyprus (69.42), exhibit a performance lower than the average score.



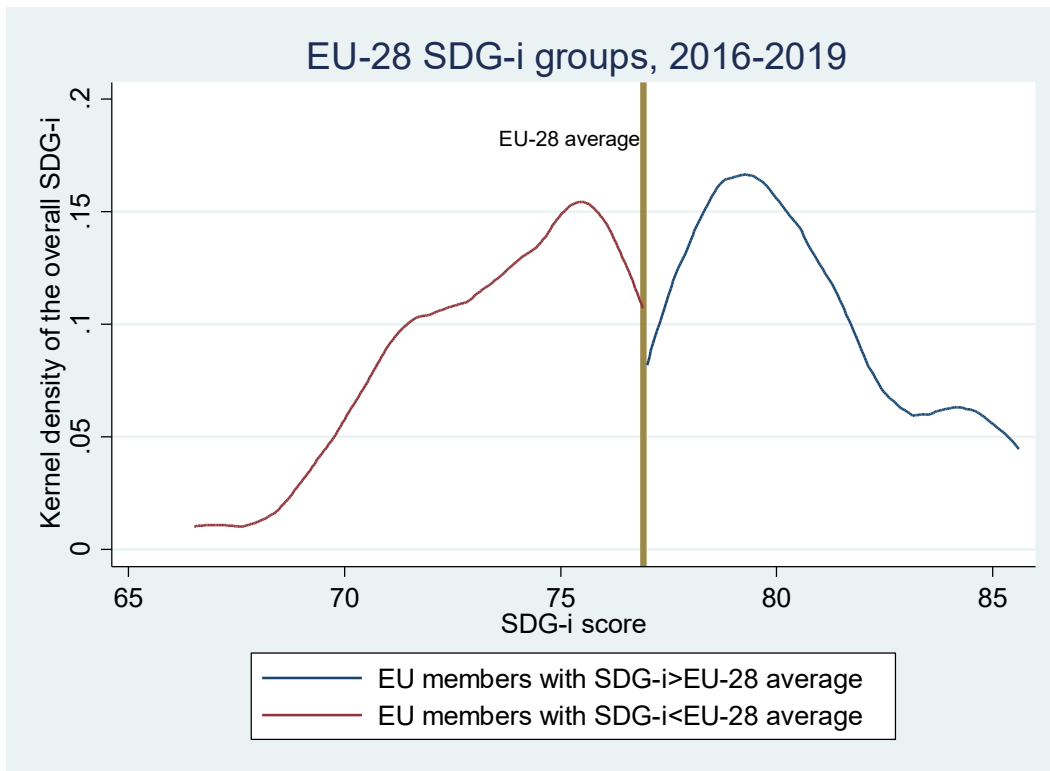
Graph 1. EU-28 Sustainable Development index score, 2016-2019

Note: “AUT” Austria, “BEL” Belgium, “BGR” Bulgaria, “CYP” Cyprus, “CZE” Czech Rep., “DEU” Germany, “DNK” Denmark, “ESP” Spain, “EST” Estonia, “FIN” Finland, “FRA” France, “GBR” United Kingdom, “GRC” Greece, “HRV” Croatia, “HUN” Hungary, “IRL” Ireland, “ITA” Italy, “LTU” Lithuania, “LUX” Luxembourg, “LVA” Latvia, “MLT” Malta, “NLD” The Netherlands, “POL” Poland, “PRT” Portugal, “ROU” Romania, “SVK” Slovak Rep., “SVN” Slovenia, “SWE” Sweden.

Source: Own construction.

Shifting the attention to the groups below and above the EU-28 average SDG-i score, (Graph 2 below), it is noticeable that there is ample heterogeneity among the EU member states regarding the SDGs implementation and therefore, achievement. As it is illustrated below, there are two distinct groups of based on their performance while the vertical line represents the EU-28 average score. It should be mentioned that there is a discontinuity in the SDG-i between the groups. The differences in the groups, however, could be attributed to the heterogeneous patterns in SDGs implementation, as the latter does not constitute an obligation for the countries yet, despite the goals have been agreed by countries across the globe. In addition, differences could be attributed to any of the individual goals as those are affected by the implementation of the institutional and legal framework, political decisions as well as the strategic orientation of each country. Those aspects are mainly latent, therefore cannot be quantified directly.

Overall, although the performance of each country is being improved as time goes by, more time is required for an unquestionable performance convergence, at the European level at least.



Graph 2. EU-28 Sustainable Development index groups, 2016-2019

Source: Own construction.

5. Case studies; SDGs in practice

In this section recent case studies around the world that have implemented the SDGs are presented. The latter have been co-funded by the Sustainable Development Goals Fund, established in 2014 by the United Nations and other funding parties such as local governments and Non-Governmental Organizations. The following case studies cover a variety of SDGs.

Case Study 1: Women Inequality in Bangladesh

From December 2014 to September 2017 the United Nations Development Program and the International Labor Organization led a joint program to offer employment opportunities to women in Bangladesh who had been through domestic crises and ended up in working in low productivity jobs. The idea was to develop a program to help women move out of poverty conditions. The program cost \$4.6 million and targeted in developing human capital, competences, and abilities by offering to the 2,592 rural and deprived women vocational skills, job placement with the prospect to extend it after the end of the program, among others. It also encouraged savings, put the interest in social inclusion and protection and contributed to the enhancement of the local government regarding the development of the institutions. The duration of the program was 18 months. It addresses SDGs 1, 2, 4, 5, 8, 10 and 13 while the main result was that the poverty rate among the female participants decreased significantly. The lessons learned from the project are found along the lines of capacity development of local government institutions in the service of the poor, that the duration of the employment is important as with longer contracts the beneficiaries could not only repay debt but also invest in

competences that will generate income in the future. More information on the case can be found via following link <https://www.sdgfund.org/case-study/bangladesh-strengthening-women%E2%80%99s-ability-productive-new-opportunities-swapno%E2%80%8B>.

Case Study 2: Food security and nutrition in Guatemala

The program aimed to bring to the forefront the issue of child malnutrition in Guatemala as it is an obstacle in exercising basic human rights, to enhance the health care quality and effectiveness and enabled families to secure income flows, and acquire access to more food options focusing on children below 2 years old. It is a devastating fact that half of the children in Guatemala between 3 and 59 months of age do not have access to proper nutrition. The program concerned 4 municipalities in San Marcos while the aim was to enhance the local mechanisms and institutions across all layers of governance, from local to national ones. Through the program, most of the beneficiary families learnt how to expand their agricultural production adding more home-grown greens and vegetables to their diet. This resulted in successful yields that increased the food capacity, and more than half of the families reduced chemical intake through food. It addresses SDGs 1, 2, 3, 5, 6 and 17. The program run from January 2015 to December 2016 with a total budget of \$3.8 million, while the World Health Organization, the Food and Agriculture Organization, the United Nations Children's Fund and the World Food Program were the agencies involved along with national parties responsible for the implementation of the program. More information on the case can be found via the following link <https://www.sdgfund.org/case-study/guatemala-food-and-nutrition-security-department-san-marcos>.

Case Study 3: Promoting water and sanitation access in Philippines

The program was designed to improve the situation in waterless or water-scarce municipalities in Philippines to boost access to clean water and sanitation tools throughout the local society. Restricted access to clean water and poor sanitation has been compromised due to pollution, mainly affecting mostly women and young girls jeopardizing their reproductive ability and economic role but also has negative impact on the socioeconomic development. More than 30 agencies joined forces to develop and implement an approach to improve access to high water quality and hygiene in six waterless areas. The program benefited individuals at the household as well as at the local society level. However, the main challenge was that the Philippines is vulnerable to climate change with hurricanes and tsunami waves threatening the infrastructure. Nevertheless, the program increased awareness about the importance of hygiene and sanitation practices. It concerns most of the SDGs, more precisely SDGs 2, 3, 4, 5, 6, 7, 10, 13, 14 and 15. The program run from 16 January 2015 through 30 June 2017 with a budget of \$3.6 million. The United Nations Development Program, the World Health Organization, the United Nations Children's Fund were the agencies involved along with national partners were responsible for the implementation of the program. More information on the case can be found via <https://www.sdgfund.org/case-study/philippines-pro-water-policies-infrastructure-and-behaviors-improved-water-and-sanitation>.

Case Study 4: Youth employment opportunities in Fiji

The program was designed to boost youth employment as well as increase food provision in Viti Levu, the biggest island of the Republic of Fiji through organic food production. This initiative aimed to cope with youth unemployment and its resulting negative consequences on sustainable development. The program was designed in a way to promote employment with the support of public-private co-operations to engage youth into organic farming which will be sustained by creating a value chain. Although there are challenges such as the negative effects (e.g. home destruction) of cyclones and heavy floods striking hard the place, employment increased to young people and women and awareness raised. It is a time demanding process requiring more synergies, knowledge exchange and government engagement. The program addresses SDGs 1, 2, 3, 5, 6, 7, 8, 12 and 13. It run from 1 November 2015 through 30 April 2018 with a budget of \$2.54 million. It was materialized through the co-operation of the United Nations Development Program, the International Fund for Agricultural Development along with the support of partners at national level such as government ministries, the Pacific Organic and Ethical Trade Community and the Fiji National Youth Council. More information on the case can be found via <https://www.sdgfund.org/youth-organic-agriculture-fiji>.

As a final note, the cases outlined here along with many more as well as all the respective program description, can be accessed via <https://www.sdgfund.org/case-studies> and <https://www.sdgfund.org/programmes> respectively.

6. References

1. Akinsete, E., Apostolaki, S., Chatzistamoulou, N., Koundouri, P., & Tsani, S. (2019). The link between ecosystem services and human wellbeing in the implementation of the European water framework directive: Assessing Four River basins in Europe. *Water*, *11*(3), 508.
2. Barbier, E. B. (1987). The concept of sustainable economic development. *Environmental conservation*, *14*(2), 101-110.
3. Bartelmus, P. (2010). Use and usefulness of sustainability economics. *Ecological Economics*, *69*(11), 2053-2055.
4. Baumgärtner, S., & Quaas, M. (2010). What is sustainability economics?. *Ecological Economics*, *69*(3), 445-450.
5. Birol, E., Hanley, N., Koundouri, P., & Kountouris, Y. (2009). Optimal management of wetlands: Quantifying trade-offs between flood risks, recreation, and biodiversity conservation. *Water Resources Research*, *45*(11).
6. Clemens, M. A., Kenny, C. J., & Moss, T. J. (2007). The trouble with the MDGs: confronting expectations of aid and development success. *World development*, *35*(5), 735-751.
7. Costanza, R., Daly, L., Fioramonti, L., Giovannini, E., Kubiszewski, I., Mortensen, L. F., & Wilkinson, R. (2016). Modelling and measuring sustainable wellbeing in connection with the UN Sustainable Development Goals. *Ecological Economics*, *130*, 350-355.
8. Dahl, A. L. (2012). Achievements and gaps in indicators for sustainability. *Ecological Indicators*, *17*, 14-19.
9. Daly, H. E., & Cobb, J. B. (1989). *For the common good*. Boston, MA: Beacon Press.
10. Dávila, O. G., Koundouri, P., Pantelidis, T., & Papandreou, A. (2017). Do agents' characteristics affect their valuation of 'common pool' resources? A full-preference ranking analysis for the value of sustainable river basin management. *Science of the Total Environment*, *575*, 1462-1469.
11. Diaz-Sarachaga, J. M., Jato-Espino, D., & Castro-Fresno, D. (2018). Is the Sustainable Development Goals (SDG) index an adequate framework to measure the progress of the 2030 Agenda?. *Sustainable Development*, *26*(6), 663-671.
12. Easterly, W. (2009). How the millennium development goals are unfair to Africa. *World development*, *37*(1), 26-35.
13. Esquivel, V., & Sweetman, C. (2016). Gender and the sustainable development goals. *Gender & Development*, *24*(1), 1-8.
14. Fukuda-Parr, S. (2016). From the Millennium Development Goals to the Sustainable Development Goals: shifts in purpose, concept, and politics of global goal setting for development. *Gender & Development*, *24*(1), 43-52.
15. Guijarro, F., & Poyatos, J. (2018). Designing a sustainable development goal index through a goal programming model: The Case of EU-28 Countries. *Sustainability*, *10*(9), 3167.
16. Hamilton, K., & Clemens, M. (1999). Genuine savings rates in developing countries. *World Bank Economic Review*, *13*(2), 333– 356. <https://doi.org/10.1093/wber/13.2.333>
17. Holden, E., Linnerud, K., & Banister, D. (2014). Sustainable development: our common future revisited. *Global environmental change*, *26*, 130-139.
18. Horton, R. (2014). Offline: why the sustainable development goals will fail. *The Lancet*, *383*(9936), 2196.
19. Joshi, D. K., Hughes, B. B., & Sisk, T. D. (2015). Improving governance for the post-2015 sustainable development goals: scenario forecasting the next 50 years. *World Development*, *70*, 286-302.
20. Koundouri, P., & Giannouli, A. (2015). Blue growth and economics. *Frontiers in Marine Science*, *2*, 94.

-
21. Koundouri, P., Rault, P. K., Pergamalis, V., Skianis, V., & Souliotis, I. (2016). Development of an integrated methodology for the sustainable environmental and socio-economic management of river ecosystems. *Science of the total environment*, 540, 90-100.
 22. Koundouri, P. (Ed.). (2017). *The Ocean of Tomorrow*. Springer International Publishing.
 23. Lafferty, W. M. (Ed.). (2006). *Governance for sustainable development: the challenge of adapting form to function*. Edward Elgar Publishing.
 24. Le Blanc, D. (2015). Towards integration at last? The sustainable development goals as a network of targets. *Sustainable Development*, 23(3), 176-187.
 25. Navarro-Ortega, A., Acuña, V., Bellin, A., Burek, P., Cassiani, G., Choukr-Allah, R., ... & Grathwohl, P. (2015). Managing the effects of multiple stressors on aquatic ecosystems under water scarcity. The GLOBAQUA project. *Science of the Total Environment*, 503, 3-9.
 26. Nelson, P. J. (2007). Human rights, the Millennium Development Goals, and the future of development cooperation. *World development*, 35(12), 2041-2055.
 27. Nordhaus, W. D., & Tobin, J. (1972). *Is growth obsolete? Economic growth*. New York: National Bureau of Economic Research
 28. Pistocchi, A., Udias, A., Grizzetti, B., Gelati, E., Koundouri, P., Ludwig, R., ... & Souliotis, I. (2017). An integrated assessment framework for the analysis of multiple pressures in aquatic ecosystems and the appraisal of management options. *Science of the Total Environment*, 575, 1477-1488.
 29. Pezzey, J. C., & Toman, M. (2002). *The economics of sustainability: a review of journal articles* (No. 1318-2016-103489).
 30. Pradhan, P., Costa, L., Rybski, D., Lucht, W., & Kropp, J. P. (2017). A systematic study of Sustainable Development Goal (SDG) interactions. *Earth's Future*, 5(11), 1169-1179.
 31. Redclift, M. (2005). Sustainable development (1987–2005): an oxymoron comes of age. *Sustainable development*, 13(4), 212-227.
 32. Remoundou, K., Koundouri, P., Kontogianni, A., Nunes, P. A., & Skourtos, M. (2009). Valuation of natural marine ecosystems: an economic perspective. *Environmental Science & Policy*, 12(7), 1040-1051.
 33. Remoundou, K., Adaman, F., Koundouri, P., & Nunes, P. A. (2014). Is the value of environmental goods sensitive to the public funding scheme? Evidence from a marine restoration programme in the Black Sea. *Empirical Economics*, 47(4), 1173-1192.
 34. Remoundou, K., Diaz-Simal, P., Koundouri, P., & Rulleau, B. (2015). Valuing climate change mitigation: A choice experiment on a coastal and marine ecosystem. *Ecosystem services*, 11, 87-94.
 35. Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G. (2016): Sustainable Development Report 2016. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).
 36. Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G. (2017): Sustainable Development Report 2017. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).
 37. Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G. (2018): Sustainable Development Report 2018. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).
 38. Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G. (2019): Sustainable Development Report 2019. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).

-
39. Singh, G. G., Cisneros-Montemayor, A. M., Swartz, W., Cheung, W., Guy, J. A., Kenny, T. A., & Sumaila, R. (2018). A rapid assessment of co-benefits and trade-offs among Sustainable Development Goals. *Marine Policy*, 93, 223-231.
 40. Stuart, E., & Woodroffe, J. (2016). Leaving no-one behind: can the Sustainable Development Goals succeed where the Millennium Development Goals lacked?. *Gender & Development*, 24(1), 69-81.
 41. Stuver, M., Soma, K., Koundouri, P., Van Den Burg, S., Gerritsen, A., Harkamp, T., ... & Hommes, S. (2016). The Governance of multi-use platforms at sea for energy production and aquaculture: challenges for policy makers in European seas. *Sustainability*, 8(4), 333.
 42. UN, 1982. A World Charter for Nature. United Nations, New York.
 43. UN, 1992. Earth Summit Agenda 21. The United Nations programme of action from Rio. United Nations Department of Public Information, New York.
 44. UN, 1995. Copenhagen Declaration on Social Development. World Summit for Social Development, March 1995, Copenhagen, Denmark <http://www.un.org/>
 45. UN, 2000, United Nations Millennium Declaration. United Nations General Assembly. 6-8 September 2000, United Nations, New York.
 46. UN, 2002. Report of the World Summit on Sustainable Development. Johannesburg, South Africa, 26 August–4 Sept 2002. United Nations, New York.
 47. UN, 2012. Realizing The Future We Want for All. Report to the Secretary-General. UN System Task Team on the Post-2015 UN Development Agenda, 27 July 2012, United Nations, New York.
 48. UN-Habitat, United Nations Habitat. (2012). State of the World's Cities 2012/2013: Prosperity of Cities.
 49. UN, 2014. Millennium Development Goals Report 2014. United Nations, New York.
 50. UN, 2015, Transforming our world: the 2030 Agenda for Sustainable Development, 25 - 27 September 2015, United Nations, New York.
 51. UN-Habitat, United Nations Habitat. (2015a). Transforming our world: The 2030 Agenda for Sustainable Development.
 52. UNDP, United Nations Development Programme (2016). *Human Development Report 2016*. New York, NY: UNDP.
 53. UN, United Nations. (2017). The City Development Index.
 54. Van den Bergh, J. C. (2010). Externality or sustainability economics?. *Ecological Economics*, 69(11), 2047-2052.
 55. Van den Burg, S., Stuver, M., Norrman, J., Garção, R., Söderqvist, T., Röckmann, C., ... & De Bel, M. (2016). Participatory design of multi-use platforms at sea. *Sustainability*, 8(2), 127.
 56. Wackernagel, M., Hanscom, L., & Lin, D. (2017). Making the sustainable development goals consistent with sustainability. *Frontiers in Energy Research*, 5, 18.
 57. WCED, 1987. Our Common Future. World Commission on Environment and Development. Oxford University Press, Oxford.
 58. Zagonari, F., Tsani, S., Mavrikis, S., & Koundouri, P. (2018). Common environment policies in different sustainability paradigms: evidence From the Baltic, Adriatic, and Black Seas. *Frontiers in Marine Science*, 5, 216