UNU-CRIS
WORKING PAPER SERIES

#05
November
2020

The Flanders City SDG Index
A Feasibility Study

Samuel Standaert
Glenn Rayp
Alvertos Konstantinos

www.cris.unu.edu

UNITED NATIONS UNIVERSITY
UNU-CRIS
Institute on Comparative Regional Integration Studies

in alliance with
VUB VRIJE UNIVERSITEIT BRUSSEL
UNIVERSITEIT GENT
Flanders State of the Art
west-vlaanderen de gedreven provincie
BRUGGE

Samuel Standaert[1], Glenn Rayp[2], and Alvertos Konstatinis[3]

[1,2,3]United Nations University Institute on Comparative Regional Integration
[1,2]Department of Economics, Ghent University

Abstract

The purpose of this report is to propose a comprehensive and straightforward, yet sufficiently sophisticated methodology for monitoring the progress of the implementation of the Sustainable Development Goals by the municipalities of Flanders, Belgium. The present report is a preliminary effort to encourage policymakers to take a regional focus and to implement bottom-up policies and initiatives supporting the Sustainable Development Goals. A distinctive element of this report is that it uses a pre-existing framework, established by international organisations, but at a much more local scale. The methodology that we follow is typically used for monitoring countries or regions, but is in this case used to track the progress of over 300 cities in the province of Flanders. Our results show that performance differs across Flanders, with the east of the region achieving better SDG scores than the west. However, this pattern is relatively weak, and the differences between SDGs do not lend themselves to easy generalisations. While some provinces score better on some goals, for most of the other SDGs a real understanding of what is driving the results will require an in-depth, city-specific analysis. This is illustrated using Bruges as a case-study. The Flanders cities SDG indexes are meant to guide policymakers to those areas where improvement is most needed while keeping a broader overview of the overall SDG performance. Furthermore, for each SDG and indicator, they point to those Flemish municipalities that can offer up best-practices.

Contents

1 Introduction

The Sustainable Development Goals (SDGs) were adopted in 2017 by all UN member states as part of the *2030 Agenda for Sustainable Development*. Since then, the need has arisen to de-centralise these development policies and design a local 'tailored-made' implementation strategy. As estimated by the Sustainable Development Solutions Network (SDSN), 65% of the successes of the SDGs depend on the immediate and active involvement of the municipalities in the implementation processes (Lafortune et al., 2019). Achieving the vision laid out in the 2030 Agenda will require both a 'data revolution' and a 'presentation revolution' aimed at the local level. First, local governments need access to data that monitors all of the different goals and subgoals. Second, they also need to have this information presented in an intuitive and easy-to-use format (Woodbridge, 2016, p.1). This report aims to help fill this gap for the governments of the Flemish towns in Belgium.

This report is focussed on the region of Flanders for a number of reasons. First, before the UN introduced the SDGs, Flanders had already developed a set of sustainable development strategies, such as the second Flemish Strategy for Sustainable Development, established in 2011. As such, its regional development policy needs to be put in-line with its SDGs strategy, requiring a tailored-made framework to monitor and implement the SDGs at the local level (Aalbers, 2020). Over the past years, the Association of Flemish Cities and Towns (VVSG - 'Vereniging voor Vlaamse Steden en Gemeenten') has been working on a pilot project aimed at fostering the support among local governments for the SDGs. There is widespread interest among Flemish cities for the SDGs, with a third of Flemish cities having signed the SDG declaration of commitment, and 60% having integrated the SDGs in the 2020-2025 policy and management cycle (VVSG, 2020). To aid cities in implementing the SDGs, VVSG developed a monitoring framework. As they note, however, the monitoring of the SDGs remains a challenge. As such there is a need for the local government to know: *'where are we doing well and where are we underperforming, where are we making progress or going backwards?'* (VVSG, 2020, p.18). In answer to these questions, this paper develops tools that cities can use to get an overview of their current SDG preparedness and identify in which areas they are leading and lagging.

The primary objective of our project is to provide a starting point for a deeper analysis of the Flemish strategies, as well as the SDG strategies at the local level more in general. To that end, this report aims to go beyond the separate indicators for each goal or sub-goal to provide a more holistic overview of SDG progress. In line with the idea of a presentation revolution, we aim to develop tools that allow a town to easily compare and quantify its progress relative to other Flemish towns.

As this report is focused on the methodology and visualisations, we initially limited our selection of indicators to those included in the town and city monitor (*'Stad en Gemeentemonitor'*), a database constructed by the Flemish government (*Agentschap Binnenlands Bestuur*). This still gave us access to more than 90 indicators tracking the SDGs. While the database contains highly detailed information, it is for the most part, limited to Flemish cities.[1] The advantage of limiting our index to the Flemish cities is that even though we are working at a more detailed level (NUTS 3), we still increase the number of indicators by roughly 50% or even 100% relative to Aalbers (2020) and Lafortune et al. (2019), respectively.

[1]Some indicators also include data on cities in the region of Brussels. Due to their partial coverage, these were not included in our analysis.

To evaluate a city's progress, and put the indicators on a similar footing such that they can be combined into an index, we compared the scores to the top and bottom performance in Flanders. This choice of normalisation has a number of important implications. The first implication concerns how the SDG indexes should be interpreted. Namely, the SDG indexes in this report do not indicate the extent to which a town is on its way to meeting all SDG goals. Rather, it expresses how well it is performing relative to other Flemish cities. Even a perfect score on a particular SDG does not necessarily mean that there is no further room for improvement. It only means that the town is scoring as well at the best performing town in Flanders. This also implies that when the top performers improve, a town's score can decrease over time, even if its performance has not changed. As such, this reflects the idea that SDG progress should not be seen as one with a fixed end goal. Instead, they are part of a process of continuous improvement, where different cities can serve as examples to others.

Second, this means that the values of the Flanders SDG indexes cannot be compared to other (city-level) SDG indexes. A high score on the Flanders city SDG index does not necessarily translate in a high score on e.g. the indexes of Lafortune et al. (2019) or Aalbers (2020). As the choice of indicators differs between these reports, even the direction of the scores is not necessarily preserved: e.g. Ghent could outperform Antwerp in one report, while the opposite is true in another.

Nevertheless, the choice to normalise the indicators in this way has two advantages. First, it ensures that the performance of any one town is evaluated relative to a representative sample: i.e. cities with a highly similar legal, historical and economic context. Secondly, while for many indicators, we could use technical optima, this would decrease the sensitivity of the index. For example, the technical optimum for CO2 emissions would be to have zero emissions.[2] However, using this instead of the actual minimum emissions (0.93 tons per capita) would decrease the range of the index by a third, resulting in more municipalities with a similar score. By using the top and bottom performance, the index gives a better idea of the difference in performance within Flanders.

The remainder of this paper is organised as follows. The next section (2) provides a brief overview of similar initiatives around the world. Section 3 outlines how the Flanders Cities SDG index is constructed, after which section 4 describes the results and explores the patterns in the indexes. Section 5 analyses the SDG index of Bruges as a case-study, after which we conclude.

2 Literature

The methodology of this report was mostly based on two previous studies: first, the '2019 SDG Index and Dashboards Report for European Cities' (Lafortune et al., 2019) developed by the Sustainable Development Solutions Network (SDSN) and the Brabant Center for Sustainable Development (Telos, Tilburg University). The second report is 'A Territorial Approach to the Sustainable Development Goals' (Aalbers, 2020) prepared by the OECD Centre for Entrepreneurship, SMEs, Regions and Cities. For brevity, we will refer both as the Euro-cities and the OECD report throughout the remainder of this paper.

Both studies are methodologically very similar but differ in one fundamental way: their scope. The Euro-cities report focuses on the performance of European metropolitan cities while the OECD report

[2]The technical 'worst' case is unbounded (infinity) as you could always pollute more. In this example, we use the worst Flemish performer.

focuses on cities and regions within the wider OECD. This difference affects the data availability, which in turn alters the selection of indicators in each index. As shown in Appendix A, the OECD is limited to around two indicators per goal, while Euro-cities often uses a multiple of that. A typical example is SDG 11 (Sustainable Cities) where the OECD has two and Euro-cities has eleven indicators. The OECD choice is likely informed by data coverage concerns, choosing a few fundamental indicators that cover the majority of the OECD cities. In contrast, the Euro-cities report has access to a large, common pool of data collected by the European Union. For similar reasons, our focus on Flemish municipalities means that this report can rely on a greater variety and more sophisticated indicators to track the SDGs.

After the indicator selection process, both studies first normalise the selected indicators and then aggregate them into a final score for each town and each goal separately. Indicators per goal are aggregated by taking the arithmetic mean of the normalised indicator score. Furthermore, a global indicator is also calculated as representative of the overall regional/urban SDG performance using the arithmetic mean of the scores for each goal. The final score, both for each goal and the final indicator, is expressed in a scale from zero (0) to one hundred (100) with the first indicating the worst possible performance and the latter being the best possible one.

While methodologically the most sophisticated instances, the studies above are by no means the only studies of SDG progress on the country or regional level. The very first reports of this kind were focussed on the country-level and the Global North (Kroll, 2015; Sachs et al., 2017). Other examples of city-level reports is that of UCLG (2020) in Barcelona to promote the idea of localising SDG strategies, providing a detailed guideline for both researchers and stakeholders. Their work also includes not only characteristic examples of regional implementation and monitoring documents, but also a summary of other reports of the SDGs such as that the policy report of the city of Kitakyushu (IGES, 2018), the voluntary local review of the city of New York (NYC, 2019), Seoul (ROK, 2016), Durban (South Africa), Malaga (Spain) and Barcarena (Brazil).[3] Another well-known study is the annual report of the Bertelsmann Stiftung Institute and the SDSN (Sachs et al., 2020). It provides one of the most extensive and holistic reporting on SDGs, covering theoretical, practical, and methodological issues in different spatial units and scales. The OECD report also extensively covers the most characteristic examples of monitoring the regional implementation of the SDGs, many of which overlap with the studies mentioned above.

Following their announcement, the SDGs have not been free of critique. With 17 goals and 169 targets, they are seen as too expansive and ambitious, especially when compared to the eight Millennium Development Goals. Moreover, the different targets are often seen as at odds with each other, in particular those dealing with environmental sustainability and economic development (see e.g. Easterly, 2015; Spaiser et al., 2017). By focussing our index on the region of Flanders, we hope to avoid many of these criticism. The indicators included in the report are chosen such that they are informative in the Flemish context. While regional contextual differences are still present in the dataset, they are many magnitudes lower than would be the case in a worldwide comparison. As we will discuss, the scores on some of the SDGS are negatively correlated, which some authors interpret as a trade-offs between the targets and goals (see e.g. Pradhan et al., 2017; Bali Swain and Ranganathan). While analysing these

[3] https://sidems.cnm.org.br/mandala/selecione-municipio/ano/2020

patterns is beyond the scope of this preliminary paper, this is something we can consider in future versions.

3 Methodology

While methodologically very similar to the reports described above, this paper's main innovation is the scale at which the index is constructed, assessing the SDG progress of more than 300 Flemish towns. In contrast, the Euro-cities and OECD reports cover only one or a couple of cities per country. This allows them to incorporate several indicators that are measured on the regional level (NUTS 2).[4] In contrast, this report exclusively uses city-specific indicators (NUTS 3), providing a previously unseen level of detail.

3.1 Indicator Selection

The first step towards indicators selection, as mentioned before, was to take advantage of the already existing database of the town and city monitor.[5] This database contains over 300 indicators on the town level, about a third of which are from a representative household survey administered every couple of years. Most of the available data dates back to 2017, as they are currently working on the 2020 update. As a result, we focussed the index on the year 2017. For the handful of indicators that are not available in that year, we used the earlier or later values, as indicated by the superscripts in Table 1.

In our choice of indicators and especially in mapping those indicators to specific SDG goals, we were guided by the Euro-cities and OECD reports (see Appendix A). One restriction when assigning indicators to SDGs is that we avoided assigning the same indicator to different goals. However, the number of indicators for which such a choice had to be made was relatively limited and often quite straightforward. For example, while the gender gap in unemployment can be assigned to SDG10 (Reduced Inequalities), it is a more natural fit for SDG 6 (Gender Equality).

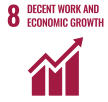
Our selection of indicators was based on three criteria. First, the indicator needs to have a clearly identifiable impact on the SDG preparedness of a particular town. This excludes a large number of the 300 indicators in the VVSG dataset, like those unrelated to the SDG goals, those whose impact on the SDGs is not unambiguously positive or negative, as well as those that reflect the SDG preparedness of the entire Flemish region.

Secondly, we focused on indicators that track outcomes as opposed to policy actions, as the latter can create endogeneity problems when analysing the results. For example, this precludes the number of people receiving a living wage, or those receiving a guaranteed income. While both indicators are positively correlated with the incidence of poverty (SDG1), they also represent efforts to combat it.

[4] Nomenclature of territorial units for statistics (NUTS), is a hierarchical system of dividing up territories in Europe and the UK.

[5] https://gemeente-stadsmonitor.vlaanderen.be/ visited last on 31/09/2020

Table 1: Indicators included in the Flemish SDG index

			Sign
SDG 1 - No Poverty			
	a	Fiscal income below critical threshold	-
	b	People experiencing payment difficulties	-
	c	People with excessive debt	-
	d	Number of children in subjective poverty (*'kansarmoede index, Kind en Gezin'*)	-
SDG 2 - Zero Hunger			
		*None*	
SDG 3 - Good Health and Well-being			
	a	Road traffic injuries and deaths	-
	b	Inactive lifestyle	
	b1	Never uses the sport-infrastructure	-
	b2	Never uses the swimming pool	-
	c	Fraction population who uses preventative dental care	+
	d	Fraction population with the status of a chronic illness	-
	e	Fraction population with diabetes	-
	f	Prevalence of antibiotics use	-
	g	Satisfaction with health infrastructure	+
SDG 4 - Quality Education			
	a	Fraction of early leavers in secondary education	-
	b	Satisfaction with school infrastructure	+
	c	Availability after school daycare	+
	d	School delay	
	d1	Fraction of students with 1 year of school delay in primary	-
	d2	Fraction of students with 2 or more years of school delay in primary	-
SDG 5 - Gender Equality			
	a	Gender gap in employment (male - female)[l1]	-
	b	Gender gap in part-time employment incidence (male - female)	-
	c	Satisfaction with quality day-care	+
	d	Satisfaction with availability of day-care	+
SDG 6 - Clean Water and Sanitation			
	a	% inhabitants whose house has access to sewerage system[f1]	+
	b	% inhabitants whose waste water is treated[f1]	+
SDG 7 - Affordable and Clean Energy			
	a	Renewable energy as fraction of total energy usage[f2]	+
	b	Payment difficulties energy	
	b1	Disconnections from electricity grid as fraction of total access points	-
	b2	Disconnections from gas grid as fraction of total access points	-
	b3	Budget meters electricity as fraction of total access points	-
	b4	Budget meters gas as fraction of total access points	-
SDG 8 - Decent Work and Economic Growth			
	a	Annual growth rate of real gross value added per worker	+
	b	Youth unemployment rate	-
	c	Elderly employment rate	-
	d	Long-term unemployment rate	-
	e	Employment in the social economy (relative to population)	+

			Sign
SDG 9 - Industry, Innovation and Infrastructure			
	a	Productivity: gross value added per employee	+
	b	Access to internet at home	+
SDG 10 - Reduced Inequalities			
	a	Employment rate gap (Belgian - non-EU citizens)	-
	b	Income inequality: *"interkwartiele coefficient"* = (Q3-Q1)/Median income	-
SDG 11 - Sustainable Cities and Communities			
	a	Difference in built-up area growth rate and population growth rate	-
	b	Safe and sustainable transportation infrastructure	
	b1	Sufficient local public transportation	+
	b2	Sufficient number of bike lines	+
	b3	Satisfaction with quality of bike lines	+
	b4	Satisfaction with quality of sidewalks	+
	b5	Satisfaction with quality of streets	+
	c	Affordability of housing: % that spends more than 30% of their income on housing	-
	d	Green neighbourhood	
	d1	City-surface devoted to green infrastructure of any size (*"woongroen"*)	+
	d2	City-surface devoted to green infrastructure of min. 0.2 ha (*"buurtgroen"*)	+
	d3	City-surface devoted to green infrastructure of min. 10 ha (*"wijkgroen"*)	+
	d4	Inhabitants living less than 150m of *"woongroen"*	+
	d5	Inhabitants living less than 400m of *"buurtgroen"*	+
	d6	Inhabitants living less than 800m of *"wijkgroen"*	+
	e	Environmental pollution	
	e1	No or little odour pollution	+
	e2	No or little dog poop	+
	e3	No or little light pollution	+
	e4	No or little vermin	+
	e5	No or little fly-tipping	+
	e6	No or little vibrations	+
	e7	No or little littering	+
	f	Traffic-related pollution	
	f1	No or little aggressive driving	+
	f2	No or little traffic noise	+
	f3	No or little cut-through traffic	+
	f4	No or little speeding	+
	f5	Traffic is unsafe for children	-
	g	Number of cultural, sport and other leisure activities per inhabitant	+
SDG 12 - Responsible Consumption and Production			
	a	Non-recycled waste per citizen	-
	b	Sustainable transportation	
	b1	Passenger vehicles per inhabitant	-
	b2	Main transportation method is personal motorized vehicle	-
	b3	Daily commute is never or rarely by car (except as passenger)	+
	b4	Leisure trips are never or rarely by car (except as passenger)	+
	b5	fraction of vehicles with ECO score above 70	+
	b6	Never or exceptional short distances by bike	-
	b7	Never or exceptional short distances on foot	-
	c	Total energy consumption per inhabitant[l3]	-
	d	Sustainable housing	
	d1	Double-paned glass	+
	d2	Energy efficient boiler	+
	d3	Green roof	+
	d4	Isolation roof	+
	d5	Solar water heating	+
	d6	Solar panels	+

			Sign
SDG 13 - Climate Action			
	a	Soil sealing[l2]	-
	b	Total energy consumption of households for heating[l3]	-
	c	Greenhouse gas emissions households per inhabitant[l1]	-
	d	Greenhouse gas emissions industry and tertiary sector per added value[l1]	-
SDG 14 - Life Below Water			
		*None*	
SDG 15 - Life on Land			
	a	% city-surface devoted to green infrastructure of min. 30 ha (*"stadsdeelgroen"*)[l1]	+
	b	% city-surface devoted to green infrastructure of min. 60 ha (*"stadsgroen"*)[l1]	+
	c	% city-surface devoted to green infrastructure of min. 200 ha (*"stadsbos"*)[l1]	+
SDG 16 - Peace, Justice and Strong Institutions			
	a	Theft and extortions per 1000 inhabitants	-
	b	Crimes against bodily integrity per 1000 inhabitants	-
	c	Crimes against property per 1000 inhabitants	-
	d	Rarely or never feel unsafe in the city	+
	e	A lot of confidence in the local government	+
	f	A lot of confidence in the police	+
	g	No or little vandalism	+
SDG 17 - Partnership for the Goals			
		*None*	

[l1] : 2016 values, [l2] : 2015 values, [l3] : 2014 values, [f1] : 2018 values

The last criterium concerns the availability of data. We followed the Euro-cities report in requiring that an indicator should cover at least 80% of the sample. This ruled out several, otherwise very interesting, indicators that were only collected for 13 larger cities in Flanders. Examples include net job growth and school delay in secondary education.

Table 1 lists the 92 indicators that were included for each of the goals. For the goals of Zero Hunger (SDG 2), Life Below Water (SDG 14) and Partnership for the Goals (SDG17), the database did not contain any relevant indicators that met all three criteria.

3.2 Index Construction

We follow the methodology proposed in the Euro-cities report (Lafortune et al., 2019) to normalise the indicators and combine them into an index. Specifically, we construct an SDG index for each of the 14 goals and one tracking the overall SDG preparedness.

For some specific sub-goals of the SDGs, the town and city monitor offers multiple suitable indicators. However, including all of them risks drowning out the signal from those subgoals were only one

indicator is available. To avoid them dominating the overall score on the SDG, we use an aggregate of those indicators when their crosscorrelation was high. For example, the availability of cultural, sport and other leisure activities in the town could be further split out into more than a dozen different specific activities. However, the correlation between them was often in excess of 99%, which is why SDG 11 only contains the total number of leisure activities per capita. Alternatively, if the correlation between the indicators was lower, we included the different indicators separately, but combined them into a sub-index before computing the SDG index. For example, SDG 12 (Responsible Consumption and Production) is the average of four indicators, two of which (sustainable housing and transportation) are themselves the average of six or more indicators. Another way of looking this is to say that the six indicators in sustainable housing only receive a sixth of the weight that the indicator for non-recycled waste per capita receives.

Specifically, the construction of the indexes follows these steps:

1. For each indicator, we defined a desired direction, negative or positive, according to whether or not the increase of this indicator is socially desirable. This direction is indicated in the last column of Table 1.

2. Since the SDG achievement of the Flemish cities is evaluated intra-regionally, we use the best and worst performers within the region as the benchmark values to rescale the indicators. For the top performers, the highest value was used as the maximum, while for the bottom performers, we used the average of the lowest 10% scoring cities.

3. Having defined the minimum ($\min_x$) and maximum value ($\max_x$), we then used the min-max method to normalise the score of the indicators. For the positive indicators, the scores are derived using Equation 1 while the negative indicators are normalised using the Equation 2:

$$\bar{x}_i = 100\frac{x_i - \min_x}{\max_x - \min_x} \quad (1)$$

$$\underline{x}_i = 100\frac{\max_x - x_i}{\max_x - \min_x} \quad (2)$$

4. If a town receives a score less than 0 or greater than 100, its score was set equal to those values.

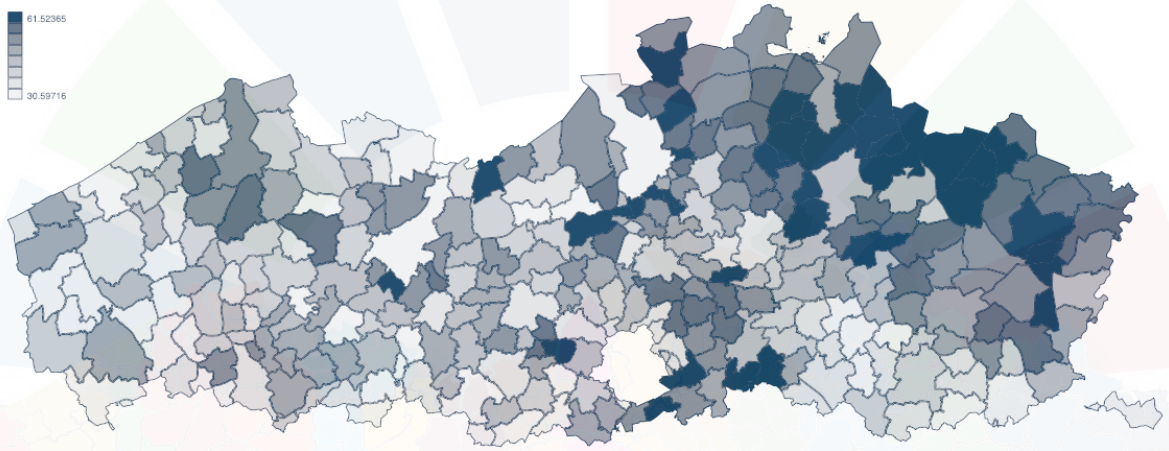
5. For those goals where there were sub-goal indicators, like SDG 2b - Inactive lifestyle, we first computed those as the unweighted mean of the normalised indicators. Combining this with the other indicators then resulted in the SDG index for each of the 14 goals for which we have data. These 14 different SDG goals were theb summarised into an overall SDG index, again using an unweighted mean of the individual SDG indexes.

4 The Flanders Cities SDG index

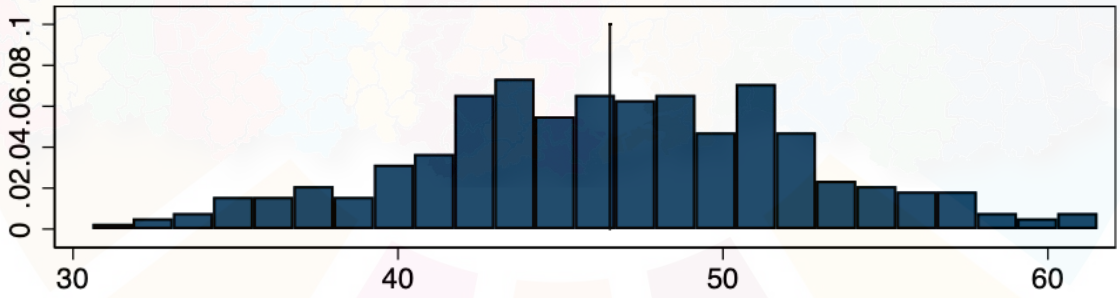
Following the methodology outlined above, we computed the SDG performance for 308 Flemish cities in 2017. To give an overview of the overall performance, panel (a) of Figure 1 plots the total index values on a map of Flanders. While in theory, the index values can lie between 0 and 100, the actual range of the SDG index is much more limited. The lowest scoring town, Heuvelland, has an average

SDG score of 30.6, while the best scoring town, Opglabbeek, only scores 61.5. Overall, the scores lie very close together as can be seen in the histogram in panel b: 80% of the scores fall in a 15-point window (38.75-53.9).

That 70% of cities have a score below 50 means that the majority of cities have more indicators where they score less than halfway between the top and bottom performer. It should be reiterated here that this does not necessarily mean that Flanders is scoring poorly on the SDGs compared to other regions, as the indexes compare Flemish cities. Similarly, a good score for a town does not mean that it will also do well on an international comparison. Instead, the top scores are most useful when looking best-practices for specific SDGs or indicators among the Flemish cities.



(a) Map

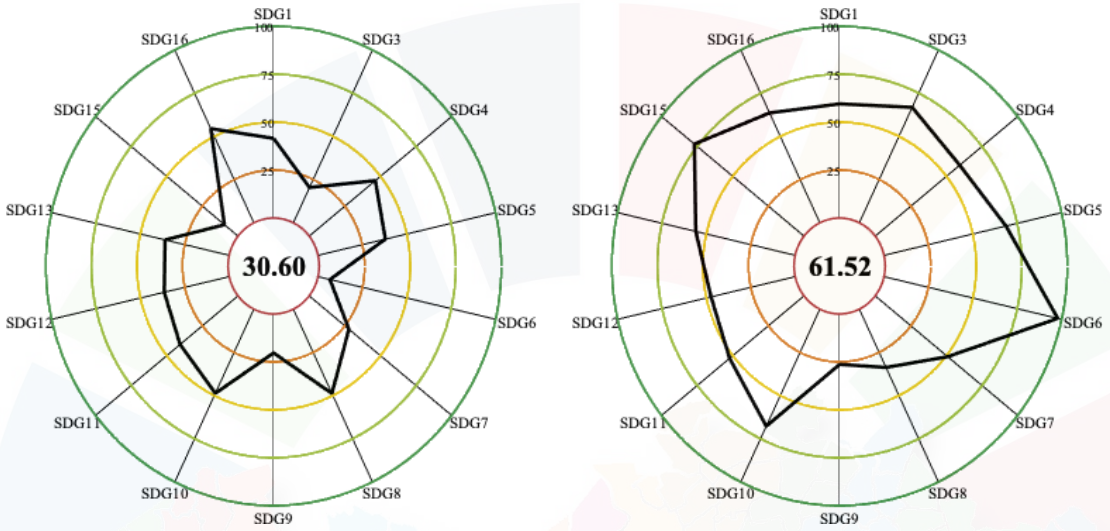


(b) Histogram

Figure 1: Overview of the SGD scores in 2017
a. Plot of the SDG index on a map of Flanders, with darker colours corresponding a higher level of preparedness. b. histogram of the scores.

To get a better idea of how the overall scores come about, Figure 2 plotting the individual SDG indexes of Opglabbeek and Heuvelland in a radar graph. This reveals that while Heuvelland has slightly-lower-than average score on a handful of goals, it scores near the bottom on SDG6 (Clean water and Sanitation) and SDG 15 (Life on Land). It just so happens that these are the goals where Opglabbeek has its highest score. In addition, the latter has another four goals where it scores near the 75 mark. While Opglabbeek has the highest score of all Flemish cities, this does not constitute an excuse to do nothing. This is clearly illustrated by the fact that it scores average or below average on

five of the SDGs. For SDG 9 (Industry, Innovation and Infrastructure), in particular, it only receives a score of 26.3. While it almost reaches the maximum score on SDG 6, its second-highest scoring goal, SDG 15, is still almost 20 points removed from the Flemish' top score, leaving it a lot of room to improve.



(a) Heuvelland (b) Opglabbeek

Figure 2: Radar graph of the lowest and highest scoring city

Overall, the individual SDG indexes have a much wider range than the overall SDG index. The summary statistics of the indexes in Table 2 show that the range of the individual indicators is typically double that of the overall index. For three indicators, their range is equal to the theoretical maximum. The distribution of the scores can differ notably depending on the indicator, both statistically (Figure 4) as well as geographically (Figure 3). For example, while the value for SDG 8 (Decent Work and Economic Growth) decreases as we travel from West-Flanders to Limburg, this pattern is completely reversed in the case of SDG 15 (Life on Land). SDG 15 also has a highly left-leaning distribution, with most cities receiving only very low scores, while the opposite is true for SDG 6 (Clean Water and Sanitation). These differences between the individual goals explain why the overall index has such a limited range: there are no cities that perform very well or very badly on all SDGs. All cities seem to compensate for high scores on one component with lower scores on another.

4.1 Representativeness of the index

The inconsistencies in the patterns in the SDG indicators suggest that there are many counterbalancing patterns present in the different indicators. This is not surprising given the diversity in the SDGs. While the overall SDG index represents the average performance on the different goals, it is not clear to what extent this truly captures the diversity in the town's performance. In this section, we examine exactly how informative this average truly is and how well the individual SDG indexes are able to summarise their respective indicators.

(a) SDG 1 - No Poverty

(b) SDG 3 - Good Health

(c) SDG 4 - Quality Education

(d) SDG 5 - Gender Equality

(e) SDG 6 - Clean Water

(f) SDG 7 - Clean Energy

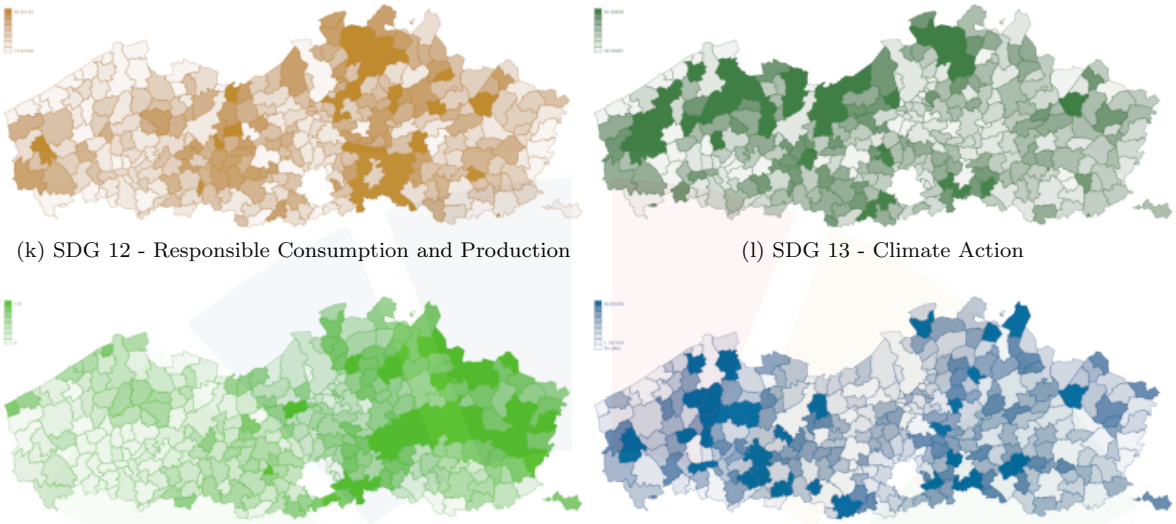
(g) SDG 8 - Decent Work

(h) SDG 9 - Industry

(i) SDG 10 - Inequality

(j) SDG 11 - Sustainable Cities

Figure 3: Maps of the Flanders Cities SDG indexes for each goal
Darker colours corresponding a higher level of preparedness.



(k) SDG 12 - Responsible Consumption and Production

(l) SDG 13 - Climate Action

(m) SDG 15 - Life on Land

(n) SDG 16 - Peace, Justice and Strong Institutions

Figure 3: Maps of the Flanders Cities SDG indexes for each goal
Darker colours corresponding a higher level of preparedness.

Table 2: Summary statistics

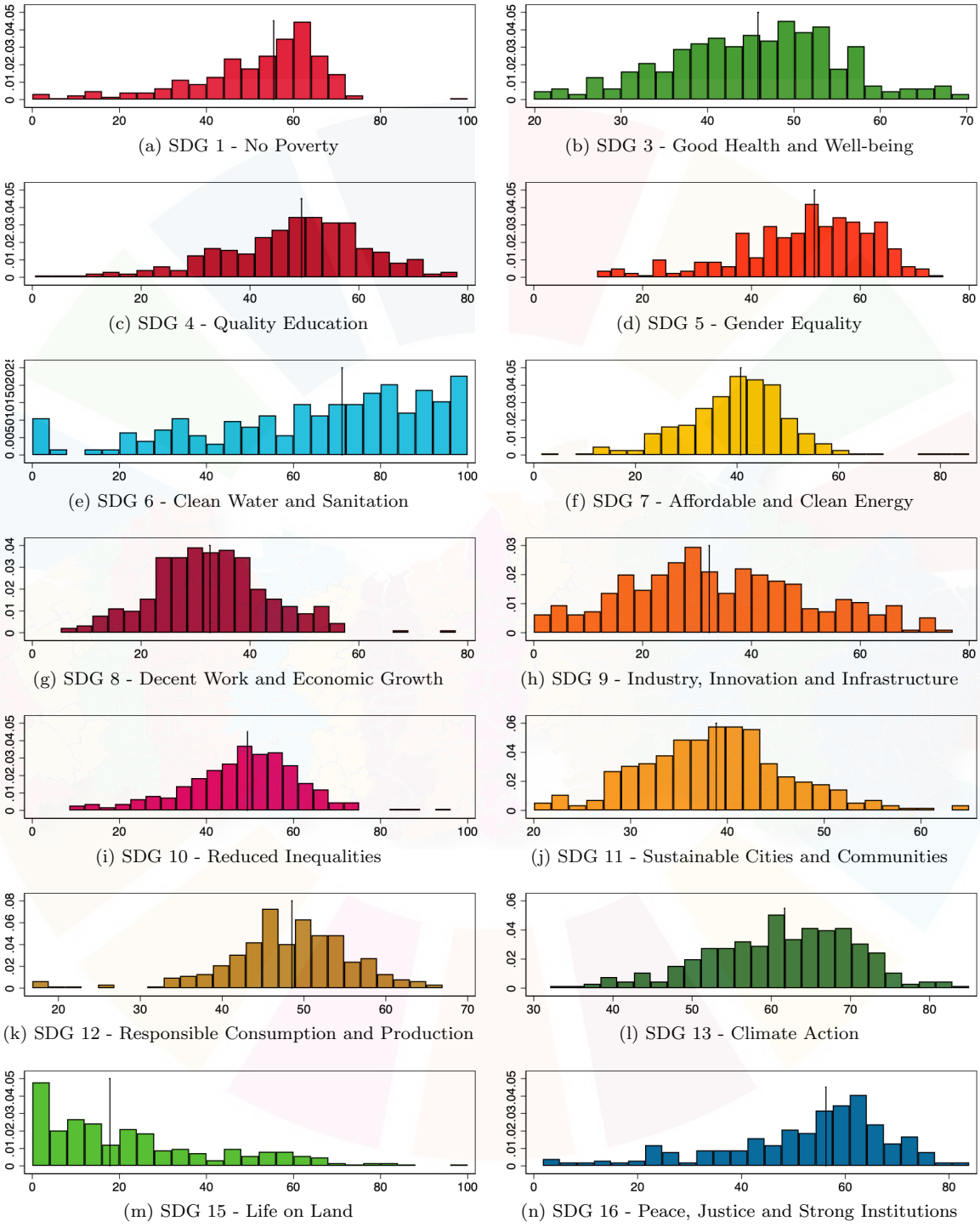
Variable	Obs	Mean	Std. Dev.	Min	Max	Range	Alpha[A]
TOTAL	308	46.495	5.859	30.597	61.524	30.926	0.556
SDG1	308	51.482	15.318	0.000	100.000	100.000	0.670
SDG3	308	45.273	9.994	19.893	70.273	50.380	0.479
SDG4	307	47.867	13.532	0.498	78.130	77.632	0.469
SDG5	308	49.768	12.511	11.631	75.254	63.623	0.273
SDG6	308	65.007	26.359	0.000	100.000	100.000	0.973
SDG7	308	39.896	10.755	1.483	85.664	84.182	
SDG8	308	32.785	10.805	5.228	77.826	72.597	0.416
SDG9	308	34.117	16.980	0.000	76.966	76.966	0.368
SDG10	308	48.274	13.357	8.491	96.078	87.587	
SDG11	308	38.788	7.693	20.022	64.972	44.950	0.399
SDG12	308	48.029	7.996	16.804	66.941	50.137	
SDG13	308	61.161	9.406	32.063	84.988	52.925	
SDG15	308	23.499	20.845	0.000	100.000	100.000	0.991
SDG16	307	52.258	16.357	1.737	83.851	82.113	0.834

[A]Cronbach alpha coefficient of constituent indicators parts, where the sign of the indicators is kept constant.

The Pearson correlation coefficients in Table 3 reveal the lack of correlation between the SDG indexes: the median cross correlation is close to 0.18 and more than nine out of ten times, the correlation is less than 0.5. On the one hand, this certainly rules out the idea of redundancy among the SDGs. Each of the indexes measures a clearly distinct concept. However, as the first column of the Table 3 also shows, the pattern in the overall SDG index can be widely different from that of its constituent parts.

The lack of consistency in the indexes is confirmed by the Cronbach's Alpha coefficient, which is only 0.56 for the overall index.[6] Most of the individual SDG indexes have a higher internal consistency

[6]This is the alpha coefficient when the signs of the indicators are fixed (positive). If the signs are unrestricted, the alpha is 0.74.)



(a) SDG 1 - No Poverty

(b) SDG 3 - Good Health and Well-being

(c) SDG 4 - Quality Education

(d) SDG 5 - Gender Equality

(e) SDG 6 - Clean Water and Sanitation

(f) SDG 7 - Affordable and Clean Energy

(g) SDG 8 - Decent Work and Economic Growth

(h) SDG 9 - Industry, Innovation and Infrastructure

(i) SDG 10 - Reduced Inequalities

(j) SDG 11 - Sustainable Cities and Communities

(k) SDG 12 - Responsible Consumption and Production

(l) SDG 13 - Climate Action

(m) SDG 15 - Life on Land

(n) SDG 16 - Peace, Justice and Strong Institutions

Figure 4: histograms of the SGD indexes for each goal
The thin line indicates the median score

Table 3: Correlation between the overall index and the SDG indexes.

	TOTAL	SDG1	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11
SDG1	0.33	1									
SDG3	0.58	0.23	1								
SDG4	0.29	0.61	0.20	1							
SDG5	0.47	0.44	0.14	0.60	1						
SDG6	0.57	-0.37	0.22	-0.39	-0.09	1					
SDG7	0.36	0.50	0.19	0.43	0.46	-0.25	1				
SDG8	0.04	0.48	0.02	0.48	0.27	-0.43	0.41	1			
SDG9	0.44	-0.01	0.49	-0.16	-0.10	0.31	0.00	-0.14	1		
SDG10	0.06	-0.26	-0.37	-0.23	0.01	0.25	-0.18	-0.25	-0.19	1	
SDG11	0.60	0.27	0.28	0.27	0.41	0.25	0.22	0.04	0.12	-0.01	1
SDG12	0.31	0.42	0.41	0.30	0.17	-0.18	0.32	0.19	0.23	-0.31	-0.03
SDG13	0.09	0.23	0.06	0.18	0.06	-0.22	0.28	0.20	-0.09	-0.18	-0.12
SDG15	0.54	0.06	0.31	0.09	0.16	0.18	0.09	-0.19	0.17	0.06	0.46
SDG16	0.19	0.76	0.22	0.62	0.39	-0.47	0.46	0.56	-0.10	-0.33	0.30

	SDG12	SDG13	SDG15
SDG13	0.31	1	
SDG15	0.12	0.00	1
SDG16	0.33	0.29	0.03

(Table 2), although only three manage to exceed the rule-of-thumb of 0.7.

Overall, the results of this analysis fall in line with an often-emphasised point: that the SDG index should not be used to simply rank cities or to name and shame the best and worst ones. The differences in the performance on the individual goals is such that such a ranking has little to no meaning. Even within a specific goal, different indicators will often come to a different conclusion. However, this is not to say that these indexes are without use, as noted in the report on the SDG pilot project '17 SDGs can be a lot' (VVSG, 2020, p.18). As such the indexes outline in this paper can serve as a starting point of a more in-depth analysis of a town's performance. They allow cities to identify the areas in which they are leading and lagging and find examples of cities that can offer up best practices, all while keeping an overview of the larger SDG performance. Moreover, the indicators are transformed such that it is straightforward to those cities that can offer up best-practices, creating a powerful tool for those cities interested in increasing their long-term sustainability.

4.2 Revealing the patterns in the SDG preparedness of Flemish cities

A closer look at the geographical dispersion in Figure 1 seems to hint at several patterns in the SDG scores. For example, towns in the west of Flanders tend to perform worse than those in the east of Flanders, and larger cities like Antwerp and Ghent also seem to score more poorly. In addition, many of the existing indexes of sustainable development are highly correlated with per capita income (Lin et al., 2019). This correlation reflects both the difference in the needs and in the available means of countries at opposite ends of the development spectrum. In this case, the correlation between the total SDG index and the median income is 0.40, which is slightly lower than what is typically found.[7]

In the final section of this paper, we examine whether these patterns are present and statistically

[7]The correlation between the gross national income per capita and the SDG indexes of Kroll (2015) and Sachs et al. (2017) is 0.67 and 0.60, respectively.

Table 4: Overview of the SDG scores for the largest Flemish cities

Gemeente	TOTAL	1 NO POVERTY	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	6 CLEAN WATER AND SANITATION	7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH
Antwerpen	37.9	0.0	53.0	8.9	11.6	99.0	10.8	8.7
Mechelen	43.1	21.5	56.3	23.4	28.6	87.0	25.3	17.5
Turnhout	48.2	7.5	51.5	30.0	31.0	90.2	27.8	22.7
Leuven	45.0	20.5	66.9	38.6	12.9	93.9	30.8	31.3
Brugge	50.7	38.3	47.7	47.3	57.5	95.5	45.6	38.8
Kortrijk	42.4	26.0	49.3	33.2	34.4	81.2	26.0	29.5
Oostende	40.1	10.3	30.2	15.5	23.7	98.1	35.8	9.4
Roeselare	44.4	28.2	53.3	38.8	42.9	86.1	42.9	35.6
Aalst	41.3	29.9	40.4	27.2	30.9	97.2	20.7	14.5
Gent	39.3	1.3	53.8	13.5	13.9	89.3	53.0	7.7
Sint-Niklaas	40.5	14.9	45.4	32.0	39.0	75.9	26.6	18.4
Genk	49.6	2.4	38.2	29.3	43.1	98.4	47.2	11.2
Hasselt	47.9	33.2	50.9	53.4	42.0	81.5	25.7	20.1

Gemeente	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	15 LIFE ON LAND	16 PEACE, JUSTICE AND STRONG INSTITUTIONS
Antwerp	59.5	54.9	29.7	33.9	51.3	9.8	4.4
Mechelen	51.7	46.2	36.6	43.9	54.2	23.9	26.3
Turnhout	71.2	58.0	36.9	51.8	56.2	49.2	5.0
Leuven	63.3	20.6	45.1	47.9	41.2	22.7	21.5
Bruges	38.2	62.3	36.8	37.0	54.7	15.0	24.6
Kortrijk	47.1	40.1	44.1	41.9	57.1	2.8	22.5
Ostend	37.5	67.6	36.3	31.9	46.7	20.1	3.8
Roeselare	34.7	39.6	38.9	43.7	50.6	0.4	21.7
Aalst	25.7	56.3	37.4	34.5	44.0	22.3	18.3
Gent	46.3	46.1	36.8	41.3	52.7	5.5	12.1
Sint-Niklaas	42.7	38.1	33.3	44.3	68.1	12.4	11.1
Genk	43.4	66.1	45.5	52.8	61.3	56.5	19.8
Hasselt	44.3	43.9	41.6	51.1	62.1	39.2	11.3

significant. We do this using a linear regression model such that we can control for other correlating factors. However, this analysis should not be mistaken for a *causal* inference, nor will these results necessarily point to the way for cities to increase their SDG score. This section merely tries to ascertain whether e.g. the bigger cities actually have a lower score once we control for the median income of a town.

We include several variables this analysis, most of which came from Statbel, the Belgian statistical office.[8] To track the effect of the wealth of a town, we include the median income per inhabitant (in 1000EUR). Town size was measured using both the number of inhabitants and the town's surface area[9], both in natural logs. We also included a dummy that is one for the thirteen cities (*'steden'*) and zero

[8] https://statbel.fgov.be/nl

[9] Source: http://www.geopunt.be/catalogus/datasetfolder/670dc426-370a-4edc-ac65-6c4bcc065773

for the smaller towns (*gemeenten*).[10] Finally, we included dummy variables to differentiate between the 5 provinces: West-Flanders, East Flanders, Flemish Brabant, Limburg and Antwerp. To avoid issues of perfect collinearity, we left out the dummy variable for province of Antwerp. As such, the remaining dummy variables capture the difference in the SDG scores relative to cities in the province of Antwerp.

Column 1 of Table 5 shows the results of regressing the overall SDG index on the explanatory variables listed above. Considering the complexity of the subject matter and the variety of factors that are expected to affect the SDG performance, our model has a surprisingly high R-squared. Close to half the variation in the overall SDG index is captured by the variables we included. Half of this is courtesy of the province dummies, as removing these dummies lowers the R squared to 21%. Given that the provincial governments have very little political power relative to the other levels of government, this is a surprisingly large effect.

Overall, we see that the average SGD score increases with the population of a town, but decreases with its surface area. Being classified as a city (*'stad'*) also has a negative effect, although this is only significant at the 10% level. As is the case with other indexes of sustainable development, more affluent towns score better. The parameter estimate suggests that the score of the wealthiest Flemish town is 24 points higher than that of the most impoverished town, all other things being equal. Finally, we note that the lower scores of East- and West-Flanders visible in Figure 1 are statistically significant. The pattern is more complex than the east-to-west improvement initially suggested. Given their other characteristics (size, population and income) towns in Flemish-Brabant score the lowest (-7.1), followed by those in East-Flanders (-5.8), West-Flanders (-3.0), Antwerp (0) and Limburg (+1.8).

Since the overall SDG index captures but a fraction of the complexity of its underlying indexes (cf. infra), we repeated the analysis for all of the SDG goals. As could be expected, the sign, size and the significance of the coefficients can be dramatically different depending on the specific SDG. Focussing on the largest parameter estimates, we see that more populous towns have much better scores on SDG 6 (Clean Water) and SDG 9 (Decent Work). However, they score worse on SDG 1 (No Poverty), SDG 4 (Quality Education) and SDG 16 (Peace and Institutions). Cities also score poorly on SDG1 and SG16 as well as on SDG 5 (Gender Inequality) SDG 10 (Reduced Inequalities). They compensate for this with higher scores on SDG 3 (Good Health and Well-Being) and SDG 9 (Innovation, Industry an Infrastructure). Once we control for population size, geographically large towns mostly score poorly on SDG 6. More affluent towns tend to perform significantly better on SDG 1 and SDG 16.

Looking at the parameters on the province dummies on the different SDGs, we begin to see why their influence on the overall SDG index was so large. All four provinces have a large and negative parameter on SDG9 (Innovation, Industry and Infrastructure), with towns in Limburg, West-Flanders and Flemish Brabant scoring 20 points lower compared to those in Antwerp. This is not surprising as a large part of the industrial manufacturing industry is located around Antwerp harbour. Towns in the province of Limburg score well on SDG 6 (Clean Water and Sanitation), where they have a 19 point lead on those in Antwerp. Unsurprisingly, they also lead Flanders by a large margin in their scores on SDG 15 (Life on Land) thanks to the relative abundance of forests. Compared to East-

[10]The cities are Aalst, Hasselt, Oostende, Sint-Niklaas, Roeselare, Kortrijk, Turnhout, Mechelen, Antwerpen, Genk, Leuven, Brugge and Gent. A robustness check using an alternative dummy based on cities with more than 100,000 inhabitants did not alter our findings.

Table 5: Revealing the patterns in Flemish SDG scores

	TOTAL	1 NO POVERTY	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	6 CLEAN WATER AND SANITATION	7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH
ln(Pop.)	2.457***	-6.269***	2.714***	-9.797***	-3.147***	27.66***	-4.103***	-5.922***
	(0.466)	(0.934)	(0.827)	(1.138)	(1.023)	(2.045)	(0.971)	(0.794)
City	-2.706*	-13.04***	7.011***	0.887	-11.71***	-8.839	-0.0727	-3.216
	(1.472)	(2.952)	(2.615)	(3.596)	(3.232)	(6.463)	(3.070)	(2.511)
ln(Area)	-1.221***	4.399***	-1.237	7.601***	1.989**	-22.53***	5.924***	7.064***
	(0.424)	(0.850)	(0.753)	(1.035)	(0.930)	(1.860)	(0.884)	(0.723)
Median inc.	1.728***	5.988***	2.818***	3.417***	2.266***	-0.192	2.667***	2.383***
	(0.159)	(0.320)	(0.283)	(0.389)	(0.350)	(0.700)	(0.332)	(0.272)
Limburg	1.824**	-1.284	-1.860	1.407	2.914	18.53***	-2.958	-4.422***
	(0.871)	(1.747)	(1.548)	(2.128)	(1.913)	(3.825)	(1.817)	(1.486)
East-Fl.	-5.823***	-2.670*	-8.629***	-4.797***	-6.776***	-4.320	-2.941*	-3.649***
	(0.746)	(1.496)	(1.325)	(1.822)	(1.638)	(3.276)	(1.556)	(1.272)
Fl.-Brabant	-7.059***	-8.044***	-5.806***	-8.681***	-19.25***	-8.843***	-8.476***	-1.758
	(0.760)	(1.525)	(1.351)	(1.857)	(1.669)	(3.338)	(1.586)	(1.297)
West-Fl.	-2.958***	3.169*	-7.965***	0.548	0.131	-0.0584	0.670	12.25***
	(0.819)	(1.641)	(1.454)	(2.000)	(1.797)	(3.594)	(1.707)	(1.396)
Constant	0.677	-124.0***	-30.71**	-79.64***	-9.949	196.2***	-92.77***	-98.02***
	(8.083)	(16.21)	(14.36)	(19.74)	(17.74)	(35.49)	(16.85)	(13.78)
Obs	305	305	305	305	305	305	305	305
R-squared	0.489	0.687	0.450	0.431	0.455	0.508	0.316	0.564

	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	15 LIFE ON LAND	16 PEACE, JUSTICE AND STRONG INSTITUTIONS
ln(Pop.)	7.488***	3.829***	1.099	-2.393***	-4.405***	-0.0281	-13.00***
	(1.298)	(1.302)	(0.723)	(0.683)	(0.904)	(1.872)	(1.015)
City	8.448**	-9.497**	1.575	2.975	-1.352	-2.214	-8.997***
	(4.103)	(4.115)	(2.285)	(2.160)	(2.857)	(5.916)	(3.207)
ln(Area)	-4.413***	-4.658***	-1.005	1.335**	5.862***	5.105***	7.796***
	(1.181)	(1.184)	(0.658)	(0.622)	(0.822)	(1.703)	(0.923)
Median inc.	1.906***	-2.609***	1.815***	1.855***	1.157***	0.917	5.005***
	(0.444)	(0.446)	(0.247)	(0.234)	(0.309)	(0.641)	(0.347)
Limburg	-18.38***	5.049**	4.300***	-3.946***	-1.526	9.174***	-3.744**
	(2.428)	(2.435)	(1.352)	(1.278)	(1.690)	(3.501)	(1.898)
East-Fl.	-23.48***	3.447*	-5.574***	-2.959***	4.142***	-18.99***	-6.787***
	(2.080)	(2.085)	(1.158)	(1.095)	(1.448)	(2.998)	(1.626)
Fl.-Brabant	-10.38***	-2.906	-7.841***	-4.136***	0.917	-4.788	-7.431***
	(2.119)	(2.125)	(1.180)	(1.116)	(1.476)	(3.056)	(1.657)
West-Fl.	-20.65***	0.478	1.968	-8.118***	-0.0167	-23.75***	4.479**
	(2.282)	(2.288)	(1.271)	(1.201)	(1.588)	(3.290)	(1.783)
Constant	1.211	162.4***	-1.457	1.407	-30.44*	-81.02**	-90.09***
	(22.53)	(22.59)	(12.55)	(11.86)	(15.68)	(32.48)	(17.61)
Obs	305	305	305	305	305	305	305
R-squared	0.522	0.219	0.280	0.401	0.263	0.349	0.683

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

and West-Flanders, towns in Limburg even have a 30 point lead here. Towns in East-Flanders tend to score significantly worse than those in Antwerp on all SDGs. The same can be said of those in Flemish-Brabant, who also tend to score significantly worse on SDG 5 (Gender Equality) by as much as 19 points. Towns in West-Flanders score well on SDG 8 (Decent Work and Economic Growth), but compensate with lower scores on SDG 3 (Good Health and Well-Being) and SDG 12 (Responsible Consumption and Production).

5 Bruges as a Case study

In this last section, we illustrate how the SDG indexes can be used, utilizing Bruges as a case study. Its overall score falls just north of 50, meaning that its SDG performance on average falls halfway between the top and bottom performers. Compared to the other towns, Bruges outperforms almost three-quarters of the dataset. It also has the highest score of all the cities in Flanders and the third-highest score in West-Flanders, after Jabbeke and Oostkamp. Its score is also 5.6 points higher than with what we would expect based on the regressions analysis in column 1 of Table 5. In summary, Bruges does rather well for a city of its size, income and location.

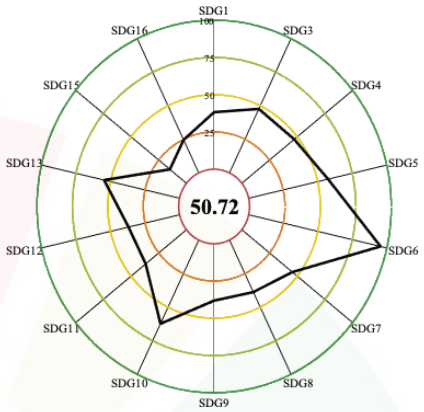


Figure 5: SDG scores of Brugge

As shown in section 4.1, the overall SDG index is unable to capture the variation in the individual SDG scores. The next step in judging the SDG performance is to look at the SDG indexes separately, which is shown in Figure 5. Its scores turn out to be relatively well balanced, with half of the SGDs receiving a score close to 50. Only four exceed this halfway point, of which SDG 6 (Clean Water and Sanitation) is the most striking positive outlier (95.5). Meanwhile, SDG 15 (Life on Land) and SDG 16 (Peace, Justice and Strong Institutions) receive its two lowest scores (15.0 and 25.6, respectively).

When we start comparing Bruges' scores on the individual SGDs with the distribution of those scores across Flanders (Figure 4), a slightly different picture emerges. Bruges' lowest score (SDG 15), for example, still ranks higher than that of 137 other towns (45%). In contrast, while its score on SDG 12 (Responsible Consumption and Production) is more than 2.5 times higher, only 22 other towns (7%) have a lower score. Other SDGs where Bruges scores relatively poorly are SDG 16 (9%) and SGD 1 (17%). This is compensated by a relatively good score on SDG 6 and SDG 10 (Reduced Inequality), where only about one in ten towns score higher.

To finish, we take a detailed look at three of the individual SDGs. Two of these are areas where Bruges underperformed, SDG 12 and SDG 15, to see where attention would be most needed. We will also take a closer look at one of Bruges top scores with SDG 10 and try to determine why Bruges outperforms so many other towns.

Responsible Consumption and Production

While Bruges score on SDG12 far from its lowest score, the histogram in Figure 6 reveals that Brugge (thick line) lies well below both the Flemish median (thin line) and the average score for cities (dotted line). Of the cities, only Aalst, Antwerp and Ostend score lower.

A closer look at the normalised indicators in the right panel of Figure 6 shows notable disagreement. Two of the indicators, sustainable transportation and energy consumption, are above average and have been slowly increasing over the past few years. This improvement is, however, entirely undone by indicator tracking the non-recycled waste, which is zero in 2017. Bruges produces almost twice the

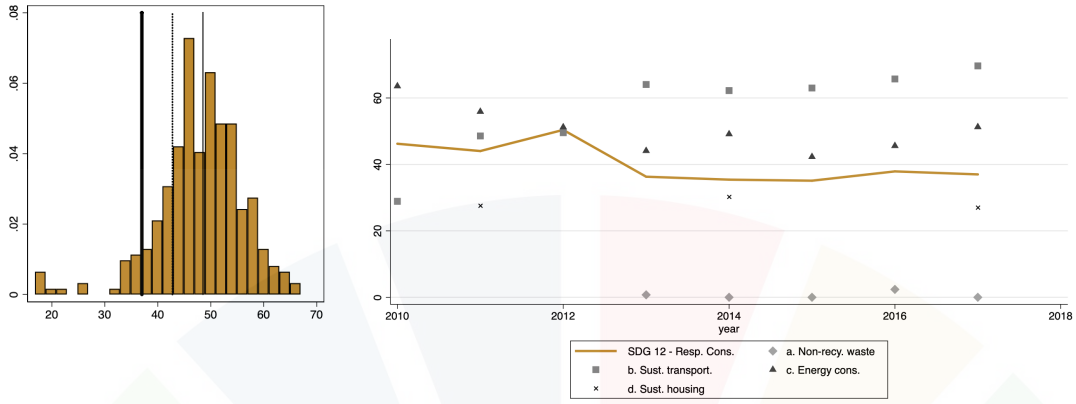


Figure 6: Breakdown of Brugge's scores on SDG 12 - Responsible Consumption and Production
In the histogram, the vertical lines represent Brugge score's (thick line), the Flemish medium score (thin line) and the average score of Flemish cities (dotted line).

weight of waste per capita as the median Flemish city. While the amount of waste had been decreasing up until 2016, it quickly rose again in 2017. All the while, the average Flemish waste production has been steadily decreasing, which further depresses Bruges' (normalised) score. While cities do produce more waste on average, Bruges is still an outlier even within this group, and only the city of Antwerp produces more. One possible reason for the large amount of waste is the popularity of Bruges as a tourist destination: Bruges is the most popular tourist destination in Flanders, with more 2 million overnight stays in 2017.[11] If this is cause of much of the waste, Bruges might benefit from taking a closer look at Lommel's policy as this city receives a similar number of tourists per capita, while producing a third of the waste.

Peace, Justice and Strong Institutions

While Bruges' score on SDG 16 (Peace, Justice and Strong Institutions) lies well below the Flemish median, it has the second-highest score of all cities, after Mechelen. For most of the individual indicators, Bruges' score has been decreasing over the past couple of years. Only its higher feeling of safety and lack of vandalism in 2017 have managed to reverse this trend in the SDG 16 index. These are also two variables where Bruges' scores diverge most from that of other cities. For a city, Bruges also has a low incidence of crimes against bodily integrity and theft and extortions.

The lowest scoring indicator is the crimes against property. Both in absolute terms and when compared to other Flemish towns, crimes against property were decreasing up until 2015. Since then, however, the incidence of those crimes has been rising again in Bruges. As they kept decreasing in the rest of Flanders, this pushed down Bruges scores even further. All the crime statistics in the database are highly skewed to the right, which makes the low scores of Bruges and other cities count heavily against them. This is also reflected in the SDG 16 index values, two-thirds of which lie above 50 (Figure 7).

The indicators measuring the confidence in the local government and the police follow a different

[11] https://gemeente-en-stadsmonitor.vlaanderen.be/verblijfstoerisme

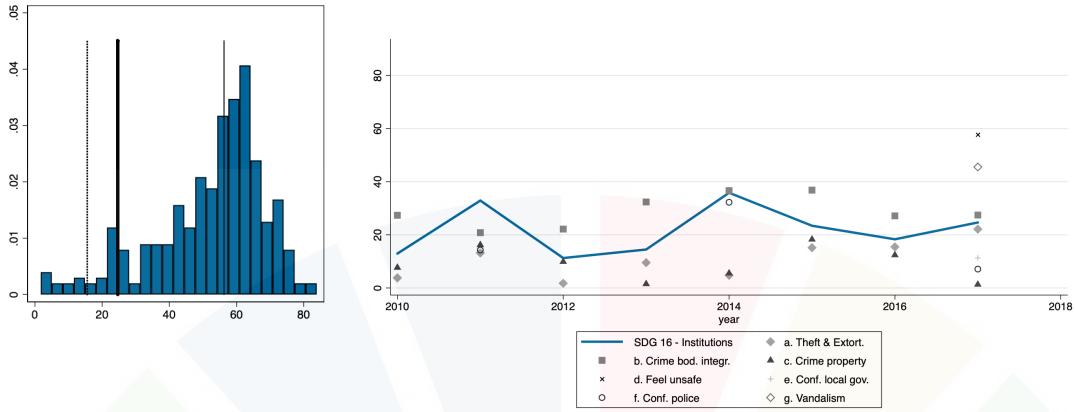


Figure 7: Breakdown of Brugge's scores on SDG 16 - Peace, Justice and Strong Institution

pattern. These indicators are highly skewed to the left, meaning that most cities have a relatively low score. Nevertheless, Bruges' score on these indicators is still lower than that of most cities and towns. The data on the confidence in the local government is only available in 2017. However, for the confidence in the police, we also have information on its value in 2011 and 2014. From an initially low score, it slightly improved in 2014, only to decrease again. Given the high feeling of safety enjoyed by most citizens, this is a surprising finding that warrants a closer look.

Reduced Inequalities

To conclude, we take a look at SDG 10, Reduced Inequalities. As shown in Figure 8, Bruges' score (62.3) is well to the right of the median Flemish score and average city score, both of which fall just short of 50. It comes about as the combination of two somewhat divergent performances on the origin gap and income inequality. The difference in employment of Belgians vs. non-EU citizens is relatively small in Bruges, and its rescaled indicator has increased dramatically since 2015. This is the result of both a decrease in the actual origin gap and a worsening of it elsewhere (Herstappe in particular). Only 16 towns have a higher score on this component, and no other city even comes close.

When it comes to the overall income inequality, on the other hand, Bruges scores just shy of 50. However, compared to other cities, Bruges scores near the bottom, as there is only one city with a worse score (Leuven). Unfortunately, our dataset currently does not contain information on the evolution of this variable. However, using the tax data described in section 4, we find that most cities have a higher fraction of people with a lower income. In contrast, Bruges' income distribution resembles more that of a typical Flemish town.

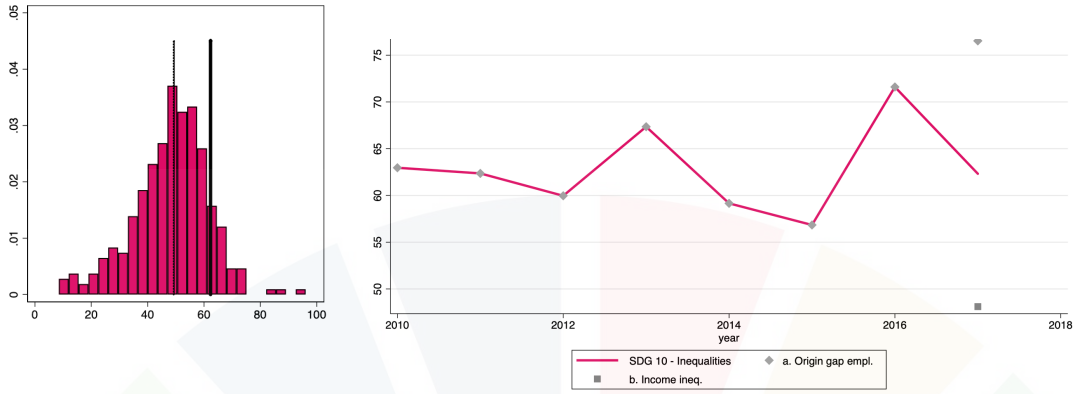


Figure 8: Breakdown of Brugge's scores on SDG 16 - Peace, Justice and Strong Institution

6 Conclusion

The purpose of this report was to propose a sophisticated yet straightforward methodology for monitoring the implementation progress of the SDGs for the Flemish cities in Belgium. Using the dataset of the Cities and Towns Monitor, we were able to construct highly detailed indexes tracking 14 of the 17 goals for all 308 Flemish cities.

Our analysis shows that our overall SDG index, computed as the average of the 14 SDG indexes, cannot truly capture the underlying variability in the SDG performances in Flanders. Given the diversity of the SDGs, this is not particularly surprising. Nevertheless, it can still function as the starting point of a more in-depth analysis of a town's readiness for the SDGs. The indexes outlined in this paper allow a city to look for its most pressing issues, while still keeping an overview of its total performance. Moreover, both the index and the normalised indicators it uses can help quickly identify those municipalities in Flanders whose experiences can provide a best-practice.

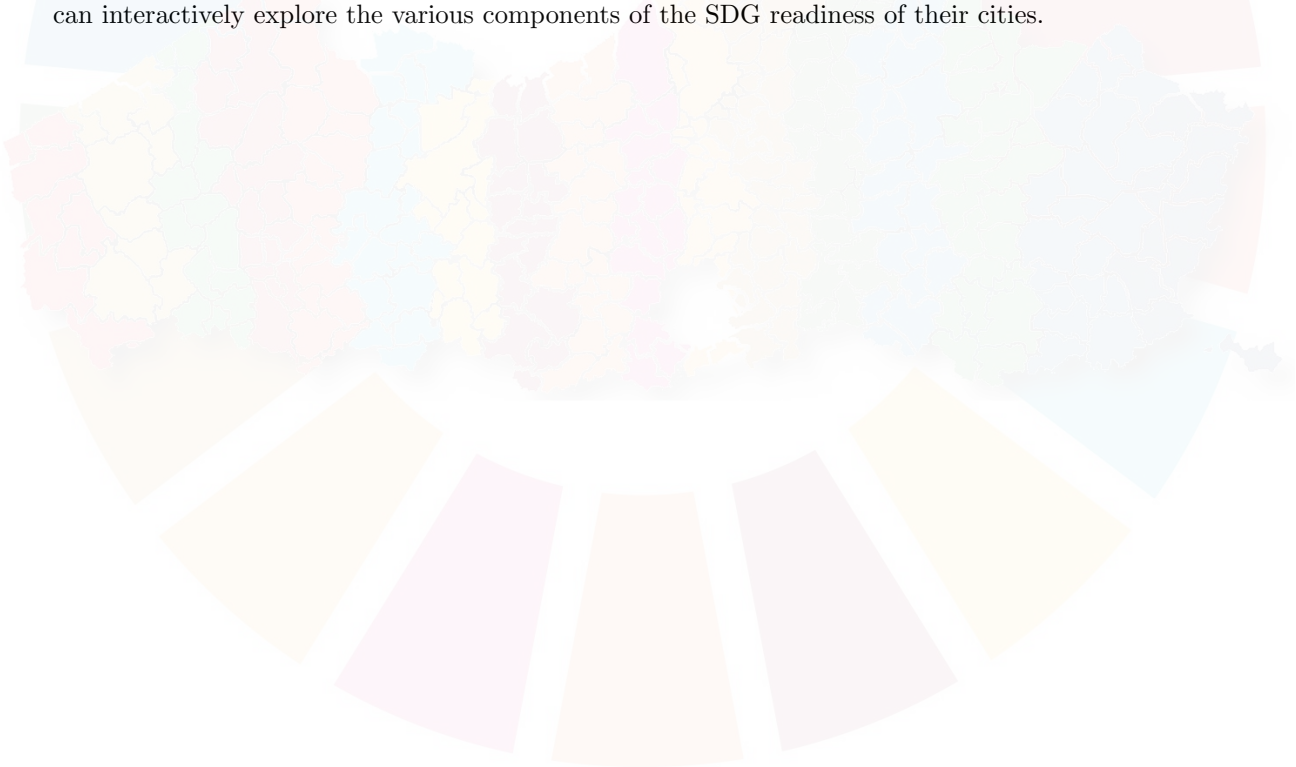
Overall, this report finds that the towns the provinces of Antwerp and Limburg score significantly better than those in the rest of Flanders. For towns in Antwerp, this is likely due to the proximity to the Antwerp harbour, which is reflected in their high score on SDG 9 (Industry and Innovation). This differs quite significantly from what drives Limburg's good scores, which is SDG 6 (Clean Water and Sanitation) and SDG14 (Life on Land). Cities (*Steden*) do not seem to suffer lower scores, and increases in population size are associated with improved scores. Towns with larger surface areas, on the other hand, tend to have a lower score. Similar to the findings of country-level analyses, we find that richer towns tend to score better on the SDGs, particularly on SDG 1 (No Poverty) and SDG 16 (Peace and Institutions).

To illustrate how indexes can be used, we develop Bruges as a case study. It provides a good example of not just looking at the SDG scores themselves, but also placing these in the wider context of the overall distribution of the scores. This shows, for example, that while SDG 15 offers its lowest score, Bruges still does better than two out of five towns. In contrast, the score for SDG 16 is much higher, but less than one in ten towns scores lower. A real understanding of the performance on a particular SDG also requires a detailed look at the individual indicators that comprises it, both in

absolute terms as well as the normalised indicators that compare performances across Flanders. The latter are particularly useful when looking for best practices to emulate.

In conclusion, we believe that this report can be a useful addition to the SDG monitoring and implementation framework in Flanders. Moreover, it paves the way for other regions to follow a similar approach and promote the regional focus in the implementation of the SDGs.

As noted at the start of this document, this paper should be seen as more of a feasibility study of an SDG index, rather than a fully finished product. There are many extensions to this report that we would implement in a more fleshed-out version. The current data selection is almost exclusively based on the selection available from the VVSG. While this dataset contains a large possible selection of indicators, a more replete report would surely benefit from a wider search for relevant data. Moreover, the index is currently limited to 2017. However, the VVSG is currently in the process of updating its database. Adding in this information when it becomes available would allow us to start looking at the evolution in the SDG scores in recent years. This is particularly relevant as this is a period in which an increasing number of Flemish towns implemented various SDG-related policy plans. This would open up the possibility of causal inferences, allowing us to pinpoint the most effective SDG strategies. Finally, to make better use of the index and make this tool accessible to all municipalities, this report would ideally have an online component where both (local) government officials and citizens can interactively explore the various components of the SDG readiness of their cities.



References

H. Aalbers. A territorial approach to the sustainable development goals: Synthesis report. 2020.

R. Bali Swain and S. Ranganathan. Modeling interlinkages between sustainable development goals using network analysis. *World Development*, 138(105136).

W. Easterly. The trouble with the sustainable development goals. *Current History*, 114(775):322–324, 2015.

IGES. Kitakyushu city: the sustainable development goals report. Technical report, Institute for Global Environmental Strategies, 2018.

C. Kroll. *Sustainable Development Goals: Are the rich countries ready?* Citeseer, 2015.

G. Lafortune, K. Zoeteman, G. Fuller, R. Mulder, J. Dagevos, and G. Schmidt-Traub. The 2019 SDG index and dashboards report for european cities. Technical report, 2019.

J. Y. Lin, C. Monga, and S. Standaert. The inclusive sustainable transformation index. *Social Indicators Research*, 143(1):47–80, 2019.

NYC. Voluntary local review: New york city's implementation of the 2030 agenda for sustainable development. Technical report, NYC Mayor's Office, 2019.

P. Pradhan, L. Costa, D. Rybski, W. Lucht, and J. P. Kropp. A systematic study of sustainable development goal (sdg) interactions. *Earth's Future*, 5(11):1169–1179, 2017.

ROK. Year one of implementing the SDGs in the republic of korea: From a model of development success to a vision for sustainable development. Technical report, The Government of the Republic of Korea, 2016.

J. Sachs, G. Schmidt-Traub, C. Kroll, D. Durand-Delacre, and K. Teksoz. SDG index and dashboards report 2017. *New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN)*, 2017.

J. Sachs, G. Schmidt-Traub, C. Kroll, G. Lafortune, G. Fuller, and F. Woelm. *The Sustainable Development Goals and COVID-19. Sustainable Development Report 2020.* 2020.

V. Spaiser, S. Ranganathan, R. B. Swain, and D. J. Sumpter. The sustainable development oxymoron: quantifying and modelling the incompatibility of sustainable development goals. *International Journal of Sustainable Development & World Ecology*, 24(6):457–470, 2017.

UCLG. Toward the localization of the SDGs: How to accelerate transformative actions in the aftermath of the covid-19 outbreak. Technical report, United Cities and Local Governments, 2020.

VVSG. SDG pilot project with local governments 2017-2019: approach and lessons learned. Technical report, Association of Flemish Cities and Municipalities, 2020.

M. Woodbridge. Measuring, monitoring and evaluating the stds. Technical report, ICLEI briefing sheet, Urban Issues No. 06, 2016.

A Comparison of the indicators used in the Euro-cities, OECD, and Flanders City SDG reports

SDG		Euro-cities	OECD	Flanders[A]
1	Severe material deprivation rate in cities	x		
1	People at risk of social exclusion	x		x
1	Average disposable income per day of the first quintile		x	x
1	Fraction population below the 60% of median disposable income		x	x
2	Obesity rate (BMI ¡30)	x		
2	Productivity (GVA per worker) in agriculture, forestry and fishing		x	
2	Change in cropland		x	
3	Traffic fatalities per capita	x		x
3	Infant mortality rate (under 1)	x	x	
3	Physicians or doctors per capita	x	x	
3	Life expectancy	x	x	
3	Daily smokers	x		
3	Active lifestyle	x		x
4	Early leavers from education	x	x	x
4	Adults with upper secondary education	x		
4	NEET ratio: 15-24 neither in employment nor in education or training	x		
4	Satisfaction with schools	x		x
4	Four years-olds in early childhood education	x		
4	Adult participation in learning	x		
4	University appearances in rankings	x		
4	Fraction population with at least tertiary education		x	
5	Gender wage gap	x		
5	Women in regional assemblies	x		
5	Gender gap in unemployment	x	x	x
5	Gender gap in part-time employment incidence		x	x
6	Waste water treated	x		x
6	Population connected to sewerage treatment	x		x
6	Change in water bodies		x	
7	Renewable energy generated	x		x
7	Fraction of electricity production from coal		x	
7	Fraction of electricity production from fossil fuels (excl coal)		x	
8	GDP per capita	x		
8	5 year average of Annual real GDP Growth Rates	x		
8	Long term unemployment Rate	x		x
8	Annual growth rate of real GVA per worker		x	x
8	Unemployment rate		x	x
8	Youth unemployment rate		x	x
9	R&D expenditure	x		
9	Access to Internet at Home	x		x
9	Patent applicants (per million pop)	x	x	
9	Community design applications (per million pop.)	x		
9	Potential road accessibility	x		

SDG		Euro-cities	OECD	Flanders[A]
9	Direct trains to other cities (per million pop.)	x		
9	Productivity (Gross Value Added per worker) in manufacturing		x	x
9	Percentage of labour force with at least tertiary education		x	
10	Gini index of disposable income (after taxes and transfers)	x	x	
10	Ratio between average disposable income of top and bottom quintiles		x	x
11	Concentration PM2.5 (microgr/ m3)	x	x	
11	Emission of nitrogen oxides (kg/km2)	x		
11	Satisfaction affordable housing	x		x
11	Housing cost overburden rate in urban areas	x		
11	Recharging stations per capita	x		
11	Satisfaction public transport	x		x
11	Satisfaction cultural facilities	x		x
11	Sights & landmarks per capita	x		x
11	Museums per capita	x		x
11	Concerts & shows per capita	x		x
11	Built-up area growth rate - population growth rate		x	x
12	Municipal waste Nuts2 per capita	x	x	x
12	Municipal recycling rate	x		
12	Ground water of good chemical status	x		
12	Surface water of good chemical status	x		
12	Number of motor road vehicles per 100 people		x	x
13	CO2 Emissions per capita	x		x
13	Satisfaction with efforts to preserve the environment		x	
13	CO2 emissions per electricity production		x	x
13	Change in cooling degree-days needed to maintain an indoor temp		x	
14	Protected coastal area as a percentage of total coastal area		x	
15	Natura 2000 Area in good quality	x		
15	Urban green area	x		x
15	Soil sealing	x		x
15	Surface Water of Good Ecological Status	x		
15	Change in tree cover (from 1992 to 2015, percentage points)		x	
15	Terrestrial protected areas as a percentage of total area		x	
16	Burglaries	x		x
16	Robberies	x		x
16	Homicides	x	x	x
16	Perception of neighborhood safety	x	x	x
16	Quality of local government	x		x
16	Percentage of population that have confidence in the national government		x	
16	Percentage of population that have confidence in the local police force		x	x
17	Share of PCT co-patent applications that are done with foreign regions		x	
17	Percentage of households with broadband internet access		x	

[A] This indicator is not always included in the same goal.

UNITED NATIONS UNIVERSITY

UNU-CRIS

Institute on Comparative Regional Integration Studies

in alliance with

VRIJE UNIVERSITEIT BRUSSEL

UNIVERSITEIT GENT

Flanders State of the Art

west-vlaanderen de gedreven provincie

BRUGGE

The United Nations University Institute on Comparative Regional Integration Studies (UNU-CRIS) is a research and training institute of the United Nations University, a global network engaged in research and capacity development to support the universal goals of the United Nations and generate new knowledge and ideas. Based in Bruges, UNU-CRIS focuses on the provision of global and regional public goods, and on processes and consequences of intra- and inter-regional integration. The Institute aims to generate policy-relevant knowledge about new patterns of governance and cooperation, and build capacity on a global and regional level. UNU-CRIS acts as a resource for the United Nations system, with strong links to other United Nations bodies dealing with the provision and management of international and regional public goods.

The mission of UNU-CRIS is to contribute to generate policy-relevant knowledge about new forms of governance and cooperation on the regional and global level, about patterns of collective action and decision-making.

UNU-CRIS focuses on issues of imminent concern to the United Nations, such as the 2030 Development Agenda and the challenges arising from new and evolving peace, security, economic and environmental developments regionally and globally. On these issues, the Institute will develop solutions based on research on new patterns of collective action and regional and global governance. The Institute endeavours to pair academic excellence with policy-relevant research in these domains.

For more information, please visit www.cris.unu.edu

UNU-CRIS

Potterierei 72

8000 Bruges

BELGIUM