



# 4.

## *Constructing the PCSDI*

The work carried out to prepare the PCDI 2016 served as a basis for constructing the PCSDI 2019. This index factors in reviewed and updated findings from the previous edition, available up-to-date information and the recommendations of a new statistical team. There are thus similarities and differences between this 2019 PCSDI methodology and composition and the 2016 PCDI.

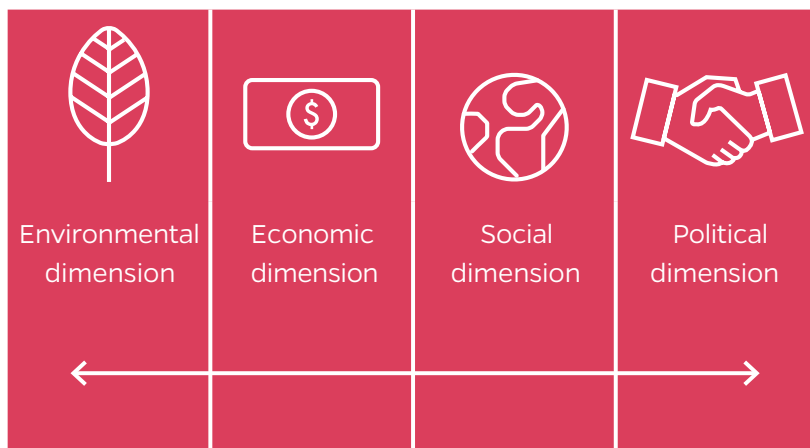
What follows summarizes the most significant elements involved in constructing the 2019 PCSDI, and highlights key changes that have been made with regard to the 2016 PCDI<sup>6</sup>.

### **4.1. POLICY ANALYSIS**

The starting point for constructing the PCSDI was analysis of 20 public policies identified on the basis of four sustainable development dimensions (economic, social, environmental

and political) with a view to gauging the key aspects to be evaluated from the perspective of sustainable development, gender and human rights for each policy and dimension and also to identify indicators that allow them to be measured. In addition, the policies<sup>7</sup> are evaluated in a cross-cutting manner from gender, human rights and cosmopolitan standpoints.

This theoretical work—which was performed by a multidisciplinary research team for the first edition of the PCDI in 2016 and enabled the identification of a set of 202<sup>8</sup> variables that were eligible for the PCDI—also provided the basis for the PCSDI 2019<sup>9</sup>.



The PCDI enables us to analyse a country's public policies through four sustainable development dimensions (economic, social, environmental and political)

#### 4.2. VARIABLE SELECTION

Once these 202 variables had been identified, the data base was purged until a smaller group of variables was identified to collect as much information as possible on the whole set. This clean-up task included the following phases that are not necessarily sequential, but are inter-related and feed into each other:

- Review of the variables: the initial data base was examined and adjustments were made on 20 variables, in some cases to correct errors detected in the previous version, and, in others, to improve the way in which policies are measured. Two variables were eliminated because of the difficulties in collecting up-to-date information, and a new one was added in the environmental component.

6. The methodological document for constructing the PCSDI analyses this process in detail and is available at: [www.icpd.info/en/](http://www.icpd.info/en/)

7. The policies analysed included tourism. However, due to the lack of data suitability for addressing what was to be measured, none of the variables evaluated in this area were ultimately incorporated into the final PCSDI 2019 variables.

8. The number of variables was reduced to 196 after certain category variables measuring related concepts were put in the same group.

9. The findings from the theoretical analysis carried out when constructing the PCDI 2016 are available at <https://www.icpd.info/wp-content/uploads/2016/04/Components-and-policies.pdf>

- **Variable suitability:** in the light of the updated information, analysis was conducted to gauge whether the variables properly measured those aspects of policies for which they were selected. As a result, 15 variables were removed.
- **Missing data:** firstly, countries with data missing for more than 55% of the 197 variables were eliminated from the data base, giving rise to the selection of 148 countries for which the PCSDI was constructed. Secondly, variables were ruled out when there was no data for at least 80% of the 148 countries, which led to the elimination of 61 variables due to missing values.
- **Correlation analysis:** existing correlation was analysed between the variables of each component to prevent information from overlapping. This resulted in the elimination of 13 variables.
- **Final selection of indicators:** the final selection of variables was made from a combination of theoretical criteria based on the research team's analysis and of statistical criteria obtained from analysis of the major components. This gave rise to choosing a final set of 57 variables with which the PCSDI was constructed. It is worth noting that, as part of this process, an in-depth review was conducted on the variables eligible to be included in the environmental component in order to better reflect the ecological impact and effects of public policies.

### 4.3. PCSDI CALCULATION

The PCSDI involves a two tier calculation. Firstly, intermediate indexes are obtained for each component based on the aggregation and weighting of the 57 variables selected. Secondly, the intermediate indexes are aggregated and weighted in order to calculate the final PCSDI.

#### Calculating indexes by component

The index for each component is calculated from the difference between the variables that contribute to and penalize development, once normalized and weighted, and once missing values have been accounted for.

#### Weighting the variables

Unlike the 2016 PCDI, in the 2019 PCSDI, variables are not weighted by Principal component analysis, but were given equal weighting instead. This option was chosen as, having ascertained for the 2016 PCDI that there were no significant differences in the final scores in the ranking whichever method was used, it was easier to interpret and understand.

Therefore, the same weight was allocated to all the variables in the set of variables contributing to and all those in the set of

Table 10. Weighting of the variables in each set and component

Component	Set	Num. variables per set	Weighting of each variable in the set
ECONOMIC	Contribute	2	0.500
	Penalize	3	0.333
SOCIAL	Contribute	15	0.067
	Penalize	6	0.167
GLOBAL	Contribute	12	0.083
	Penalize	4	0.250
ENVIRONMENTAL	Contribute	4	0.250
	Penalize	4	0.250
PRODUCTIVE	Contribute	5	0.200
	Penalize	2	0.500

values penalizing development in each component. This means that the implicit weight of the variables would be determined by the number of variables in each of these sets. As this number differs between one component and another, the variables of each set have different weights (table 10).

### Normalizing the variables

As for the 2016 PCDI, the variables are normalized using the min-max method, which adjusts the values between 0 and 1, with reference to the maximum and minimum values of each variable. Zero is allocated to the value of the worst-performing country and 1 to the value of the best-performing country.

As this method is highly impacted by the maximum and minimum limits established as the benchmark, outliers in the 57 variables were first identified and the following adjustments were made<sup>10</sup>:

- For the “worst” values, the minimum values were adjusted by percentile 2.5 (or 97.5 for compensating variables).
- For the “best” values, the maximum values were adjusted by the first value excluding atypical values or by the first value excluding extreme values.

For the indicators measuring gender gaps or those relating to targets where there is broad international consensus (such as universal access to health or education), the most widely recognized reference values were used.

<sup>10</sup> The methodology document explains the limits set for the outliers.

## Imputation of missing data

Finally, information had to be completed for those countries for which it is not available. Generally, the missing values were estimated based on the behaviour of a group of countries with similar geopolitical characteristics. The countries were first organized into six groups and missing data were replaced by the average of the group assigned to each country<sup>11</sup>. The mode was used for the categorical variables. Also, exceptionally, the missing values of some indicators were estimated based on their theoretical interpretation or specific research work, or by following the indications of the organization that developed them.

## Calculating the indexes by component

Once these adjustments and calculations have been made, the intermediate indexes were calculated as the difference between the average of the indicators contributing to development and the average of the indicators that penalize it.

$$I \text{ component} = \sum_{i=1}^{N^+} \frac{x_i}{N^+} - \sum_{j=1}^{N^-} \frac{y_j}{N^-}$$

Where  $x_i$  are the variables that contribute to development and  $y_j$  those that penalize it for each component.

## Calculating the final index

The calculation of the final index is the arithmetic mean of the indexes of each component, once normalized and weighted.

## Normalizing the indexes per component

The 2019 PCSDI uses a different normalization method from the one used in 2016 when the min-max method was applied. For this index, 0 was assigned to the value of the lowest-scoring country in each

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<sup>11</sup>. The country classification by group is available in the methodology document available at [www.icpd.info/en/](http://www.icpd.info/en/)

component and 100 to the value of the highest-scoring country. The maximum and minimum values of the ranking of each component were thus determined by the countries which performed best and worst in the set.

In the 2019 PCSDI, the components were normalized by assigning a nought (0) to the value of the worst-performing country (as in the 2016 PCDI) and a one hundred (100) to value 100 of each component. The change in the normalization criterion for the maximum score means that the benchmark was no longer the best-performing country (as it was in 2016), but a hypothetical country that obtained the best possible score in all the component variables.

This affects the scores and interpretation of the total PCSDI, because the maximum possible value will be determined by that of the hypothetical country which obtains the best score of all the countries in all indicators in the five components. The maximum scores obtained by countries in the PCSDI are lower and better reflect their scope for PCSD improvement.

### **Weighting the indexes by component**

Another methodological difference between the 2019 PCSDI and the 2016 index involves the weighting of components. In the 2016 PCDI, a different weighting was established for each component decided by the group of experts constructing the index<sup>12</sup>.

For the 2019 PCSDI, the decision was taken to apply equal weighting to the five components for two main reasons. Firstly, it is the prevailing tendency in existing literature when there is no general consensus in the scientific community about the relative importance of each component or empirical evidence supporting an alternative. Secondly, it was a way of prioritizing the index's interpretational simplicity.

### **Aggregating the components**

The final PCSDI is calculated as an arithmetic mean of the intermediate indexes after normalization.

$$PCSDI = \frac{EC^* + SC^* + GC^* + EnC^* + PC^*}{5}$$

These normalized intermediate indexes also operate as rankings of the different components.

<sup>12</sup>. For more information, see <https://www.icpd.info/en/informe-2016/>