METHODOLOGY

BUILDING THE 2023 POLICY COHERENCE INDEX

June 2023

SMART &CITY

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The Coherence Index is an initiative promoted by the Spanish Development NGO Platform, in collaboration with *Futuro en Común* and the *Red Española de Estudios del Desarrollo* (REEDES).

Statistical calculations were made by the Smart&Cities Solutions team.

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The Coherence Index joint committee took part in the construction process. We would also like to express our gratitude to the people and entities that have generously participated in the process, made it more robust and applied it to today's context.

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1. INTRODUCTION

Smart&City Solutions provided methodological and statistical support to the Spanish Development NGO Platform in the process of building and interpreting the new 2023 version of the Policy Coherence Index (Indico).

This document details the work performed and the methodology followed in updating and adapting the Coherence Index and presents the results and final country ranking.

The set of indicators of the previous version of the index, published in 2019, has been reviewed and updated in terms of both methodology and analysis of the availability of possible new indicators. With a view to improving the quality of the measurement, important changes were made in the structure of the indicator and in different phases of the methodology. Moreover, more indicators and countries were analysed.

2. FINAL DATABASE

2.1COUNTRIES ANALYSED

The final database includes 153 countries. We started with the official list of countries recognised by the United Nations and then eliminated the countries for which no information was available for at least 80% of the selected indicators.

2.2 BATTERY OF INDICATORS

A total of 265 indicators were considered in building the Coherence Index. This list was refined through a selection process based on statistical criteria, the opinions of experts working in the different areas covered by the Coherence Index, and criteria applied by Indico's joint committee[1].

Of the final set of 53 indicators, 25 were brought back from the previous version and 28 are new. The following table details the indicators used in this version and their relationship to previous ones.

Code 2016/19	Code 2023	Indicator Name	2016	2019	2023
	D-SC1	Civicus Monitor			1
IT7	D-SC2	Open government index			1
J3	D-DDHH1	Abolition of the death penalty		1	1
J6	D-DDHH2	Ratification of UN Human Rights treaties	1	1	1
J9	D-DDHH3	Ratification of the Rome Statute of the International Criminal Court	1	1	1
EM7	D-DDHH4	Ratification of Fundamental ILO Conventions			1

[1] The joint committee is a team of people from the organizations managing the tool (the Platform, Futuro en Común and REEDES), together with people who participated in the creation and launch of its first edition.

PYS6	D-DDHH5	Participation in international weapons treaties and conventions	1	1	1
	D-DDHH6	Women's access to justice			1
PYS12	D-DDHH7	Existence of an action plan to implement resolution UNSCR 1325		1	1
PYS1	D-MILIT1	Military spending (% GDP)	1	1	1
PYS9	D-MILIT2	Nuclear and heavy weapons capabilities		1	1
	D-MILIT3	Exports and imports of the main conventional weapons (TIV million constant dollars per 100,000 inhabitants)			1
	F-LEG1	Ratification of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and its optional protocol			1
IG5_6_7	F-LEG2	Legislation on violence against women	1	1	1
J10	F-LEG3	Abortion legislation		1	1
	F-LEG4	Legislation on sexual orientation			1
J4_5	F-LEG5	Legal recognition of LGTBI families	1	1	1
	F-LEG6	The law requires equal pay for women and men for work of equal value			1
	F-LEG7	Ratification of the Domestic Workers Convention, 2011 (C-189)			1
	F-LEG8	Women and men have equal legal rights and opportunities at the workplace			1
	F-LEG9	Women and men have equal rights as citizens and the ability to exercise those rights			1
	F-SOC1	Percentage of women who have suffered physical or sexual violence at the hands of their partner			1
	F-SOC2	Average number of years of education (women)			1
	F-SOC3	Percentage of population with at least a secondary education (women)			1
	F-SOC4	Maternal mortality rate			1
	F-SOC5	Adolescent birth rate			1
IG1	F-POL1	Seats held by women in National Parliaments (%)		1	1
	F-POL2	Women in ministerial positions (%)			1

	F-BRECH1	Gender gap in labour force participation rates (% men - % women)			1
F4	F-BRECH2	Account holders in financial institutions or mobile money service providers (% male-% female)		1	1
	F-BRECH3	Average years of education: Difference between men and women (%)			1
	S-SOC1	Completion rate of upper secondary education			1
S2	S-SOC2	Healthy life expectancy at birth (years)	1	1	1
S3	S-SOC3	Number of physicians per 10,000 inhabitants	1	1	1
S10	S-SOC4	Population exposed to levels exceeding WHO reference score for PM2.5 (%)			1
PS1	S-SOC5	Public spending on social protection (% GDP)	1	1	1
	S-SOC6	Population covered by at least one social protection benefit (%)			1
EM1	S-EMP1	Unemployment rate	1	1	1
EM6	S-EMP2	Vulnerable employment (% of total employment)		1	1
FIS1	S-FIS1	Government revenue (% GDP)	1	1	1
FIS3	S-FIS2	Variation rate of the Gini Index before and after taxes and transfers (%)	1	1	1
FIS6	S-FIS3	Financial Secrecy Index	1	1	1
IT4	S-SSBB1	Access to electricity (% of population)	1	1	1
IT5	S-SSBB2	Internet users (per 100 people)		1	1
IT3	S-SSBB3	Improved water sources, rural sector (% of the population with access)	1	1	1
	S-DESIG1	Palma Index			1
B10	ECO1	Participation in international agreements on the environment		1	1
T4	ECO2	Terrestrial and marine protected areas (% of total area)			1
	ECO3	Water stress level: Freshwater extraction as a proportion of available freshwater resources			1
EN1	ECO4	Electricity generation using renewables (excluding hydropower)			1
	ECO-IMP1	Material Footprint per Capita (Consumption)			1
EN4	ECO-IMP2	Carbon dioxide emissions (metric tonnes per person)	1	1	1

Table 1: Comparison of the indicators of the 2023 Coherence Index with those of previous versions

3. METHODOLOGICAL DESCRIPTION OF HOW THE 2023 COHERENCE INDEX WAS BUILT

3.1PREPARATION OF INDICATORS

In step one, 71 indicators were discarded based on the information gathered from previous versions of the index and initial consultations with experts. Hence, the original database was built from information from 241 countries for each of the remaining indicators.

3.1.1 CLASSIFICATION OF INDICATORS BY TRANSITIONS AND DIMENSIONS

It was decided to restructure the index into an aggregate of 4 transitions and a planetary pressure index for use as an ecological adjustment factor. The transitions, in turn, were divided into 13 dimensions for which indicators were identified to measure the coherence of the countries evaluated.

	Transitions	Dimensions	Indicators no.
The transitions	Democractic	Civil society and transparency	12
		Political commitment to human rights and justice	
		Militarization	
	Feminist	Legal and regulatory framework	19
		Social situation of women	
		Political participation	
		Gender gaps	
	Socioeconomic	Social situation	14
		Employment	
		Taxation	
		Basic services	
		Inequality	
	Ecological	Ecological	4
Planetary pressures index			2

Table 2: Transitions, dimensions, and number of indicators of the 2023 Coherence Index

3.1.2 CLASSIFICATION OF INDICATORS BASED ON THEIR CONTRIBUTION TO DEVELOPMENT

In building previous versions of the index, it was observed that not all indicators contribute in the same way to development. We therefore decided to classify indicators into two groups:

- **Indicators exerting a positive effect** on development.
- **Indicators exerting a negative effect** or that hinder development.

The same criteria and classification of indicators used in 2019 were used in this year's version, and new indicators were added to the analysis. The following table shows the classification of the indicators selected according to this criterion.

Code	Dimension	Indicator Name	Classification
D-SC1	Civil society and transparency	Civicus Monitor	POSITIVE
D-SC2	Civil society and transparency	Open government index	POSITIVE
D-DDHH1	Political commitment to human rights and justice	Abolition of the death penalty	POSITIVE
D-DDHH2	Political commitment to human rights and justice	Ratification of UN Human Rights treaties	POSITIVE
D-DDHH3	Political commitment to human rights and justice	Ratification of the Rome Statute of the International Criminal Court	POSITIVE
D-DDHH4	Political commitment to human rights and justice	Ratification of Fundamental ILO Conventions	POSITIVE
D-DDHH5	Political commitment to human rights and justice	Participation in international weapons treaties and conventions	POSITIVE
D-DDHH6	Political commitment to human rights and justice	Women's access to justice	NEGATIVE
D-DDHH7	Political commitment to human rights and justice	Existence of an action plan to implement resolution UNSCR 1325	POSITIVE
D-MILIT1	Militarization	Military spending (% GDP)	NEGATIVE
D-MILIT2	Militarization	Nuclear and heavy weapons capabilities	NEGATIVE
D-MILIT3	Militarization	Exports and imports of the main conventional weapons (TIV million constant dollars per 100,000 inhabitants)	NEGATIVE
F-LEG1	Legal and regulatory framework	Ratification of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and its optional protocol	POSITIVE
F-LEG2	Legal and regulatory framework	Legislation on violence against women	NEGATIVE
F-LEG3	Legal and regulatory framework	Abortion legislation	POSITIVE

F-LEG4	Legal and regulatory framework	Legislation on sexual orientation	POSITIVE
F-LEG5	Legal and regulatory framework	Legal recognition of LGTBI families	POSITIVE
F-LEG6	Legal and regulatory framework	The law requires equal pay for women and men for work of equal value	POSITIVE
F-LEG7	Legal and regulatory framework	Ratification of the Domestic Workers Convention, 2011 (C-189)	POSITIVE
F-LEG8	Legal and regulatory framework	Women and men have equal legal rights and opportunities at the workplace	NEGATIVE
F-LEG9	Legal and regulatory framework	Women and men have equal rights as citizens and the ability to exercise those rights	NEGATIVE
F-SOC1	Social situation of women	Percentage of women who have suffered physical or sexual violence at the hands of their partner	NEGATIVE
F-SOC2	Social situation of women	Average number of years of education (women)	POSITIVE
F-SOC3	Social situation of women	Percentage of population with at least a secondary education (women)	POSITIVE
F-SOC4	Social situation of women	Maternal mortality rate	NEGATIVE
F-SOC5	Social situation of women	Adolescent birth rate	NEGATIVE
F-POL1	Political participation	Seats held by women in National Parliaments (%)	POSITIVE
F-POL2	Political participation	Women in ministerial positions (%)	POSITIVE
F-BRECH1	Gender gaps	Gender gap in labour force participation rates (% men -% women)	NEGATIVE
F-BRECH2	Gender gaps	Account holders in financial institutions or mobile money service providers (% male-% female)	NEGATIVE
F-BRECH3	Gender gaps	Average years of education: Difference between men and women (%)	POSITIVE
S-SOC1	Social situation	Completion rate of upper secondary education	POSITIVE
S-SOC2	Social situation	Healthy life expectancy at birth (years)	POSITIVE
S-SOC3	Social situation	Number of physicians per 10,000 inhabitants	POSITIVE
S-SOC4	Social situation	Population exposed to levels exceeding WHO reference score for PM2.5 (%)	NEGATIVE
S-SOC5	Social situation	Public spending on social protection (% GDP)	POSITIVE

S-SOC6	Social situation	Population covered by at least one social protection benefit (%)	POSITIVE
S-EMP1	Employment	Unemployment rate	NEGATIVE
S-EMP2	Employment	Vulnerable employment (% of total employment)	NEGATIVE
S-FIS1	Taxation	Government revenue (% GDP)	POSITIVE
S-FIS2	Taxation	Variation rate of the Gini Index before and after taxes and transfers (%)	NEGATIVE
S-FIS3	Taxation	Financial Secrecy Index	NEGATIVE
S-SSBB1	Basic services	Access to electricity (% of population)	POSITIVE
S-SSBB2	Basic services	Internet users (per 100 people)	POSITIVE
S-SSBB3	Basic services	Improved water sources, rural sector (% of the population with access)	POSITIVE
S-DESIG1	Inequality	Palma Index	NEGATIVE
ECO1	Ecological transition	Participation in international agreements on the environment	POSITIVE
ECO2	Ecological transition	Terrestrial and marine protected areas (% of total area)	POSITIVE
ECO3	Ecological transition	Water stress level: Freshwater extraction as a proportion of available freshwater resources	NEGATIVE
ECO4	Ecological transition	Electricity generation using renewables (excluding hydropower)	POSITIVE
PLANETARY PRESSURE INDEX			
ECO-IMP1	Planetary pressure index	Material Footprint per Capita (Consumption)	NEGATIVE
ECO-IMP2	Planetary pressure index	Carbon dioxide emissions (metric tonnes per person)	NEGATIVE

Table 3: Ranking of indicators based on their impact on development

3.1.3 COUNTRY RANKING

Countries were divided into six geopolitical regions as per the World Bank classification.

ISO3	Name	World Bank Regions (2022)	World Bank Income (2022)	HDI 21/2022
AGO	Angola	Sub-Saharan Africa	Low-to-middle income	Low HDI
BDI	Burundi	Sub-Saharan Africa	Low income	Low HDI
BEN	Benin	Sub-Saharan Africa	Low-to-middle income	Low HDI
BFA	Burkina Faso	Sub-Saharan Africa	Low income	Low HDI
BWA	Botswana	Sub-Saharan Africa	Upper middle income	Medium HDI

ISO3	Name	World Bank Regions (2022)	World Bank Income (2022)	HDI 21/2022
CAF	Central African Republic	Sub-Saharan Africa	Low income	Low HDI
CIV	Ivory Coast	Sub-Saharan Africa	Low-to-middle income	Low HDI
CMR	Cameroon	Sub-Saharan Africa	Low-to-middle income	Low HDI
COD	Congo (Democratic Republic of)	Sub-Saharan Africa	Low income	Low HDI
COG	Congo (Republic of)	Sub-Saharan Africa	Low-to-middle income	Low HDI
CPV	Cape Verde	Sub-Saharan Africa	Low-to-middle income	Medium HDI
ETH	Ethiopia	Sub-Saharan Africa	Low income	Low HDI
GHA	Ghana	Sub-Saharan Africa	Low-to-middle income	Medium HDI
GIN	Guinea	Sub-Saharan Africa	Low income	Low HDI
GMB	Gambia	Sub-Saharan Africa	Low income	Low HDI
KEN	Kenya	Sub-Saharan Africa	Low-to-middle income	Medium HDI
LBR	Liberia	Sub-Saharan Africa	Low income	Low HDI
LSO	Lesotho	Sub-Saharan Africa	Low-to-middle income	Low HDI
MDG	Madagascar	Sub-Saharan Africa	Low income	Low HDI
MLI	Mali	Sub-Saharan Africa	Low income	Low HDI
MOZ	Mozambique	Sub-Saharan Africa	Low income	Low HDI
MRT	Mauritania	Sub-Saharan Africa	Low-to-middle income	Low HDI
MUS	Mauritius	Sub-Saharan Africa	Upper middle income	High HDI
MWI	Malawi	Sub-Saharan Africa	Low income	Low HDI
NAM	Namibia	Sub-Saharan Africa	Upper middle income	Medium HDI
NER	Niger	Sub-Saharan Africa	Low income	Low HDI
NGA	Nigeria	Sub-Saharan Africa	Low-to-middle income	Low HDI
RWA	Rwanda	Sub-Saharan Africa	Low income	Low HDI
SDN	Sudan	Sub-Saharan Africa	Low income	Low HDI

ISO3	Name	World Bank Regions (2022)	World Bank Income (2022)	HDI 21/2022
SEN	Senegal	Sub-Saharan Africa	Low-to-middle income	Low HDI
SLE	Sierra Leone	Sub-Saharan Africa	Low income	Low HDI
TCD	Chad	Sub-Saharan Africa	Low income	Low HDI
TGO	Togo	Sub-Saharan Africa	Low income	Low HDI
TZA	Tanzania	Sub-Saharan Africa	Low-to-middle income	Low HDI
UGA	Uganda	Sub-Saharan Africa	Low income	Low HDI
ZAF	South Africa	Sub-Saharan Africa	Upper middle income	Medium HDI
ZMB	Zambia	Sub-Saharan Africa	Low-to-middle income	Low HDI
ZWE	Zimbabwe	Sub-Saharan Africa	Low-to-middle income	Low HDI
CAN	Canada	North America	High income	Very high HDI
USA	United States	North America	High income	Very high HDI
ARG	Argentina	Latin America and the Caribbean	Upper middle income	High HDI
BHS	Bahamas	Latin America and the Caribbean	High income	High HDI
BLZ	Belize	Latin America and the Caribbean	Low-to-middle income	Medium HDI
BOL	Bolivia	Latin America and the Caribbean	Low-to-middle income	Medium HDI
BRA	Brazil	Latin America and the Caribbean	Upper middle income	High HDI
CHL	Chile	Latin America and the Caribbean	High income	High HDI
COL	Colombia	Latin America and the Caribbean	Upper middle income	High HDI
CRI	Costa Rica	Latin America and the Caribbean	Upper middle income	High HDI
CUB	Cuba	Latin America and the Caribbean	Upper middle income	High HDI
DOM	Dominican Republic	Latin America and the Caribbean	Upper middle income	Medium HDI
ECU	Ecuador	Latin America and the Caribbean	Upper middle income	Medium HDI

ISO3	Name	World Bank Regions (2022)	World Bank Income (2022)	HDI 21/2022
GTM	Guatemala	Latin America and the Caribbean	Upper middle income	Medium HDI
GUY	Guyana	Latin America and the Caribbean	Upper middle income	Medium HDI
HND	Honduras	Latin America and the Caribbean	Low-to-middle income	Medium HDI
HTI	Haiti	Latin America and the Caribbean	Low-to-middle income	Low HDI
JAM	Jamaica	Latin America and the Caribbean	Upper middle income	Medium HDI
MEX	Mexico	Latin America and the Caribbean	Upper middle income	High HDI
NIC	Nicaragua	Latin America and the Caribbean	Low-to-middle income	Medium HDI
PAN	Panama	Latin America and the Caribbean	Upper middle income	High HDI
PER	Peru	Latin America and the Caribbean	Upper middle income	High HDI
PRY	Paraguay	Latin America and the Caribbean	Upper middle income	Medium HDI
SLV	El Salvador	Latin America and the Caribbean	Low-to-middle income	Medium HDI
TTO	Trinidad and Tobago	Latin America and the Caribbean	High income	High HDI
URY	Uruguay	Latin America and the Caribbean	High income	High HDI
VEN	Venezuela	Latin America and the Caribbean	Not classified	Medium HDI
AFG	Afghanistan	Southern Asia	Low income	Low HDI
BGD	Bangladesh	Southern Asia	Low-to-middle income	Medium HDI
IND	India	Southern Asia	Low-to-middle income	Medium HDI
LKA	Sri Lanka	Southern Asia	Low-to-middle income	High HDI
NPL	Nepal	Southern Asia	Low-to-middle income	Medium HDI
PAK	Pakistan	Southern Asia	Low-to-middle income	Low HDI

ISO3	Name	World Bank Regions (2022)	World Bank Income (2022)	HDI 21/2022
AUS	Australia	Asia and the Pacific	High income	Very high HDI
BRN	Brunei	Asia and the Pacific	High income	High HDI
CHN	China	Asia and the Pacific	Upper middle income	Medium HDI
FJI	Fiji	Asia and the Pacific	Upper middle income	Medium HDI
IDN	Indonesia	Asia and the Pacific	Low-to-middle income	Medium HDI
JPN	Japan	Asia and the Pacific	High income	Very high HDI
KHM	Cambodia	Asia and the Pacific	Low-to-middle income	Low HDI
KOR	South Korea	Asia and the Pacific	High income	Very high HDI
LAO	Laos	Asia and the Pacific	Low-to-middle income	Medium HDI
MMR	Myanmar	Asia and the Pacific	Low-to-middle income	Low HDI
MNG	Mongolia	Asia and the Pacific	Low-to-middle income	Medium HDI
MYS	Malaysia	Asia and the Pacific	Upper middle income	High HDI
NZL	New Zealand	Asia and the Pacific	High income	Very high HDI
PHL	Philippines	Asia and the Pacific	Low-to-middle income	Medium HDI
PNG	Papua New Guinea	Asia and the Pacific	Low-to-middle income	Low HDI
SGP	Singapore	Asia and the Pacific	High income	Very high HDI
THA	Thailand	Asia and the Pacific	Upper middle income	High HDI
VNM	Vietnam	Asia and the Pacific	Low-to-middle income	Medium HDI
ALB	Albania	Europe and Central Asia	Upper middle income	High HDI
ARM	Armenia	Europe and Central Asia	Upper middle income	High HDI
AUT	Austria	Europe and Central Asia	High income	Very high HDI
AZE	Azerbaijan	Europe and Central Asia	Upper middle income	Medium HDI
BEL	Belgium	Europe and Central Asia	High income	Very high HDI

ISO3	Name	World Bank Regions (2022)	World Bank Income (2022)	HDI 21/2022
BGR	Bulgaria	Europe and Central Asia	Upper middle income	High HDI
BIH	Bosnia and Herzegovina	Europe and Central Asia	Upper middle income	High HDI
BLR	Belarus	Europe and Central Asia	Upper middle income	High HDI
CHE	Switzerland	Europe and Central Asia	High income	Very high HDI
CYP	Cyprus	Europe and Central Asia	High income	Very high HDI
CZE	Czech Republic	Europe and Central Asia	High income	Very high HDI
DEU	Germany	Europe and Central Asia	High income	Very high HDI
DNK	Denmark	Europe and Central Asia	High income	Very high HDI
ESP	Spain	Europe and Central Asia	High income	Very high HDI
EST	Estonia	Europe and Central Asia	High income	Very high HDI
FIN	Finland	Europe and Central Asia	High income	Very high HDI
FRA	France	Europe and Central Asia	High income	Very high HDI
GBR	United Kingdom	Europe and Central Asia	High income	Very high HDI
GEO	Georgia	Europe and Central Asia	Upper middle income	High HDI
GRC	Greece	Europe and Central Asia	High income	Very high HDI
HRV	Croatia	Europe and Central Asia	High income	High HDI
HUN	Hungary	Europe and Central Asia	High income	High HDI
IRL	Ireland	Europe and Central Asia	High income	Very high HDI
ISL	Iceland	Europe and Central Asia	High income	Very high HDI
ITA	Italy	Europe and Central Asia	High income	Very high HDI
KAZ	Kazakhstan	Europe and Central Asia	Upper middle income	High HDI
KGZ	Kyrgyzstan	Europe and Central Asia	Low-to-middle income	Medium HDI
LTU	Lithuania	Europe and Central Asia	High income	Very high HDI
LUX	Luxembourg	Europe and Central Asia	High income	Very high HDI
LVA	Latvia	Europe and Central Asia	High income	Very high HDI
MDA	Moldavia	Europe and Central Asia	Upper middle income	Medium HDI
MKD	Northern Macedonia	Europe and Central Asia	Upper middle income	Very high HDI

ISO3	Name	World Bank Regions (2022)	World Bank Income (2022)	HDI 21/2022
MNE	Montenegro	Europe and Central Asia	Upper middle income	High HDI
NLD	Netherlands	Europe and Central Asia	High income	Very high HDI
NOR	Norway	Europe and Central Asia	High income	Very high HDI
POL	Poland	Europe and Central Asia	High income	Very high HDI
PRT	Portugal	Europe and Central Asia	high income	Very high HDI
ROU	Romania	Europe and Central Asia	Upper middle income	High HDI
RUS	Russia	Europe and Central Asia	Upper middle income	High HDI
SRB	Serbia	Europe and Central Asia	Upper middle income	High HDI
SVK	Slovakia	Europe and Central Asia	high income	High HDI
SVN	Slovenia	Europe and Central Asia	high income	Very high HDI
SWE	Sweden	Europe and Central Asia	high income	Very high HDI
TUR	Turkey	Europe and Central Asia	Upper middle income	High HDI
UKR	Ukraine	Europe and Central Asia	Low-to-middle income	High HDI
UZB	Uzbekistan	Europe and Central Asia	Low-to-middle income	Medium HDI
ARE	United Arab Emirates	Middle East and North Africa	High income	Very high HDI
BHR	Bahrain	Middle East and North Africa	High income	High HDI
DZA	Algeria	Middle East and North Africa	Low-to-middle income	Medium HDI
EGY	Egypt	Middle East and North Africa	Low-to-middle income	Medium HDI
IRN	Iran	Middle East and North Africa	Low-to-middle income	High HDI
IRQ	Iraq	Middle East and North Africa	Upper middle income	Medium HDI
ISR	Israel	Middle East and North Africa	High income	Very high HDI
JOR	Jordan	Middle East and North Africa	Upper middle income	Medium HDI

ISO3	Name	World Bank Regions (2022)	World Bank Income (2022)	HDI 21/2022
KWT	Kuwait	Middle East and North Africa	High income	High HDI
LBN	Lebanon	Middle East and North Africa	Upper middle income	Medium HDI
MAR	Morocco	Middle East and North Africa	Low-to-middle income	Medium HDI
MLT	Malta	Middle East and North Africa	High income	Very high HDI
OMN	Oman	Middle East and North Africa	High income	High HDI
QAT	Qatar	Middle East and North Africa	High income	High HDI
SAU	Saudi Arabia	Middle East and North Africa	High income	High HDI
SYR	Syria	Middle East and North Africa	Low income	Low HDI
TUN	Tunisia	Middle East and North Africa	Low-to-middle income	Medium HDI
YEM	Yemen	Middle East and North Africa	Low income	Low HDI

Table 4: Country ranking as per World Bank geopolitical regions

3.2SCREENING OF INDICATORS

3.2.1 ELIMINATION DUE TO MISSING INFORMATION

Indicators for which no information was available for at least 80% of countries or which were last updated prior to 2017 were eliminated. The 72 indicators shown in the following table were eliminated for that reason.

Code	Indicator Name	Obs.	Year
B*	Indicator 2.2.2, Series: Proportion of children moderately or severely overweight (%) SN_STA_OVWGT	76	2017-2019
B13	Biocapacity reserve / deficit (ha per person)	185	2016
B14_prov	Incidence of obesity in the adult population (over age 18)	191	2016
B1b	FIES (Food Insecurity Experience Scale)	185	2016
B2*	Ecological footprint based on consumption	186	2016
B3b	% of land covered by primary forest (not subject to conservation)	146	2020
CIT2	Researchers per million inhabitants	66	2018

Code	Indicator Name	Obs.	Year
CIT5	Gross government funded R&D expenditure (% GDP)	82	2018-2020
CIT6	Female students enrolled in tertiary education (%)	136	2018-2020
DR1	Poverty gap at rural poverty line level (%)	Indicator not available	
DR13	Distribution of agricultural landholders by gender (% of women)	99	2012
DR2	Improved sanitation facilities, rural sector (% of population with access)	78	2018-2020
DR3	Poverty rate based on rural poverty line (% of rural population)	Indicator not available	
EDU*	Proportion of children and young people at the end of year two of secondary school who attain at least a minimum level of proficiency in (i) reading and (ii) mathematics, by gender	78	2017-2020
EDU*	Participation rate of young people and adults in formal and non-formal education and training in the last 12 months, by gender	<40	2017-2020
EDU1	Percentage of children not enrolled at the prescribed age to commence secondary education	53	2020
EDU10	Student-teacher ratio in secondary education	81	2018-2021
EDU12	Net enrolment rate in secondary education (gender parity index)	130	2018-2021
EDU5	% of students remaining in school until reaching the last year of secondary education, both male and female	Indicator not available	
EDU8	Student-teacher ratio in early childhood education	83	2018-2021
EM10_prov	Proportion of young people (between ages 15 and 24) who are not in school, are not employed and are not engaged in vocational training.	96	2018-2019
EM11_prov	Trade union density (%)	<40	2019
EM12_prov	% workers covered by collective bargaining agreements	<40	2019
EN1	Electricity production from renewable sources, excluding hydroelectric (%)	Data not available	
EN2	Ecological footprint from imports (ha. per person)	180	2016
FIS2*	Social public spending (% GDP)	Data not available	
FIS7	Budget transparency index	117	2019

Code	Indicator Name	Obs.	Year
IG10	Companies with women shareholders (%)	51	2018-2020
IG4	Gender pay gap, economic activities	58	2018-2020
IN1	R&D spending (% of GDP)	82	2018
IN3	Unemployed from the industrial-manufacturing sector (% of the total unemployed)	Indicator not available	
IN5*	Water exploitation index	<40	2017
IN9	Gender pay gap in the manufacturing sector (men-women)	Indicator not available	
IT2	Lost income due to power outages (% sales score)	51	2018-2020
J1	Number of judges and magistrates per 100,000 inhabitants		2017
J12	Number of female judges or magistrates per 100,000 inhabitants		2017
J18_prov	Proportion of the population that has had a dispute in the last two years and that made use of a formal or informal dispute resolution mechanism, by type of mechanism	Indicator not available	
J6b	Existence of independent national human rights institutions, in compliance with the Paris Principles	121	2020
M7	Visa requirements for those visiting the country	Indicator not available	
M8	International migrants as a % of the population	123	2020
P1	Ecological footprint by consumption, fishery areas	Indicator not available	
P10	Gender pay gap in fisheries	Indicator not available	
P11	Gender gap in fishery sector employment	Indicator not available	
P12	Gender gap in fishery and aquaculture sector employment	Indicator not available	
P14_prov	Percentage of protected areas in marine environments	187	2019
P15_prov	Country progress in the degree of implementation of international instruments to combat illegal, unreported, and unregulated fishing	144	2020
P17_prov	Progress in ratification, acceptance and implementation of ocean-related instruments that implement international law through legal, political, and institutional frameworks, as reflected in the United Nations Convention on the Law of the Sea, for the conservation and sustainable use of the	45	2021

Code	Indicator Name	Obs.	Year
	oceans and their resources. Score for the implementation of UNCLOS and its two implementation agreements (%)		
P18_prov	Threats to marine biodiversity related to imports (per million inhabitants)	Removed as there is no assurance that data will be updated 175 (2018)	
P19_prov	Fish caught by trawlers	85	2014
P20_prov	Status of the fish population	13	2018
PS2	Public spending on social security (% GDP)	Indicator not available	
PS8	Amount of aid or benefits targeting the poorest quintile (%)	27	2018-2020
PYS4	Facility in gaining access to small arms and light weapons	Failed to reach the 80% threshold	
PYS5b	Homicide rate	90	2019
S11	Population with access to improved sanitation facilities (%)	120	2020
S15_prov	Proportion of women of childbearing age (between 15 and 49) able to meet their family planning needs with modern methods	53	2018-2020
S5	Availability of contraceptives - modern and traditional methods (%): urban	Indicator not available	
S6	Availability of contraceptives - modern and traditional methods (%): rural	Indicator not available	
T7	Gender pay gap by economic activity: hotels and restaurants	58	2018-2020
U1	Poverty rate based on urban poverty line (% of urban population)	16	2020
U4	Air pollution: average annual exposure to PM2.5	194	2017
U5	Intentional homicides (per 100,000 inhabitants)	90	2018
U6	Urban Prosperity Index	46	2016
	Total waste generation by activity (tonnes) EN_TWT_GENV	66	2019
	Femicide- Intentional murder of women	112	2017-2020
	Ratio, between women and men, of the average time spent over a 24-hour period in unpaid domestic care and volunteer work	102	2019
	Proportion of time spent in unpaid care and domestic work, by gender, age, and location	13	2017-2019

Code	Indicator Name	Obs.	Year
	The extent to which countries have enacted laws and regulations ensuring full and equal access for women and men aged 15 and over to sexual and reproductive health care, information and education (%)	32	2019
	Waste generated per capita	46	2017-2019
	Secure access to land assets (under the law)	180	2019
	Secure access to land assets (in practice)	97	2019

Table 5: Indicators eliminated due to missing information

3.2.2 SCREENING BASED ON CONCEPTUAL AND APPROACH CRITERIA

Conceptual and approach criteria were also applied when selecting indicators. Indicators were analysed and evaluated through workshops and direct consultation with experts in the different fields included in the Coherence Index. The opinions of the Index's joint committee members were also taken into consideration. As a result, 63 indicators were eliminated, because they were difficult to implement or construct, did not adequately measure the issues for which they were chosen, or measured parameters already covered by other indicators. Table 6 shows the indicators eliminated based on the above criteria.

Code	Indicator Name
B1	Global Hunger Index
B11	Lack of access to improved water sources (% of rural population)
B12	Lack of access to improved water sources (% of urban population)
B15_prov	Aerial biomass reserve in the forest (tonnes per hectare)
B16_prov	Average proportion of freshwater Key Biodiversity Areas (KBA) included within protected areas (%)
B17_prov	Red List Index
B2	Ecological footprint from production (ha per person)
B3	Average annual deforestation rate
B3a	Ground surface covered by forest
C5	Contribution to UN-WOMEN (GDP per capita)
C6	Contribution to UNEP (GDP per capita)
CIT1	Internet access at schools
CIT10	Households with internet access (%)
CIT11	Households with computers (%)
CIT13	Women with a tertiary education diploma (%)
CIT9	Researchers (ETC) (% women)
DR10	Use of pesticides (tonnes of active substances, per 1,000 ha.)

DR9	Use of fertilisers
EDU11	Net enrolment rate in primary education (gender parity index)
EDU13	% of girls not enrolled in primary school
EDU14	Repetition rate in primary education, all grades, both male and female (%)
EDU2	Percentage of children not enrolled at the prescribed age to commence primary education
EDU4	% of students remaining in school until reaching the last year of primary education, both male and female
EDU4*	Graduation rate
EDU6	Net enrolment rate in year one of primary school, both male and female (%)
EDU7	Expenditure on education (% of total public expenditure)
EDU7b	Public spending on education as a percentage of GDP (%)
EDU9	Student-teacher ratio in primary education
EM8	Employed persons living under the poverty line (% of total employment)
EN3	Environmental vulnerability index
EN6	Population without access to electricity (%)
EN7_prov	Share of renewables in the mix of total energy consumption
F2	Disproportionate size of the banking sector
IG10*	Proportion of women in management positions (total) and proportion of women at senior and middle management levels
IG11_12	Maternity/Paternity leave
IG2	Women in vulnerable employment: Unpaid workers in family businesses (% of female employment)
IG3	Existence of quotas for women under electoral law
IG8	Constitutional guarantee of equality under the law
IN5	Annual freshwater withdrawal for industrial use (% of total freshwater withdrawal)
IN6	CO2 emissions (metric tonnes per capita)
IN7	Ratification of the Convention on the right to organize and collective bargaining
IT1	Railway lines (km per 10,000 people)
IT12_prov	Logistic Performance Index: Quality of infrastructure related to trade and transport (worst 1-5 best)
IT6	CO2 emissions generated by the transport sector (% of total fuel consumed)

IT8	Length (in kilometres) of metro and light rail lines in major cities, since 2006
J13_14_15	Women's rights in the field of justice
J16_prov	World Press Freedom Index
J19_prov	Observatory of killed journalists
J8	Universal jurisdiction
M2	Ease of hiring foreign labour
M3	Refugees and similar (% of the total population)
M4_5	Convention and Protocol relating to the Status of Refugees and the International Convention on the protection of the rights of all migrant workers and their families
P3	Lifestyles and economies in coastal areas
P5	Carbon sequestering
P6	Marine biodiversity
P7	Marine trophic index
P8	Marine protected areas (% of territorial waters)
PS10	Ratification of ILO conventions on social security
PYS7	Participation in international security treaties and conventions
S14_prov	Proportion of the population with large household health expenditure as a percentage of total household expenditure or income
S7	Public spending on healthcare (% GDP)
S8	National public expenditure on health (% of total health expenditure)
U2	Improved sanitation facilities, urban sector (% of population with access)

Table 6: Indicators eliminated due to conceptual and approach criteria

3.2.3 SCREENING FOR STATISTICAL COHERENCE

The last criterion applied in the screening of indicators was the statistical coherence of the indicators and their correlation with the index. In this case, 6 indicators were eliminated for failing to correlate significantly with the Coherence Index or for being problematic in terms of statistical coherence, kurtosis, or symmetry.

Code 16/19	Description	Reason
J17_prov	Proportion of unconvicted detainees out of the total prison population	Non-significant correlation with democratic transition and weak correlation with Indico
P4	Clean water	Statistical coherence. All high-income countries scored 100 and hence this was not useful in drawing distinctions

Code 16/19	Description	Reason
PYS3	Armed forces personnel (per 100,000 inhabitants)	No significant correlation with Indico
S9	Universal Health Coverage Index	Statistical coherence
SECEDUDIF	Difference between males and females in the percentage of population with at least a secondary school education	Problems of kurtosis and asymmetry
	Restricted physical integrity – reproductive autonomy – practice	Statistical coherence and approach: non-significant correlation with socio-economic transition

Table 7: Indicators eliminated due to lack of statistical coherence

3.3IMPUTATION

Country information was completed for those indicators for which no information was available from the data source used for the rest of the countries. To that end, two processes were carried out:

- Identification of information: This method was applied to categorical indicators where it was possible to complete the information for an indicator using other national or international data sources, or where records could be identified corroborating that the non-existence of data was the reason it was not included in the record. Its score could thus be imputed manually.[2][3]
- Nearest neighbours: The rest of the scores were calculated by applying the 'nearest neighbour' algorithm. The K-Nearest Neighbour algorithm, also known as KNN or k-NN, is a non-parametric supervised learning classifier, which uses proximity to make classifications or predictions about the grouping of an individual data point. Commonly used in ranking processes, imputation is performed using the average nearest neighbour scores that are the most closely clustered in each training set. In this specific case, the indicators of each transition are used separately as a training set and the scores of each transition are imputed using the training set to which it belongs. This prevents confusion when there are training sets for countries that have contrasting performance between transitions, such as the nearest neighbours of an economically advanced country with human rights problems that are close to countries of socially and economically advanced regions with a sounder democratic underpinning. This is done by using Python's sklearn.impute.KNImputador library using five neighbours for imputation and a uniform weighting distance. In summary, for each country the algorithm finds the five nearest neighbours based on characteristics within a transition. For each missing score in that transition, the average of the scores of the five nearest neighbours is used to impute the score of a particular indicator.

[2] The imputation of variables of international treaties in the United Nations (UN) database was performed when such treaties did not appear as officially signed or ratified by the corresponding States.

[3] The score of the F-LEG6 variable for Cuba was imputed after consulting the information found in the National Assembly of People's Power of the Republic of Cuba, in its Labour Code Act, Law No. 116.

In addition, there are two units of information that are imputed using the most recent data available for the specific country. This is a specific indicator that, in certain countries, has its own characteristics due to the geopolitical situation and/or the socio-economic context of the area which renders the imputation method inefficient as it gives scores far removed from those most recently recorded or those deemed reasonable for those particular cases. The scores imputed by means of this method are D-MILIT1, military expenditure as a percentage of GDP, applied to Syria and Yemen. For these two countries, World Bank data are used, the source of which is the Stockholm International Peace Research Institute (SIPRI). Figures for Syria are from 2010 and for Yemen from 2014.

3.4STANDARDISATION

A Min-Max method transforming indicators into a range between 0 and 100 was used to work with the indicators, aggregate them, and ultimately build the index.

This standardisation was done in two stages, pre-processing followed by verification. The process was performed on the full battery of indicators, including imputed scores. However, these imputed scores were not considered when analysing the distribution of the data and defining minimum and maximum scores. Although the very nature of the Min-Max method prevents it from being affected by the imputation of missing scores, it was adopted because some of the methods used to smooth and correct indicators (explained further on) could have an impact when using imputed scores within an indicator.

The **first stage** of pre-processing the indicators acts as a statistical filter to correct errors in the individual distribution of each indicator separately. Standardisation, as mentioned above, is performed using the Min-Max method where the minimum and/or maximum reference score for the calculation is established. Thus, the formula for calculating standardisation using the Min-Max method for the different indicators of the index is as follows:

For indicators that exert a 'positive' effect

$$\frac{X_i}{N} = \frac{X_i - X_{min}}{X_{max} - X_{min}}$$

For indicators that exert a 'negative' effect

$$\frac{X_i}{N} = \frac{X_i - X_{max}}{X_{min} - X_{max}}$$

For the selection of reference thresholds, maximum and minimum scores of the indicator in the sample and/or reference limit scores established by international organizations for some specific indicators were prioritised. For certain indicators (such as those measuring gender gaps or related to educational levels), reference scores generally accepted or defined by experts were used to establish maximum and minimum scores.

It is essential to ensure the proper distribution of indicators during the standardisation process. Thus, when distribution problems are encountered within an indicator during the standardisation process, a statistical exploration of the indicator is performed to identify errors that may have been made in calculating the final standardisation. This is done by following criteria based on data asymmetry and kurtosis. According to the recommendations of the Joint Research Centre (JRC), indicator asymmetry levels should not exceed 2 and kurtosis levels should not exceed 3.5 simultaneously; or exceed kurtosis levels of 10. Hence, when an indicator fails to meet these requirements, its distribution is corrected as part of the standardisation process.

Problems associated with the distribution of some indicators are divided into:

- Infrequent scores at the extremes of a distribution.

  This is rare within the sample of indicators used, but at times the distribution of certain indicators' scores exhibited a cluster of uncommon scores at either end of the distribution (minimum or maximum). The percentile method was used to smooth out these anomalies (p 2.5 or p 97.5) which ignores the peaks of outlier scores in the distribution, thus providing a more robust and accurate standardisation.

- Extreme scores.

  Indicators featuring appreciable deviations, but which are not considered outliers with respect to the sample, are considered extreme scores. The standard deviation method, also known as the sigma "k" method or the Chauvenet criterion, is used to correct these anomalies where the minimum and maximum scores are the remainder or sum, respectively, of multiplying the arithmetic mean of the sample by the standard deviation and a cutoff threshold, represented by a "k" score. A k = 3 score is applied if data follow a normal distribution.

- Outliers.

  This is a common problem for some indicators where certain countries may be either substantially ahead or substantially behind the mean score of the rest of the sample. Such significant deviations with respect to the rest of the observations are uncommon. The interquartile method is used to correct these anomalies, where the minimum and maximum scores are the remainder or sum of the interquartile range of the indicator multiplied by 1.5 over the original minimum and maximum scores of the indicator.

Therefore, the following maximum-minimum criteria were applied in the calculation according to the characteristics of each indicator:

Minimum scores.

- Minimum sample score. Standard calculation option.
- Minimum score represented by the 2.5 percentile.
- Minimum score excluding extreme scores. Standard Deviation Method.
- Minimum score excluding outliers. Interquartile method.

Maximum scores.

- Maximum sample score. Standard calculation option.
- Minimum score represented by the 97.5 percentile.
- Maximum score excluding extreme scores. Standard Deviation Method.
- Maximum score excluding outliers. Interquartile method.

Lastly, the **second stage** of indicator verification allows us to review those indicators where none of the established criteria has managed to smooth out their distribution or correct the series. To correct these possible distribution errors, the Winsorization technique was applied. In this process, the scores that distort the distribution of an indicator were excluded following the kurtosis criteria (concentration of the scores of a specific metric in the central part of its frequency distribution) and asymmetry (separation of the distribution of a metric from the arithmetic mean). Winsorization entails transforming the scores of a specific indicator. It limits the extreme scores and/or outliers by means of a specific sampling scale usually corresponding to the percentiles of the sample.

During the verification process, three indicators were identified as exhibiting asymmetry and/or kurtosis problems, even after the processing stage, due to the following reasons:

- DEM6 (Ratification of ILO Fundamental Conventions) is a binary categorical indicator with scores from zero to one.
- SOCIECO4 (population exposed to levels that exceed the WHO reference score for PM2.5) has extreme scores that are impossible to correct without a very high degree of winsorization. They were therefore maintained due to the nature of the indicator itself.
- ECO2 (per-capita dioxide emissions) has an optimal reference score established by experts and international organizations, which skews the scores of the statistics analysed.
- S-FIS3 (Financial Secrecy Index) is characterised by highly asymmetric distribution that cannot be corrected by the methods used in the study. The winsorization technique was therefore chosen to address this problem. Here, the maximum score is adjusted using three units of measurement within the indicator. Luxembourg's score, the fourth highest in the series, was used.

Code	Indicator Name	MAX	MIN	Maximum criterion	Minimum Criterion
D-SC1	Civicus Monitor	4.00	0.00	Maximum score	Minimum score
D-SC2	Open government index	0.87	0.23	Maximum score	Minimum score
D-DDHH1	Abolition of the death penalty	03:00:00	0.00	Maximum score	Minimum score
D-DDHH2	Ratification of UN Human Rights treaties	16.00	4.00	Maximum score	Minimum score
D-DDHH3	Ratification of the Rome Statute of the International Criminal Court	01:00:00	0.00	Maximum score	Minimum score
D-DDHH4	Ratification of Fundamental ILO Conventions	8.00	2.00	Maximum score	Minimum score
D-DDHH5	Participation in international weapons treaties and conventions	8.00	1.00	Maximum score	Minimum score
D-DDHH6	Women's access to justice	1.00	0.00	Maximum score	Minimum score
D-DDHH7	Existence of an action plan to implement resolution UNSCR 1325	1.00	0.00	Maximum score	Minimum score
D-MILIT1	Military spending (% GDP)	5.97	0.01	Maximum score excluding extremes	Minimum score

D-MILIT2	Nuclear and heavy weapons capabilities	5.00	1.00	Maximum score	Minimum score
D-MILIT3	Exports and imports of the main conventional weapons (TIV million constant dollars per 100,000 inhabitants)	572.38	0.00	Maximum score excluding outliers	Minimum score
F-LEG1	Ratification of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and its optional protocol	2.00	0.00	Maximum score	Minimum score
F-LEG2	Legislation on violence against women	1.00	0.00	Maximum score	Optimal score
F-LEG3	Legislation on abortion	4.00	0.00	Maximum score	Minimum score
F-LEG4	Legislation on sexual orientation	8.00	0.00	Maximum score	Minimum score
F-LEG5	Legal recognition of LGTBI families	4.00	0.00	Maximum score	Minimum score
F-LEG6	The law requires equal pay for women and men for work of equal value	1.00	0.00	Maximum score	Minimum score
F-LEG7	Ratification of the Domestic Workers Convention, 2011 (C-189)	1.00	0.00	Maximum score	Minimum score
F-LEG8	Women and men have equal legal rights and opportunities at the workplace	1.00	0.00	Maximum score	Minimum score
F-LEG9	Women and men have equal rights as citizens and the ability to exercise those rights	1.00	0.00	Maximum score	Minimum score
F-SOC1	Percentage of women who have suffered physical or sexual violence at the hands of their partner	85.00	0.00	Maximum score	Optimal score
F-SOC2	Average number of years of education (women)	13.91	1.29	Maximum score	Minimum score
F-SOC3	Percentage of population with at least a secondary education (women)	100.00	6.40	Maximum score	Minimum score
F-SOC4	Maternal mortality rate	735.85	1.00	Maximum score excluding extremes	Minimum score

F-SOC5	Adolescent birth rate	170.46	1.91	Maximum score	Minimum score
F-POL1	Seats occupied by women in National Parliaments (%)	50.00	0.00	Optimal score	Minimum score
F-POL2	Women in ministerial positions (%)	50.00	0.00	Optimal score	Minimum score
F-BRECH1	Gender gap in labour force participation rates (% men -% women)	61.81	0.00	Maximum score	Optimal score
F-BRECH2	Account holders in financial institutions or mobile money service providers (% male-%female)	26.57	0.00	Maximum score	Optimal score
F-BRECH3	Average years of education: Difference between men and women (%)	0.00	-64.82	Optimal score	Minimum score
S-SOC1	Completion rate of upper secondary education	100.00	2.10	Optimal score	Minimum score
S-SOC2	Healthy life expectancy at birth (years)	74.10	52.72	Maximum score	P 2.5 percentile
S-SOC3	Number of physicians per 10,000 inhabitants	84.20	0.35	Maximum score	Minimum score
S-SOC4	Population exposed to levels exceeding WHO reference score for PM2.5 (%)	100.00	0.00	Maximum score	Minimum score
S-SOC5	Public spending on social protection (% GDP)	24.40	0.10	Maximum score	Minimum score
S-SOC6	Population covered by at least one social protection benefit (%)	100.00	1.40	Maximum score	Minimum score
S-EMP1	Unemployment rate	29.95	0.09	Maximum score	Minimum score
S-EMP2	Vulnerable employment (% of total employment)	94.33	0.14	Maximum score	Minimum score
S-FIS1	Government revenue (% GDP)	57.30	5.88	Maximum score	Minimum score
S-FIS2	Variation rate of the Gini Index before and after taxes and transfers (%)	21.79	-49.05	Maximum score	Minimum score
S-FIS3	Financial Secrecy Index	803.67	3.68	Winsorized	Minimum score
S-SSBB1	Access to electricity (% of population)	100.00	18.26	Maximum score	P 2.5 percentile

S-SSBB2	Internet users (per 100 people)	100.00	06:10:00	Maximum score	Minimum score
S-SSBB3	Improved water sources, rural sector (% of the population with access)	100.00	27.21	Maximum score	Minimum score
S-DESIG1	Palma Index	4.71	0.90	Maximum score excluding extremes	Optimal score
ECO1	Participation in international agreements on the environment	10:00:00	05:00:00	Maximum score	Minimum score
ECO2	Terrestrial and marine protected areas (% of total area)	51.34	0.01	Maximum score	Minimum score
ECO3	Water stress level: Freshwater extraction as a proportion of available freshwater resources	100.00	0.01	Optimal score	Minimum score
ECO4	Electricity generation using renewables (excluding hydropower)	81.56	0.00	Maximum score	Minimum score
ECO-IMP1	Material Footprint per Capita (Consumption)	60.04	0.47	Maximum score excluding extremes	Minimum score
ECO-IMP2	Carbon dioxide emissions (metric tonnes per person)	29.80	0.00	Maximum score excluding extremes	Optimal score

Table 8: Maximums and minimums applied in the standardisation process

The standardization process concludes by adapting data to the [0,100] range mentioned above. By smoothing or correcting the limit scores of certain indicators, negative scores or scores above 100 could arise in some countries. Therefore, the battery of indicators is standardised between 0 and 100, applying a conditional hypothesis to each data series where scores below zero are imputed as zero and scores above one hundred are imputed as one hundred. We would point out that these imputed zeros are approximations of zero, which in statistics is called a mathematical probability of zero. Based on Kolmogorov's zero-one law, the condition is imposed that no country will receive a score of zero but rather a number that is approximately equal to zero, in this case '1e-2'.

This is done because zeros in the sample make it impossible to determine geometric means used when building the index, and because, although the scores used to standardise the sample come from the data itself or are verified expert assessments, the assessment criterion remains subjective.

4. CALCULATION OF THE COHERENCE INDEX

The Coherence Index is calculated hierarchically.

LEVEL 1: Calculation of a synthetic indicator for each dimension as the arithmetic mean of the standardised indicators contained in it.

$$Ip_j = \sum_{1}^{N} \frac{X_i}{N}$$

LEVEL 2: Calculation of a synthetic indicator for each transition as the geometric average of the dimensions contained in it, calculated at the previous level. The geometric mean is used so as not to allow full compensability offsetting of high and low scores in different dimensions.

$$It_k = \left(\prod_{j=1}^{n} Ip_j \right)^{\frac{1}{n}} = \sqrt[n]{Ip_1 \cdot Ip_2 \cdots Ip_j}$$

LEVEL 3a: Calculation of the aggregate of the transitions as the geometric average of all the transitions. Just as in the previous case, the geometric mean is used so as not to allow full compensability offsetting of high and low scores in different transitions.

$$T = \sqrt[4]{It_{DEM} \cdot It_{FEM} \cdot It_{SOCIECO} \cdot It_{ECO}}$$

LEVEL 3b: Calculation of the Planetary Pressure Index as the arithmetic mean of the two indicators that compose it.

$$Ipp = \frac{(ECO\text{-}IMP1 + ECO\text{-}IMP2)/2}{100}$$

LEVEL 4: The Coherence Index is calculated by multiplying the aggregate of the transitions by the planetary pressure index.

$$Indico = T * Ipp$$

$T = Agregate\ of\ the\ transitions$

$Ipp = Planetary\ pressure\ index$

$It_{DEM} = Democratic\ transition$

$It_{FEM} = Feminist\ transition$

$It_{SOCIOECO} = Socioeconomic\ transition$

$It_{ECO} = Ecological\ transition$

5. STATISTICAL COHERENCE

Statistical coherence plays a fundamental role in the field of research and evaluation of indices and measurements. It is a rigorous analytical approach that seeks to understand and examine the relationships between the different indicators involved, and to make a very detailed comparison between the classifications of the intermediate indices of the Coherence Index and their constitutive parts. This detailed analysis provides a deeper and more accurate view of the validity and reliability of the results obtained in the final index.

Through correlation analysis, the relationship between the various indicators used and the real-world phenomena that we are trying to measure is explored more thoroughly. This stage is vitally important as it provides insight into how the different aspects that make up the index are interrelated and impact one another.

Correlation analysis enables us to assess the degree to which the data observed support the proposed conceptual framework. Under ideal conditions, one would expect to find positive and significant correlations at every level of the index. According to the JRC-COIN recommendations, these correlations should be between 0.3 and 0.92. This optimal range ensures that the global scores of the index accurately and consistently reflect the scores inherent to the underlying indicators, thus allowing for a reliable measurement of the phenomena being analysed.

However, we must stress the importance of avoiding redundancy within the framework of the index, that is, the presence of extremely high correlations, greater than 0.92, between two or more indicators as they pose a risk of counting the same phenomenon twice, which could lead to overweighting and thus distort the results. Even the smallest signs of redundancy must be carefully identified and addressed to ensure measurement validity and reliability.

As the tables show, there are many significant and positive correlations with scores greater than 0.30. However, below we will mention several noteworthy results in the tables and some problem cases that merit special attention:

- In democratic transition, all indicators are significant and correlate with at least some of the indicators within their own dimension and exhibit excellent results in terms of their correlation within the transition as a whole. The militarization dimension must be highlighted, as it is the only one deviating from these results. No relevant or significant results emerge in terms of correlation with the indicators outside their own dimension.
- In the feminist transition, all indicators are significant and correlate with at least some within its own dimension. It is important to note the possible redundancy between indicators F-SOC2 and F-SOC3 regarding the social situation of women.
- In the socio-economic transition, all indicators are significant and correlate with at least some of the indicators within their own dimension. There is a lack of representativeness and significance in two indicators within the transition, S-EMP1 and S-SSBB1. These not only do not have very low correlations, but also negative correlations vis-à-vis the rest of the transition indicators.
- Correlations in the ecological transition are all positive but low, some not even reaching the 0.30 threshold. This could be a symptom of the diversity of indicators used in the transition and the different aspects they are trying to cover.
- The indicators used in the ecological adjustment factor correlate positively, robustly and significantly.

	NORM_D-SC1	NORM_D-SC2	NORM_D-DDHH1	NORM_D-DDHH2	NORM_D-DDHH3	NORM_D-DDHH4	NORM_D-DDHH5	NORM_D-DDHH6	NORM_D-DDHH7	NORM_D-MILIT1	NORM_D-MILIT2	NORM_D-MILIT3
NORM_D-SC1		0.771	0.484	0.428	0.595	0.270	0.554	0.489	0.365	0.301	0.125	0.082
NORM_D-SC2	0.771		0.449	0.348	0.423	0.059	0.454	0.525	0.414	0.076	-0.091	-0.196
NORM_D-DDHH1	0.484	0.449		0.715	0.446	0.429	0.474	0.484	0.329	0.223	0.188	0.246
NORM_D-DDHH2	0.428	0.348	0.715		0.558	0.550	0.581	0.366	0.434	0.244	0.267	0.269
NORM_D-DDHH3	0.595	0.423	0.446	0.558		0.357	0.673	0.378	0.347	0.361	0.269	0.284
NORM_D-DDHH4	0.270	0.059	0.429	0.550	0.357		0.361	0.265	0.188	0.301	0.321	0.282
NORM_D-DDHH5	0.554	0.454	0.474	0.581	0.673	0.361		0.439	0.280	0.432	0.288	0.210
NORM_D-DDHH6	0.489	0.525	0.484	0.366	0.378	0.265	0.439		0.216	0.350	0.020	0.032
NORM_D-DDHH7	0.365	0.414	0.329	0.434	0.347	0.188	0.280	0.216		0.158	0.146	0.025
NORM_D-MILIT1	0.301	0.076	0.223	0.244	0.361	0.301	0.432	0.350	0.158		0.311	0.325
NORM_D-MILIT2	0.125	-0.091	0.188	0.267	0.269	0.321	0.288	0.020	0.146	0.311		0.652
NORM_D-MILIT3	0.082	-0.196	0.246	0.269	0.284	0.282	0.210	0.032	0.025	0.325	0.652	

Table 9: Correlations of indicators in the same transition. Democratic.

	NORM_F-LEG1	NORM_F-LEG2	NORM_F-LEG3	NORM_F-LEG4	NORM_F-LEG5	NORM_F-LEG6	NORM_F-LEG7	NORM_F-LEG8	NORM_F-LEG9	NORM_F-SOC1	NORM_F-SOC2	NORM_F-SOC3	NORM_F-SOC4	NORM_F-SOC5	NORM_F-POL1	NORM_F-POL2	NORM_F-BRECH1	NORM_F-BRECH2	NORM_F-BRECH3
NORM_F-LEG1		0.257	0.461	0.532	0.319	0.268	0.233	0.288	0.421	0.245	0.260	0.251	0.196	0.104	0.301	0.232	0.332	0.195	0.179
NORM_F-LEG2	0.257		0.155	0.419	0.232	0.072	0.197	0.222	0.258	0.097	0.131	0.111	0.126	0.115	0.177	0.303	0.184	0.112	0.113
NORM_F-LEG3	0.461	0.155		0.463	0.334	0.327	-0.090	0.255	0.396	0.257	0.470	0.483	0.392	0.448	0.317	0.204	0.349	0.315	0.254
NORM_F-LEG4	0.532	0.419	0.463		0.660	0.348	0.315	0.498	0.560	0.291	0.530	0.502	0.451	0.343	0.434	0.484	0.341	0.363	0.385
NORM_F-LEG5	0.319	0.232	0.334	0.660		0.350	0.373	0.462	0.332	0.208	0.449	0.391	0.338	0.374	0.397	0.471	0.265	0.383	0.318
NORM_F-LEG6	0.268	0.072	0.327	0.348	0.350		0.176	0.333	0.126	0.013	0.197	0.122	0.070	0.124	0.379	0.308	0.287	0.093	0.081
NORM_F-LEG7	0.233	0.197	-0.090	0.315	0.373	0.176		0.213	0.182	0.046	0.115	0.080	0.114	0.005	0.306	0.330	0.122	0.162	0.175
NORM_F-LEG8	0.288	0.222	0.255	0.498	0.462	0.333	0.213		0.291	0.222	0.305	0.248	0.258	0.197	0.430	0.468	0.298	0.281	0.234
NORM_F-LEG9	0.421	0.258	0.396	0.560	0.332	0.126	0.182	0.291		0.252	0.359	0.376	0.272	0.196	0.387	0.282	0.330	0.364	0.293
NORM_F-SOC1	0.245	0.097	0.257	0.291	0.208	0.013	0.046	0.222	0.252		0.452	0.445	0.429	0.391	0.074	0.097	0.173	0.323	0.422
NORM_F-SOC2	0.260	0.131	0.470	0.530	0.449	0.197	0.115	0.305	0.359	0.452		0.965	0.753	0.772	0.228	0.182	0.069	0.528	0.815
NORM_F-SOC3	0.251	0.111	0.483	0.502	0.391	0.122	0.080	0.248	0.376	0.445	0.965		0.741	0.754	0.182	0.133	0.070	0.513	0.760
NORM_F-SOC4	0.196	0.126	0.392	0.451	0.338	0.070	0.114	0.258	0.272	0.429	0.753	0.741		0.781	0.229	0.101	-0.165	0.356	0.709
NORM_F-SOC5	0.104	0.115	0.448	0.343	0.374	0.124	0.005	0.197	0.196	0.391	0.772	0.754	0.781		0.117	0.042	-0.119	0.400	0.622
NORM_F-POL1	0.301	0.177	0.317	0.434	0.397	0.379	0.306	0.430	0.387	0.074	0.228	0.182	0.229	0.117		0.597	0.270	0.209	0.148
NORM_F-POL2	0.232	0.303	0.204	0.484	0.471	0.308	0.330	0.468	0.282	0.097	0.182	0.133	0.101	0.042	0.597		0.355	0.160	0.088
NORM_F-BRECH1	0.332	0.184	0.349	0.341	0.265	0.287	0.122	0.298	0.330	0.173	0.069	0.070	-0.165	-0.119	0.270	0.355		0.337	-0.078
NORM_F-BRECH2	0.195	0.112	0.315	0.363	0.383	0.093	0.162	0.281	0.364	0.323	0.528	0.513	0.356	0.400	0.209	0.160	0.337		0.448
NORM_F-BRECH3	0.179	0.113	0.254	0.385	0.318	0.081	0.175	0.234	0.293	0.422	0.815	0.760	0.709	0.622	0.148	0.088	-0.078	0.448	

Table 10: Correlations of indicators in the same transition. Feminist.

	NORM_S-SOC1	NORM_S-SOC2	NORM_S-SOC3	NORM_S-SOC4	NORM_S-SOC5	NORM_S-SOC6	NORM_S-EMP1	NORM_S-EMP2	NORM_S-FIS1	NORM_S-FIS2	NORM_S-FIS3	NORM_S-SSBB1	NORM_S-SSBB2	NORM_S-SSBB3	NORM_S-DESIG1
NORM_S-SOC1		0.825	0.755	0.320	0.683	0.761	0.052	0.810	0.559	0.644	-0.388	0.828	0.869	0.751	0.420
NORM_S-SOC2	0.825		0.745	0.397	0.692	0.738	0.141	0.805	0.559	0.648	-0.473	0.802	0.822	0.765	0.470
NORM_S-SOC3	0.755	0.745		0.417	0.775	0.758	0.087	0.735	0.676	0.770	-0.233	0.633	0.734	0.658	0.488
NORM_S-SOC4	0.320	0.397	0.417		0.440	0.516	0.113	0.399	0.402	0.533	-0.198	0.243	0.397	0.314	0.279
NORM_S-SOC5	0.683	0.692	0.775	0.440		0.764	-0.017	0.672	0.785	0.825	-0.307	0.520	0.662	0.583	0.467
NORM_S-SOC6	0.761	0.738	0.758	0.516	0.764		0.067	0.716	0.581	0.728	-0.398	0.617	0.755	0.629	0.417
NORM_S-EMP1	0.052	0.141	0.087	0.113	-0.017	0.067		-0.059	-0.028	0.108	-0.211	-0.005	0.050	0.034	0.278
NORM_S-EMP2	0.810	0.805	0.735	0.399	0.672	0.716	-0.059		0.630	0.633	-0.431	0.780	0.870	0.799	0.381
NORM_S-FIS1	0.559	0.559	0.676	0.402	0.785	0.581	-0.028	0.630		0.762	-0.232	0.388	0.596	0.489	0.348
NORM_S-FIS2	0.644	0.648	0.770	0.533	0.825	0.728	0.108	0.633	0.762		-0.308	0.437	0.619	0.572	0.486
NORM_S-FIS3	-0.388	-0.473	-0.233	-0.198	-0.307	-0.398	-0.211	-0.431	-0.232	-0.308		-0.319	-0.443	-0.360	-0.157
NORM_S-SSBB1	0.828	0.802	0.633	0.243	0.520	0.617	-0.005	0.780	0.388	0.437	-0.319		0.820	0.760	0.346
NORM_S-SSBB2	0.869	0.822	0.734	0.397	0.662	0.755	0.050	0.870	0.596	0.619	-0.443	0.820		0.754	0.402
NORM_S-SSBB3	0.751	0.765	0.658	0.314	0.583	0.629	0.034	0.799	0.489	0.572	-0.360	0.760	0.754		0.381
NORM_S-DESIG1	0.420	0.470	0.488	0.279	0.467	0.417	0.278	0.381	0.348	0.486	-0.157	0.346	0.402	0.381	

Table 11: Correlations of indicators in the same transition. Socio-economic.

	NORM_ECO1	NORM_ECO2	NORM_ECO3	NORM_ECO4
NORM_ECO1		0.217	0.145	0.288
NORM_ECO2	0.217		0.324	0.154
NORM_ECO3	0.145	0.324		0.203
NORM_ECO4	0.288	0.154	0.203	

	NORM_ECO-IMP1	NORM_ECO-IMP2
NORM_ECO-IMP1		0.866
NORM_ECO-IMP2	0.866	

Table 12: Correlations of indicators in the same transition. Ecological and ecological adjustment factor.

This correlation analysis continues with the results shown in Table 13. The different sub-tables comprising it show the correlations between the indicators and the aggregate of their dimension, the aggregate of their transition and the final index (13.a), the correlation between the aggregate of the dimensions and the aggregate of their transition and the final index (13.b), and lastly, the correlation between the aggregates of the transitions and the final index.

The results show how all indicators, except S-EMP1 (not correlated with its transition) and S-FIS3 (not correlated with its dimension or transition), correlated significantly and robustly not only with their dimension but also with their transition. A few high coefficients can be found, above the 0.92 threshold, used to highlight redundancy. These results demonstrate the sound structure and construction of the index at early and intermediate stages. These two indicators (S-EMP1 and S-FIS3) should be monitored in future versions of the index in order to consider their modification or whether they should be included in future versions.

As for the results shown in sub-tables 13.b and 13.c, the dimensions are adequately coherent and properly assigned within their respective transitions, showing notably high correlation levels. However, there is an excessively high correlation between the 'social situation' dimension and the socioeconomic transition, potentially indicating a dependency on this 'subpillar'. Despite this pronounced correlation, it is important to note that no excess correlation was found when analysing the relationship between the dimensions and the final index, or the relationship between the transitions and the final index. This finding is encouraging as it indicates that a

balanced representation of the transitions has been achieved in the overall context of the analysis. However, there is a very low correlation between the socio-economic transition and the general index. This is because the transition total correlates negatively with the adjustment factor, while the socioeconomic transition specifically correlates significantly with a correlation coefficient of -0.63. Because of the way the index was formulated, this correlation detracts from the representativeness of this transition as regards the score of the final index.

The results obtained solidly support the existing coherence between the conceptual framework and the statistical structure of the pillars analysed. Likewise, these results reaffirm the validity of the conceptual framework as an effective tool to evaluate and understand the pillars in the study. The issue of the representativeness of one of the transitions is linked to the very construction of the final index and is supported by the theoretical and conceptual assumptions underpinning it. In any case, the indicators and indicators used in the analysis are appropriate to capture the essential aspects of the pillars being evaluated. This ensures that the analysis provides an accurate representation of the key dimensions and how they interrelate.

	Dimensión	Transición	Índice
NORM_D-SC1	0.956	0.864	0.298
NORM_D-SC2	0.925	0.703	0.147
NORM_D-DDHH1	0.783	0.657	0.464
NORM_D-DDHH2	0.817	0.663	0.627
NORM_D-DDHH3	0.782	0.736	0.422
NORM_D-DDHH4	0.551	0.436	0.441
NORM_D-DDHH5	0.739	0.708	0.432
NORM_D-DDHH6	0.620	0.577	0.305
NORM_D-DDHH7	0.633	0.507	0.229
NORM_D-MILIT1	0.629	0.448	0.369
NORM_D-MILIT2	0.823	0.422	0.218
NORM_D-MILIT3	0.894	0.373	0.321
NORM_F-LEG1	0.640	0.525	0.470
NORM_F-LEG2	0.426	0.361	0.216
NORM_F-LEG3	0.584	0.575	0.174
NORM_F-LEG4	0.830	0.780	0.389
NORM_F-LEG5	0.730	0.671	0.048
NORM_F-LEG6	0.599	0.479	0.138
NORM_F-LEG7	0.480	0.393	0.253
NORM_F-LEG8	0.655	0.610	0.222
NORM_F-LEG9	0.628	0.596	0.455
NORM_F-SOC1	0.587	0.392	0.035
NORM_F-SOC2	0.949	0.666	-0.044
NORM_F-SOC3	0.942	0.622	-0.027
NORM_F-SOC4	0.874	0.516	-0.023
NORM_F-SOC5	0.874	0.461	-0.129
NORM_F-POL1	0.880	0.711	0.289
NORM_F-POL2	0.906	0.686	0.270
NORM_F-BRECH1	0.606	0.437	0.277
NORM_F-BRECH2	0.855	0.518	0.039
NORM_F-BRECH3	0.641	0.523	0.021
NORM_S-SOC1	0.871	0.863	0.004
NORM_S-SOC2	0.877	0.876	0.005
NORM_S-SOC3	0.874	0.846	0.111
NORM_S-SOC4	0.618	0.488	-0.135
NORM_S-SOC5	0.861	0.787	0.180
NORM_S-SOC6	0.913	0.802	0.066
NORM_S-EMP1	0.456	0.188	-0.077
NORM_S-EMP2	0.862	0.832	-0.167
NORM_S-FIS1	0.827	0.670	0.094
NORM_S-FIS2	0.775	0.768	0.075
NORM_S-FIS3	0.254	-0.315	0.347
NORM_S-SSBB1	0.936	0.795	0.019
NORM_S-SSBB2	0.931	0.857	-0.113
NORM_S-SSBB3	0.901	0.784	0.009
NORM_S-DESIG1	1.000	0.682	-0.028
NORM_ECO1	0.521	0.521	0.247
NORM_ECO2	0.676	0.676	0.216
NORM_ECO3	0.767	0.767	0.540
NORM_ECO4	0.570	0.570	0.222
NORM_ECO-IMP1	0.968	0.968	0.544
NORM_ECO-IMP2	0.964	0.964	0.581

Tabla 11.a

	Transición	Índice
Sociedad civil y transparencia	0.843	0.246
Compromiso político con los DDHH y la justicia	0.872	0.559
Militarización	0.508	0.380
Marco legal y normativo	0.894	0.407
Situación social mujeres	0.632	-0.047
Participación política	0.781	0.312
Brechas de género	0.701	0.161
Situación social	0.927	0.041
Empleo	0.837	-0.188
Fiscalidad	0.600	0.280
Servicios básicos	0.880	-0.031
Desigualdad	0.682	-0.028
Transición ecológica	1.000	0.511
Impactos y presiones ambientales	1.000	0.582

Tabla 11.b

	Índice
Democrática	0.490
Feminista	0.355
Socioeconómica	0.048
Ecológica	0.511
Factor de Ajuste Ecológico	0.582

Tabla 11.c

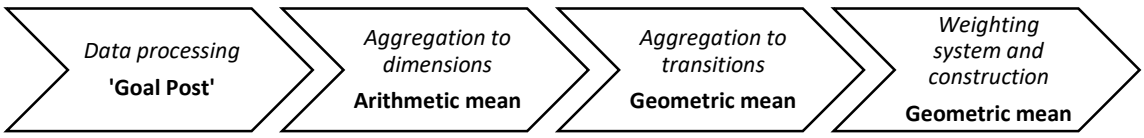
Table 13: Correlations of indicators in the same transition. Ecological and ecological adjustment factor.

6. UNCERTAINTY AND SENSITIVITY ANALYSIS

Uncertainty and sensitivity analysis of a composite indicator involves evaluating the different modelling assumptions and their effect on country ranking. Despite great efforts made when developing the index, there is a degree of subjectivity in the options chosen. This which can be explored by comparing the results obtained with different alternative assumptions. The literature suggests the robustness of the index be evaluated by simulating assumptions and applying a multiple modelling approach.

The Coherence Index is the result of several choices, including the underlying theoretical framework, the indicators selected, the imputation of missing scores, the weighting scheme, the standardisation method, and the aggregation method. Some of these choices may be based on expert opinions, considerations driven by statistical analysis, or the need to facilitate communication or draw attention to specific issues. This section aims to test the impact of varying some of these assumptions within a range of plausible alternatives as part of an uncertainty analysis.

The modelling issues considered in our evaluation of the robustness of the Coherence Index are the aggregation formula, data processing (outliers and standardisation) and the weighting of the pillars. This analysis is performed on the aggregate of the four calculated transitions, i.e. without taking the ecological adjustment factor into account. For the Coherence Index, we decided to use the 'goal post' system based on both statistical and conceptual criteria, the arithmetic mean for the first method of aggregation to dimensions, the geometric mean for the second method of aggregation to transitions and, lastly, a final weighting to build the index prior to the adjustment factor generated by a geometric mean of the transitions.



To evaluate the impact of these choices, we analysed the different alternatives resulting from modifying the arithmetic and/or geometric mean at the different levels of aggregation: dimensions, transitions, and transition aggregation. Also, to include a greater number of different interactions, data processing was modified by alternating the different alternatives between the 'Goal Post' and 'Min-Max' methods, in other words, by strictly standardising using the minimum and maximum scores of each indicator. Lastly, we modelled 15 different assumptions and then compared the resulting rankings and the ranking generated for the Coherence Index with the chosen frame of reference. The different combinations of these alternative constructions can be seen in the following table.

	Data processing	**Aggregation formula 1**	**Aggregation formula 2**	**Aggregation formula 3**
Reference	'GOAL POST'	ARITHMETIC	GEOMETRIC	GEOMETRIC
Alternative 1	'GOAL POST'	ARITHMETIC	GEOMETRIC	ARITHMETIC

	Data processing	Aggregation formula 1	Aggregation formula 2	Aggregation formula 3
Alternative 2	'GOAL POST'	ARITHMETIC	ARITHMETIC	GEOMETRIC
Alternative 3	'GOAL POST'	ARITHMETIC	ARITHMETIC	ARITHMETIC
Alternative 4	'GOAL POST'	GEOMETRIC	ARITHMETIC	ARITHMETIC
Alternative 5	'GOAL POST'	GEOMETRIC	ARITHMETIC	GEOMETRIC
Alternative 6	'GOAL POST'	GEOMETRIC	GEOMETRIC	ARITHMETIC
Alternative 7	'GOAL POST'	GEOMETRIC	GEOMETRIC	GEOMETRIC
Alternative 8	MIN-MAX	ARITHMETIC	GEOMETRIC	GEOMETRIC
Alternative 9	MIN-MAX	ARITHMETIC	GEOMETRIC	ARITHMETIC
Alternative 10	MIN-MAX	ARITHMETIC	ARITHMETIC	GEOMETRIC
Alternative 11	MIN-MAX	ARITHMETIC	ARITHMETIC	ARITHMETIC
Alternative 12	MIN-MAX	GEOMETRIC	ARITHMETIC	ARITHMETIC
Alternative 13	MIN-MAX	GEOMETRIC	ARITHMETIC	GEOMETRIC
Alternative 14	MIN-MAX	GEOMETRIC	GEOMETRIC	ARITHMETIC
Alternative 15	MIN-MAX	GEOMETRIC	GEOMETRIC	GEOMETRIC

Table 14: Combinations used to generate alternative constructions.

The results of the robustness analysis are found in the following table which shows the ranking of the aggregate of the Indico 2023 transitions, the interval of rankings resulting from the 15 assumptions, the range of these alternative classifications, the average ranking of all assumptions and the median ranking of all assumptions.

ISO3	Name	Ranking	Interval	Range	Average	Median
AFG	**Afghanistan**	138	[121,148]	27	137	142
AGO	**Angola**	119	[103,136]	33	124	126
ALB	**Albania**	30	[29,51]	22	40	42
ARE	**United Arab Emirates**	126	[75,148]	73	113	117
ARG	**Argentina**	35	[23,38]	15	33	35
ARM	**Armenia**	58	[50,87]	37	71	82

ISO3	Name	Ranking	Interval	Range	Average	Median
AUS	**Australia**	19	[15,31]	16	20	20
AUT	**Austria**	3	[3,9]	6	5	5
AZE	**Azerbaijan**	86	[83,132]	49	105	107
BDI	**Burundi**	129	[111,148]	37	133	135
BEL	**Belgium**	9	[5,9]	4	7	7
BEN	**Benin**	109	[101,139]	38	116	113
BFA	**Burkina Faso**	105	[74,109]	35	91	84
BGD	**Bangladesh**	103	[108,130]	22	120	122
BGR	**Bulgaria**	27	[25,33]	8	28	28
BHR	**Bahrain**	140	[116,150]	34	133	134
BHS	**Bahamas**	77	[71,101]	30	85	82
BIH	**Bosnia and Herzegovina**	48	[47,64]	17	54	52
BLR	**Belarus**	79	[65,114]	49	77	72
BLZ	**Belize**	66	[53,69]	16	64	66
BOL	**Bolivia**	50	[46,64]	18	56	56
BRA	**Brazil**	46	[22,48]	26	37	37
BRN	**Brunei**	117	[104,141]	37	123	123
BWA	**Botswana**	84	[86,109]	23	96	92
CAF	**Central African Republic**	147	[139,153]	14	147	148
CAN	**Canada**	17	[14,23]	9	18	17
CHE	**Switzerland**	26	[20,29]	9	25	26
CHL	**Chile**	32	[21,34]	13	29	28
CHN	**China**	125	[103,152]	49	128	128
CIV	**Ivory Coast**	102	[102,130]	28	112	111
CMR	**Cameroon**	114	[107,133]	26	122	122
COD	**Congo (Democratic Republic)**	131	[117,140]	23	130	132
COG	**Congo (Republic of)**	118	[114,131]	17	120	120

ISO3	Name	Ranking	Interval	Range	Average	Median
COL	**Colombia**	64	[60,82]	22	70	71
CPV	**Cape Verde**	55	[51,121]	70	75	72
CRI	**Costa Rica**	40	[38,48]	10	42	42
CUB	**Cuba**	75	[68,104]	36	79	76
CYP	**Cyprus**	31	[30,36]	6	32	32
CZE	**Czech Republic**	20	[17,25]	8	21	22
DEU	**Germany**	8	[1,18]	17	7	6
DNK	**Denmark**	1	[1,3]	2	1	1
DOM	**Dominican Republic**	59	[53,63]	10	58	57
DZA	**Algeria**	141	[117,147]	30	134	134
ECU	**Ecuador**	51	[51,66]	15	59	59
EGY	**Egypt**	152	[94,152]	58	135	145
ESP	**Spain**	24	[13,30]	17	20	17
EST	**Estonia**	12	[8,14]	6	10	10
ETH	**Ethiopia**	115	[95,138]	43	121	124
FIN	**Finland**	4	[1,5]	4	4	4
FJI	**Fiji**	65	[66,79]	13	73	71
FRA	**France**	25	[17,47]	30	25	22
GBR	**United Kingdom**	28	[14,45]	31	24	21
GEO	**Georgia**	42	[43,62]	19	49	48
GHA	**Ghana**	78	[67,83]	16	76	78
GIN	**Guinea**	111	[98,116]	18	108	107
GMB	**Gambia**	95	[99,117]	18	107	107
GRC	**Greece**	36	[32,40]	8	37	37
GTM	**Guatemala**	72	[52,79]	27	64	56
GUY	**Guyana**	54	[55,65]	10	61	61
HND	**Honduras**	80	[66,85]	19	76	74

ISO3	Name	Ranking	Interval	Range	Average	Median
HRV	**Croatia**	18	[15,24]	9	20	20
HTI	**Haiti**	132	[126,147]	21	139	140
HUN	**Hungary**	37	[34,45]	11	39	38
IDN	**Indonesia**	83	[74,97]	23	89	90
IND	**India**	133	[130,145]	15	139	138
IRL	**Ireland**	13	[13,18]	5	15	15
IRN	**Iran**	151	[136,152]	16	147	149
IRQ	**Iraq**	135	[130,145]	15	138	138
ISL	**Iceland**	7	[7,19]	12	12	12
ISR	**Israel**	127	[79,133]	54	96	94
ITA	**Italy**	29	[14,33]	19	26	29
JAM	**Jamaica**	67	[67,90]	23	73	70
JOR	**Jordan**	123	[74,140]	66	112	106
JPN	**Japan**	61	[41,68]	27	53	49
KAZ	**Kazakhstan**	62	[53,65]	12	61	61
KEN	**Kenya**	76	[50,79]	29	64	58
KGZ	**Kyrgyzstan**	71	[67,125]	58	85	80
KHM	**Cambodia**	90	[77,104]	27	91	91
KOR	**South Korea**	68	[51,77]	26	62	58
KWT	**Kuwait**	139	[129,153]	24	141	141
LAO	**Laos**	108	[98,146]	48	120	118
LBN	**Lebanon**	106	[105,123]	18	113	113
LBR	**Liberia**	112	[89,129]	40	111	117
LKA	**Sri Lanka**	98	[87,108]	21	97	97
LSO	**Lesotho**	93	[92,137]	45	113	116
LTU	**Lithuania**	10	[10,16]	6	13	13
LUX	**Luxembourg**	2	[2,10]	8	4	3

ISO3	Name	Ranking	Interval	Range	Average	Median
LVA	**Latvia**	22	[18,28]	10	23	23
MAR	**Morocco**	100	[85,126]	41	105	101
MDA	**Moldavia**	33	[32,44]	12	38	39
MDG	**Madagascar**	110	[104,127]	23	115	116
MEX	**Mexico**	43	[28,45]	17	39	38
MKD	**Northern Macedonia**	45	[44,48]	4	46	46
MLI	**Mali**	101	[78,111]	33	99	102
MLT	**Malta**	47	[30,46]	16	35	33
MMR	**Myanmar**	136	[117,148]	31	133	132
MNE	**Montenegro**	41	[38,43]	5	40	40
MNG	**Mongolia**	44	[43,52]	9	47	47
MOZ	**Mozambique**	120	[99,131]	32	115	115
MRT	**Mauritania**	128	[102,142]	40	128	128
MUS	**Mauritius**	60	[58,109]	51	71	64
MWI	**Malawi**	92	[76,101]	25	90	92
MYS	**Malaysia**	97	[75,115]	40	97	102
NAM	**Namibia**	124	[39,79]	40	55	60
NER	**Niger**	113	[92,123]	31	111	113
NGA	**Nigeria**	122	[123,149]	26	134	133
NIC	**Nicaragua**	73	[57,89]	32	69	65
NLD	**Netherlands**	16	[10,28]	18	15	12
NOR	**Norway**	14	[8,14]	6	10	11
NPL	**Nepal**	69	[72,94]	22	81	78
NZL	**New Zealand**	6	[6,10]	4	8	8
OMN	**Oman**	146	[137,150]	13	145	148
PAK	**Pakistan**	148	[141,152]	11	147	148
PAN	**Panama**	52	[48,59]	11	52	50

ISO3	Name	Ranking	Interval	Range	Average	Median
PER	**Peru**	49	[37,57]	20	46	46
PHL	**Philippines**	74	[61,81]	20	71	70
PNG	**Papua New Guinea**	150	[112,151]	39	136	137
POL	**Poland**	34	[30,38]	8	33	32
PRT	**Portugal**	11	[4,13]	9	9	7
PRY	**Paraguay**	53	[50,69]	19	56	55
QAT	**Qatar**	143	[106,148]	42	132	133
ROU	**Romania**	38	[24,39]	15	34	34
RUS	**Russia**	91	[84,133]	49	103	97
RWA	**Rwanda**	81	[66,88]	22	80	83
SAU	**Saudi Arabia**	145	[136,153]	17	147	147
SDN	**Sudan**	142	[132,150]	18	142	145
SEN	**Senegal**	85	[71,93]	22	84	86
SGP	**Singapore**	107	[81,137]	56	101	100
SLE	**Sierra Leone**	121	[90,127]	37	108	101
SLV	**El Salvador**	57	[49,66]	17	57	57
SRB	**Serbia**	39	[39,46]	7	42	42
SVK	**Slovakia**	21	[20,37]	17	27	27
SVN	**Slovenia**	15	[15,29]	14	21	20
SWE	**Sweden**	5	[2,6]	4	4	4
SYR	**Syria**	149	[143,151]	8	149	150
TCD	**Chad**	134	[118,140]	22	131	129
TGO	**Togo**	104	[96,121]	25	110	112
THA	**Thailand**	82	[68,97]	29	84	87
TTO	**Trinidad and Tobago**	63	[62,110]	48	78	71
TUN	**Tunisia**	87	[67,106]	39	78	77
TUR	**Turkey**	99	[73,128]	55	100	97

ISO3	Name	Ranking	Interval	Range	Average	Median
TZA	**Tanzania**	96	[75,114]	39	97	98
UGA	**Uganda**	89	[76,100]	24	90	91
UKR	**Ukraine**	56	[51,59]	8	55	54
URY	**Uruguay**	23	[14,28]	14	23	24
USA	**United States**	88	[79,143]	64	106	94
UZB	**Uzbekistan**	137	[103,146]	43	129	131
VEN	**Venezuela**	70	[67,107]	40	87	88
VNM	**Vietnam**	94	[96,134]	38	107	101
YEM	**Yemen**	153	[151,153]	2	153	153
ZAF	**South Africa**	130	[49,135]	86	70	67
ZMB	**Zambia**	144	[72,112]	40	96	96
ZWE	**Zimbabwe**	116	[89,123]	34	112	116

Table 15: Results of the robustness analysis.

The main findings of the robustness study confirm that the ranking generated by the Coherence Index in its transition aggregate is representative and resistant to changes in the method of aggregation and data processing. The ranking resulting from the Coherence Index in its transition aggregate is very close to the average and median ranking in all the scenarios analysed. For both, the average and the median ranking of all alternatives, 92.56% of the cases are less than 15 positions away (10% of the sample), and 26.80% vary by only one or zero positions.

However, significant deviations were observed in the ranking of four countries: Israel, Zambia, South Africa, and Namibia. This is because these countries have scores equal to or close to zero in one or more intermediate (dimensions) or final (transitions) pillars of the index, due to specific indicators or because of the new min-max standardisations included. This means that the scenarios where the geometric mean is used in the aggregations of transitions get lower scores.

Despite these deviations, in general, the Coherence Index rankings of transitions are robust in the face of changes in the weighting of pillars, data processing and aggregation formula for most of the countries considered. This means that, apart from the countries mentioned above, significant inferences can be drawn from the rankings obtained. The following graphs illustrate the robustness in both the average and median rankings compared to the Coherence Index ranking of its transitions aggregate.

In short, the results of the study confirm the validity and robustness of the ranking generated by the Coherence Index in its transitions aggregate of, proving to be remarkably consistent in different scenarios. This provides a solid basis for drawing significant conclusions from the Coherence Index's transitions ranking, with the exception of the countries mentioned above. The graphs show the robustness of both the average and median rankings, vis-à-vis the Coherence Index ranking in terms of its transitions aggregate.

Figure 1 Correlation between the average ranking of the scenarios and the transitions aggregate

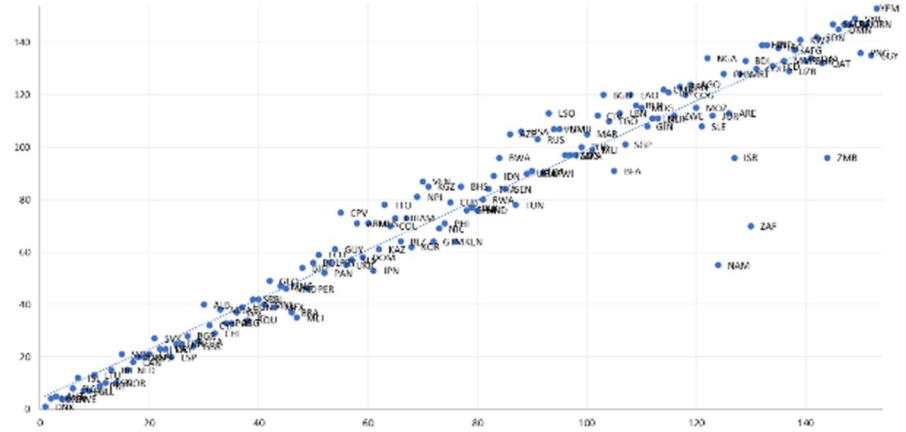
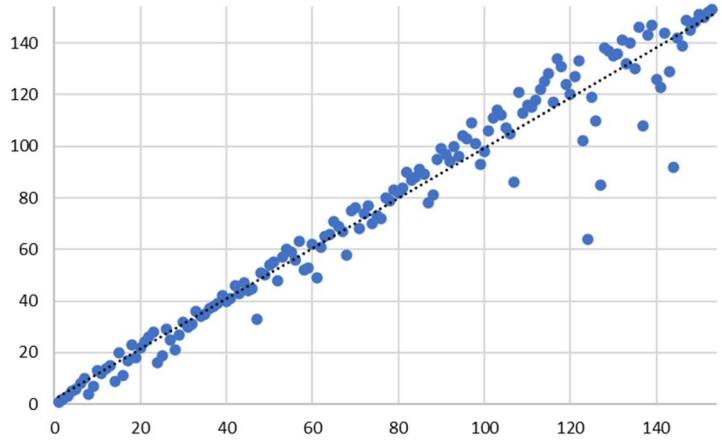


Figure 2 Correlation between the median ranking of the scenarios and the transitions aggregate

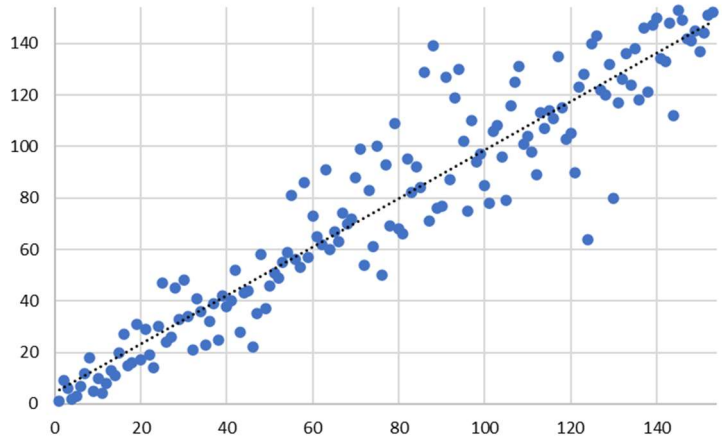
This sensitivity and uncertainty analysis is rounded out by a study of the resulting rankings factoring in specific changes in modelling assumptions. Illustration 3 compares the rankings resulting from the Coherence Index's transitions aggregation with those obtained after making changes in how data was processed in standardising the min-max method. This comparison shows whether the variability in ranking intervals is caused by the change in the standardisation method. The graph demonstrates that variability is not very high and only impacts some countries, far down in the ranking, that exhibit extreme scores. Hence, the processing of data, both and by means of the goal post method, smooths out index scoring but in no case creates instability.

Figure 3 Comparison of rankings according to data processing



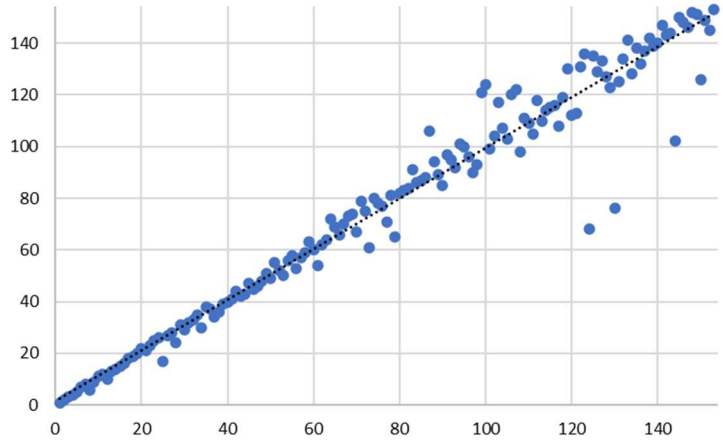
Similarly, Illustration 4 compares the rankings of the Coherence Index's transitions aggregate with those obtained by changing the aggregation method to dimensions, using the geometric average in this case. It is plain to see how this change is the one that generates the most noise within the index. This is due to the large number of dimensions and the different distribution of indicators within them. It is highly likely that the geometric average penalizes them for their lack of balance. We also observe that the ranking of the top 50 countries of the Index are less affected than the rest, attesting to the significance of the scores of these countries.

Figure 4 Comparison of rankings according to dimension aggregation



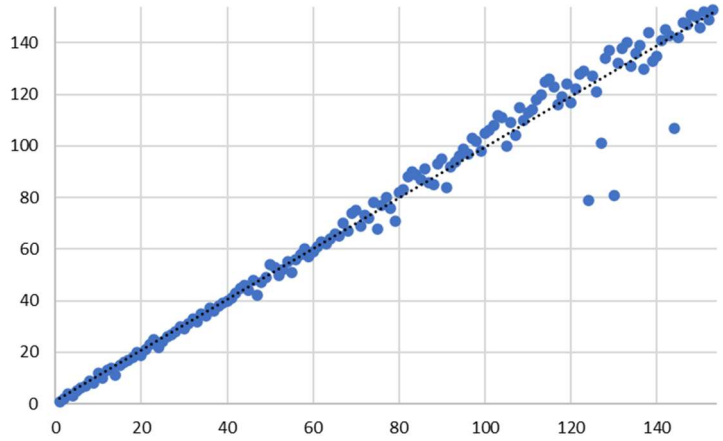
The following test represented in Illustration 5 compares the Coherence Index ranking of its aggregation of transitions with the ranking after modification of the transitions aggregation method using the arithmetic average. The ranking is practically identical for most countries with a slight deviation in the countries with medium-low scores. The deviation of the four countries mentioned above can also be observed.

Figure 5 Comparison of rankings according to the transitions aggregation



The last test, shown in Illustration 6, shows the scores of the transitions aggregate and the test modifying the final aggregation method or weight allocation, changing it to the arithmetic average. The graph shows that this modification is the one with the least impact on the final ranking in the index and is practically identical to the index's highest scores. The same four countries exhibit problems in the scores due to the geometric average. Their ranking varies when any change is introduced, showing that only with these countries is there a high degree of instability.

Figure 6 Comparison of rankings depending on the weighting/final aggregation system



The results of the uncertainty analysis reveal that the transition index is a robust measurement for most countries. While there are certain countries with a degree of instability in the index, it would be inappropriate to identify this instability in the four countries as a structural problem of the Coherence Index. The changes in the first dimensions aggregation are those causing the greatest degree of instability in the index. Nevertheless, the index is representative and robust in the remaining aspects included in the sensitivity analysis.

A thorough analysis of multiple options considered when building the index was conducted. The results of the uncertainty analysis reveal that the Coherence Index's transitions aggregation is a robust summary measure for most countries. The simulated intervals are narrow enough to allow significant inferences to be drawn from the index in most cases. However, it is important to note that, as shown in the sensitivity analysis conducted, there are four countries whose ranking varies significantly in response to changes in data processing and/or the aggregation

method. Nevertheless, it would be unfair to attribute this instability solely to a structural problem with the Coherence Index. It is important to view these results in context and bear in mind the social, economic, and situational differences among the countries included in the sample.

Bearing in mind all the above-mentioned aspects as well as the statistical coherence analysis set out in the previous section, it is safe to say that the index is reliable for the conceptual framework and the context to which it refers. It has a high degree of statistical coherence even considering the great many dimensions observed and countries included in the analysis.