

The European Commission's science and knowledge service

Joint Research Centre



European
Commission

Ten Steps Guide for Indices & Scoreboards

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COIN 2018 - 16th JRC Annual Training on Composite Indicators & Scoreboards
05-07/11/2018, Ispra (IT)

Example of a scoreboard

Social Pillar Scoreboard for the European Pillar of Social Rights



- 3 dimensions & 12 areas
- 14 headline indicators
- 21 secondary indicators
- 93 indicators in total (gender/age)

Dimension	Area	Indicator	unit	EU28			EA19		
				2010	2015	Difference	2010	2015	Difference
I - Equal opportunities and access to the labour market	1 Education, skills and lifelong learning	1 Early leavers from education and training	%	13.9	11.0	↓	15.4	11.6	↓
		2 Adult participation in learning	%	9.3	10.7	↑	8.0	10.9	↑
		3 Underachievement in education [EU28 and EA19 values correspond to a simple arithmetic mean across countries]	%	...	23.9	22.8	...
		4 Tertiary educational attainment, age group 30-34	%	33.8	38.7	↑	33.7	37.3	↑
	2 Gender equality in the labour market	1 Gender employment gap [Gap expressed in absolute values]	%	13.0	11.6	↓	13.2	11.2	↓
		2 Gender gap in part-time employment [Gap expressed in absolute values]	%	23.7	23.3	↓	26.9	27.0	↑
		3 Gender pay gap in unadjusted form [Gap expressed in absolute values]	%	16.4	16.3	↓	17.0	16.8	↓
	3 Inequality and upward mobility	1 Income inequality	ratio	4.9	5.2	↑	4.9	5.2	↑
		2 Variation in performance explained by students' socio-economic status [EU28 and EA19 values correspond to a simple arithmetic mean across countries]	%	...	13.9	13.6	...
	4 Living conditions and poverty	1 At-risk-of-poverty or social exclusion rate (AROPE)	%	23.7	23.7	↔	22.0	23.1	↑
		2 At-risk-of-poverty-rate (AROP)	%	16.5	17.3	↑	16.3	17.2	↑
		3 Severe material deprivation rate (SMD)	%	8.4	8.1	↓	6.1	6.9	↑
		4 Persons living in a household with a very low work intensity	%	10.3	10.6	↑	10.4	11.2	↑
		5 Severe housing deprivation (% of owners, with mortgage or loan)	%	1.7	1.9	↑	1.4	2.0	↑
		6 Severe housing deprivation (% of tenants, with rent at market price)	%	6.8	6.3	↓	6.7	5.8	↓
	5 Youth	1 Young people neither in employment nor in education and training, age group 15-24	%	12.8	12.0	↓	12.8	12.2	↓

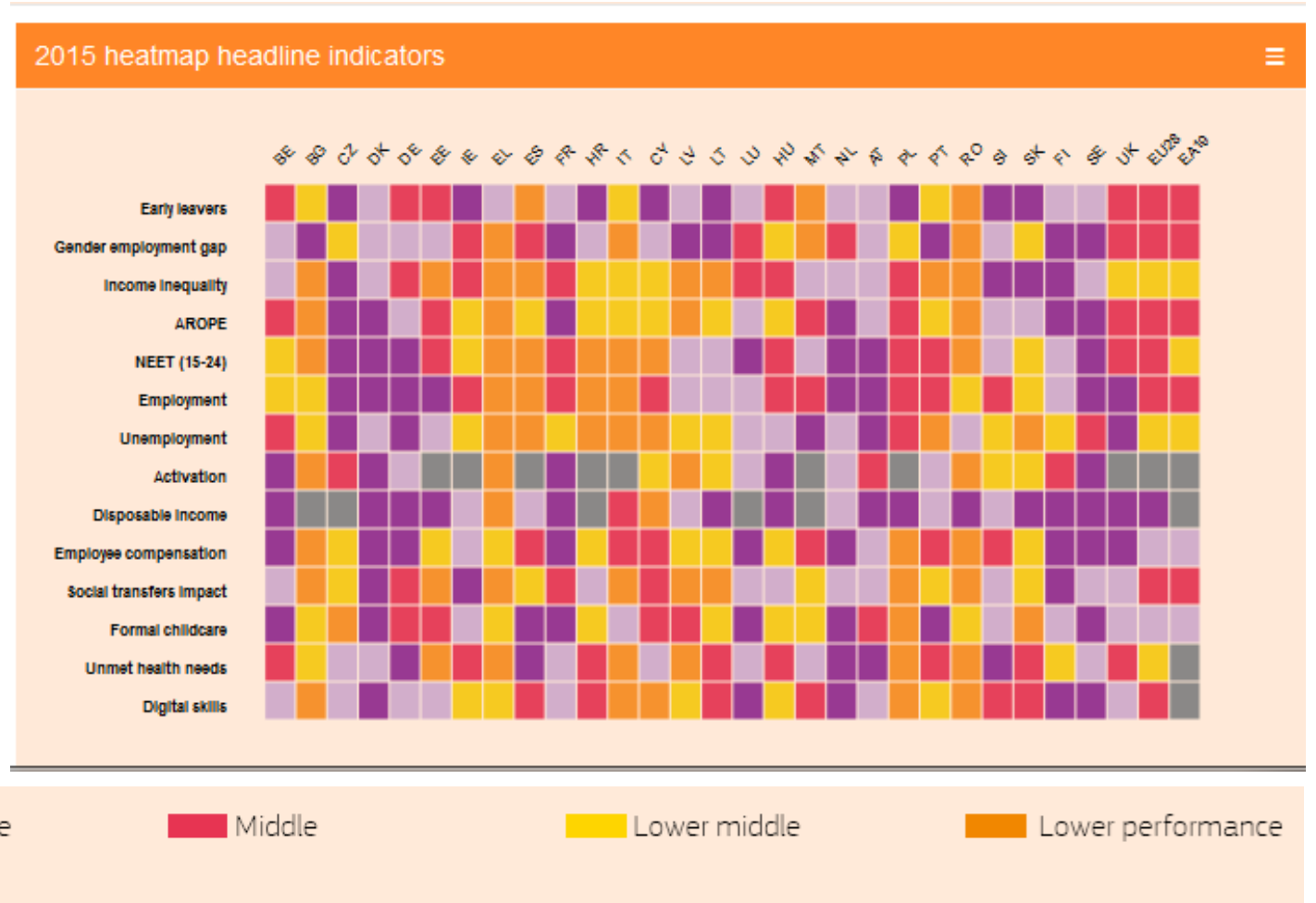
<https://composite-indicators.jrc.ec.europa.eu/social-scoreboard/>

Example of a scoreboard

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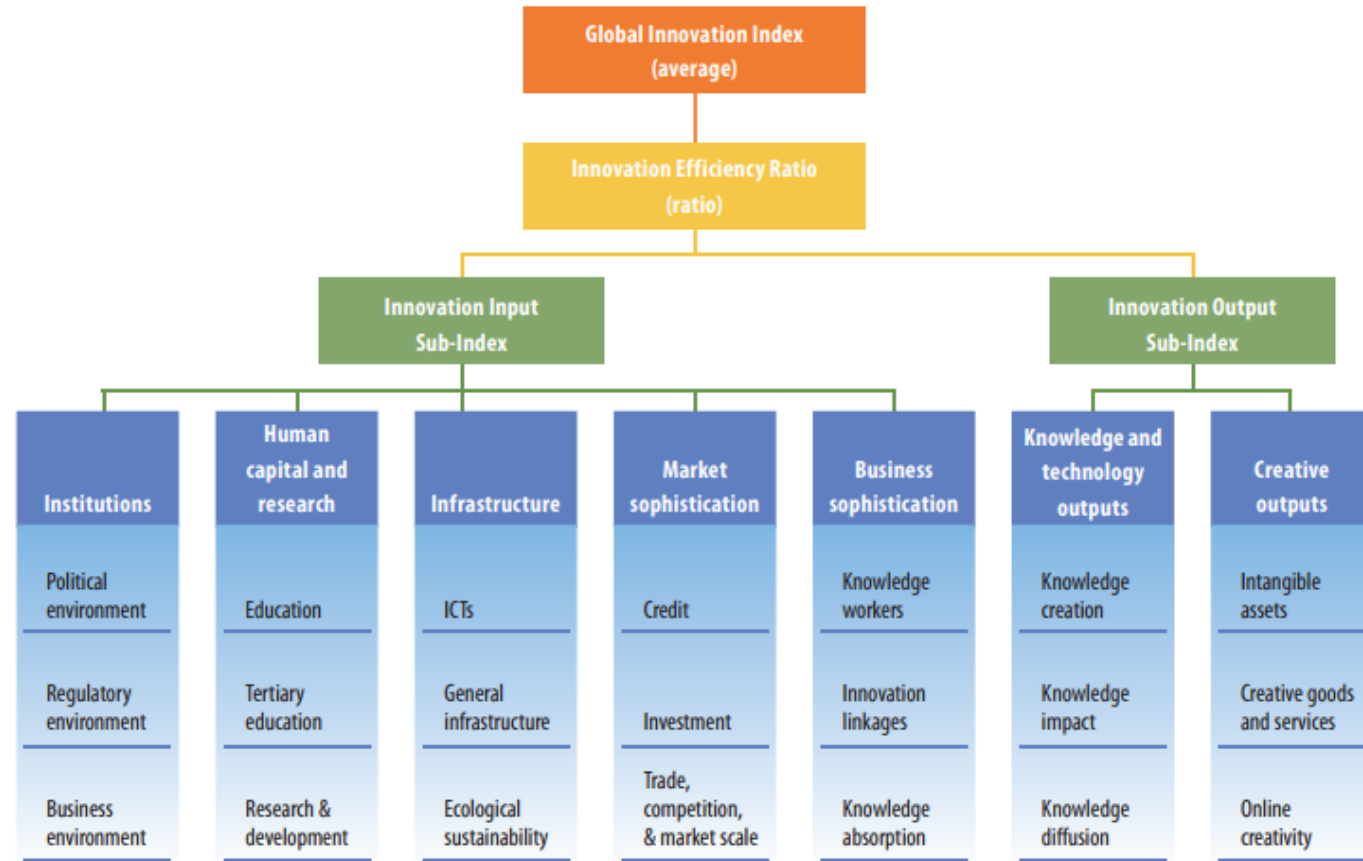


Example of a composite indicator

Global Innovation Index



- 1 index
- 2 sub-indices
- 7 pillars
- 21 sub-pillars
- 80+ indicators



Example of a composite indicator

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Table 6: Heatmap for GII top 10 economies and regional and income group averages (1–100)

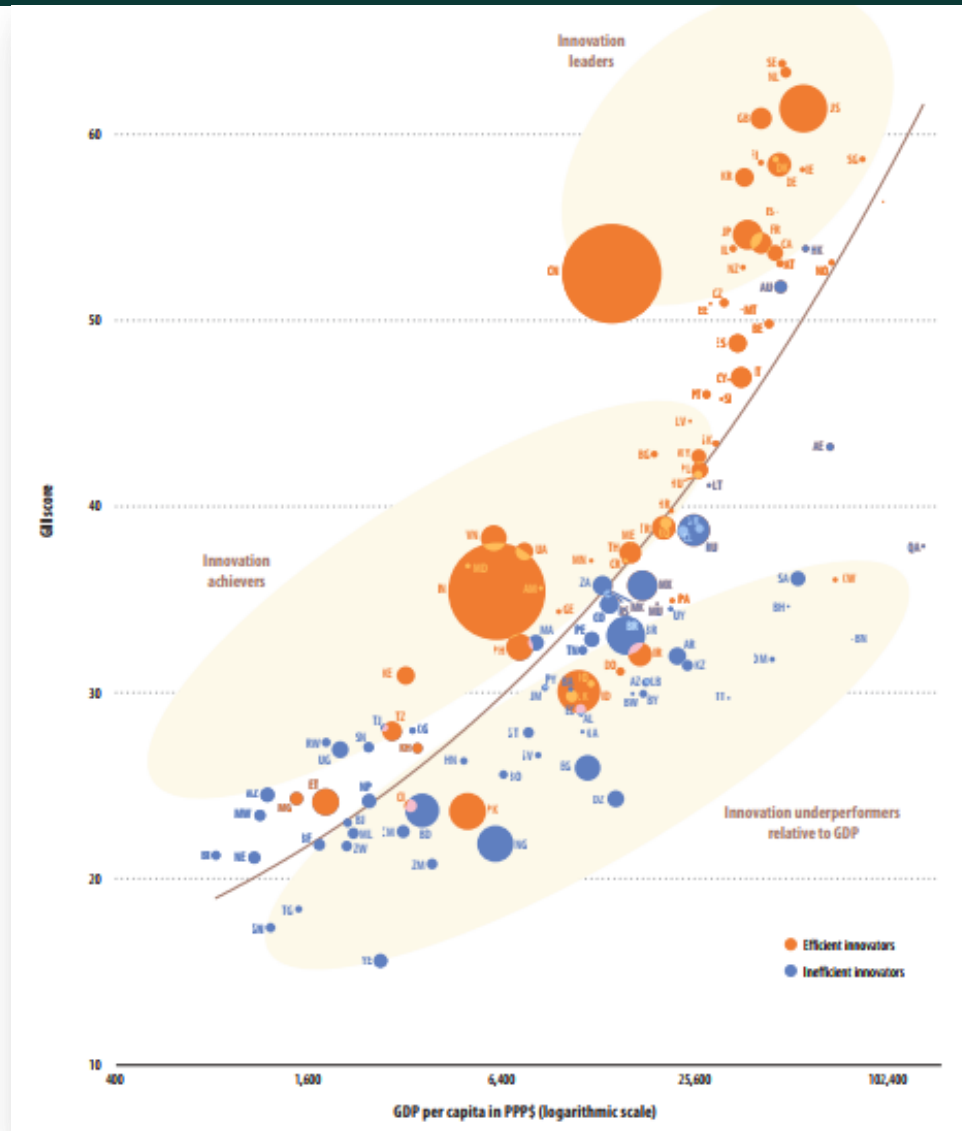
Country/Economy	GI	Institutions	Human capital and research	Infrastructure	Market sophistication	Business sophistication	Input	Knowledge and technology outputs	Creative outputs	Output	Efficiency
Switzerland	67.69	89.47	63.29	65.10	67.51	62.61	69.60	69.06	62.50	65.78	0.95
Sweden	63.82	88.31	63.71	69.13	64.87	62.58	69.72	62.51	53.33	57.92	0.83
United Kingdom	63.36	88.24	54.70	63.32	59.02	63.69	65.79	62.88	58.97	60.92	0.93
United States of America	61.40	86.25	57.21	61.04	83.45	56.41	68.87	54.38	53.48	53.93	0.78
Finland	60.89	88.44	63.32	67.14	70.19	52.18	68.25	46.49	60.54	53.52	0.78
Singapore	58.70	91.43	66.13	63.19	70.17	52.50	68.68	43.93	53.48	48.71	0.71
Ireland	58.69	94.36	63.67	69.15	71.20	62.88	72.25	47.33	42.94	45.14	0.62
Denmark	58.49	92.18	66.41	64.35	61.59	60.12	68.93	48.79	47.32	48.06	0.70
Netherlands	58.39	83.53	60.13	61.55	60.00	51.44	63.33	51.06	55.85	53.46	0.84
Germany	58.13	87.62	55.07	62.06	55.05	54.51	62.86	55.88	50.94	53.41	0.85
Average	37.12	63.05	34.03	46.19	47.23	34.97	45.10	25.77	32.53	29.15	0.63

Example of a composite indicator

Global Innovation Index



- 1 index
- 2 sub-indices
- 7 pillars
- 21 sub-pillars
- 80+ indicators



Need for indices and scoreboards

What are they?

com'-po-site: made of various parts or elements

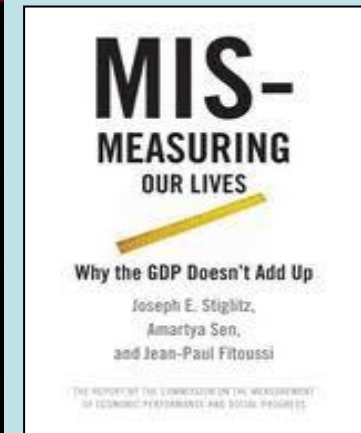
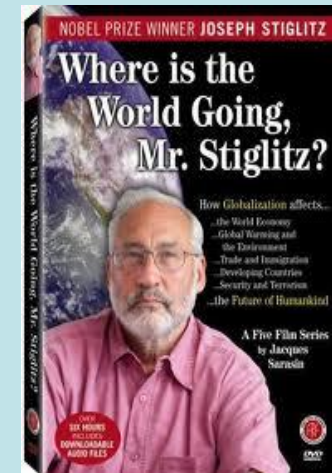
in'-di-ca-tor: a device providing information on the state or condition

Why are they needed?

Globalization + Complexity + Data Revolution

Who needs them?

International organizations, European Commission, governments, public



Uptake of indices in the EC policies



1987 First CI proposed by the EC

Proposal for a Council Regulation establishing a Community system of aids to agricultural income [COM(87) 166 final]

1985 Second CI developed by a government

German gov. to select areas eligible for investment aid in the North Rhine-Westphalia [85/12/EEC]

1982 First CI developed by a government

Danish gov. to select areas eligible for regional aid [82/691/EEC]

1973 First reference within an EC document but ...

14th rep. on the activities of the Monetary Committee [OJ 9.11.73 No C94]

Uptake of indices in the EC policies

The screenshot displays the EUR-Lex website interface. At the top, the EUR-Lex logo and navigation links are visible. The search criteria section shows the query: «composite indicator» OR «synthetic indicator» OR «aggregate indicator». The search results are sorted by Relevancy in descending order. The left sidebar shows filters by domain and subdomain. The right sidebar shows filters by author, with the European Commission having 83 documents.

EUR-Lex
Access to European Union law

About EUR-Lex | Site map | A-Z | FAQ | Help | Links | Legal

EUROPA > EU law and publications > EUR-Lex > Search results

Home | Official Journal | EU law and related documents | National law | Legislative procedures | More

Refine query

Search criteria

Search for «composite indicator» OR «synthetic indicator» OR «aggregate indicator»

Save to my searches | Create in my RSS feeds | Save to my items

Sort by Relevancy Descending

Results 1 – 10 of 118 | Export selection/Export all | Change displayed metadata | Clear selection

By domain

- EU law and related documents (106)
- Official Journal (39)

By subdomain

- All (101)
- Preparatory acts (79)
- Legislation (17)
- International agreements (5)
- Parliamentary questions (5)

By author

- European Commission (83)
- Council of the European Union (7)
- European Parliament (6)
- Economic and Social Committee (6)
- European Community (3)

See more...

118 documents (most of them by the EC)

Uptake of indices in the academia

Google

Scholar

"composite indicator" OR "synthetic indicator" OR "aggregate indicator"

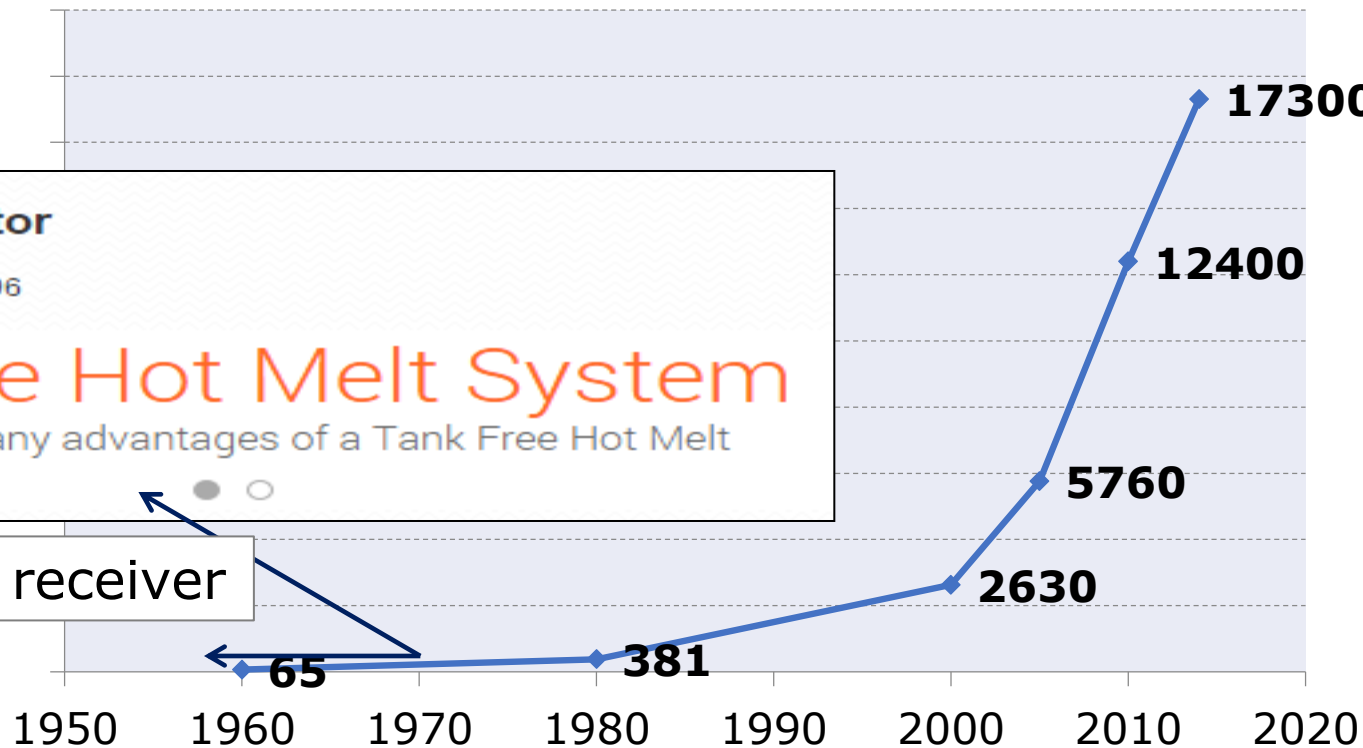
Composite indicator

United States Patent 2873396

Tank Free Hot Melt System

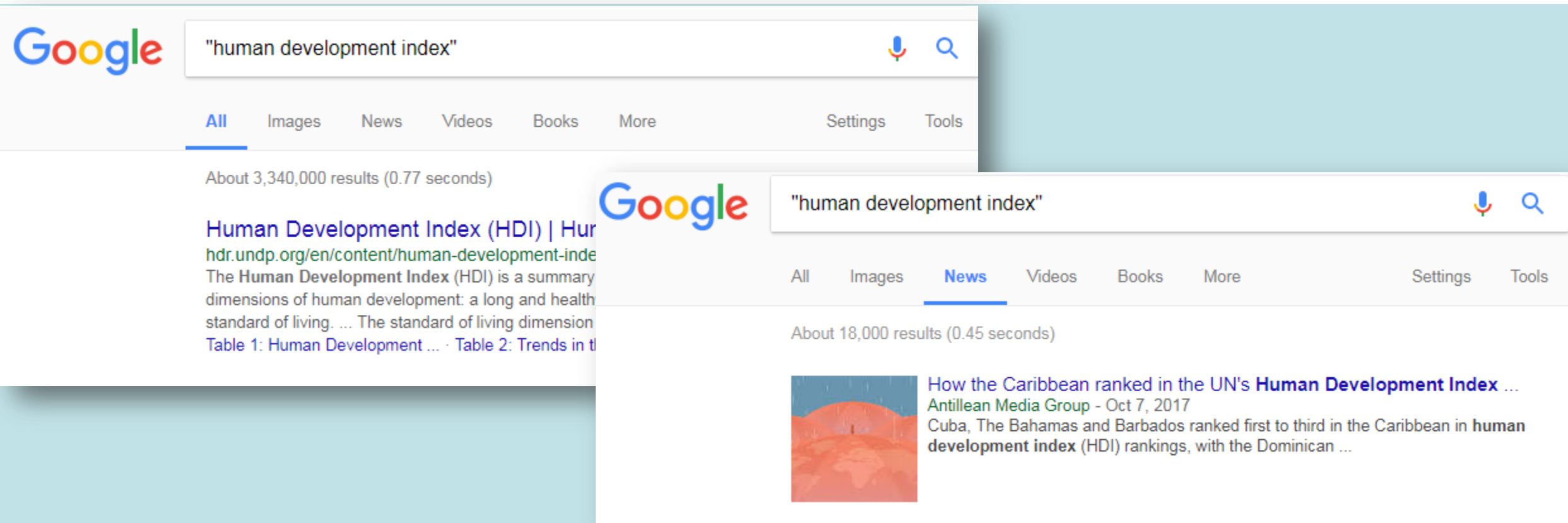
Discover now the many advantages of a Tank Free Hot Melt System

Directional radio receiver





More than ten-fold increase since 2000!

Uptake of indices in the media





The image shows two overlapping Google search results for the query "human development index". The background search results (All tab) show approximately 3,340,000 results in 0.77 seconds. The top result is from the Human Development Index (HDI) page on the UNDP website, with a snippet describing the HDI as a summary of human development dimensions. The foreground search results (News tab) show approximately 18,000 results in 0.45 seconds. The top news result is titled "How the Caribbean ranked in the UN's Human Development Index ..." from the Antillean Media Group, dated October 7, 2017. The snippet mentions that Cuba, The Bahamas, and Barbados ranked first to third in the Caribbean in HDI rankings, with the Dominican Republic also mentioned.

Google "human development index"  

[All](#) [Images](#) [News](#) [Videos](#) [Books](#) [More](#) [Settings](#) [Tools](#)


About 3,340,000 results (0.77 seconds)

Human Development Index (HDI) | Human Development Reports
hdr.undp.org/en/content/human-development-index
The Human Development Index (HDI) is a summary of human development dimensions: a long and healthy life, a decent standard of living, and access to knowledge. ... The standard of living dimension ...
[Table 1: Human Development ...](#) · [Table 2: Trends in the ...](#)

Google "human development index"  

[All](#) [Images](#) [News](#) [Videos](#) [Books](#) [More](#) [Settings](#) [Tools](#)

About 18,000 results (0.45 seconds)

 **How the Caribbean ranked in the UN's Human Development Index ...**
[Antillean Media Group](#) - Oct 7, 2017
Cuba, The Bahamas and Barbados ranked first to third in the Caribbean in human development index (HDI) rankings, with the Dominican Republic ...

Polarized audience

Enthusiastic supporters, mostly from advocacy groups developing their own indices to advance a cause

Skeptical economists and official statisticians concerned by the subjective nature of the selection of variables, weights and aggregation

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Indicators are powerful advocacy tools



Andrew Forrest

2010

- A. Forrest decided to take up the cause of combatting human trafficking → he established the **Walk Free Foundation**

- Bill Gates gave him some advice: "use a quantifiable metric. [...] if you can't measure it, it doesn't exist."

2012

- A. Forrest got Richard Branson on board, and by Dec. 2012, they had appealed to 25 large companies and governments to ban the use of forced labor

2013

- One year later, one activity got more attention than all of Walk Free's efforts combined...

Indicators are powerful advocacy tools



Andrew Forrest

2013

- *September: The Global Slavery Index*

2013

- *October: The index was covered in >100 newspaper stories around the world*

2014

- *July: In a global survey of NGOs that work on trafficking issues, over 40% had already heard of this new index*

Polarized audience



The diagram consists of two large, light blue arrows pointing in opposite directions, one to the left and one to the right, set against a dark teal background. The left arrow contains text about enthusiastic supporters, and the right arrow contains text about skeptical economists and official statisticians.

Enthusiastic supporters, mostly from advocacy groups developing their own indices to advance a cause

Skeptical economists and official statisticians concerned by the subjective nature of the selection of variables, weights and aggregation

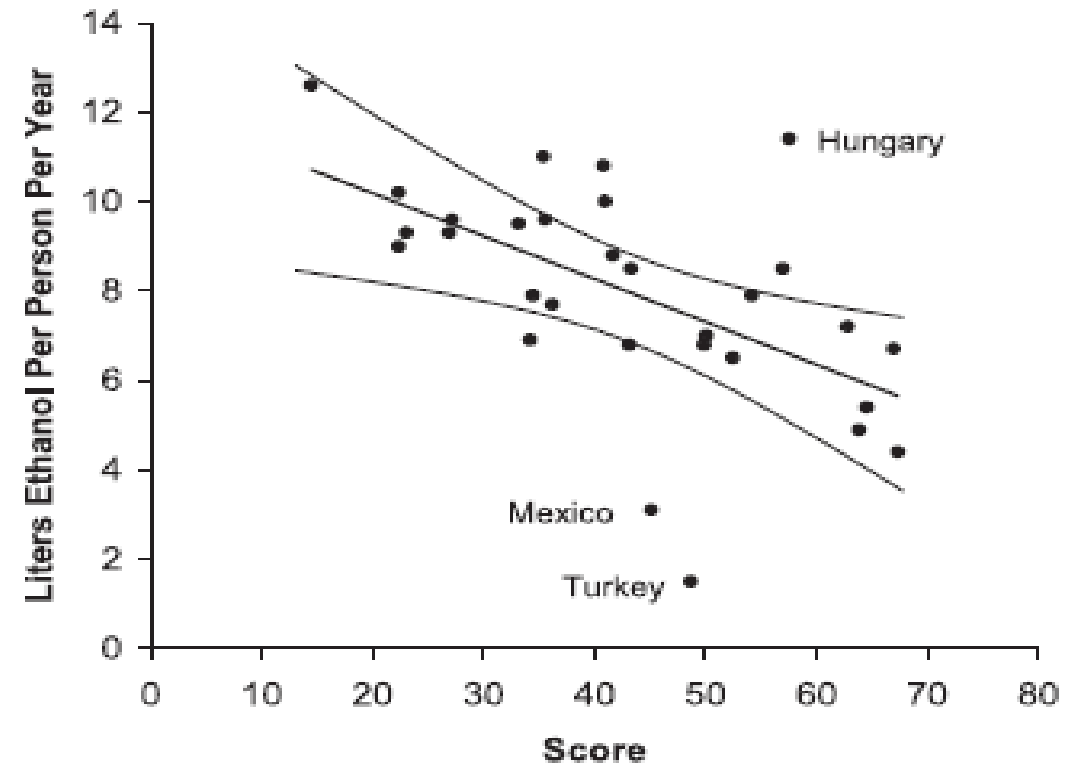
«Measurements without theory...»

Conceptual Framework – World Health

Domains	Ratings	Topics	Policies
Physical availability (32 points)	☆☆☆	Legal alcohol purchase age (y)	16, 17, 18, 19, 20+
	☆☆☆	Alcohol server liability for damages caused by actions of patrons	No, Yes
	☆☆	Restrictions on types of alcoholic beverages sold in retail stores	None; Partial government monopoly; Full government monopoly
	☆☆	Restrictions on density of stores selling alcoholic beverages in a given locale	None; On wine only; On wine and beer; On wine, spirits, and beer
	☆☆	Restrictions on business hours for selling alcohol	None; On hours or days; On both
Drinking context (8 points)	☆☆	Community mobilization programs to increase public awareness of, and prevent alcohol problems	No, Yes
	☆	Mandatory training of alcohol servers to prevent and manage aggression	No, Yes
Alcohol prices* (24 points)	☆☆☆	Beer price index	0–0.29, 0.30–0.59, 0.60–0.89, 0.90+
	☆☆☆	Wine price index	0–0.9, 1.0–1.9, 2.0–2.9, 3.0+
	☆☆☆	Spirit price index	0–2.9, 3.0–5.9, 6.0–8.9, 9.0+
Alcohol advertising (3 points)	☆	Number of different media (print, broadcast, billboards) with advertising restrictions	0, 1, 2, 3
Motor vehicles (34 points)	☆☆☆	Random breath testing	None, ^b Rare, Occasional, Often
	☆☆☆	Legal blood alcohol limit—adult (mg/dl)	0.08+, 0.03–0.07, 0–0.02
	☆☆☆	Legal blood alcohol limit—youth (mg/dl)	0.04+, 0.02–0.03, 0–0.01
	☆☆	Mandatory penalty for exceeding legal limit	Fine, License suspension
	☆☆	Graduated licensing for young drivers	No, Yes

Unlike the Alcohol Policy Index, **most composite indicators cannot be validated versus a ground truth**

[Alcohol Policy Index, 2007, *PLoS Medicine*, 4(4):752-759]



...and on top of that indices have ... strong Political and Policy Implications

- The **Malaysian** Industrial Development Authority insisted that Malaysia aims to move from the 24th to top 10 on in the **World Bank's `Doing Business'** ranking list. *"We continue to ask ourselves what it will take to reach the top 10, and are we willing to do what it takes to get there."* [Asia in Focus, Jan. 8 2007]
- The Minister of the Economic Development in **Kyrgyzstan**, expressed a hope (in 2008) that his country shall rank among top 20 countries in the Doing Business rating in three years.

[The WB *Doing Business Report* has long been credited with bringing about reforms in countries – as many as 2000 distinct reforms since its 2003 launch (Source: The Economist 2013)]

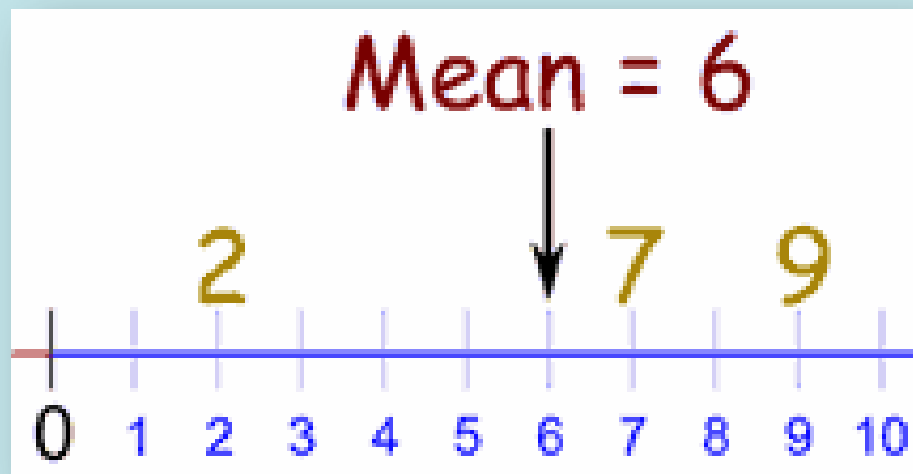
Indices are powerful advocacy tools

*This is WHY composite indicators should be ...
developed sensibly and used responsibly*

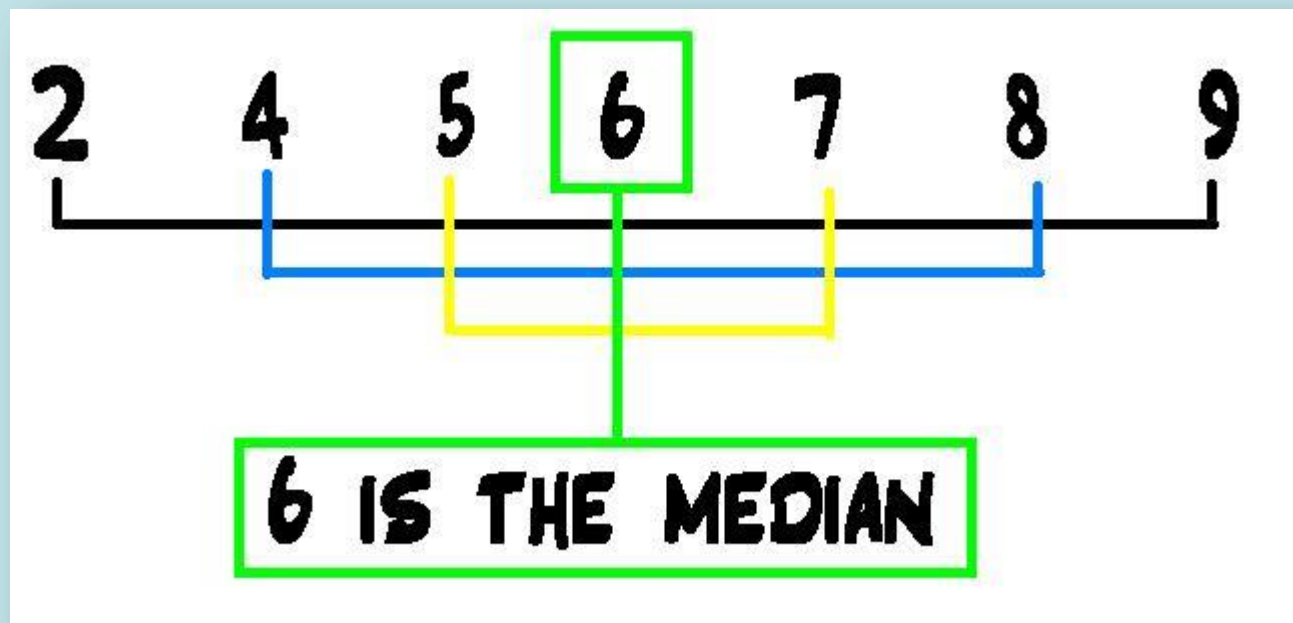
- ✓ **‘Sensible development’** of a composite indicator implies a quality control process based on both conceptual and statistical considerations.
- ✓ **‘Responsible use’** calls for care in drawing conclusions and recommendations without taking into account the conceptual context in which composite indicators were developed.

[...Refreshing key statistical terms...]

Mean

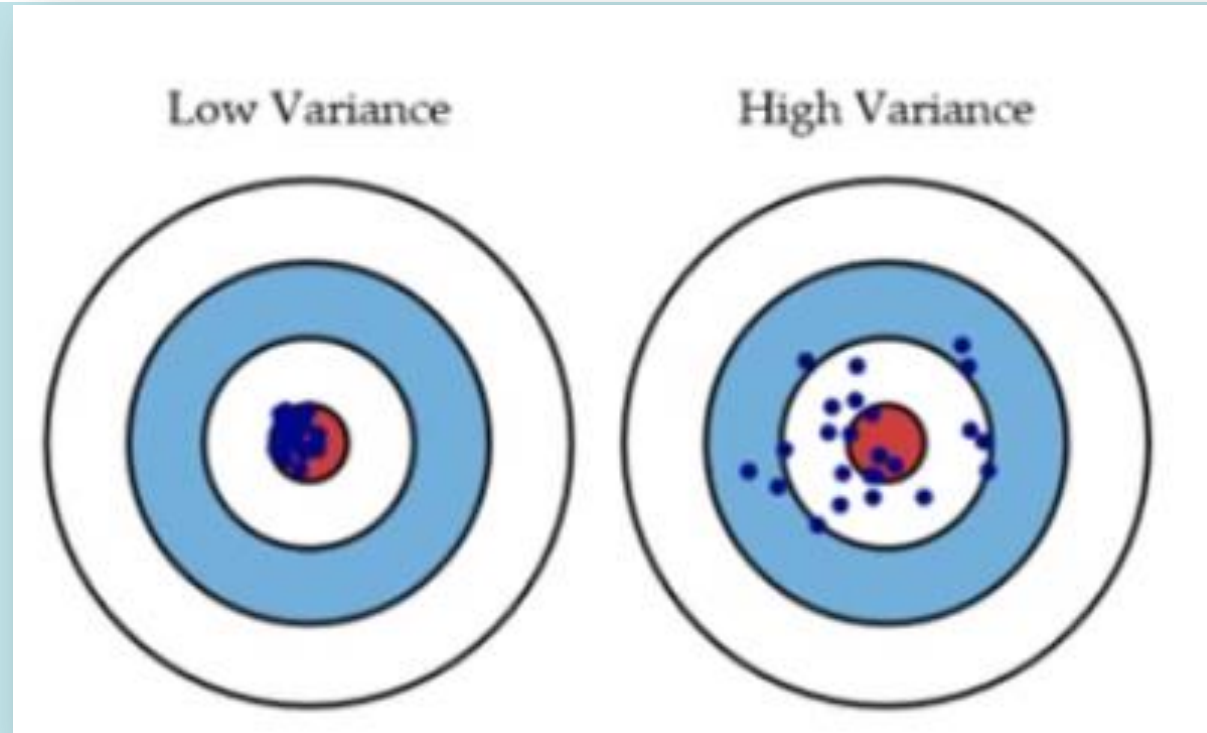


Median



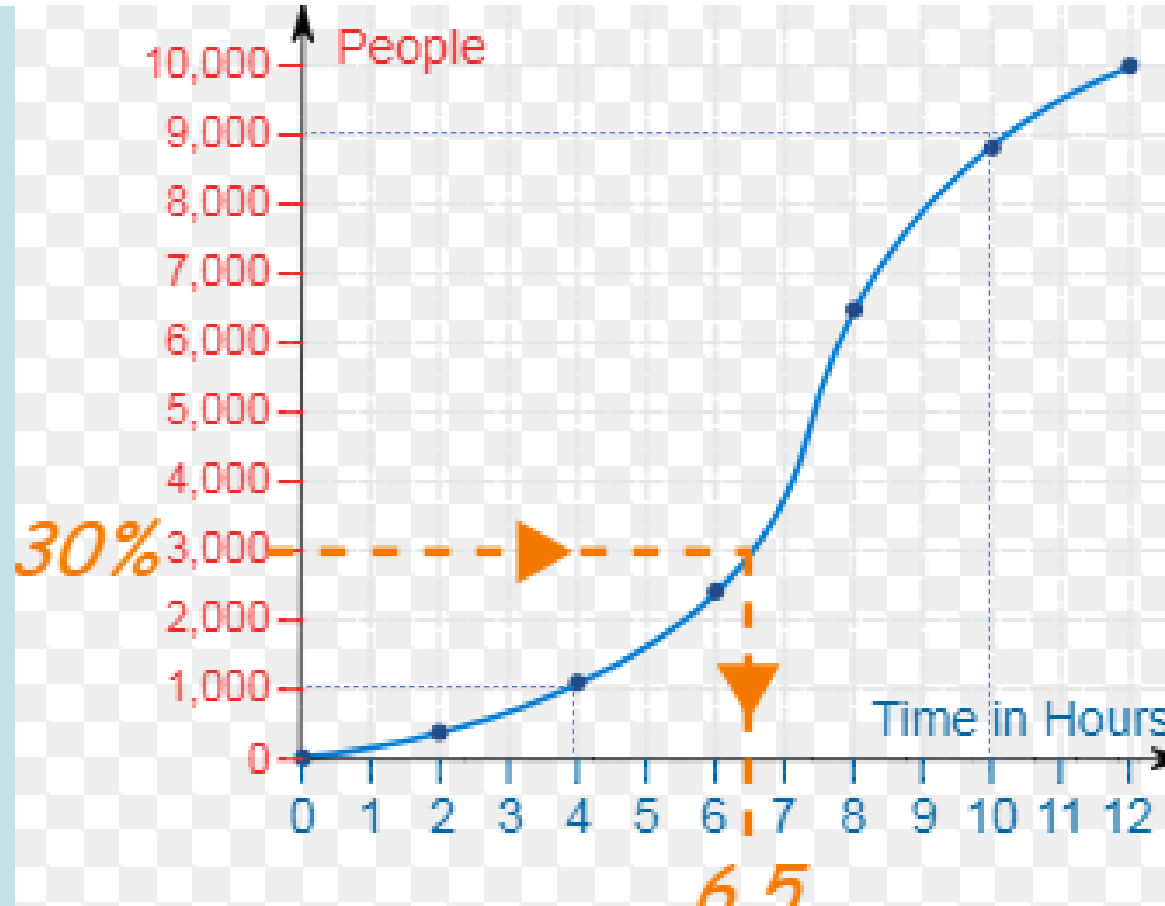
[...Refreshing key statistical terms...]

Variance

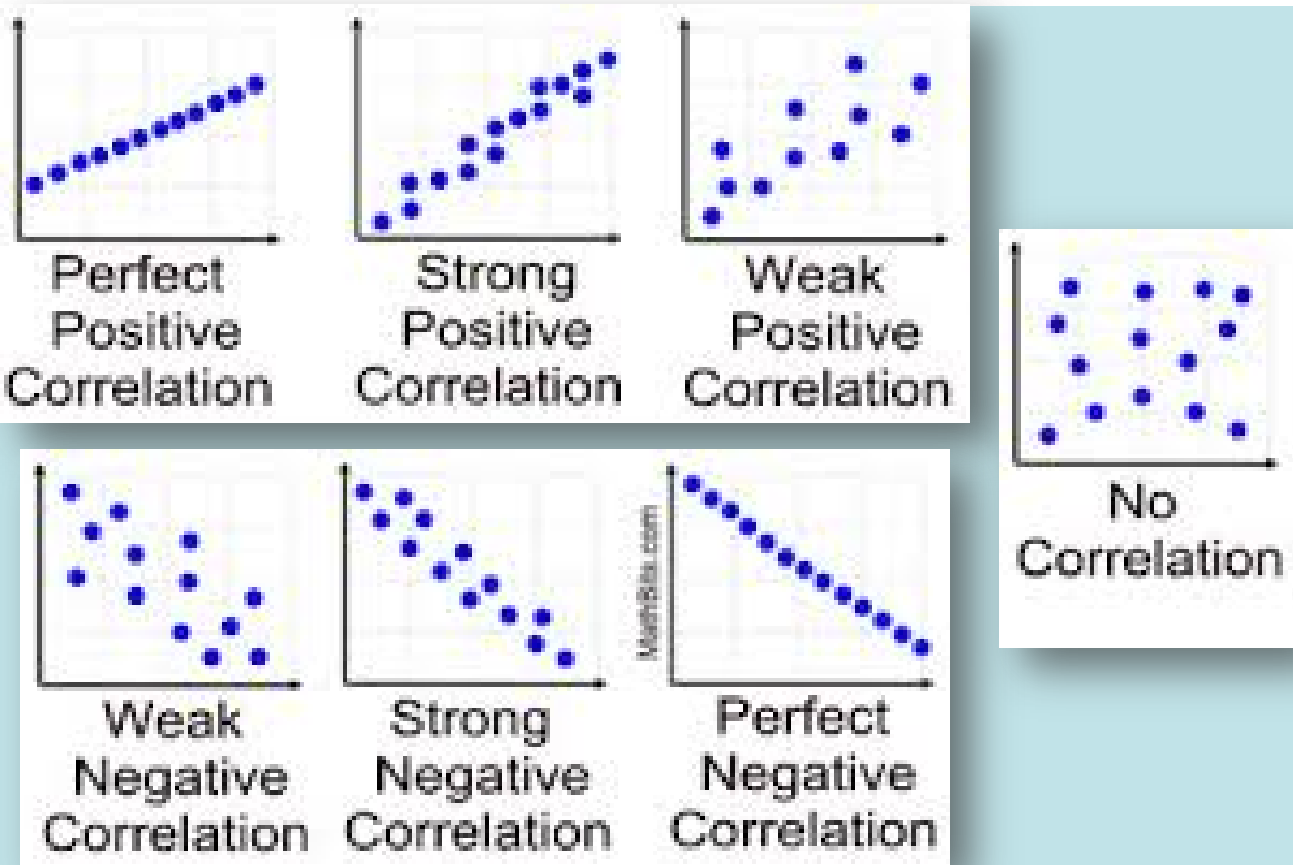


[...Refreshing key statistical terms...]

Percentiles



[...Refreshing key statistical terms...]



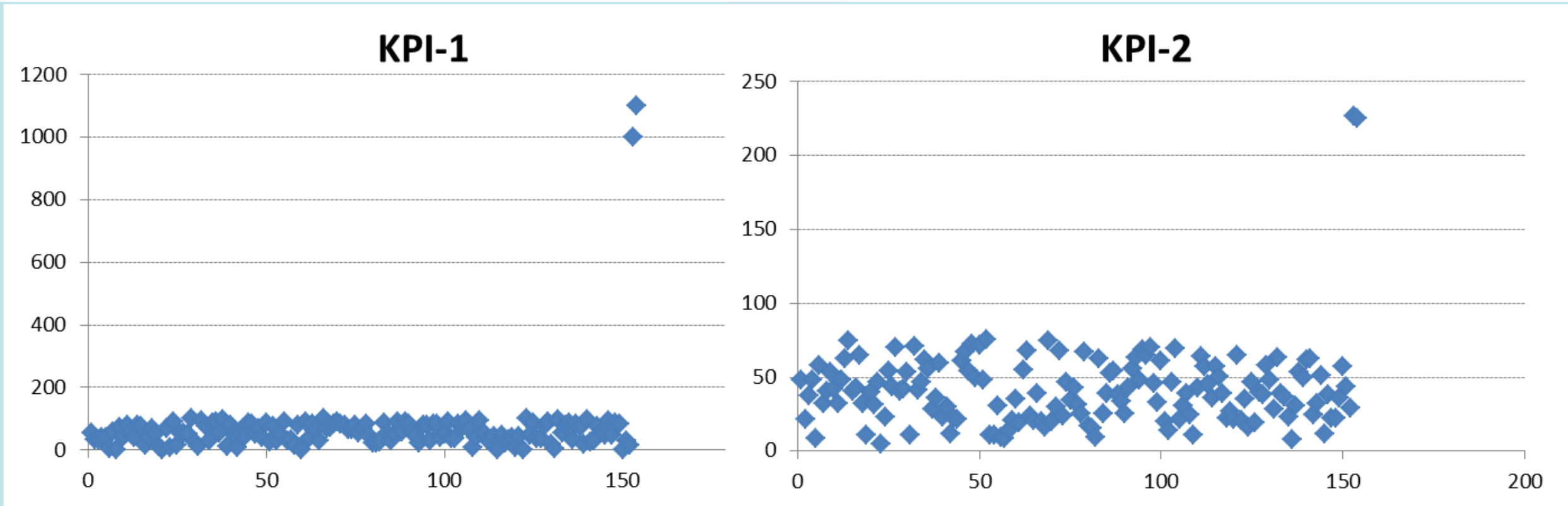
- ❑ The correlation coefficient only assesses the strength of a linear relationship between two variables.
- ❑ The correlation coefficient does not assess causation – that one event causes the other.

[...Refreshing key statistical terms...]

Rule of Thumb for Interpreting the Size of a Correlation Coefficient

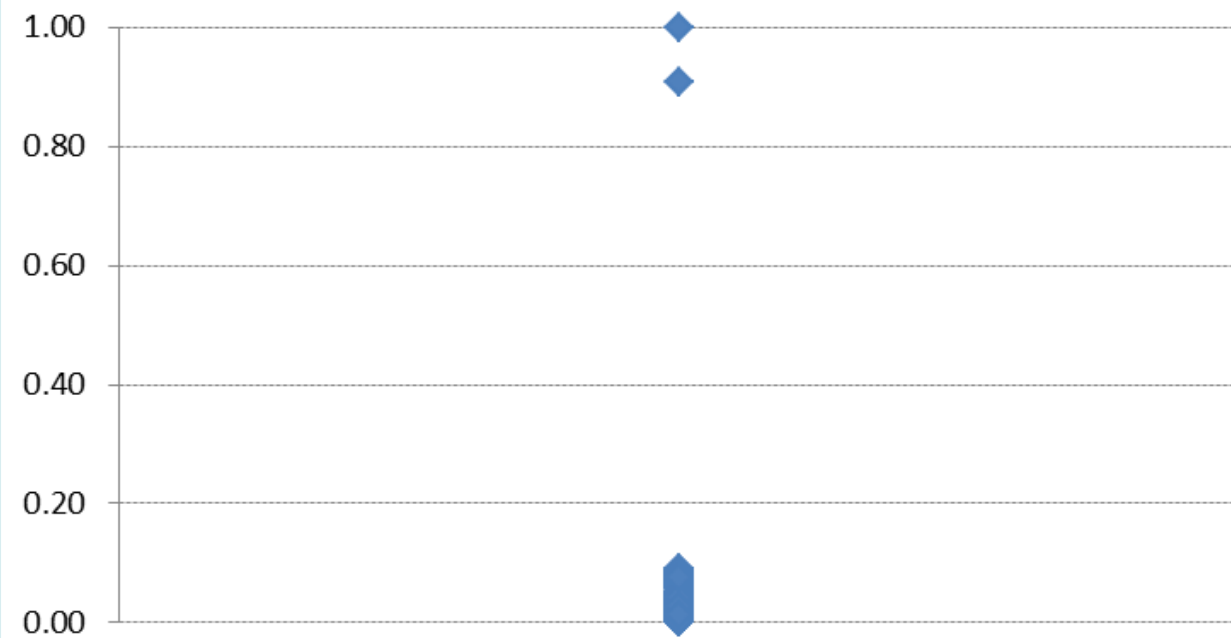
Size of Correlation	Interpretation
.90 to 1.00 (−.90 to −1.00)	Very high positive (negative) correlation
.70 to .90 (−.70 to −.90)	High positive (negative) correlation
.50 to .70 (−.50 to −.70)	Moderate positive (negative) correlation
.30 to .50 (−.30 to −.50)	Low positive (negative) correlation
.00 to .30 (.00 to −.30)	negligible correlation

[...Refreshing key statistical terms...]

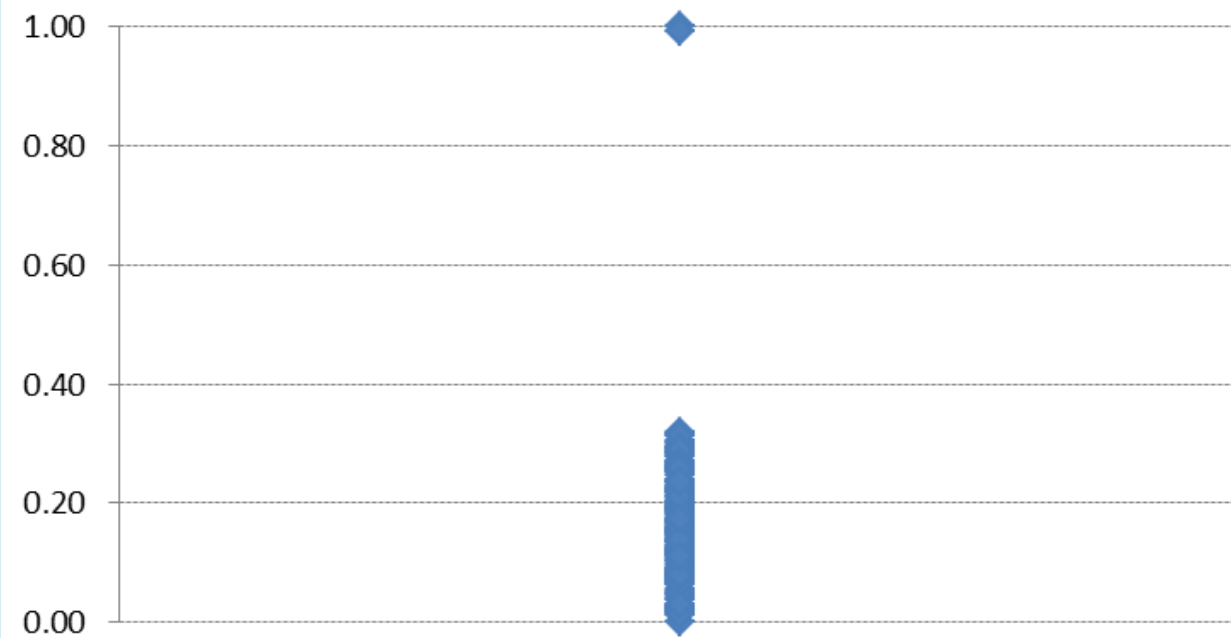


[...Refreshing key statistical terms...]

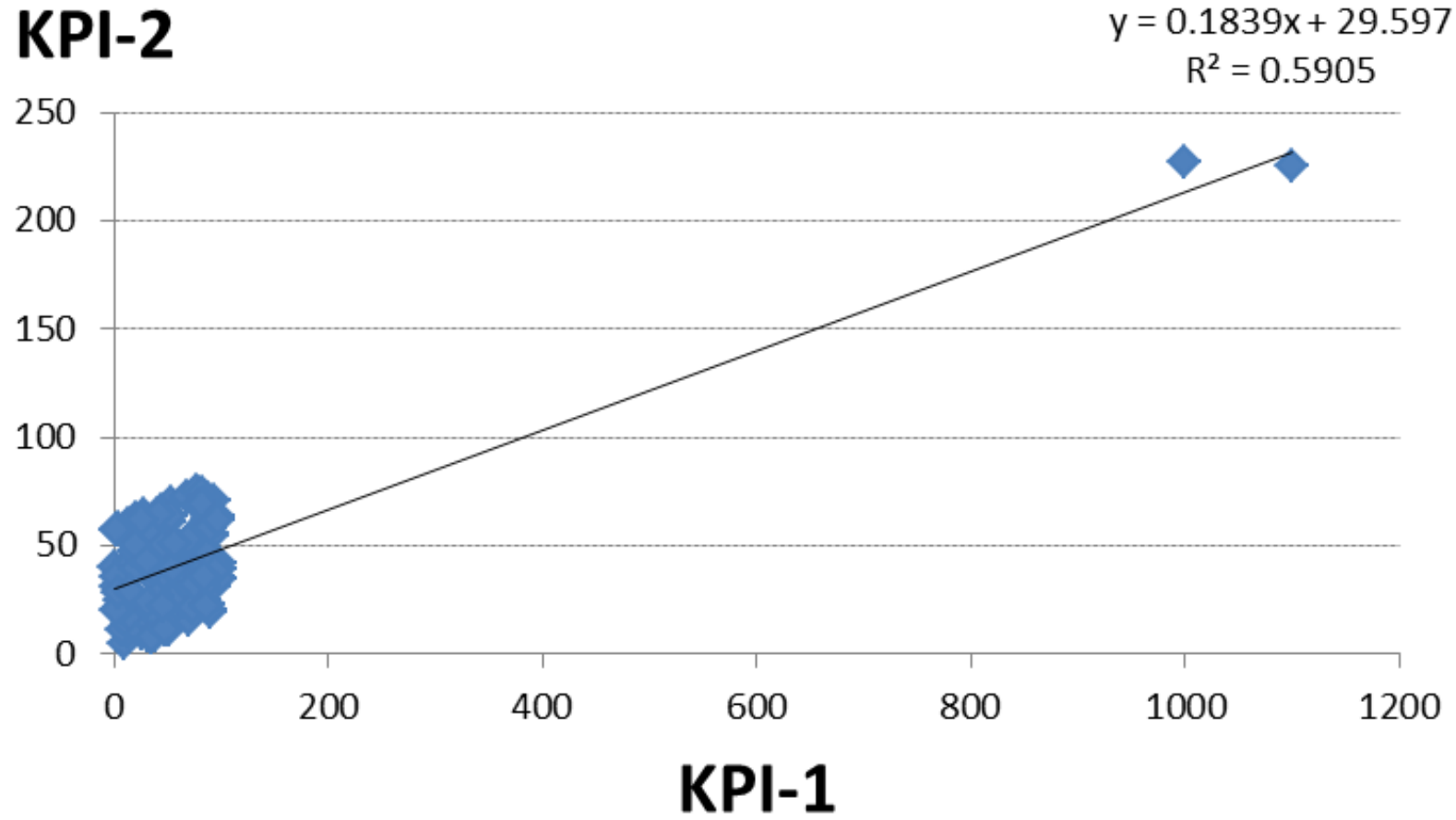
KPI-1



KPI-2



[...Refreshing key statistical terms...]

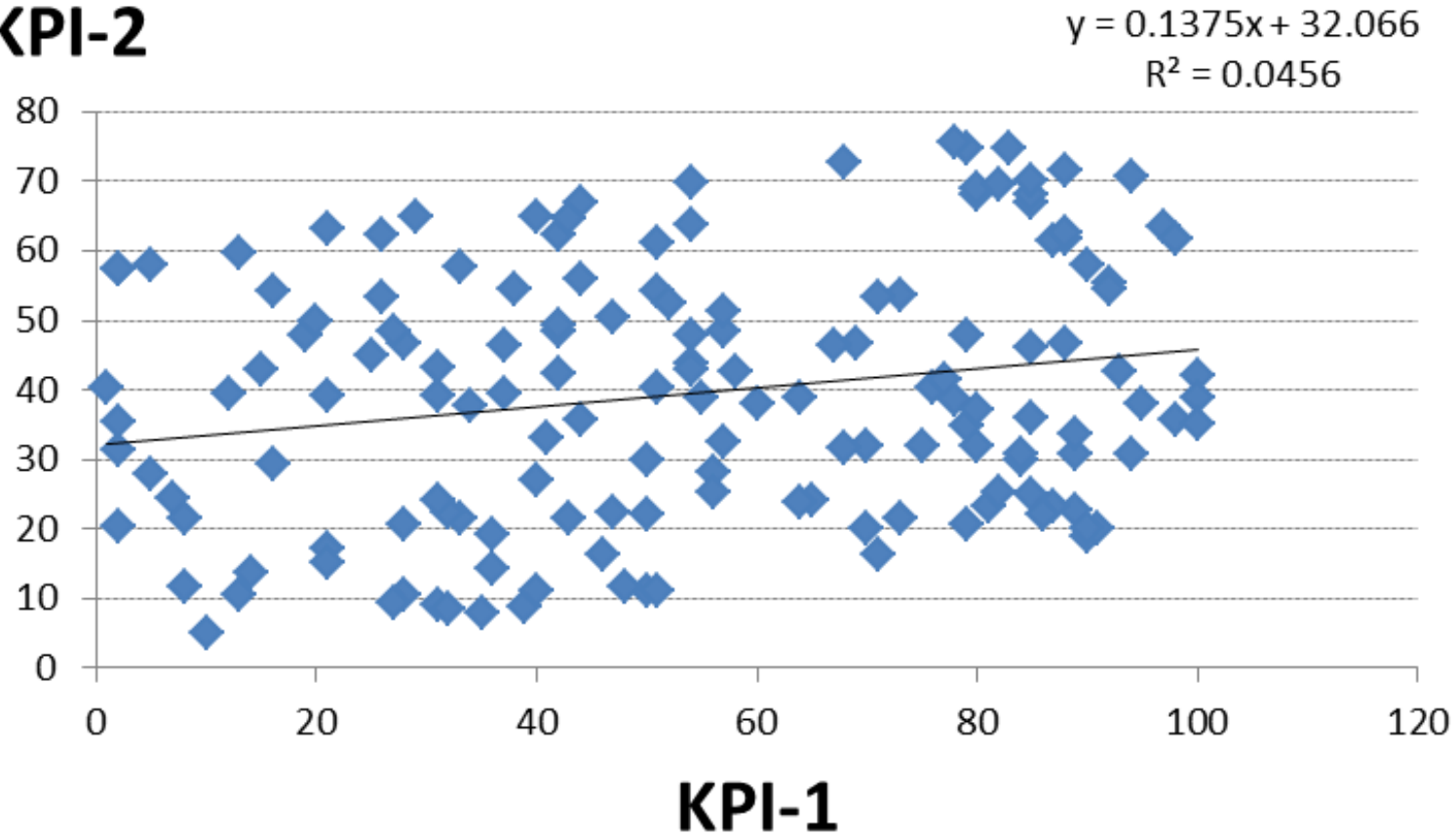


KPI-1 with KPI-2
 $r = 0.768$

(high positive
correlation)

[...Refreshing key statistical terms...]

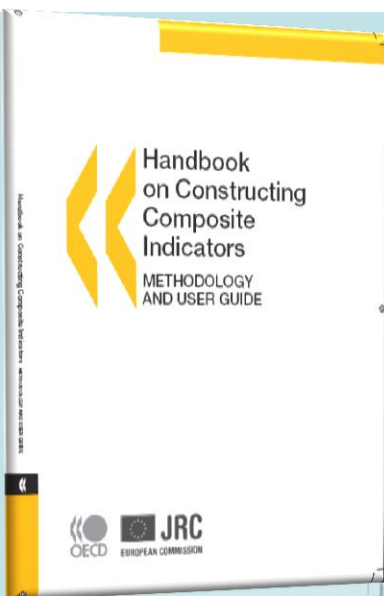
KPI-2



KPI-1 with KPI-2
 $r = 0.213$

(negligible
correlation)

Ten Steps Guide for Composite Indicators



➤ *Finally endorsed (after 2 rounds of consultation) by the OECD high level statistical committee in March 2008*

Step 10. Presentation & dissemination

Step 9. Association with other variables

Step 8. Back to the indicators

Step 7. Robustness & sensitivity

Step 6. Weighting & aggregation

Step 5. Normalisation of data

Step 4. Multivariate analysis

Step 3. Data treatment

Step 2. Selection of indicators

Step 1. Developing the framework



Ten Steps Guide for Composite Indicators & Scoreboards



- *New version to be released 2019-2020*
- *10+ year anniversary*

Step 10. Visualisation & Communication

Step 9. Back to the data

Step 8. Robustness & Sensitivity

Step 7. Statistical coherence

Step 6. Aggregation

Step 5. Weighting

Step 4. Normalisation

Step 3. Data treatment

Step 2. Selection of indicators

Step 1. Developing the framework

Step 1

Theoretical/Conceptual framework

- ✓ Definition of the phenomenon
- ✓ Added-value of index/scoreboard
- ✓ Nested structure of the framework
- ✓ Involve experts and stakeholders

Table 5.2. Comparison between the conceptual and measurement frameworks of the Gender Equality Index and the Gender Gap Index

	Gender Equality Index			Gender Gap Index	
	Domains	Sub-domains	Concepts measured	Concepts measured	Domains
Core	Power	Political decision-making	Ministerial level	Minister-level positions	Political empowerment
			Parliamentary level	Parliamentary positions	
			Regional assemblies level	Gender ratio of years in executive office (prime minister or president) for the last 50 years.	
		Social decision-making			
		Economic decision-making	Members of central banks		
			Members on boards	Advancement gap	
	Work	Segregation and quality of work	Sectoral segregation		Economic participation and opportunity
			Work intensity		
			Flexible personal/family arrangements		
		Participation	FTE participation	Participation in the labour market	
			Duration of working life		
	Money	Financial resources	Earnings	Remuneration gap	
			Income		
	Knowledge	Economic situation	Not at-risk-of-poverty		
			Income distribution		
		Educational attainment and segregation	Tertiary educational attainment	Primary-, secondary- and tertiary-level education gap	Educational attainment
				Literacy rate gap	
		Lifelong learning	Segregation		
			Lifelong learning		
	Time	Care activities	Domestic activities		
			Childcare activities		
			Leisure and sport activities		
		Social activities	Charitable and volunteering activities		
	Health	Status	Life expectancy		Health and survival
			Healthy life years	Healthy life expectancy	
			Self-perceived health	Ratio at birth (phenomenon of 'missing women' prevalent in many countries with a strong son preference)	
		Behaviour			
			Unmet medical needs		
			Unmet dental needs		
Satellites	Violence	Direct			
		Indirect			
	Intersecting inequalities	Opening up the analytical space			

Source: World Economic Forum (2014).

Step 2

Data selection

- ✓ **Selection criteria** for indicators
 - ✓ input, output, outcome, process
 - ✓ salience, credibility, legitimacy
 - ✓ data coverage
 - ✓ consider using proxy variables when official statistics are scarce
- ✓ **Summary statistics**
 - ✓ Source & data availability (countries, time)
 - ✓ type (hard, soft or input, output, process),
 - ✓ descriptive statistics (mean, median, skewness, kurtosis, min, max, variance, histogram)

VOLUNTEERING

WHAT IS IT?

The proportion of Canadians involved in unpaid activities within a group or an organization, according to the triennial Canada Survey of Giving, Volunteering and Participating conducted by Statistics Canada. This indicator measures the level of social and community engagement among Canadians.

NEARLY HALF OF ALL CANADIANS VOLUNTEERED IN 2004

According to the Canada Survey of Giving, Volunteering and Participating (CSGVP), nearly 12 million Canadians over the age of 15 worked a total of nearly 2 billion volunteer hours in 2004. That amounts to 168 hours per volunteer, or the equivalent of 1 million full-time jobs.

Regionally, Saskatchewan residents were more likely to volunteer than residents of any other province—almost 10% more than the national average of 45% (see Chart 1).

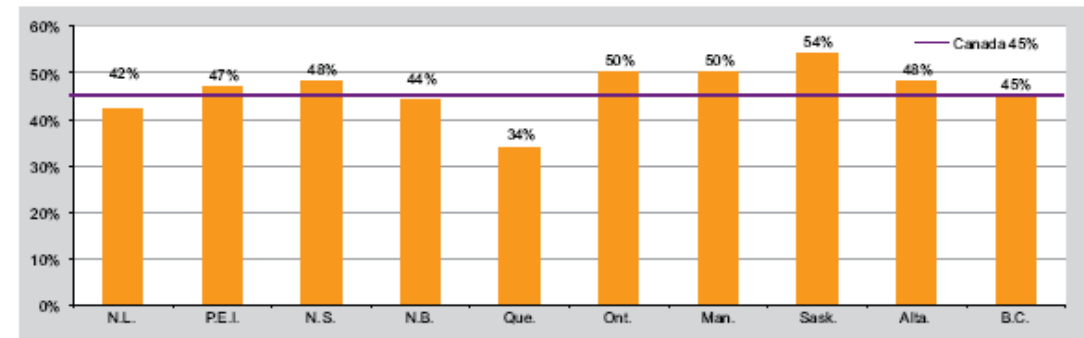
WHY IS IT IMPORTANT TO LEARNING IN CANADA?

Volunteerism is one way that Canadians support each other and the communities they live in. It strengthens the social fabric, cultivates concern for and understanding of others, and brings people together to work toward a common set of goals.

In recognition of the important role volunteering plays around the world, the United Nations declared 2001 the International Year of the Volunteer. According to a UN statement, volunteering allows "individuals [to] exercise their rights and responsibilities as members of communities, while learning and growing throughout their lives, realizing their full human potential."

Volunteering helps fortify community services used by children, the elderly and others. It also provides learning opportunities for the volunteers themselves, opening the way to new skills and wider social networks.

CHART 1: PROPORTION OF CANADIANS VOLUNTEERING, 15 YEARS AND OLDER, 2004

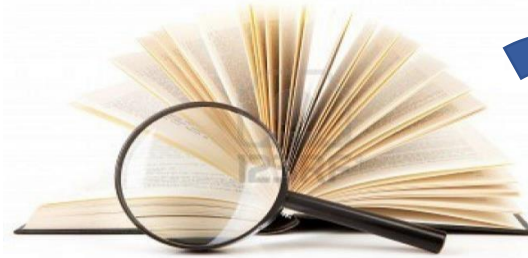


Source: Statistics Canada, Canada Survey of Giving, Volunteering and Participating, 2006

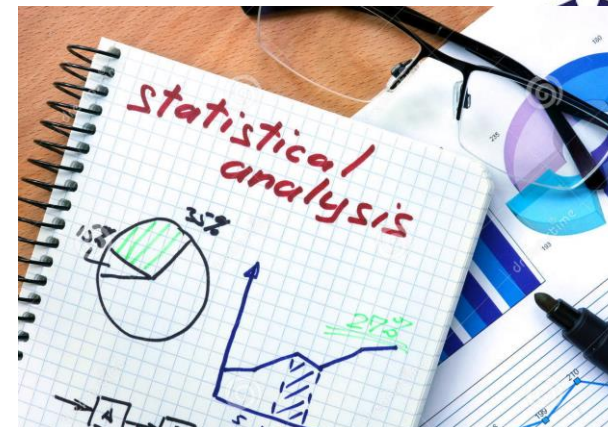
Step 2

Data selection

- ✓ ...
- ✓ Discuss **strengths and limitations** of each selected indicator
- ✓ **Involve** experts and stakeholders



Literature Review



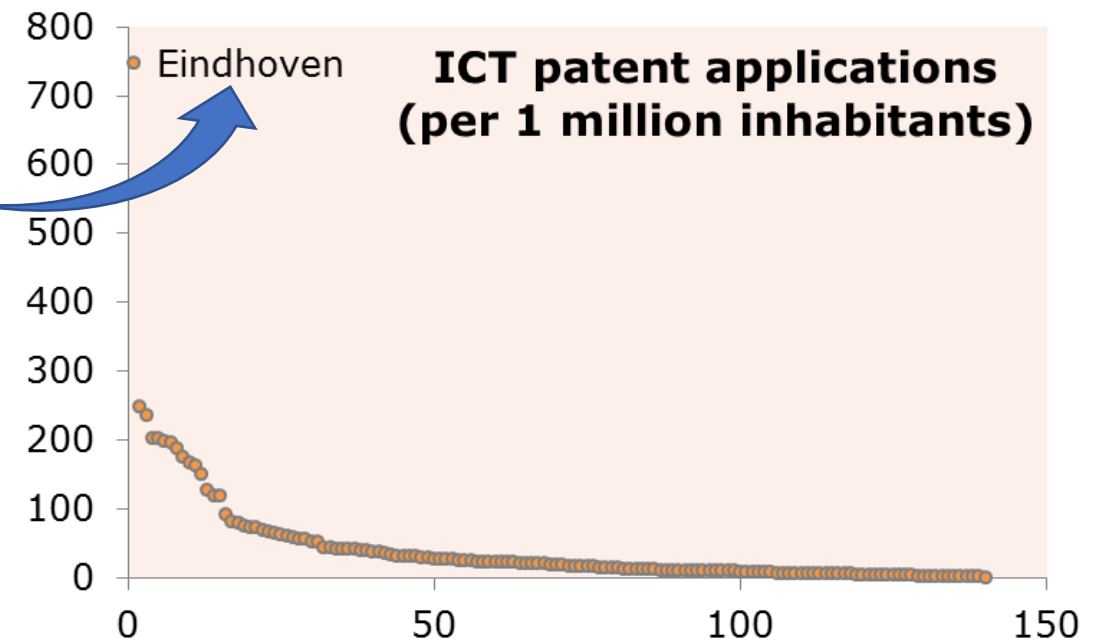
Step 3

Data treatment

- ✓ Make **scale adjustments** if necessary (e.g. divide by population, GDP, other)
- ✓ Check for **missing data** and **outliers**
- ✓ **Treat outliers**, if needed (so as to avoid that they become unintended benchmarks)
- ✓ **Estimate missing data**, if appropriate (and estimate confidence interval for each imputed value to assess the impact of imputation on the results)



D1.1 Cultural Venues & Facilities				
[number per 100,000 inhabitants]	[number per 100,000 inhabitants]	[number per 1,000 inhabitants]	[number per 100,000 inhabitants]	[number per 100,000 inhabitants]
Sights & landmarks	Museums	Cinema seats	Concerts & shows	Theatres



Normalisation

- ✓ Make **directional adjustments** (so that higher scores correspond to better performance in all indicators or vice versa)
- ✓ Select a **suitable normalisation method** that respects the conceptual framework and the data properties



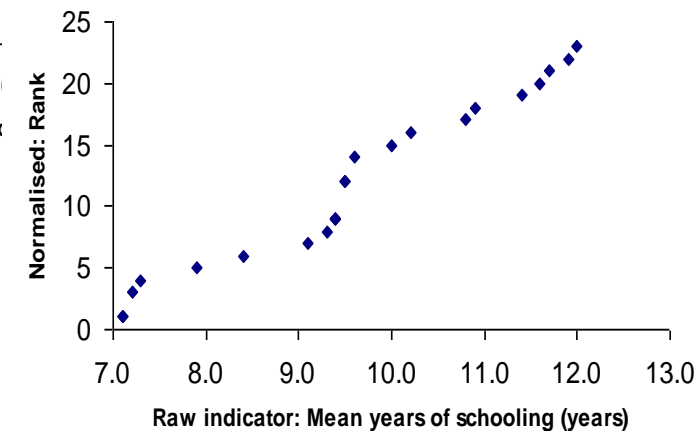
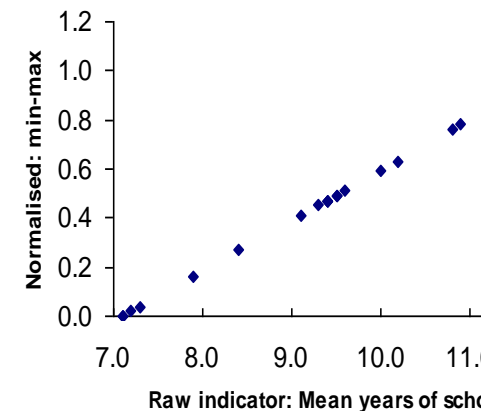
Does a large group of foreign-born population decrease social cohesion? (yes/no → direction)

→ **5 seconds rule!**

Step 4

Normalisation

- ✓ Make **directional adjustments** (so that higher scores correspond to better performance in all indicators or vice versa)
- ✓ Select a **suitable normalisation method** that respects the conceptual framework and the data properties

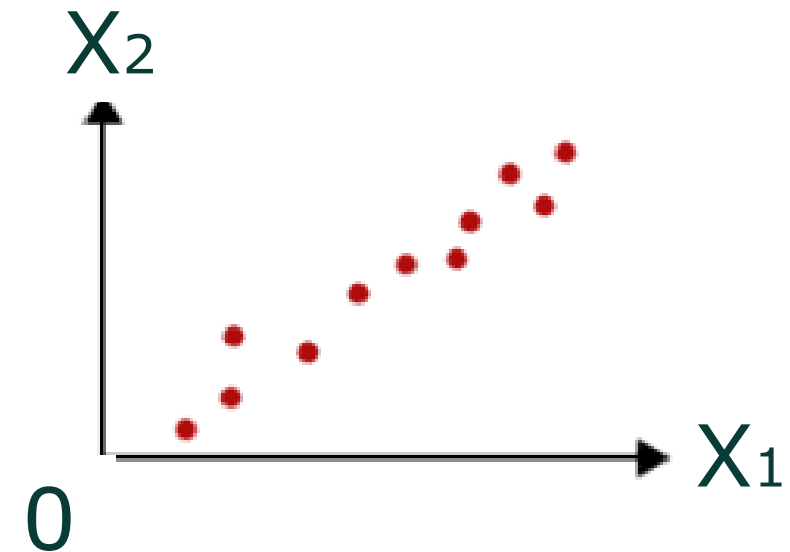


	ranking	z-score	Min-max	Distance to reference country	Categorical scales
Adjust for measurement unit	Y	Y	Y	Y	Y
Adjust for variance	Y	Y	N	N	Y/N
Adjust for range	Y	N	Y	N	Y
Adjust for extreme values	Y	N	N	N	Y

Step 5

Weighting

- ✓ Discuss if **correlation** among indicators should be accounted for in the weights
 - ✓ If yes, then how (more correlated indicators more or less weight?)
- ✓ Select a **suitable weighting method** that respects the conceptual framework and the data properties



Step 6

Aggregation

- ✓ Discuss if **compensability** among indicators should be allowed (fully, partially, not at all)
- ✓ Discuss **up to which level to aggregate**
- ✓ Select a **suitable aggregation method** that respects the conceptual framework and the data properties

Question

$$8+2 < = > 5+5$$

Outranking matrix

	A	B	C	D	E
A	0	0.2	0.4	0.2	0.2
B	0.8	0	0.8	1	0.2
C	0.6	0.2	0	0.4	0.4
D	0.8	0	0.6	0	0.2
E	0.8	0.8	0.6	0.8	0

Example: Multidimensional Poverty Assessment Tool

Component: *Domestic Water Supply*, Subcomponent: *Availability*

17.1) During the last 12 months, for how many months was your household's main source of water sufficient to meet your household's drinking, cooking, bathing and cleaning needs?

Months: ≤ 4 ≥ 8 *Don't remember (-1)*

17.2) How often do you worry there will not be enough water from your household's main water source to satisfy your household's drinking, cooking, bathing and cleaning needs?

Never (1) *Rarely (2)* *Sometimes (3)* *Often (4)* *Always (5)*

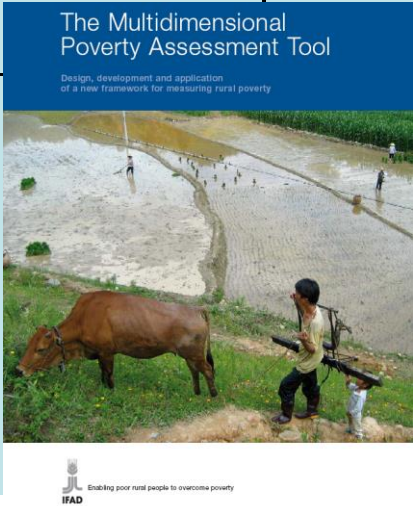
3 HHs

Careless?

104 HHs

Too worried?

Suggestion: With **survey data**, given some unavoidable inconsistencies (in part due to the way the human mind works), use a (weighted) **arithmetic average** (rule of thumb: 5-10 indicators) within a subcomponent.



Step 7

Statistical coherence

- ✓ Assess if **few indicators dominate** the framework
($r_{\text{indicator}, \text{index}} > 0.95$)
- ✓ Assess if indicators behave as "**noise**" in the framework
($-0.3 < r_{\text{indicator}, \text{index}} < 0.3$)
- ✓ Assess if indicators are **negatively** related to the index
($r_{\text{indicator}, \text{index}} < -0.3$)

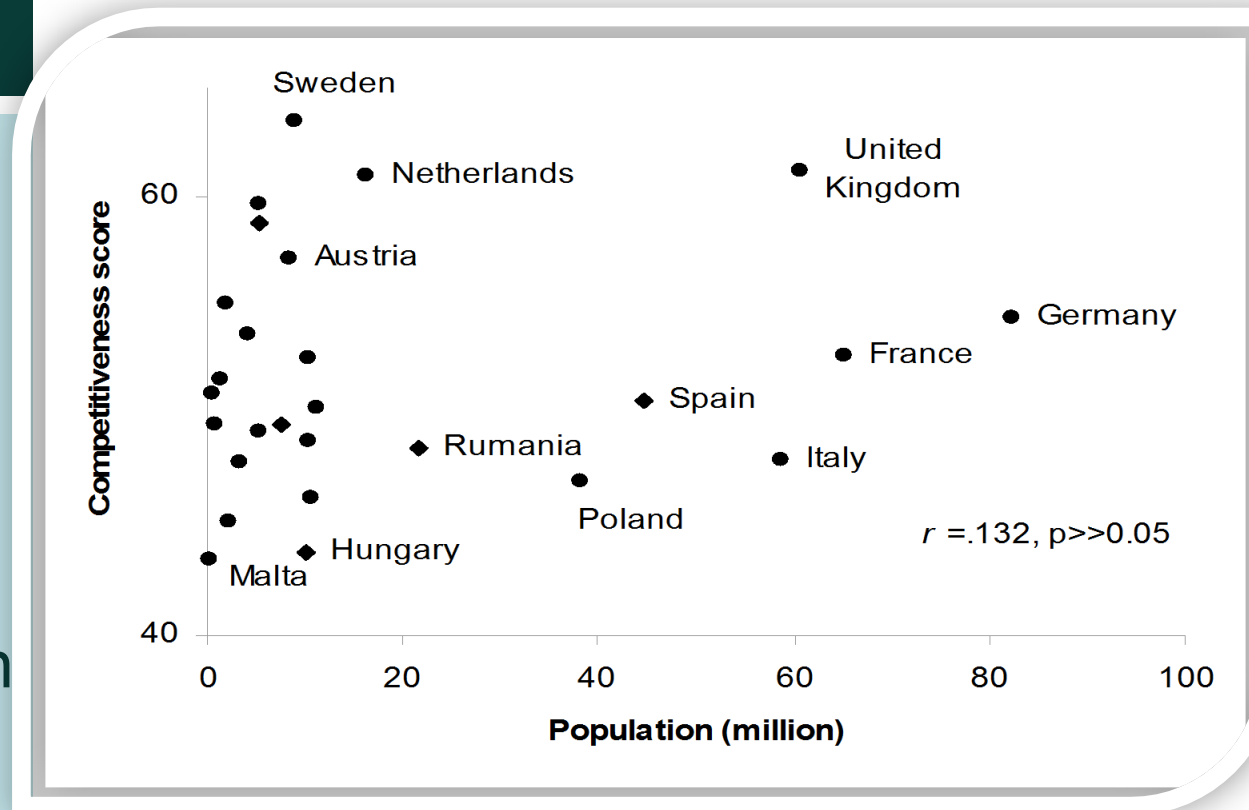
SSI categories	SSI Indicators	SSI categories							
		I	II	III	IV	V	VI	VII	VIII
I.Basic Needs	Sufficient Food	0.82	0.71	0.59	-0.15	-0.50	-0.71	0.45	0.54
	Sufficient to Drink	0.90	0.72	0.58	-0.14	-0.41	-0.76	0.45	0.53
	Safe Sanitation	0.97	0.79	0.64	-0.22	-0.51	-0.81	0.46	0.58
II.Health	Healthy Life	0.87	0.87	0.70	-0.12	-0.52	-0.79	0.55	0.62
	Clean Air	0.75	0.87	0.62		-0.57	-0.73	0.48	0.52
	Clean Water	0.40	0.68	0.52	0.20	-0.10	-0.32	0.51	0.28
III.Personal & Social Development	Education	0.80	0.82	0.71		-0.45	-0.73	0.55	0.56
	Gender Equality	0.47	0.57	0.52			-0.34	0.48	0.34
	Income Distribution	0.35	0.37	0.81		-0.22	-0.41	0.33	0.19
IV.Nature & Environment	Good Governance	0.62	0.76	0.76		-0.48	-0.56	0.68	0.54
	Air Quality	-0.37	-0.17	-0.13	0.62	0.27	0.50	0.12	-0.21
	Biodiversity				0.84	0.13	0.12	0.25	
V.Natural Resources	Renewable Water Resources	-0.24			0.43	0.58	0.38	0.15	
	Consumption	-0.46	-0.61	-0.46		0.70	0.40	-0.50	-0.48
VI.Climate & Energy	Renewable Energy	-0.79	-0.65	-0.52	0.33	0.47	0.96	-0.34	-0.54
	Greenhouse Gases	-0.75	-0.75	-0.72	0.16	0.59	0.87	-0.45	-0.62
VII.Transition	Organic Farming	0.44	0.59	0.58	0.24	-0.29	-0.37	0.94	0.30
	Genuine Savings	0.28	0.29	0.32	0.17		-0.19	0.54	0.29
	GDP	0.80	0.86	0.73		-0.60	-0.79	0.59	0.68

Pearson Correlations	Ecosystem Vitality	Environmental Health
<i>EPI 2010</i>	0.29	0.90
Environmental Health	-0.08*	
<i>Variance</i>	<i>117</i>	<i>615</i>

Step 7

Statistical coherence

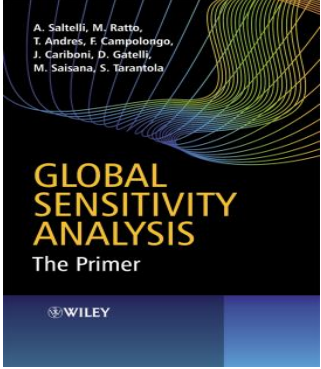
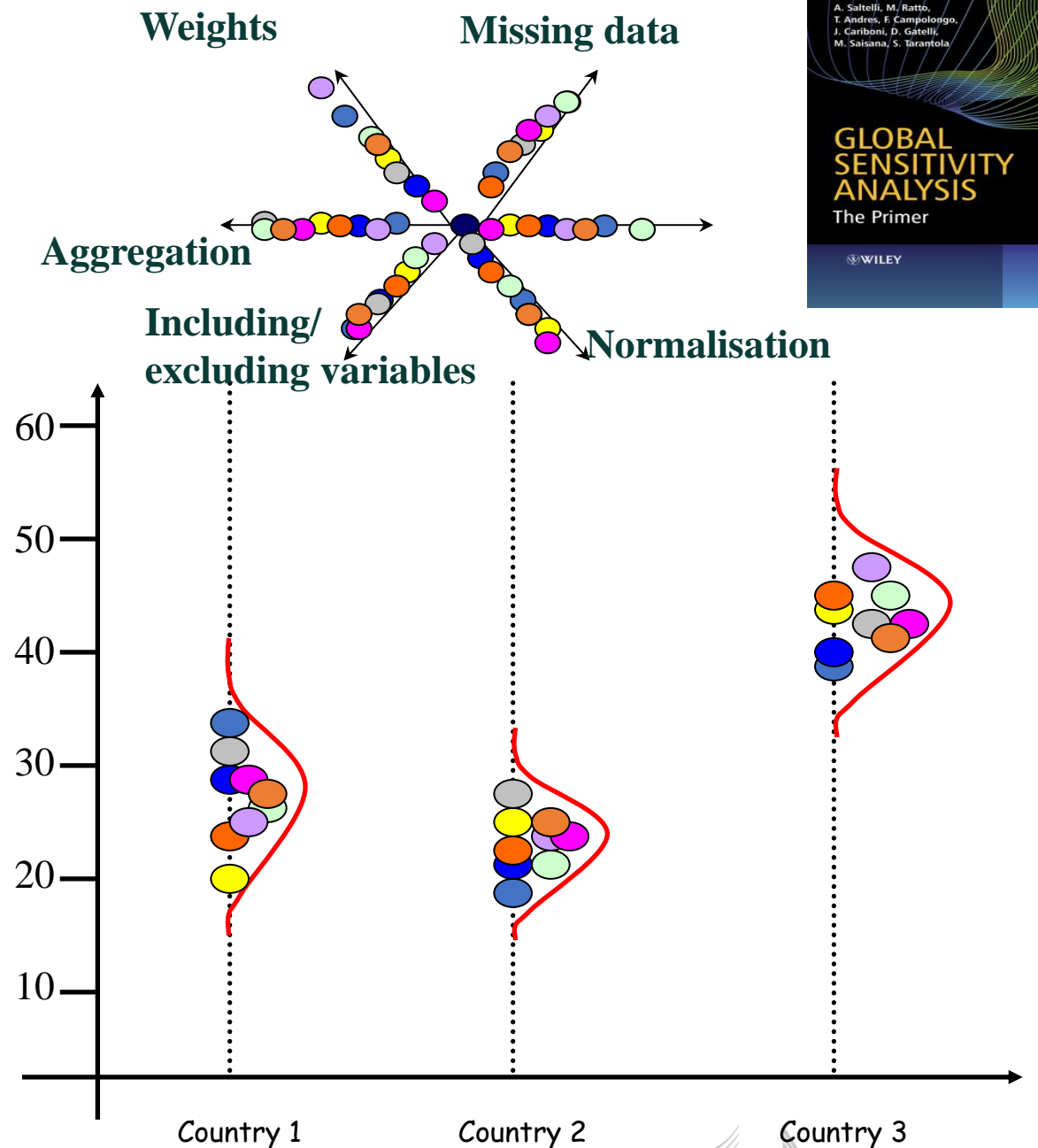
- ✓ ...
- ✓ Assess if indicators **statistically fit better** under **different dimensions** than those in the framework
- ✓ Assess if **dimensions should be merged or split**
- ✓ Assess if **bias** has been introduced in the index (e.g., due to population size, population density, GDP)



Step 8

Robustness & Sensitivity

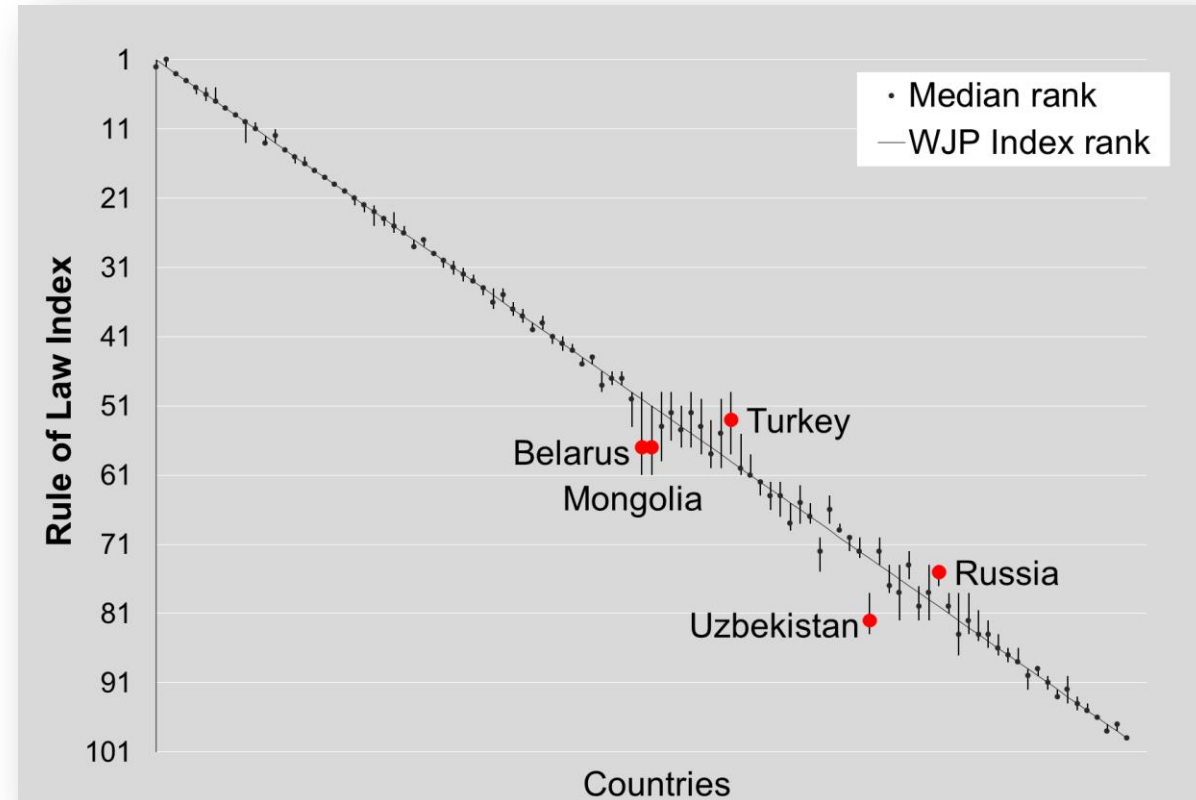
- ✓ Identify the **sources of uncertainty** in the index development
- ✓ Assess the **impact of the uncertainties** to the index scores or ranks
 - ✓ complement scores/ranks with confidence intervals



Step 8

Robustness & Sensitivity

- ✓ Identify the sources of uncertainty in the index development
- ✓ Assess the impact of the uncertainties to the index scores or ranks
 - ✓ complement scores/ranks with confidence intervals

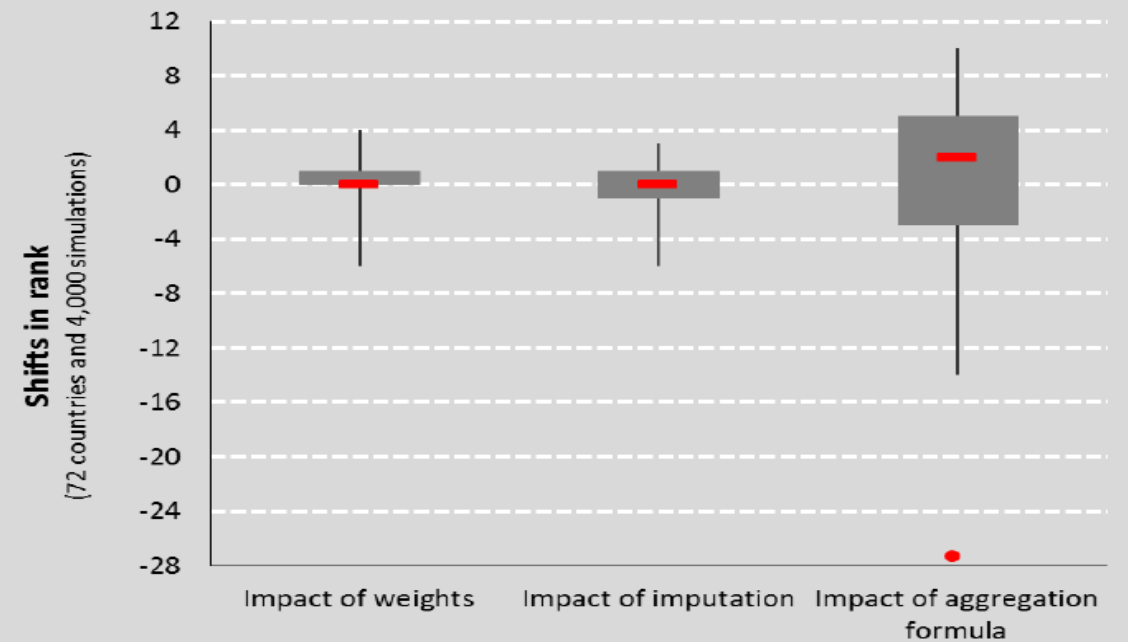


Step 8

Robustness & Sensitivity

- ✓ ...
- ✓ Identify which **uncertainties are more crucial** in determining the final classification
- Explain **why certain countries notably improve or deteriorate** their relative position given the assumptions

Robustness \neq Quality

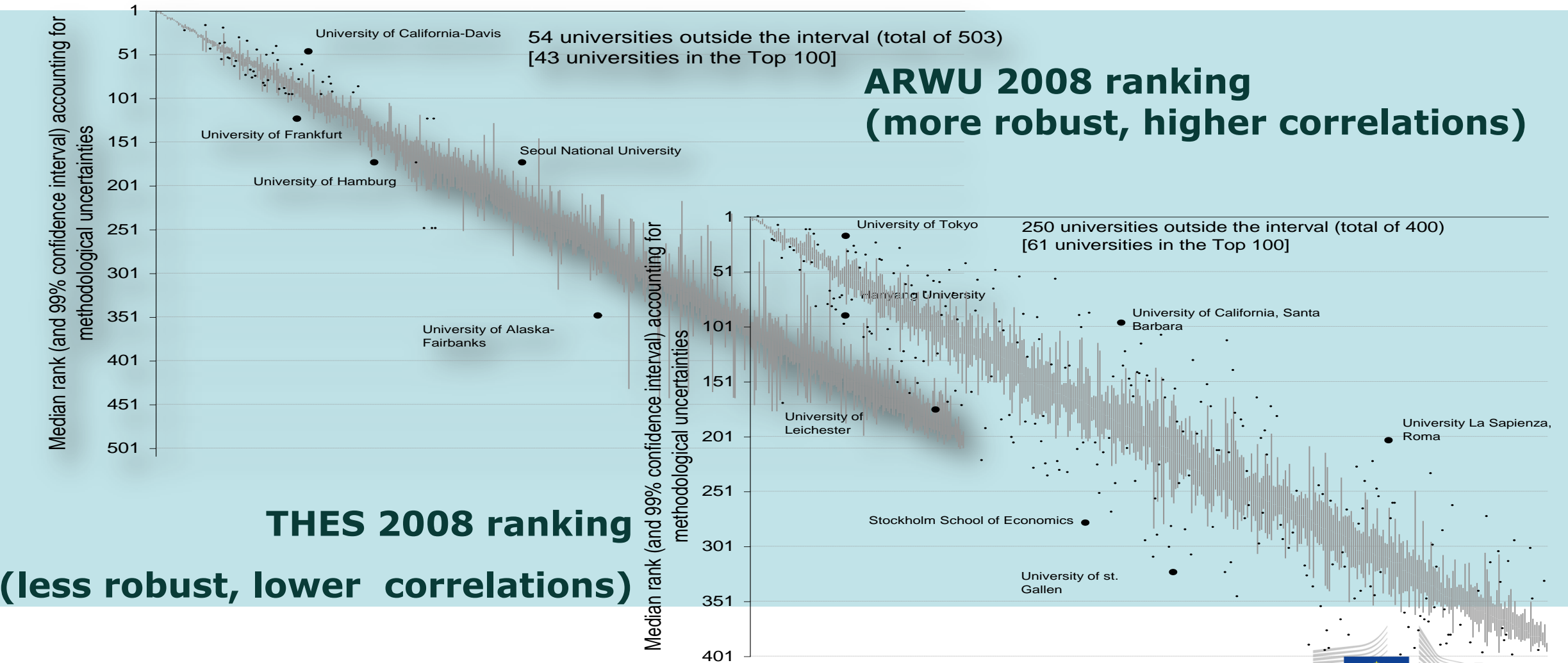


Robustness can also be used in the process of building an index ...



...not only to criticize an existing one!

Robustness ≠ Quality



Step 9

Look back into the data & vis-à-vis other measures

- ✓ Decompose performance at the **indicator level** (to reveal strengths and limitations for each country)
- ✓ Correlate the index with relevant **measurable phenomena** and explain similarities or differences
- ✓ Develop **evidence based narratives**
- ✓ Perform **causality tests** (if time series data or microdata are available)

The Eight Factors of the WJP Rule of Law Index

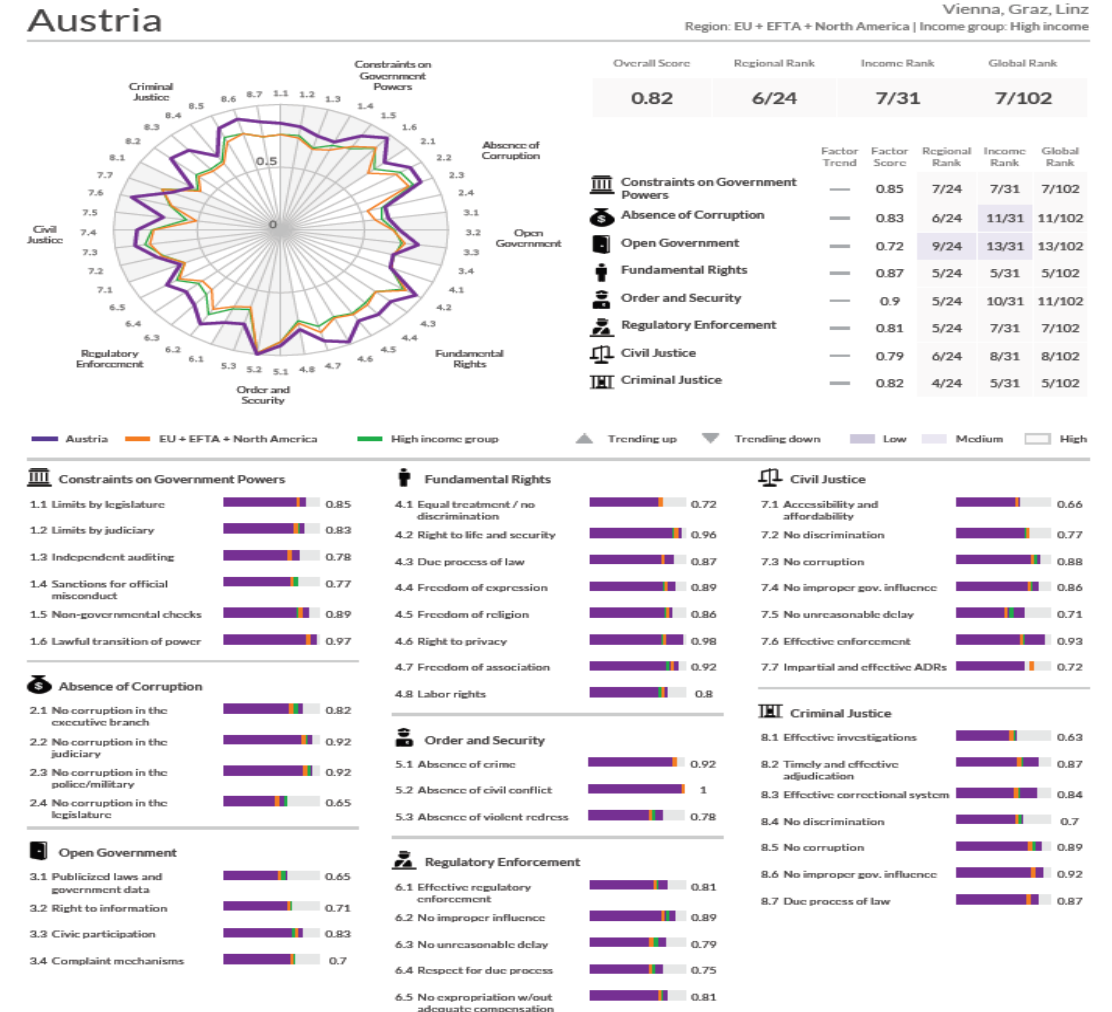
The following chart presents country performance on the eight factors of the WJP Rule of Law Index



Step 9

Look back into the data & vis-à-vis other measures

- ✓ Decompose performance at the indicator level (to reveal strengths and limitations for each country)
- ✓ Correlate the index with relevant measurable phenomena and explain similarities or differences
- ✓ Develop data-driven narratives on the results.
- ✓ Perform causality tests (if time series data or microdata are available)



Step 10

Visualisation & Communication

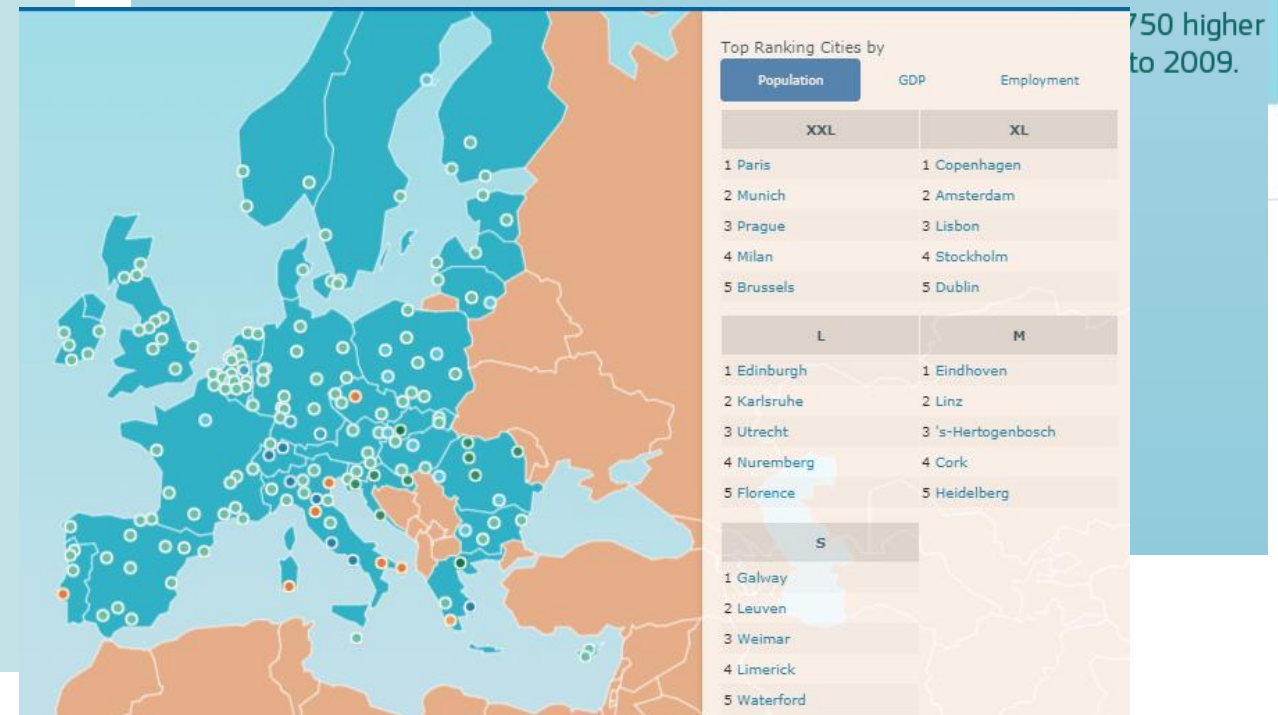
- ✓ Identify suitable visualisation tools for the **targeted audience**
- ✓ Select the visualisation technique which communicates the most information **without hiding vital information**
- ✓ Make your index/scoreboard **EAST**
 - ✓ Easy, Attractive, Social and Timely



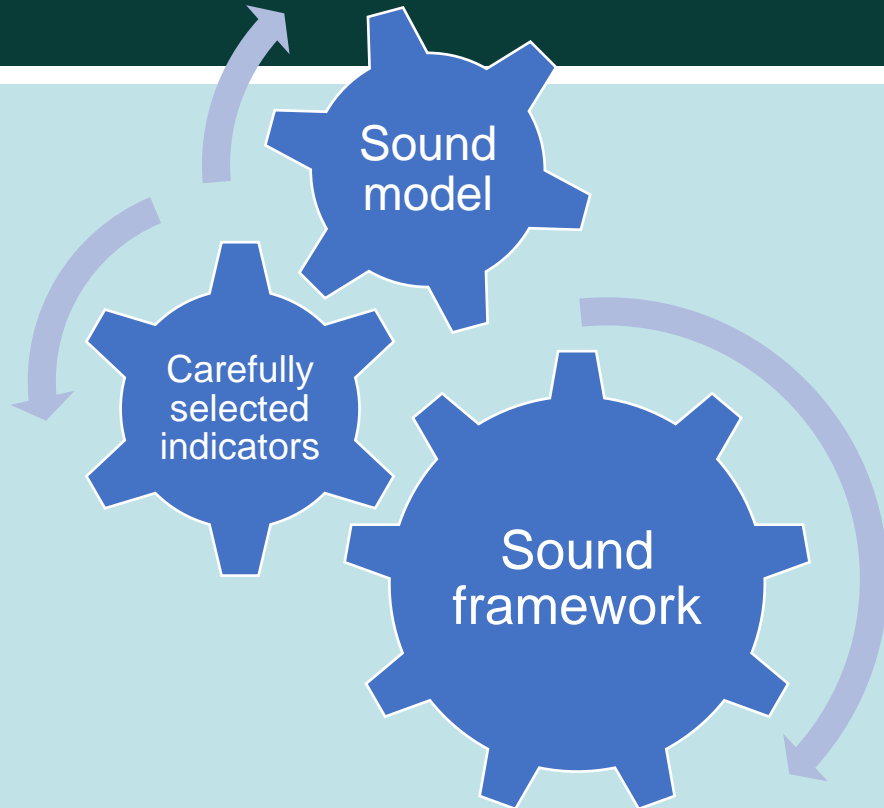
Tibor Navracsics @TNavracsicsEU · Jul 6
New @EU_ScienceHub tool for #EUCreativeCities is excellent example of #science and facts supporting #culture, #innovation & development



Leading Cultural and Creative Cities are more prosperous



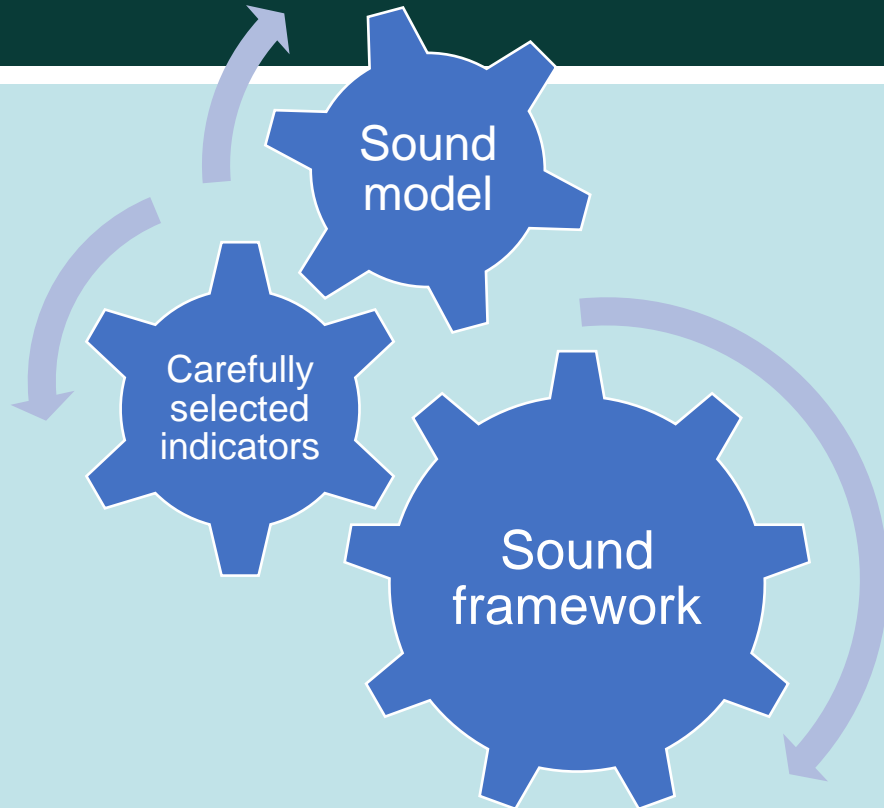
Prerequisites for any index



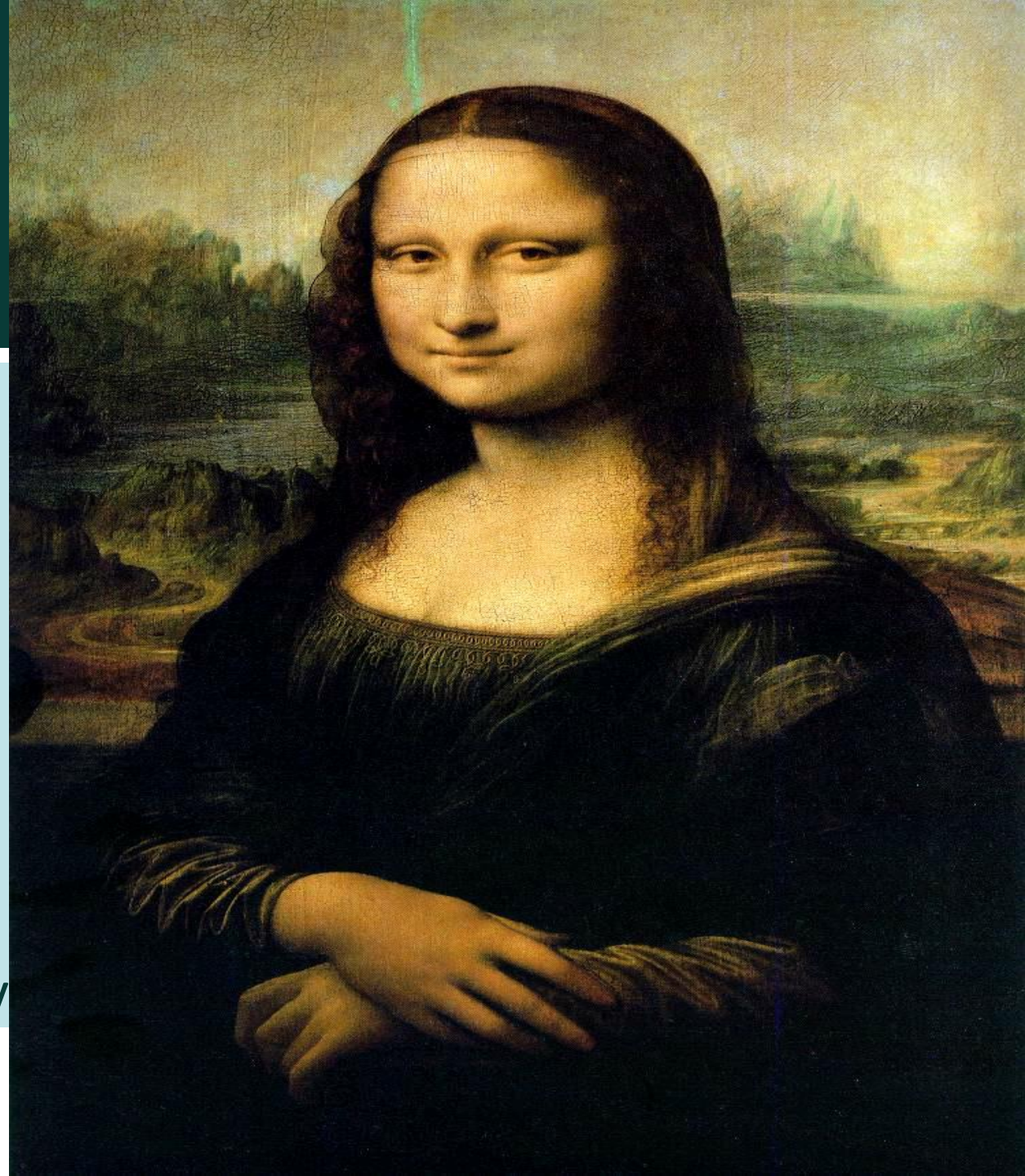
can help to depict reasonably reality



Prerequisites for any index



can only offer an **imperfect mirror** of reality



(Composite) Indicators

*Powerful evidence based narratives supported by **good statistical measures** and good **analytic work** are a possibility which should not be left untried*

*We need **relevant** and **sound**...*



References and related reading

- <https://ec.europa.eu/jrc/en/coin>
- <https://composite-indicators.jrc.ec.europa.eu/>

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THANK YOU

Welcome to email us at: jrc-coin@ec.europa.eu

COIN in the EU Science Hub

<https://ec.europa.eu/jrc/en/coin>

COIN tools are available at:

<https://composite-indicators.jrc.ec.europa.eu/>

The European Commission's
Competence Centre on Composite
Indicators and Scoreboards



Questionnaire – Post Day 1:

<https://goo.gl/qy19yD>