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| Step 1: Concept definition |  | | | | |
| A theoretical framework provides the basis for the selection and combination of variables into a meaningful composite indicator which is fit for purpose. The involvement of experts and stakeholders is important. This step involves:   Clearly defining the objectives and the end-users of the index.   A clear understanding and definition of the concept to be measured.   Map existing literature, indicator frameworks and definitions and assess the added-value of your index.   Building a hierarchical structure of the various sub-groups of the phenomenon (if relevant). Tips: You may need to spend up to 2/3 of the overall time in defining the conceptual framework and  indicators. 5-7 indicators per dimension is good practice. A minimum of 3 indicators by dimension is  acceptable. | | | | | |
| Step 2: Indicator selection | |  | | | |
| The selection of data and indicators should be based on criteria such as the relevance, value-added, data availability, and statistical considerations. Again, the involvement of experts and stakeholders is important. This step involves:   Research, data downloading, data mining.   A quality assessment of the available indicators, based on indicator criteria, potentially using a summary table of indicator characteristics (data, relevance, statistical properties, etc.).   Scaling indicators by an appropriate size measure to have an objective comparison across countries, e.g. population, GDP, etc.  Tips: Aim for at least 65% of data coverage across each indicator and each country. | | | | | |
| Step 3: Data treatment and analysis | | |  | | |
| Missing data can be imputed, outliers treated and transformations can be applied to indicators where necessary and appropriate. Specifically, this may involve:   Visualising the distribution of each indicator using histograms and scatter-plots.   Checking for missing data and carefully deciding whether or not to impute the data, and which method to use.   Discussing and treating outliers, if necessary and appropriate (e.g. by Winsorisation, or transformations).  Tips: Plot first and consider indicators for outlier treatment if: (a) absolute skewness > 2.0 and kurtosis  > 3.5 or, (b) kurtosis is very high (> 10). | | | | | |
| Step 4: Normalisation | | | |  | |
| Normalisation brings indicators onto a common scale, which renders the variables comparable. Generally this involves:   Making directional adjustment, so that higher indicator values correspond to better performance in the concept being measured.   Selecting and applying a suitable normalisation method that respects the conceptual framework, the data properties, and can be easily interpreted by users.  Tip: A commonly-adopted normalisation method is the Min-Max approach, which rescales indicators onto an identical range (0-100) | | | | | |
| Step 5: Weighting | | | | |  |
| When indicators are aggregated into a composite measure, they can be assigned individual weights. This allows the effect or importance of each indicator to be adjusted according to the concept being measured. Weighting methods can be statistical, based on public/expert opinion, or both. This step can involve:   Expert/public consultation to understand the relative importance of indicators or components of the index to stakeholders.   Selecting the appropriate weighting method—note that different methods can be trialled but keep in mind that the ability to communicate the final weighting scheme is important. Simpler methods can be more effective in this respect. | | | | | |

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| Step 6: Aggregating indicators |  | | | |
| Aggregation combines the values of a set of indicators into a single summary ‘composite’ or  ‘aggregate’ measure. This step can involve:   Selecting the appropriate aggregation method, based on the concept being measured, particularly considering whether high values of one indicator should be allowed to compensate for low values of another, relating to the goals of the index.   Considering up to which level to aggregate.  Tip: Popular aggregation methods include the arithmetic average, geometric average, and the Borda and Copeland methods. | | | | |
| Step 7: Statistical and conceptual coherence | |  | | |
| This can be used to study the overall structure of the dataset, assess its suitability, and guide subsequent methodological choices (e.g., weighting and aggregation). This can involve:   Check correlations between aggregations and the underlying indicators - are some over or under-represented in the aggregate scores?   Assessing whether statistical properties can be improved by moving indicators under different dimensions or merging/splitting dimensions.   Checking whether a bias has been introduced in the composite indicator, e.g. a strong correlation with population (>0.6) or GDP.  Tip: Check whether indicators: dominate the framework (correlation > 0.95), or are under- represented (-0.3 < correlation < -0.3). | | | | |
| Step 8: Uncertainty and sensitivity analysis | | |  | |
| *Uncertainty analysis* quantifies the uncertainty in the scores and ranks of the composite indicator, as a result of uncertainty in the underlying assumptions. *Sensitivity analysis* quantifies the uncertainty caused by each individual assumption, which identifies particularly sensitive assumptions which might merit closer consideration, for example. This step involves:   Identifying which are the main uncertainties underlying the composite indicator (e.g. methodological choices, indicator selection, alternative frameworks, etc.)   Assessing the impact of the uncertainties on the scores or ranks (e.g. by assigning confidence intervals). Use sensitivity analysis to see which assumptions cause the most uncertainty.   Explaining why certain countries notably improve or deteriorate their relative position given changes in the assumptions | | | | |
| Step 9: Making sense of the data | | | |  |
| The scores of the composite indicator (or its dimensions) can be compared (e.g. plotted, correlated) with other existing composite indicators and other indicators/data to identify possible links with other concepts. This can involve:   Correlating the composite indicator with relevant measurable phenomena (similar composite indicators but also relevant quantities e.g. GDP, GDP/capita, etc.) and explain similarities or differences.   Develop data-driven narratives based on the results. What question(s) did you set out to answer? Keep in mind the significance level of the correlations and the implications of multiple testing.   Don’t assume causality from correlation. Perform causality tests (if time series data is  available). | | | | |
| Step 10: Visualisation | | | | |
| Composite indicators are ultimately a communication tool, which can be greatly enhanced by proper visualisation, both static and interactive (online). Good visualisation helps to effectively communicate the message, gives a sense of professionalism, and online data exploration tools give full transparency to the data set and allow users to drill down to underlying data. This step can involve:   Identifying the target audience and the best means of visualisation (e.g. simple vs technical).   Communicating key messages/conclusions through carefully selected charts and infographics which are clear and do not over-complicate or obscure the information.   Constructing a web platform for visualising the data, reporting methodology, making data available for download, etc. | | | | |