

Chapter 6: composite socio-economic indicators

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6.1 Introduction

There is a growing attention for non-economic indicators, whether it be social, socio-economic or environmental indicators. To a great extent this rise in attention is a result of the report on measuring economic performance and social progress (Stiglitz, Sen and Fitoussi 2009), although the tradition of social indicators dates further back (cf. Boelhouwer 2010, Noll 2011). In this chapter the focus is on socio-economic and composite indicators.

As is the case with economic indicators, there is a wide variation in arguments for and against composite indicators and in methods of aggregation. Because of the lack of a common unit for measurement (as provided by monetary units for economic indicators), the way of combining and weighting socio-economic indicators provides an extra point of discussion. These discussions will be addressed in this chapter.

Socio-economic concepts

Under the umbrella notion of ‘socio-economic indicators’ various concepts are to be placed. Examples are ‘happiness’, ‘quality of life’, ‘well-being’, ‘living conditions’ and ‘life situation’; but also ‘social capital’, ‘generalized and political trust’ or environmental concepts (for example various (ecological) footprints). Other concepts used to describe these broad kind of indicators are Human Development (UNDP), ‘Beyond GDP’ (European Commission, 2007), and How’s Life? (OECD, 2016). Some concepts still need to be developed (further) or are under debate, such as the concept ‘sustainable development’, which might not only be based on indicators for the <here and now> such as subjective well-being, but also on <later> from the perspective of the capital approach (natural, human, social, economic), and on <elsewhere>, referring to welfare’s impact in one country on the welfare in other countries (UNECE et al 2014).

Sustainable development

A starting point for the measurement framework for many if not all measures of sustainable development is the Brundtland Report published in 1987. This report defines sustainable development as development that “meets the needs of the present without compromising the ability of future generations to meet their needs”. Besides the distinction between ‘now’ and ‘later’, the report addresses the ‘here’ versus ‘there’: “the Brundtland Report puts emphasis on the fairness of societal developments on a global scale. In an increasingly globalized world, the measurement approaches should reflect the transboundary impact of sustainability, by highlighting how a country in pursuit of the well-being of its citizens may affect the well-being of citizens of other countries.”

The CES recommendations (UNECE et al. 2014) suggest a small set of 24 and a large set of 90 indicators for measuring sustainable development, within 20 themes, ranging from subjective well-being, health and education, to nutrition, leisure and climate.

“The Recommendations do not aim to define a one-size-fits-all approach, but rather presents a flexible framework that can respond to a variety of needs. Users who want to stress the current as well as the future aspects of human well-being (the “integrated approach”), can base their indicator system on the twenty themes. Those who want to emphasize the intergenerational aspects of sustainable development (the “future-oriented” or “capital approach”) can restrict themselves to the use of capital indicators.”

Based on UNCE et al. (2014)

Composite indicators

Socio-economic composite indicators serve to measure the above-mentioned concepts. A common practice in the construction of a composite indicator is (1) select the indicator variables; (2) weight and aggregate the indicator variables; (3) test robustness of the composite indicator (OECD, 2008). Typical of composite indicators, and thus also of composite socio-economic indicators, is that they measure complex, multidimensional phenomena which cannot be measured directly. One of the most widely used composite indexes is the Human Development Index (HDI) of the United Nations in which indicators of life expectancy, educational attainment and income are included in one index (UNDP, 2010).

The Human Development Index

Human development is about enlarging human choices—focusing on the richness of human lives rather than simply the richness of economies. The Human Development Index (HDI) is a composite index focusing on three basic dimensions of human development: to lead a long and healthy life, measured by life expectancy at birth; the ability to acquire knowledge, measured by mean years of schooling and expected years of schooling; and the ability to achieve a decent standard of living, measured by gross national income per capita. The geometric mean of the resulting indices is then taken to form the HDI. The HDI has an upper limit of 1.0.

Here, the life expectancy and GNI indices are not composite indicators, since they are simply single indicators that have undergone a normalization procedure. The education index, however, is a composite indicator, since it combines two indicators denominated in different units. While mean years of schooling and expected years of schooling may both appear to be denominated in the same unit (years), a mean year of schooling is a different unit from an expected year of schooling. Combining the two indicators therefore involves a decision about weighting (in this case, the decision was made to weight both equally).

Though the number of composite socio-economic indicators is rising rapidly, it is sometimes believed that, contrary to stakeholders’ positive views, official statisticians are not keen on these indicators - because they are ‘unwilling to waste or hide information behind a single number of dubious significance’ (Saisana, 2014). That might be more true for socio-economic composite indicators than for economic ones, as composite economic indicators are widely used by NSO’s (see chapter 5).

Notwithstanding these reservations, socio-economic indicators are increasingly used, also by NSO's, and there is a growing number of NSO's actually producing composite socio-economic indicators.

An example, based on the Netherlands, is the composite indicator 'social capital', built upon 17 socio-economic indicators (Van Beuningen & Schmeets, 2013). The index is based on a social cohesion framework, including the dimensions participation, trust and integration (Schmeets and Te Riele, 2010). Participation and trust consist of three levels: the subdimensions social, organisational, and political. The indicators were incorporated in the new survey on social cohesion and wellbeing (in 2009; redesigned in 2012). The operationalization and selection of the 17 indicators builds partly upon Putnam's social capital index (Putnam, 2000, p. 291) and various robustness checks. Weights are assigned to the 17 indicators, the six subdimensions, and the two main dimensions (participation and trust), showing the various contributions to the social capital index.

An index for social capital

Participation	Trust
Social - 1. Contacts: family - 2. Contacts: friends - 3. Contacts: neighbours - 4. Informal help	Social - 10. Trust in Other People
Organizational - 5. Participation in organisational activities - 6. Paid Work - 7. Volunteering	Organizational - 11. Army; 12. Judges; - 13. Police; 14. Press; - 15. Large companies; - 16. Civil servants
Political - 8. Voting - 9. Political action	Political - 17. In national parliament

Structure of the chapter

In section 6.2 different arguments in favour and against composite indicators are summarized. Section 6.3 discusses the successive steps to be taken to compile a composite indicator and in section 6.4 the issue of dissemination is addressed.

Various documents and handbooks have been used for this chapter - the most important ones are compiled by the OECD (2008: Handbook on constructing composite indicators) and Eurostat (2014: Towards a harmonised methodology for statistical indicators).

6.2 Arguments for and against composite socio-economic indicators

Other than statistical figures, an indicator most of the times has a normative character (Michalos 2014, Boelhouwer 2010, OECD 2008), especially when they are used for policy making or policy evaluation. In other words: "social indicators are [...] statistics, statistical series, and all other forms of evidence – that enable us to assess where we stand and are going with respect to our values and goals, and to evaluate specific programs and determine their impact" (Bauer 1966: p. 1). Combining indicators to construct a composite indicator has pros and cons. The following arguments for and against indices draw heavily on OECD (2008) and Boelhouwer (2010) .

Pros of composite indicators:

- Can summarise complex, multi-dimensional realities. Thus makes it also easier to compare social groups, countries or regions.
- Are easier to interpret than a battery of many separate indicators.

- Make trends easier to interpret, especially when some indicators point in a positive direction and others in a negative direction.
- Reduce the visible size of a set of indicators without dropping the underlying information base. Thus make it possible to include more information within the existing size limit.
- Facilitate communication with stakeholders (whether that be policymakers, journalists or the general public) and promote accountability.
- Help to construct/underpin narratives for lay and literate audiences.
- Enable users to compare complex dimensions effectively.
- From a methodological point of view, an index has the advantage of increased reliability, as measurement errors in separate indicators are balanced out. Lastly, it is easier to perform analysis with a composite index than with several indicators.

Cons of composite indicators:

The most important objections are the absence of consensus regarding:

- Selecting the individual indicators: it is not clear on what basis the indicators should be selected. Often a conceptual model or theory does not exist, or is rather ambiguous.
- Taking the selected indicators together: can one compare apples and oranges, or combine them into one index or composite indicator?
- Weighting the indicators or domains: how should the weighting factors be determined?
- The choice of the model: should the indicators be specified as effects or as causes of the index? If indicators are effects, reflective models (e.g. factor-model) should be used. If the indicators directly constitute the index, formative models might be a better approach.
- The treatment of the item missing values: more cases will have at least one missing value on one of the indicators which may result in a substantial reduction of valid cases in an index. Imputation of the missing values is often an arbitrary remedy.
- Monitoring the year-over-year values of an composite index urges for a robust model. If the model is not robust, the trends are disputable.

Next to this we note the following disadvantages of a composite index.

- It may send misleading messages if the composite index is poorly constructed and/or misinterpreted.
- It may invite simplistic conclusions. Related: the use of rankings can be misleading and simplistic as it is often unclear what differences exactly mean. What does it mean if the difference in HDI (Human Development Index) score between Norway and Sweden is 0.037 in 2015 (ranks 1st and 14th)?
- Just like any statistical figure, a composite index may be misused, e.g. to support a desired policy, all the more so if the construction process is not transparent and/or lacks sound statistical or conceptual principles.
- It may disguise serious failings in some dimensions and increase the difficulty of identifying proper remedial action, if the construction process is not transparent or if dimensions of performance that are difficult to measure are ignored.

Weighting the pros and cons

In short: a composite indicator makes clear at a glance whether things are going better or worse (just as GDP does for the economy), is easy to communicate and simplifies comparisons between groups. On the other hand, a composite indicator is a simplification of developments in the different domains and there is no uncontroversial method for selecting and weighting the individual indicators.

An overall argument for using composites was given as long ago as the 1970s by the economist Drewnowski (1974): only combining social indicators into a single figure will deliver an equivalent alternative to set against GDP – itself also a combined indicator. Besides, GDP was also not easily established; it is most likely not obvious to everyone what indicators are used to measure GDP and its meaning is the subject of recent debate (‘beyond GDP’). These are the same arguments that are often used against a quality of life index, but still GDP is a widely used measure.

When it comes to weighting the different indicators – another point for debate with regard to indices – there are sufficient good solutions available. This point is discussed in the next section and at large in the 2008 OECD Handbook on constructing composite indicators.

Combining single indicators into a composite indicator does by no means imply that a composite indicator should include everything. It is a good thing to encapsulate socio-economic, multidimensional phenomena with composite indicators, but including the well-being of here and now with the well-being of later and elsewhere makes less sense (cf. Stiglitz et al. 2009). Besides, there is no need to choose between having a composite or having multiple indicators. Having them both might be combining the best of two worlds.

Composite indicators should also not be overrated: a general index is not suitable as a means of answering specific (policy) questions: a composite index cannot always provide the desired insight when analysing and explaining developments.

6.3 Steps for constructing composite socio-economic indicators

There are several steps to be taken in the construction of composite socio-economic indicators. In this section these steps are briefly described. More detailed information can be found in OECD (2008), Land (2014) and Boelhouwer (2010), on which this section to a large extent is based.

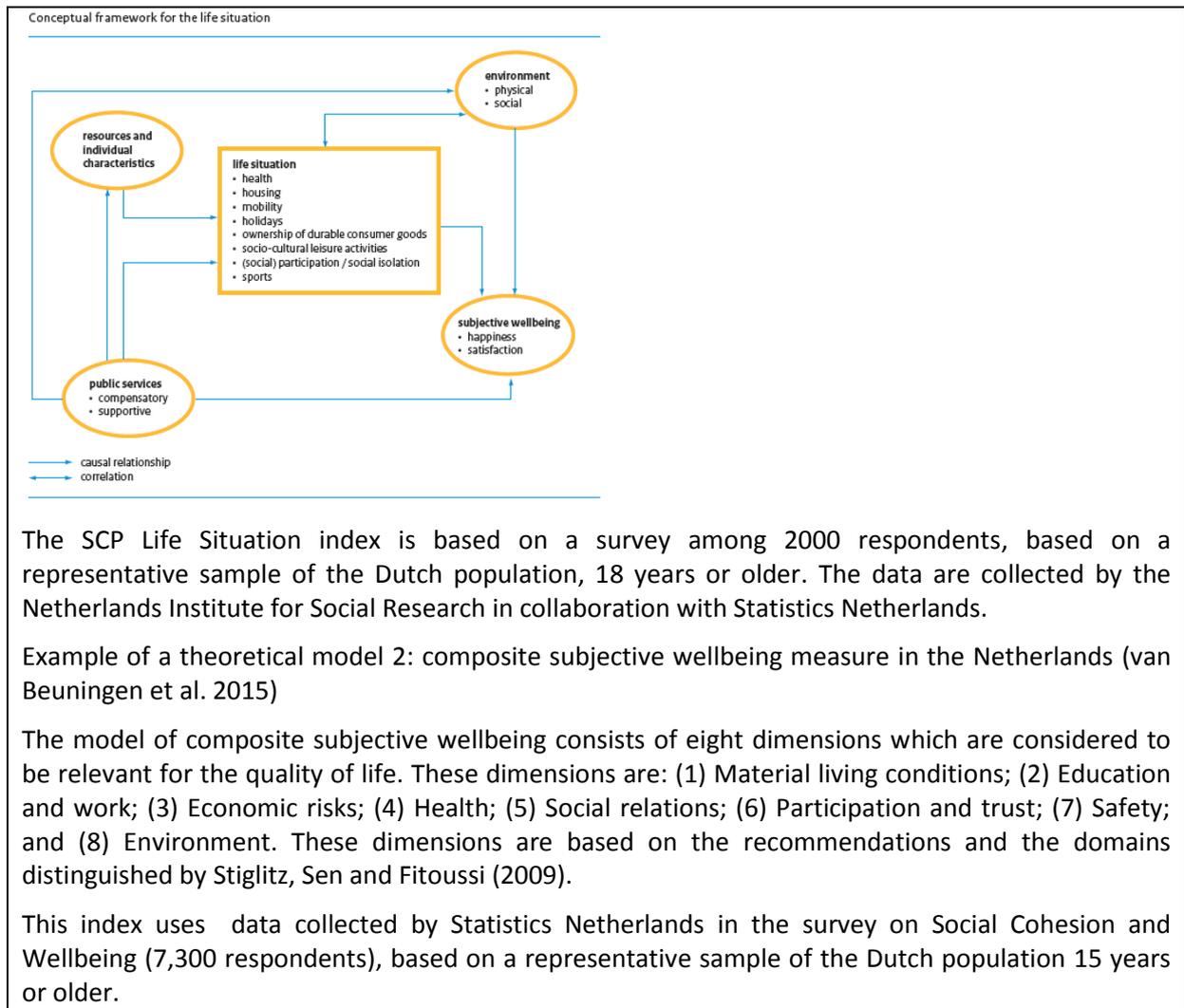
6.3.1 Using a conceptual model

The first step is the theoretical underpinning of the composite indicator. This model provides the basis for choosing the domains and indicators. Important is to get clear what is to be measured (what is the definition of the phenomenon and what is understood by it).

The conceptual model can also be used to describe the composite indicator and relate it to other relevant phenomena. For instance: one can make a distinction between inputs (for instance number of doctors), outputs (state of health) and outcomes (quality of life) and decide not to combine them in one composite indicator, but to make a composite for the outcomes only (see also the next section).

Example of a theoretical model 1: the life situation in the Netherlands (Boelhouwer 2010)

In the conceptual model the life situation takes centre stage (see figure). It also includes determinants of the life situation: in addition to personal characteristics (such as age and household composition), also education, work, health and income (which we call ‘resources’ here). Environment also plays a role in the life situation of citizens. These include both a physical component (the city and neighbourhood a person lives in, is it safe?) and a social component (what is the demographic composition of the neighbourhood?). The life situation index itself includes indicators which relate to the actual state of affairs, not to an (individual) evaluation of it. In the broader conceptual model we look at both. We assume that people’s life situation will affect their happiness and satisfaction. And finally, the conceptual model includes the use of public services. The idea here is that the government helps to prevent social disadvantages from developing, and where these do develop, to compensate them as much as possible.



6.3.2 Selecting domains and variables

Suppose we want to compose an indicator for a phenomenon called quality of life. Then each domain has to constitute a separate but substantial part of the phenomenon. A domain is an aspect of the quality of life phenomenon, like education, safety or health. For each domain there may be one or more indicator variables, i.e. years of schooling, burglary figures or the subjective health question. Important in the selection of variables and domains is that they have to be related to the phenomenon and they have to be sensitive to change (of course, next to be valid and reliable). Moreover, the number of domains has to be manageable and hence limited. If the goal is to measure progress or decline for the whole population, the chosen variables within the domains have to apply to the whole population, and not to specific groups. So, if you want to measure work in an index, including trends in working conditions is not a good idea as the non-working population is by definition excluded. Of course, this is not a problem if the goal is to describe the changes in conditions of the working population.

The possibility of disaggregating the composite indicator is another issue. To be able to do so, it is necessary that the constituent variables can be disaggregated by subgroups in society (such as male and female, younger and elderly, lower and higher educated), or by regions or other geographical units. Are the variables measured at the individual level (e.g. quality of life of individuals based on a survey) or at an aggregate (contextual) level (e.g. HDI, based on country level data)? Data based on person or household surveys data can be easily disaggregated into a variety of background characteristics, but limited sample size and sampling error prohibits disaggregation to small parts of

the population. Register based data are not hampered by sampling error, but usually include less background information for dividing the whole population into subgroups.

Another question that has to be answered is what kind of variables are needed to measure the phenomenon: input, output, outcome or a mix of these? Are objective indicators or subjective indicators to be chosen, or maybe a combination?

Though the OECD Better Life Index includes both objective and subjective indicators, the combination of both types in one composite indicator is disputed. That is because the nature, the determinants and the processes are very different (Boelhouwer 2010, Hagerty and Land 2001). It can be relevant for policy purposes to keep them distinct, for example if we want to analyze what people are in (objective) good circumstances, but unhappy.

If the goal is to measure trends, variables have to be chosen with which it is possible to tell whether things are getting better or worse. Moreover, in that case creating a time series is necessary, to be able to monitor developments. In doing so, it is important to bear in mind that indicator variables should be consistent in time. Time series that are interrupted due to a change in method, like question wording, data editing or population redefinition, should be repaired in order to measure trends (chapter 3 in UN, 2016).

An important question is what domains to choose? A socio-economic composite indicator involves figures in several different dimensions. It is however important that the number of dimensions does not become too large, because otherwise there is a danger of losing the overall picture. The question of precisely which dimensions should be included under quality of life is often the subject of discussion. When comparing the various different composite indicators that are available, it might seem at first sight that the range of domains is nearly endless. But when looked at more precisely, it becomes clear that there is a strikingly large correspondence between the content of the composite indicators that are around. This goes not only for the composites, but in fact also for several social reports that are being published. The range of different domains described is relatively small. See table 1 for an overview. Although different wording is sometimes used, the content and indicators used frequently resemble each other closely. This gives an idea that, at a meta level, the most important socio-economic domains are agreed upon.

Table 1: Domains covered by a selection of social reports

	Stiglitz, Sen, Fitoussi	OECD Better Life	France (Portrait Social)	Germany (Data Report)	Ireland (Measuring Ireland's Progress)	Netherlands (Social State of the Netherlands)	Switzerland (Sozialbericht)	UK (Social Trends)
Income	X	x	X	x	x	x	x	x
Poverty / social exclusion			X	x	x	x	x	x
Employment/work	X	x	X	x	x	x	x	x
Health	X		X	x	x	x	x	x
Housing		x	X	x	x	x		x
Education	X	x	X	x	x	x	x	x
Sustainability (nature environment)	X	x	X	x	x		x	x
Leisure time (culture, sports, social contacts)	X	x	X	x		x	x	x
Mobility			X	x	x	x	x	x
Safety	X	x	X	x	x	x	x	x

Taken and adapted from Noll & Berger (2014, p. 60)

In itself, this insight is not new. There was a good deal of consensus as long ago as the 1970s regarding the choice of domains in different countries: “I was very intrigued by the fact that “my” list was very similar to the lists developed in other countries, even if the political systems and cultures were very different. [...] I think that the lists also reveal a high degree of universalism in what is considered as social concerns in all countries.” (Johansson 2002: pp. 25-26).

Selecting domains and indicators through societal debates

United Kingdom, ONS leading the debate

The Office for National Statistics (ONS) undertook a national debate on ‘what matters to you?’ between 26 November 2010 and 15 April 2011. In total, ONS held 175 events, involving around 7,250 people. In total the debate generated 34,000 responses, some of which were from organisations and groups representing thousands more. The debate has helped us identify the key areas that matter most and will help to ensure that the measures we use will be relevant not only to government but also to the wider public. This is crucial to allow for effective development and appraisal of policy for individuals to use information to identify ways of improving well-being, and to allow for assessment of how society is doing overall.

(taken from:ONS 2011)

Italy, statistical office involved (BES - equitable and sustainable wellbeing)

In December 2010 Cnel and Istat committed themselves to provide the society with a measurement tool capable of identifying the underlying elements of well-being in Italy. This result has been achieved through the involvement not only of some of the major experts in the various aspects which contribute to well-being (health, environment, employment, economic conditions, etc.), but also of the Italian society itself, through discussions and exchange of views with thousands of citizens, along with meetings held with institutions, social partners and NGOs. This is why Bes indicators aim at becoming a sort of “Statistical Constitution”, providing a constant and shared point of reference for the Italian society, capable of leading the way to achieve the progress which the society itself is looking for.

(taken from Cnel/Istat 2013)

Germany, federal government

What do you think is important in life? What, in your opinion, is characteristic of the quality of life in Germany? These were questions that the German government discussed with the people between April and October 2015. The national dialogue gave everybody in Germany the chance to make their voices heard and to contribute their ideas – either in person at about 200 events held up and down the country, online or by using a simple postcard.

With the dialog the German government aimed to identify yardsticks that can be used to pinpoint the many different facets of the quality of life. This will allow the government to gear its action in future to what is important to the people in Germany

(taken from German Federal Government 2016)

Some concepts are more easy to measure than others: social participation is about activities people do, but social capital has to do with social networks and mutual norms and values: how to measure that? More in general: for personal characteristics and psychological abilities (like self-reliance or resilience) indicators must be sought that measure the concept in an indirect way, via latent constructs (see the example of social capital earlier in this chapter).

6.3.3 Data treatment

A composite indicator should be robust to incomplete data or other data problems. One problem concerns the treatment of missing information: the missing values. One remedy is the imputation of such missing information by, e.g., the mean value of the variable.

Also take into consideration the possibility of outliers, which can disturb the picture. The treatment of outliers should be fully transparent and well documented. If outliers are disturbing, they have to be treated separately. However, sometimes outliers can provide useful information (in the case of social exclusion for example, outliers could be the most socially excluded people).

Make scale adjustments if necessary. If desirable: look at (sub)scales and take for instance logarithms in order to make differences at the lower end more important.

When comparing countries or regions, indicators can have different definitions per country or region. In that case one can look for a cross-national study with a uniform definition or a strongly related indicator to derive internationally comparable figures.

These issues and treatments might lead to reconsidering the choice of domains and indicators. In that case, step 2 (section 6.3.2) must be reconsidered.

6.3.4 Multivariate analysis

Take some time to have a look at the overall structure of the indicators, assess the suitability of the data set and explain the methodological choices, e.g. weighting, aggregation, and the statistical models.

6.3.5 Normalisation of data

As socio-economic composites often don't have the same unit of measurement and can differ in scale, this step is necessary to make the variables comparable.

The creation of z-scores, i.e. subtracting the average and dividing by the standard deviation, is the standard treatment, but may not always be appropriate (for example when comparisons outside the dataset are wanted – between years or countries. A solution can be to combine these datasets). Again, be aware of skewed data and of extreme values.

Make sure to select a suitable normalization method (e.g., min-max, z-scores, and distance to best performer) that respects the data properties.

It might be wise to recode the values so that a higher number always implies a better position and vice versa. This also makes it easier to interpret correlations and other analyses.

6.3.6 Weighting and aggregation

Typically, an aggregation consists of two steps: (1) from indicators to sub-dimensions or domains; and (2) from domains to a composite index. In the second step weighting the domains is mostly a matter of personal taste or current policy making preference.

For example, one could opt for assigning equal weights to all domains if from a theoretical and/or policy perspective all domains are equally important.

Also in the first step weights can be assigned. For example, the calculated individual scores in factor analyses (the scores on the distinguished factors) by statistical software such as SPSS and STATA are in fact weighted scores, taken into account the indicators' variation of the loadings. The quality of the provided factor solution has to be sufficient. One aspect of the quality assessment concerns the number of the extracted factors. Apart from the theoretical perspective, also empirical criteria in terms of Eigen Values have to be considered, such as the 1.0 or higher value according to Kaiser, or a

clear distinction in Eigen Values with the successive factor (Eigenvalues measure the explained variance accounted for by each factor). In addition, the indicators' loadings should demonstrate that the indicators refer to a specific factor only (uni-dimensionality). Also statistical considerations like homogeneity and the data properties play a role as well. Then indicators should be aggregated and weighted according to the underlying conceptual model. Both steps can be combined in one analysis by using statistical software.

Issues to be addressed

Correlation and compensation issues among indicators need to be considered and either be corrected for or treated as features of the phenomenon that need to be retained in the analysis.

Assess the direction of impact of indicators and subdimensions: do all components point to the same direction as the composite indicator? Invert indicators that correlate negatively with the main dimension of the domain.

Results based on the statistical analysis may not (always) correspond to the conceptual model. If that is the case, assess whether certain indicators are statistically grouped under different dimensions than conceptualized and whether certain dimensions should be merged or split. For instance, when including indicators of leisure time activities it could be that sport activities form a different dimension from cultural activities.

For most purposes, taking the arithmetic average of indicators for a country or region will perform well and reflects individuals' importance weights (Hagerty and Land, 2007).

When aggregating regions to a national figure it may be desirable to stress national homogeneity, i.e. if one region lags behind one may want to give the whole nation a much lower score than an arithmetic mean would do. In that case a geometric (or harmonic) mean of regions could perform well, in combination with a proper transformation of the regional indicators.

Weighting approaches

Most studies use equal weighting (e.g. social capital index developed by Putnam (2000)). Another approach is to use subjective weighting based on the researchers own judgement or based on the judgement of consulted experts. Also statistical methods can be applied, such as Principal Component Analysis (PCA) and Factor Analysis (FA), in which no a priori assumptions on the weights are required (these statistical techniques can be seen as less normative, as they are more empirical and relatively more objective. See Booyen 2002). Both PCA and FA are used to group the indicators into one or more dimensions (the 'factor(s)'). For a given, limited number of dimensions PCA explains as much variance as possible and FA explains the associations between indicators as much as possible. Such models have limitations, especially if the relations are not linear. Nonlinear methods to address such problems are also available, e.g. optimal scaling techniques such as categorical PCA (CATPCA), or nonlinear canonical correlation analysis (Overals, van der Burg et al 1994). A further limitation of such reflective models is the requirement that the indicators – at least to some extent – are correlated. Another approach is the use of formative models in which this assumption does not need to be met (Edwards & Bagozzi, 2000; Jarvis, MacKenzie, & Podsakoff. 2003). If all indicators stem from one micro data source, the construction of the composite indicator may also be formed by formative modelling (Heise, 1972). A social capital index, for instance, has been built by considering several causes as building blocks of the index (Van Beuningen and Schmeets, 2013). Another example of formative modelling is socio-economic status (SES), which is formed by three elements: education, professional status and income. Note that the reverse causal direction is not assumed, i.e. SES is not the cause of these three indicators, but the reverse holds true, the indicators constitute SES. Partial Least Squares (PLS) is the statistical instrument for formative modelling. An advantage of PLS is that it can cope with non-normally distributed data and multicollinearity between indicators.

A property of indicators which is of practical consequence, is whether all relevant indicators are available on the level of micro data. If all indicators stem from one single data source, such as a census or one single survey, all sorts of multivariate statistics may be applied to combine indicators to dimensions or domains. However, if some indicators are not available on the individual level but only as an aggregate, like for instance the number of traffic victims, then these multivariate statistics cannot be applied. In this case still methods like time series analysis can be used to explore to which extent indicators belong to the same dimension. See the *Handbook on constructing composite indicators* (OECD 2008) for a description of other weighting and aggregating techniques that can be used.

A relatively new approach: POSET

The assessment of multidimensional phenomena is usually based on the construction of composite indicators. However, when synthesising information of different nature in a unique number, the incomparability present in the original set can be easily lost.

A relatively new technique to describe phenomena by a set of indicators is ‘partial ordered sets’ (POSET). This technique has been applied for example in a European Union study on the relocation of refugees and a study on the Fragile/Failed State Index.

An advantage of POSET is that they were designed to deal with multi-indicator systems, where conflicting scores prevent statistical units to be completely ordered. They allow for multi-dimensional ordinal data to be treated consistently, avoiding scaling ordinal attributes into scalars. They also allow deriving rankings and synthetic indicators, without variable aggregations, and they enable fuzzy descriptions of multidimensional phenomena such as well-being/deprivation.

Posets seem promising from a methodological point of view, but are not yet part of the day-to-day toolbox for a simple and easy to understand presentation of social indicators.

Largely based on Fattore et al.(forthcoming)

6.3.7 Robustness and sensitivity

Next some checks on robustness and sensitivity should be carried out. What does it mean to include or exclude a single variable – does the composite indicator change? Does it change when the weights are changed – if so: how?

Is the structure the same for different units (social groups, countries, regions)? If not: is that to worry?

Bootstrapping methods can be used to examine the stability of the index and the weights. This procedure selects samples consisting of the same number of observations based on the original sample. By comparing the weights, e.g. 100 re-samples of 100 cases, it will reveal whether these weights differ from the original weights.

6.3.8 Index validity and links to other variables

Relate the composite indicator to other element of the conceptual model if applicable, or to other indicators that are relevant. For example, an index for objective quality of life (ic life situation) can be linked to subjective quality of life (ic happiness) or to resources (like income and education – see Boelhouwer 2010).

Other variables can help to explain developments over time (after all, indicators just indicate, so the reason for development might be in other indicators). For example, the scores on a social capital index can be linked to indicators of well-being, such as perceived happiness and self-reported health (Van Beuningen & Schmeets, 2013).

Experimental Statistics

As socio-economic indicators and composites are a relatively new terrain for most NSO's, some of them classify these new statistics as 'experimental'. This is for instance the case in Mexico, where measures of subjective wellbeing are presented, following the recommendations of OECD. Moreover, not only general life satisfaction, but also satisfaction with domains like family life, social life or health are reported.

For more information, see

<http://www.inegi.org.mx/inegi/contenidos/investigacion/Experimentales/Bienestar/default.aspx>

6.4 Dissemination issues

The dissemination of the composite figures is important. However, as a composite indicator typically is one number, the dissemination issues relate more to the domains, indicators or other breakdowns. The composite indicator must not only be presented as one figure, but also the underlying parts (domains and may be even indicators) have to be presented (this is also important for transparency reasons).

When describing possible causes for an increase or decline of a concept such as well-being or social capital, insight in developments of separate indicators will help to understand which (combined) indicators are the main drivers of this change.

Visualization of the findings is important too. For example, when differences between subpopulations are explored (like gender, age, education and regions) these differences can be visualized by graphs, spider webs, dashboards or traffic lights.

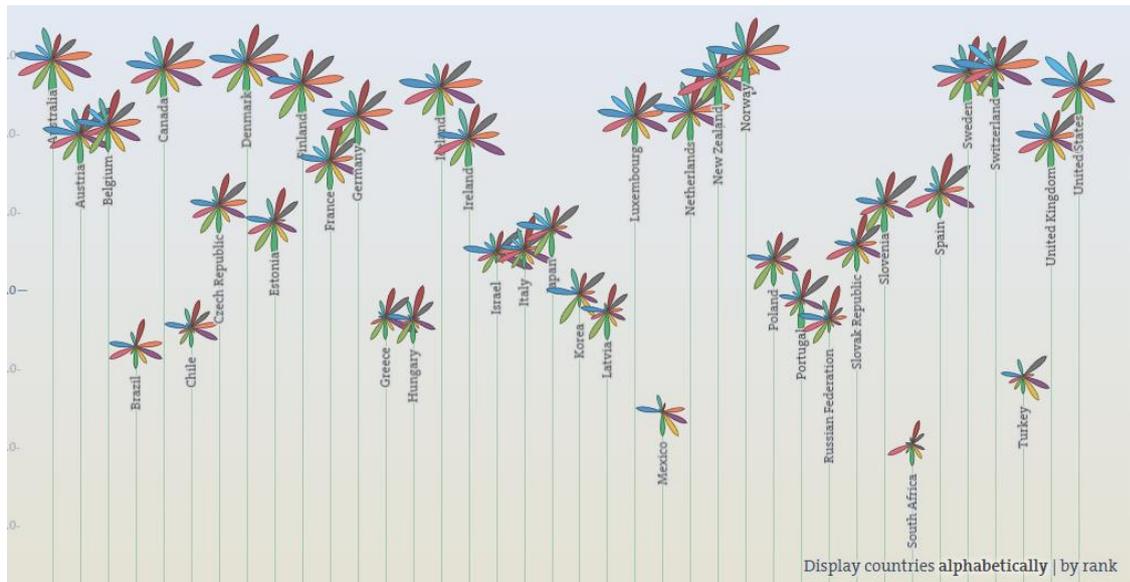
Good examples are the Better Life Index (OECD 2016), the Wheel of Wellbeing in the UK (ONS 2016), the Sustainability Monitor of the Netherlands (CBS 2015), the Equitable and Sustainable Well-being (Bes) from Italy and the Social Report of New Zealand.

It is important to make understanding graphs or visualizations easier. These can differ between stakeholder groups.

An interesting visualization of an index can be found on the website of the OECD Better Life Index. Comparison between OECD countries is visualized by ranking the countries according to their index-scores. Website visitors can assign their own weights to the domains, according to the importance each domain has for them – or to assign equal weights. This last option is shown in the figure below.

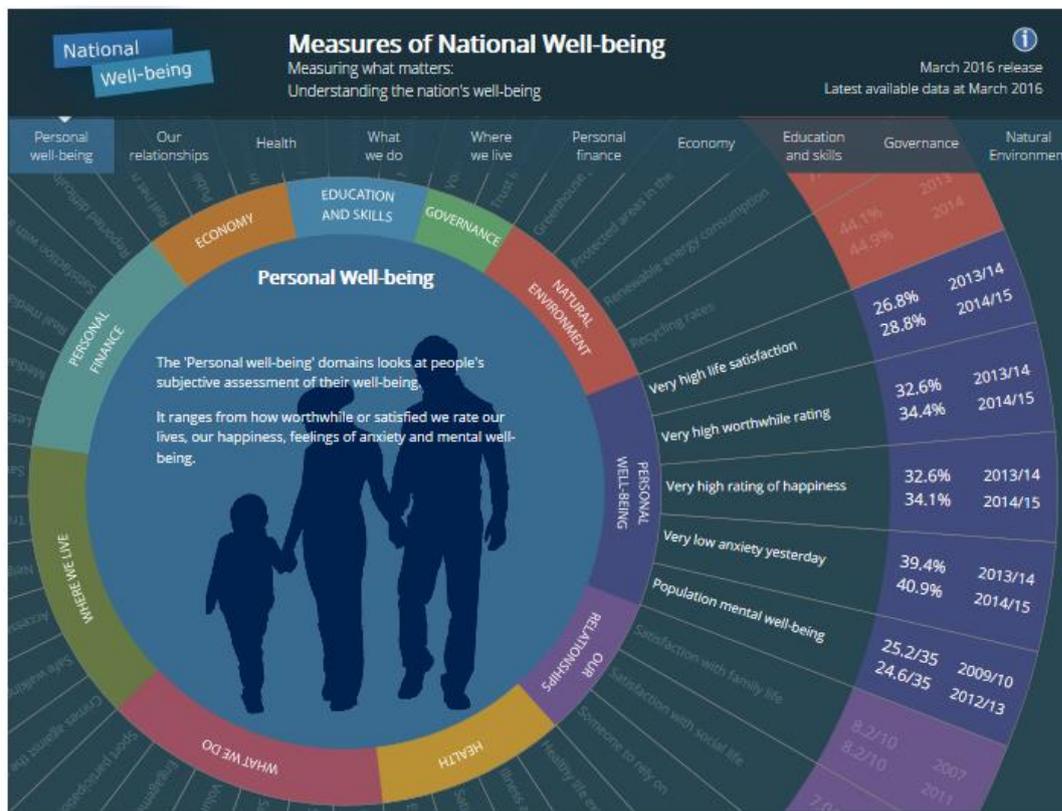
There is no solution provided for the weighting problem, as each user can assign his or her own weights. This makes the index less useful for policymakers – though of course the indicators and domain-rankings provide useful information, as does the 'what matters most to people' overview based on the rating of domains.

OECD Better Life Index (taken from <http://www.oecdbetterlifeindex.org/> accessed December 2016, equal weights used)



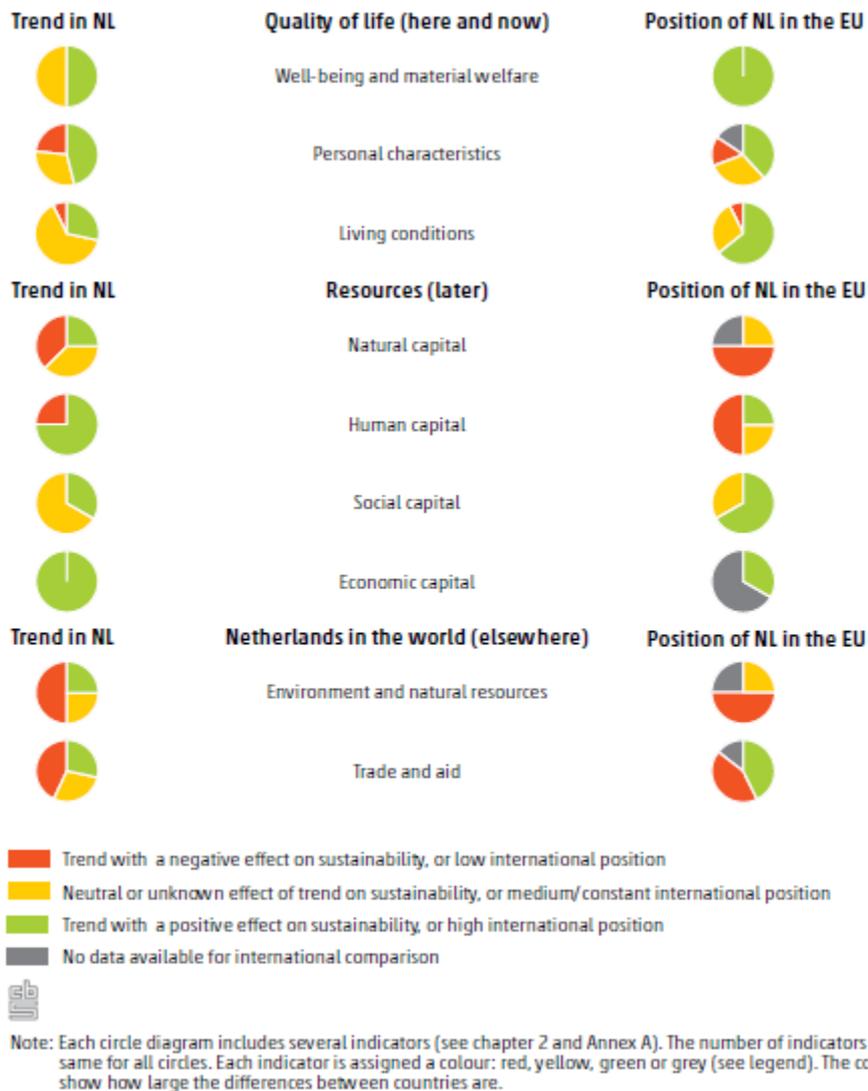
An example of an interactive visualization of domain and indicators is the so-called 'wheel of measures of well-being' in the United Kingdom. The indicators are grouped according to the ten domains that are used. Users can click on the domain they are interested in and then get the scores on the indicators within that domain (see figure below).

Wheel of well-being measures, ONS UK (taken from <http://www.neighbourhood.statistics.gov.uk/HTMLDocs/dvc146/wrapper.html> accessed January 2017).



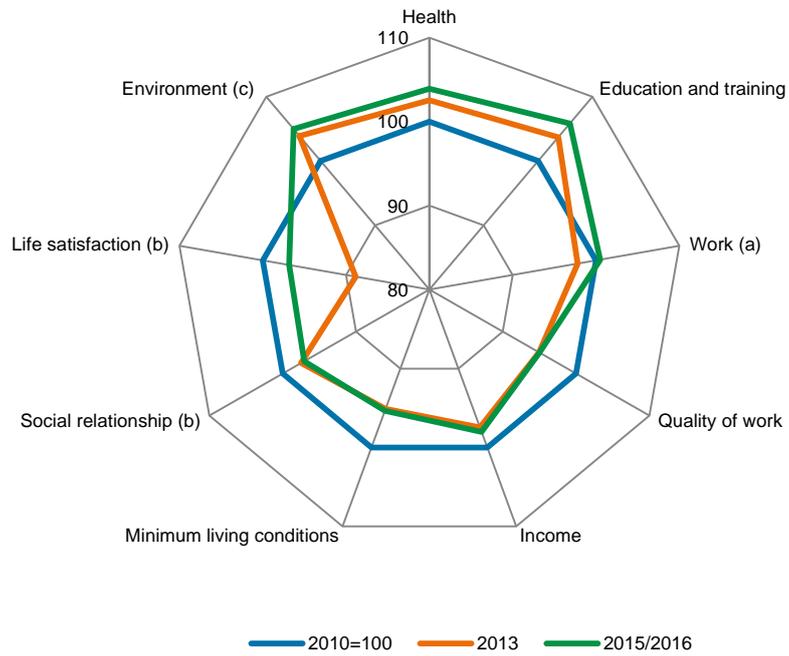
Another example of a dashboard is provided in the Dutch Sustainability Monitor. This dashboard shows how the trend in the Netherlands is and how the Netherlands are doing compared to other EU-countries. No index is created, but traffic lights are used to provide the reader with a quick overview of the scores on the indicators (see figure below).

Example of a dashboard: the Dutch Sustainability Monitor (CBS 2015; another example can be found in Cnel/Istat 2013)



Another visualization is chosen in Italy. The “Equitable and Sustainable Well-being” (Bes) developed by Istat consists of 130 indicators within 12 domains (health; education and training; work and life balance; economic well-being; social relationship; security; landscape and cultural heritage; environment; subjective well-being; politics and institutions; research and innovation; quality of services). For each domain a set of representative indicators has been identified in a way to give an image of the main attributes of the domain. However it is not easy to read at the same time the yearly development of 130 indicators. Hence Istat has adopted a composite index called MPI (Mazziotta Pareto-Index) ‘which consists of an arithmetic mean adjusted by a function of variability that penalizes the geographical areas with a unbalanced distribution of the indicators’(Mazziotta 2013). The figure reports the evolution of the composite indicators for Italy for 2010, 2013 and 2015-2016.

Example of Italian BES: composite indicators for Italian well-being – years 2010, 2013, 2015-2016.
Italy 2010 = 100



(a) Data referred to the first semester in 2016

(b) Data referred to 2016

(c) Italy 2008=100

The last example is taken from the Social Report of New Zealand. A figure is presented which shows the number of measures that has improved, worsened or remained unchanged – both for two time-periods: recent and medium-term changes (see figure below). In the accompanying text the most important changes are described, like: “Outcomes have particularly improved for the Knowledge and Skills and Safety domains” or “The Health, Paid Work, Civil and Political Rights, and Leisure and Recreation domains showed a mixed picture, with some areas showing improvements and others showing no change or a worsening situation”.



Taken from <http://socialreport.msd.govt.nz/social-wellbeing-at-a-glance.html> (accessed january 2017)

6.5 Conclusions/recommendations

Drawing from the arguments presented in this chapter, we arrive at the following conclusions and recommendations:

Conclusion 6-1: pros and cons of a composite socio-economic indicator

Combining single indicators into a composite socio-economic indicator has pros and cons. A composite indicator makes clear at a glance whether things are going better or worse, is easy to communicate and simplifies comparisons between groups. On the other hand, a composite indicator is a simplification of developments in different domains and there is no uncontroversial method for selecting and weighting the individual indicators. A composite indicator is in general not suitable for answering specific (policy) questions and cannot always provide the desired insight when analysing and explaining developments. It is therefore important to combine both worlds, that is, to present the composite indicator, as well as the separate indicators.

Recommendation 6-1: steps for constructing composite socio-economic indicators

Several steps are to be taken in the construction of composite socio-economic indicators. The first step is the theoretical underpinning of the composite indicator. A conceptual model provides the basis for the second step, i.e. choosing the domains and indicators. Next steps involve the imputation of missing data, multivariate analysis in order to investigate the overall structure of the indicators, the normalisation of data, weighting and aggregation, checks on robustness and sensitivity and attempts to link the composite indicator to other elements of the conceptual model or to other indicators that are relevant.

Recommendation 6-2: on dissemination

One cannot expect one single figure to tell the entire story of a complex phenomenon. Therefore, the composite indicator must not only be presented as one figure. The underlying parts (domains and may be even indicators) should also be presented. Insight in development of separate indicators will help to understand the driving forces of a change in the composite indicator. To present the separate indicators is also important for transparency reasons. A well-designed visualisation is considered important in order to communicate the picture effectively to users.

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