**(Don’t) be afraid of the conceptual validity**

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**Abstract**

*Conceptual validity is not mentioned in the European statistics code of practice. Yet, an exclusive focus on reliability can lead us to measure the wrong thing with great consistency and precision. I will argue that a focus on conceptual validity can increase the relevance, accuracy, coherence and clarity of output. However, there are also important pitfalls to avoid when introducing new concepts. To illustrate I will present the re-evaluation of the Icelandic social indicators system. The system was created in order to monitor welfare, health, well-being and the needs of Icelanders in the wake of the economic crisis. The social indicators were a collection of measurements on various social issues, ranging from governmental spending, to drug perscriptions, and number of pensioners. Although all of them were useful, it was vague why certain indicators were included from the start, added or excluded later on. Moreover, it was unclear on what grounds the indicators were classified into various dimensions. The aim of the re-evaluation was to clarify conceptually what exactly the social indicators should measure and systematically assess their quality, and the dimensions used to classify them. A systematic review of the concepts and measurments used by statistical offices worldwide was conduced. Following this review, a new conceptual tree for social indicators was introduced which clarified that social well-being is divided into different social dimensions, and that each dimension in turn is measured with several social indicators. It was concluded that the goal was to measure the outcomes of social well-being, which may be regarded as inherently important for individuals. Further, pre-determined quality criterias were used as grounds for including and excluding dimensions and indicators into the social indicators system. I believe this process demonstrates how systematic analysis of concepts can create a more coherent framework for statistical information.*

**Keywords:** Conceptual validity, relevance, coherence, well-being, social indicators system

1. Introduction

The European statistics code of practice (ESCOP, 2017) stresses the importance of providing a proof of quality for statistical output. At its core, good quality statistic provides evidence for something that is correct and true. However, philosophers and scientists have long argued about the criteria for truth. In Cook, Campell, & Shadish’s (2002) typology of validity, they integrate several theories of truth into a coherent framework. Given that this typology of validity is exceedingly influential, it is interesting to view the ESCOP in the light of this framework.

1.1 Short description of the typology of validity

The framework emphasises that there must be a correspondence between empirical evidence and the inferences made based on the evidence. Further, it highlights the associations between an inference and corresponding theory and previous findings. According to this theory, no method alone can guarantee validity. Instead, statements of validity always include human judgment of too what extent evidence supports an inference. More specifically, the framework describes the relationship between four major types of validity. These are statistical conclusion validity, internal validity, external validity and construct validity. The description of the four types can be seen in table 1.

**Table 1. Typology of validity**

|  |  |
| --- | --- |
| **Type of validity** | **Description** |
| Statistical conclusion validity | The validity of the inferences about the relationship among variables. |
| Internal validity | The validity of the inferences of the causal relationship between A and B. |
| External validity | The validity of inferences about whether results hold for different people, settings, and measurment variables. |
| Construct validity | The validity of inferences can be made from the operations in a study to what the operation claims to be measuring. |

Source: Cook et al. (2002)

1.2 Comparing the typology of validity with the ESCOP

First, perhaps not surprisingly, the ESCOP primarily emphasises principles related to statistical conclusion validity. For example, principle 8 –appropriate statistical procedures - describes in length the procedures that should be used throughout the process to guarantee quality statistics. Further, infused in the other principles for statistical processes and statistical output is an emphasis on reliable measurements, reliable implementation, as well as standardisation of concepts, definitions, classification, and standards. According to the typology of validity, following these principles remedies many of the threats to statistical conclusion validity.

Second, since most statistical offices focus on descriptive statistics, addressing internal validity is in many cases irrelevant. Therefore, it is not a major concern that the ESCOP does not emphasise improving the validity of causal claims. With that being said principle 9 – non-excessive burden on respondents – does address attrition, which can lead to invalid causal claims if the loss of respondents relates to the object of interest.

In contrast, addressing threats to external validity is highly relevant for statistical offices. Arguably, one of major underpinnings of the legitimacy of official statistics are claims of generalisability. Several ESCOP principles aim at improving external validity so that findings are applicable across persons and settings. For example, principle 7.3 states that registry and frames should be updated regularly. Principle 12.1 and 12.3 stress the importance of assessing, validating, and revising source data. Principle 14.2 and 14.5 stress that statistics should be comparable, and thus generalizable, to different time periods and across nations.

Finally, on the face of it many of the ESCOP principles seem to address construct validity. In my mind, words like relevance, accuracy, coherence and clarity form implicit association with construct validity. However, upon closer inspection most of the ESCOP principles that describe how accuracy, coherence, and clarity should be increased are reformulations of reliability measures. This may be problematic, since an exclusive focus on reliability can lead us to measure the wrong thing with great consistency and precision. Further, the relevance aspect of ESCOP seem to be mainly concerned with the opinions of users, and not whether a specific measurement is a relevant measure of the general construct of interest.

In sum, the ESCOP is generally speaking a practical guide that addresses many of the threats to validity that are outlined in the typology of validity. The exception to that rule is that principles that tackle construct validity are largely absent. This is problematic since construct validity is as important for statistical output as it is for science in general. Construct validity involves making inferences from a particular statistic to the higher-order constructs they represent. Not seldom the interest in statistics is not primarily because of the specific measurement, but rather because the measurement is seen as a measure of a general construct (Cook et al. 2002, p. 65). I believe that thinking more explicitly about construct validity can increase the relevance, coherence and clarity of statistical output. To illustrate this point, I will present a case study conducted at Statistics Iceland, where the explicit goal was to address the construct validity of a set of statistical indicators.

**2. Case study aimed at increasing construct validity**

The Icelandic social indicators system was created in the wake of the economic crisis, which highlighted the need for better information to see how residence were doing. Over twenty experts from various public institutions, ministries, organisations and the University of Iceland were involved in the creation of the system. The result was a collection of established statistical measurements that together should help the government and the public monitor broad societal changes and trends.

Since 2012, the Ministry of Social Affairs and Statistics Iceland have annually collected and published these social indicators. In the first publication 55 statistical measures were divided in to four dimensions: demography, equality, sustainability, and health and social cohesion. The following year one indicator was added while the dimensions remained the same. In 2014, the number of indicators had increased to 67 and were categorized into demographics and activity, living standards and welfare, health and cohesion. In 2015, the indicators were reduced to 45, but the same dimensions were used. In 2016, the indicators again increased to 49 and the category of cohesion was replaced with a dimension about children. In 2017, the indicators were again 45 and divided into the categories of demographics, education, employment, living standards and welfare, health, and children.

These changes in dimensions and indicators have unfortunately not been well documented, justified, or explained through the years. Further, the initial criteria for choosing which indicators should be included as a part of the social indicators system are unclear. Furthermore, it is unclear what principles underlie the classification of indicators into dimensions. For example, the same indicator (e.g. unemployed) have been categorised into three different dimension depending on the year of the publication (e.g., sustainability, demographics and activity, and employment). This suggests that both the dimensions and justifications for classification are unclear. Due to this conceptual confusion, the social indicators are difficult to grasp and use to gain oversight.

The aim of the revision of the social indicator system was therefore to clarify what the indicators should measure, specify quality criteria to determine inclusion and exclusion of indicators into the system, provide grounds for classification of indicators, and justify the conceptual framework of social indicators. Description of the case study is translated and adapted from the Icelandic working paper called Revision of Social Indicators (2019).

2.1 Definition of social indicators

Initially, the social indicators system was defined as a set of indicators that would give a comprehensive picture of the welfare, health, well-being and the needs of the residence of Iceland. This definition is quite broad, which makes it difficult to use in deciding what indicators to include and exclude into the system.

Further, this definition does not take into consideration recent theoretical developments of concepts of social indicators and other similar concepts, such as life satisfaction, quality of life, living conditions, prosperity, well-being, flourishing, resources etc. Although concepts and definitions are still under discussion, the Stiglitz, Sen, and Fitoussi’s (2009) report marked an important milestone in official measurements of economic and social progress. Following the "Beyond GDP" report, as it is often called, various statistical offices and international organizations developed a similar conceptual framework for monitoring societal changes. The OECD statistical collaboration (OECD, 2017), Eurostat (Eurostat, 2017), the Nordic well-fare indicators working group, (Nyman et al. 2016), and the Social Progress Imperative (Stern, Wares, & Epner, 2018) all developed measurements system of well-being based on measuring well-being outcomes. This means trying to measure things that are inherently important to people's lives and directly affect them.

This definition is helpful since it can be used as grounds for inclusion and exclusion. For example, this means that governmental health care expenditure falls outside of the system while health outcomes are included into the system. This is because health care expenditure can be spent wisely or poorly, and changes in expenditure may take a long time to trickle down. Further, factors that have an indirect impact on people’s health are excluded from the system. For example, increased drug use can be a sign of more people receiving appropriate treatment or of deteriorating health. The drug use itself is therefore not a well-being outcome, but has an indirect effect on well-being. In contrast, most can agree that good health is inherently important to well-being and therefore a part of the system. Given the demonstrated usefulness of this definition, and following in the footsteps of others (e.g. OECD, 2017; Eurostat, 2017; Nyman et al. 2016; & Stern et al. 2018), the definitions was adopted that social indicators should measure the outcomes of social well-being.

2.2 The conceptual diagram of the Icelandic social indicators system

To further explain what the Icelandic social indicator system should measure a conceptual diagram was developed. As figure 1 demonstrates, at the top of the diagram there is social-well-being. The construct social well-being is broad, hard to define, and impossible to measure directly. What we know is that social well-being is multifaceted, since people need more than just income. A person who lacks safety, social connection, and health can be worse off than an individual who is only in poor health. Therefore, the middle of the diagram has dimensions. The dimensions can be seen as central aspects or categories of social well-being. The bottom of the diagram shows social indicators. Within each dimension the social indicators share characteristics and their goal is to measure the dimension. Ideally, each dimension should be measured with three to five indicators. Finally, social indicators can be divided into different societal groups, for example males and females, age groups and so forth.

**Figure 1. Conceptual diagram of social indicators**

Source: Statistics Iceland (2019 a)

The conceptual diagram forms an important framework for the social indicator system. A measure of a good indicator system is that choices can be explained and justified at each level of the diagram. Thus, it is not only important to choose good indicators, but also good dimension of the over-arching construct, and relevant societal groups. Further, a review of previous publication of social indicators showed that they did not follow this hierarchy. For example, a societal group has previously been presented as both a dimension, an indicator, and as a unit for the breakdown of an indicator. Thus, following this diagram provides a much-needed structure that helps clarify the statistical output.

2.3 Dimensions of social indicators

Following the general definition and conceptual framework of the social indicator system the next step was to define the dimension. A dimension is considered conceptually valid if it covers an important aspect of social well-being. Here, the criteria used to determine this was whether the dimension was generally accepted and used by other National Statistical Institutes (NSI’s) and similar organisations to measure social well-being. Further, since social well-being is a multi-faceted concept, several dimensions are needed in order to get a comprehensive picture. However, it is not feasible to consider all possible dimension. Instead, the social indicator system aimed for a good compromise between being parsimonious and exhaustive (Törnblom & Kazemi, 2012).

For this purpose, we created a comprehensive overview of social well-being dimensions used by several NSI’s and similar organisations (for the list of references used for the overview, see Appendix). This overview was the bases for choosing dimensions for the Icelandic social indicator system. Since different names can be used for similar dimensions, and similar names can be used for distinct dimensions, the next step of the overview was to sort the dimensions and if relevant give them an overarching label. Following this process a consensus emerged, where most dimensions used by statistical offices and similar organisations could be categorised into 11 dimensions of social well-being, which are displayed in figure 2. Dimensions that could not be categorised into these 11 dimensions where seldom used by others, and therefore not a part of the general consensus.

**Figure 2. The dimensions of social well-being**

Source: Statistics Iceland (2019 a)

2.4 Quality criteria for indicators

Finally, there are many indicators that can be seen as measures of social well-being outcomes. However, in order for the social indicator system to provide an overview of social well-being it is important to limit the number of indicators included in the system. The indicators should therefore be seen as giving an indication of the status of a dimension, rather than an in- depth analysis of each dimension.

To guarantee the timeliness of the indicators some practicalities needed to be considered. Many of the indicators in the previous publications of the social indicator system are useful and generally accepted indicators. Therefore, the indicators used through the years were, if possible, categorised into the new dimensions. In cases where this was not possible, other indicators that Statistics Iceland regularly collects and publishes were sorted into the new dimensions. This resulted in a list of indicators that were systematically quality assessed in order to determine which should be included and excluded from the system.

The quality criteria were guided by different sources. In general, they followed the general ESCOP (2017) guidelines, but more specifically they considered the criteria for well-being outcomes outlined by the How’s life? framework (OECD, 2017) and the Nordic welfare indicator system (Nyman, et al. 2016). This resulted in 11 criteria. A good indicator satisfies all or most of the conditions outlined below.

1. The unit of measurement is people (individuals or homes)
2. The indicator measures well-being outcomes that are directly important for people, and not the cause or consequences of these outcomes (e.g., the indicator measures the number of people who have experienced crime rather than the number of policemen)
3. Has the potential to change and be influenced by policy
4. Generally accepted measurement that is widely used
5. Repeated measurement with a timeline
6. A timely measurement
7. Provides the possibility to look at subgroups and distributions
8. A precise measurement
9. A conceptually valid measure of the dimensions. Indicators should be chosen to adequately cover the dimension with as few measurements as possible. Ideally, 3-5 indicators should measure each dimension.
10. That Statistics Iceland can guarantee the quality of the measurement and that it can be enriched with registry and population data.
11. The social indicators meet the needs of the users.

The result of the quality assessment was an indicator system of social well-being with 41 statistical measures seen in table 2. Each social indicator measures a particular dimension of social well-being. Still, not all indicators met all of the criteria listed above. For example, some indicators are collected irregularly, and will therefore not be a part of the annual publication. I believe however that this is an important step forward. By making the criteria explicit, both users and statistics office staff can make evaluations on whether a given indicator matches the criteria listed above. The goal is that the indicators can be continuously assessed and improved using the criteria listed above in order to increase the match between the criteria and the system of indicators.

**Table 2. Revised social indicator system**

|  |  |
| --- | --- |
| **Dimension** | **Indicator** |
| Finances dimension | Household income |
| Number of households with financial assistance |
| Houshold debt |
| Houshold assets |
| At risk of poverty rate |
| Material deprivation |
| Severe material deprivation |
| Ecucation dimension | Enrolment in primary school |
| Enrolment in upper secondary school |
| Enrolment in tertiary school |
| Work dimension | Employment rate |
| Unemployment rate |
| Not in education, employment or training (NEET) |
| Inactive |
| Long term unemployment |
| Involuntary part time |
| Health dimension | Self-perceived health |
| Self-reported long-standing limitations due to health problems |
| Unmet needs for health care due to cost |
| Unmet needs for dental care due to cost |
| Well-being dimension | Life satisfaction\* |
| Frequency of feeling happy the last month\* |
| Social connection dimension | Social network\* |
| Participation in social activity\* |
| Social support\* |
| Housing dimension | Housing cost burden |
| Arrears of payment of mortgage or rent |
| Subjective housing cost burden |
| Overcrowding |
| Problems with housing quality |
| Security dimension | Deaths due to accidents |
| Experiences problems with crime and violence in the neighborhood |
| Work life balance dimension | Work hours per week |
| Non-standard work hours |
| Parental leave |
| Democracy dimension | Trust in government\* |
| Trust in political parties\* |
| Participation in parliamentary elections |
| Participation in municipal elections |
| Environmental dimension | Experiences problems with noise in the neighborhood |
| Experiences pollution and grime in the neighborhood |

Source: Statistics Iceland (2019 a)

Notes:\*The following indicators are not measured annually †Indicators that only are measured when elections are held

The social indicators presented above will be updated anually. In the annual edition they will be broken down by gender, age and income when appropriate, and special issues will provide more in depth analyses. Importantly, this will be done within the conceptual framework presented here. For example, a special issue may consist of an in depth analysis of a particular dimension og social well being or the social well-being status of a certain societal group will be considered more closely. A first stab at this approach was published in january, where the social well-being of immigrants was studied for the finances, education, work, housing, democracy, work-life balance, security and environmental dimension (Statistics Iceland, 2019 b). By follwing a structured framework when studying the social well-being of different societal groups it becomes easier to identify inequalities of well-being. This is a crucial step for designing effective policy measures aimed at increasing social well-being.

**3. Pitfalls and lessons**

Generally speaking, the revision of the social indicators system provided a much needed clarification of the definitions, the concepts and the relationships between the concepts included in the indicator system. By explicitly motivating the selection of dimensions and indicators, the system now stands on firmer conceptual grounds. Additionally, the methods and results have been published in a working paper so users can follow the logic of the system. This has already proved helpful for structuring the internal work of the social indicators at Statistics Iceland. Further, the user feedback has been positive regarding the special issue on the social well-being of immigrants. Since the implementation of the new framework is still under way, much remains to be seen about the result of the revision.

However, there are also important pitfalls to avoid when introducing new concepts that are important to keep an eye out for as the social indicator system develops. More generally, thinking about these pitfalls may be useful for other statistical offices wanting to improve the construct validity of their statistics.

First, as the typology of validity stresses that addressing one type of validity may influence another type of validity simultaneously. Thus, increasing construct validity may introduce trade-offs with other types of validity. For example, a standardisation of a conceptual framework may decrease the external validity of the findings (Cook, Campbell, and Shadish, 2002, p. 34). Therefore, careful considerations and evaluations of these trade-offs are important in order to make correct inferences based on the statistics.

Second, it is important to provide sufficient explanations and labels of a construct in order for correct inferences to be drawn. Failing to do so leads to improper interpretations of the relationship between a given statistic and the construct it should represent. Further, when an entity is measured it typically consists of multiple constructs and a failure to describe the entire construct may lead to incomplete inferences, something called construct confounding. Similarly, when a construct is measured the measurement always includes measures of irrelevant constructs as well as failing to measure parts of the construct. This is called a mono-operation bias, which complicates correct construct inferences. Again, only using one method when measuring a construct, for example self-report, that method becomes a part of the construct. This can lead to a mono-method bias when making inferences about the measurement (Cook, Campbell, and Shadish, 2002, p. 73).

3.1. Further methodological developments

This paper has described a case study aimed at increasing the construct validity of a set of indicators and the methods used to approach this goal. The methods described have mainly focused on increasing the face validity of the social indicators system. That means that the indicators appear effective at measuring social well-being. The face validity is supported by emerging consensus among other statistics offices and the following explicit quality criteria. The methods could also be said to tackle nomological validity, since it specifies how different dimensions of well-being are related to one another, and operationalises these concepts using the social indicators (Cronbach and Meehl, 1955). However, there are many other ways to evaluate construct validity, many of whom are statistical in nature. These will be briefly discussed in order to highlight further methodological developments.

Perhaps the simplest way is to test the Cronbach alpha, Omega or greatest lower bound (GLB) between a set of variables aimed at measuring the same construct. Roughly speaking, these statistical tests all quantify the extent to which the set of variables are related. Another common method to test construct validity is exploratory factor analysis (EFA). The goal of EFA analysis is to use statistics to identify underlying constructs in a set of variables. It is often used as a first step for construct identification and does not require an explicit theory about the expected relationship between variables. In contrast, confirmatory factor analysis (CFA) is a similar approach that is used either following the results of an EFA or if a clear theory exists regarding the relationship between variables. A specific type of CFA called multi-trait multi-method (MTMM) analysis is an advanced method used to study whether indicators form reliable but distinct constructs that are not influenced by the methods used to study them. Finally, a useful way of studying construct validity is a correlation matrix between a set of variables. Construct validity is supported if a measurement demonstrates high correlations with constructs expected to be similar and low correlations with proposedly dissimilar constructs (Peters, 2014).

I see no objections to why statistical offices should start using these methods to tackle the construct validity of their statistical measures. I believe that the statistical know how is already available in most statistical offices today, as many of the methods described above are no more complicated than methods already used by statistics offices. Thinking more about construct validity can help statistical offices improve the quality of their output. By providing solid evidence for the validity of the constructs used, the legitimacy of the constructs can be increased. Further, constructs help us organise the world, making it more clear and coherent. Since the interest in statistics often comes from a more general interest in the construct it aims to measure, improving the link between the construct and the measurement can spark curiosity and help users make better inferences on the basis of the statistics.

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