Indicators - How do we measure whether we are achieving our goals?

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Abstract

In the SDGVisionPath project[1] we support stakeholders and experts in constructively linking issues such as economic growth, greenhouse gas emissions and (energy) poverty. For this purpose, we developed system images of how these topics influence each other in order to then jointly formulate visions from which relevant indicators and pathways to achieve can be derived. This working paper shows how indicators can be derived from visions and goals formulated by stakeholders that can be used to measure the achievement of those. The research team suggested appropriate indicators based on the visions and goals and asked developed by the stakeholders. We then conducted an online survey in which stakeholders were asked to evaluate the appropriateness of the indicators suggested and to define concrete measurable targets. For measuring progress, we propose to create an indicator index framed in terms of the doughnut economy.

[1] https://sdg.visionpath.at/

1 Background and goals

In the project SDGVisionPath (Kirchner et al., 2024) we combined the application of “Communities of Practice (CoP)'' (Palmetshofer et al., 2024; Wenger, 1999) for stakeholder and expert collaboration with two models specifically suited to address SDG interactions and for integrating stakeholder and expert knowledge at the Austrian national level.

The project’s theme focuses on SDG 8 (decent work and economic growth), SDG 13 (climate action) and SDGs 1/10 (no poverty/reduced inequalities). In a first workshop (see Wretschitsch et al., 2024b) the stakeholders developed a common systems understanding of these SDGs, applying a method from systems thinking. In a second workshop (Hinterberger et al., 2024), stakeholders jointly formulated visions and goals applying arts-based methods. In a third workshop (see Bukowski et al., 2024b) stakeholders applied storytelling to develop pathways that could bring us closer to the desired futures.

Based on this, we conducted a survey to identify indicators that can be used to measure the goals proposed by stakeholders and to identify target values for these goals. On the basis of scientifically prepared information, stakeholders should evaluate in how far indicators "measure" the achievement of their goals. These indicators are supplemented by scientifically non-negotiable indicators for ecological and social limits. A measurement along the three sustainability dimensions (ecological, economic, social) will be combined with and presented in a doughnut framework according to Raworth (2018, 2017), leading to a stringent metric that ensures that the achievement of the goals set by the stakeholders is measured as precisely as possible and that a (visual) language that conveys the content well is found.

After the three workshops described above, the project team assigned the goals formulated by the participants to the three dimensions of sustainability in the sense of doughnut economics and condensed them into a system of indicators in accordance with Option 8_01 developed in the UniNEtZ project entitled "New measurement of progress beyond GDP (Hinterberger and Spittler, 2021)". To this end, the project team had to find indicators derived not only from the SDGs themselves, but also from the goals formulated by the stakeholders. The indicators proposed by the research team were put up for discussion with the help of an online survey. In this way, we ensured that these indicators measure as much as possible what the stakeholders directly or indirectly involved in the transformation process are striving for, rather than adopting concepts developed by experts.

2 Method

A semi-structured online-survey was carried out through LimeSurvey from 20.02.2024 to 20.03.2024 among stakeholders. Our purposive sample consisted of 106 people who were invited to take part by e-mail. A total of 19 people answered our questionnaire, 9 of them completely, five did not get beyond the welcome page and 5 others only partially answered the questionnaire. In order to see an initial trend, we decided to include the partially completed questionnaires in the analysis. To keep the questionnaire as short as possible, we did not collect any socio-demographic data.

2.1 The doughnut economy as a starting point

In addition to typical SDG indicators, such as “be able to heat living space adequately” (SDG 1/10 – energy poverty), “job satisfaction” (SDG 8), “real GDP per capita” (SDG 13) and “greenhouse gas emissions” (SDG 13), stakeholders broadened this horizon by including own goals that were important in their vision , for example: work-life balance, gender equality, circular economy and biodiversity. Furthermore, stakeholders suggested including institutional goals for education (e.g., education for sustainable development), transparency (e.g., monitoring progress) and governance (e.g., citizen panels).

Kate Raworth (2018, 2017) proposed the image of a "doughnut" to illustrate what the economy and society are ultimately about: the simultaneous observance of planetary boundaries and minimum social conditions for a good life for everyone - now and in the future. The economy and society would then be able to develop freely within those guidelines. The graphical representation as a doughnut is a playfully serious approach to framing this challenge, and it serves as a compass for human progress in this century.

The ecological ceiling consists of nine planetary boundaries (Richardson et al., 2023; Rockström et al., 2009; Steffen et al., 2015), beyond which lie unacceptable environmental degradation and potential tipping points in Earth systems. On the other hand, Raworth derived 12 dimensions of the social foundation from internationally agreed minimum social standards as set out by the world's governments in the 2015 Sustainable Development Goals - SDGs (United Nations, 2015). Between the social and planetary boundaries lies an ecologically safe and socially just space in which humanity can thrive.

From this follows that the economic system makes a high quality of life possible while respecting planetary boundaries and minimum social conditions in a sustainable way, regardless of whether the economy grows in monetary terms or not. Wellbeing, on the other hand, will have to be decoupled from economic growth in order to allow a flourishing society and at the same time meet nature’s needs to be able to support our human needs (i.e. to provide ecosystem services).

The doughnut can be used to both inform and evaluate policies on the macro level but also the management of businesses as well as individual choices. Respecting planetary boundaries requires a reduction of resource consumption, especially but not only of fossil fuels, to 10-20% of today’s level in a few decades (IPCC, 2023; United Nations Environment Programme, 2024) to achieve the macro goals of climate neutrality and biodiversity loss reduction. This requirement concerns each actor in society at the micro level such as individuals or companies.

Individuals, companies, organizations and governments set goals, make plans and monitor their compliance. Indicators for monitoring need to refer to the goals set. If not, implicitly used indicators define goals. Often, one-dimensional indicators are used, for instance monetary values such as

individual income, a company's profit, regional or gross domestic product (GDP), which measure production or income at a regional or national level.

2.2 Identifying useful and acceptable indicators

The concept of measuring progress in terms of GDP was developed about 80 years ago in close coordination with corresponding scientific findings (of Keynesianism as a response to the prevailing neoclassicism) and political programs (of deficit spending - after the Great Depression) (Lepenies, 2013; Schmelzer, 2016). At the micro level, this refers to income or profit. The great achievement of national accounting is that individual incomes and business profits can be summed up to regional, national and global incomes in terms of GDP.

The importance of GDP hints at economic growth as the implicit goal. Indicators for income do not say much, though, about whether or how this affects wellbeing, as long as the purchasing power behind it is not taken into account. The same applies to other indicators such as poverty risk or inequality parameters: they do not directly say anything about target values (where do we want to go) or how they can be achieved (Becker, 2017; Koch, 2022).

For a transformation towards a more sustainable and distributive society, the measurement of progress beyond the financial (income, GDP) needs to be broader (Binswanger, 2006; Easterlin, 1974). The global Sustainable Development Goals (SDGs) of the UN's 2030 Agenda are scientifically (Alliance for Sustainable Universities in Austria, 2021) and politically (Republic of Austria, 2020; United Nations, 2015) justified.

The development of indicators requires a strict metric to determine whether I myself, whether a company, a region or a country is moving towards sustainability or not. For this we need a method that is applicable to all regions, companies, organizations and countries so that it is possible to describe the respective contribution of the individual, the company or a country to the (non-)achievement of the overall goals, in the same way as GDP can be understood as an aggregation of the income of people, companies, sectors or regions.

It is important that the impacts of human activities within the existing environmental boundaries (Steffen et al., 2015) contribute to the achievement of social goals and thus ensure human wellbeing. To this end, a conceptual framework was created within the UniNEtZ project (Hinterberger and Spittler, 2021) based on Kate Raworth's (2018, 2017) concept of "doughnut economics" and including personal wellbeing in a comprehensive and at the same time limited set of indicators. It describes a society and economy that makes a good life possible for everyone within the planetary boundaries set by nature but also within social boundaries.

This is related to discourses on the topic of "Beyond GDP", which has recently gained some attention again. The central idea is that GDP is not a meaningful indicator (Kubiszewski et al., 2013). Therefore, various alternatives to GDP have been developed to help move societies towards a "wellbeing economy". Indicators that are important to people should be derived from their goals and not vice versa. To ensure that indicators are used by people and decision makers and are therefore effective, it is necessary that indicators relate to the goals that people also have. Implementation can subsequently strengthen the self-efficacy of the participants, the organizations, regions or companies involved.

In the framework of the so-called Bellagio STAMP Principles (Shortall et al., 2015a, 2015b), participation was defined as an important principle for the development of assessment frameworks

for sustainability, including indicators (Hardi and Zdan, 1997). This requires a process of affected citizens or relevant stakeholders (business, politics, interest groups, media, science and civil society).

This approach enables the evaluation of progress through sustainability reports, assessing the extent to which the goals have been achieved. Ideally, this ensures that communities contribute to broader systemic development toward shared goals, without achieving individual objectives at the expense of others.

To achieve this in this project, we conducted an online survey to identify whether the indicators that the project team derived from the goals suggested by the stakeholders are suitable to measure the goals and asked for target values. To this end, the project team proposed indicators not only based on the objectives formulated in the SDGs but also by the stakeholders. In this way, we wanted to ensure that these indicators really measure what the stakeholders directly or indirectly involved in the transformation process are aiming for, rather than imposing concepts developed by experts or bureaucrats (Zeng et al., 2020).

2.3 Concretisation of the indicators

First, we proposed scientifically non-negotiable indicators for climate and social limits (Raworth, 2018; Steffen et al., 2015). For this, we decided to use the following four indicators for the SDGs the project team and stakeholders mainly dealt with in this project:

- SDG 1 & 10: 'Being able to heat living space adequately' (I1),
- SDG 8: 'Labour climate index' (I2) and 'Real GDP per capita' (I3), and
- SDG13: 'Greenhouse gas emissions' (I4).

Based on the vision developed by the stakeholders in the second workshop (Hinterberger et al., 2024), the project team proposed the following indicators for additional social and ecological goals:

- Work-life balance: "hours devoted to leisure and personal care " (I5)
- Gender justice: "Gender equality in the workplace" (I6)
- Biodiversity: "soil sealing" (I7)
- Circular economy: "material footprint (taking process emissions into account)" (I8)

Stakeholders also identified institutional goals. The proposed indicators for these were:

- Education (with the aim of 'free access to holistic education' and 'anchoring education for sustainable development'):
  - 'free access to holistic education' (I9) and
  - embedding education for sustainable development in schools (ESD) (I10),
- Transparency (with the aim of 'institutionalised monitoring based on a broad selection of indicators and control by a climate audit office') - (I11), and
- Governance (with the aim of ensuring that 'citizens' councils have decision-making power over trend-setting measures") - (I12).

2.4 The survey

For each indicator proposed, we asked the stakeholders:

- Is this indicator valid for the achievement of the vision?
- Do you have any comments or further suggestions for this indicator?

In addition, where data was available, we presented the development of the proposed indicators over the past decades and asked for the 'desired' target value of the respective indicator according

to their vision. With this survey, we aimed at further concretizing some of the goals and paths developed in the first three workshops of our project by asking the question: “How can we check the extent to which the goals have been achieved?”.

2.5 Calculation of an Index

The idea of an index is to develop a comprehensive set of indicators in the sense of a wellbeing index that describes in a directionally reliable and easily understandable way whether and to what extent individual actors, concrete developments, and politicians (as well as entire countries and regions) contribute to the achievement of the global goals. The results of the survey could be used to derive indices for the three dimensions of sustainability in terms of the doughnut economy (Hinterberger, 2025).

Target and baseline values are known for each indicator (the latter either from the data provided in the questionnaire or from the results of the survey). If the target value is now defined as 100 % and the baseline value as 0 %, a ‘distance to target’ can be determined over time, i.e. by how much the gap between the target value and the current value has closed or widened compared to the baseline value. The various indicators can thus be represented on a scale between 0 (= if the target is achieved) and 1 (= distance from target as in the initial situation) and summarised into corresponding indices in the sense of an average calculation.

If, for example, the target is 100 and the initial value is 50, then the gap would be 50% at a value of 75, i.e. half closed. The value of the corresponding indicator x would then be 0.5. Our 12 indicators can be categorised into the sustainability dimensions supplemented by a fourth, institutional, dimension (Valentin and Spangenberg, 2000).

3 Results

In this section we describe the survey results (section 3.1) and the potential calculation of a 4-dimensional index.

3.1 Results of the survey

Around 1/4 of all stakeholders and experts involved have taken part in the online survey. Although the absolute number is very low with nine people, initial assumptions and trends can be drawn from these results, and were discussed again with the participants in the last stakeholder workshop. Because storytelling is a key objective of the project, we sorted them according to the stories elaborated in the first workshop (Wretschitsch et al., 2024b). For the presentation of results, we grouped the indicators into a social, economic, ecological, and institutional dimension.

As already described, we presented in our survey line charts visualizing the respective development of eight indicators (I1 to I8) over the last decade(s) and four indicators were derived from the participants qualitative descriptions of the goals in the second workshop of the project.

The task for the respondents was now to assess the fit (4=very good fit to 1=no fit at all) of the selected indicators for achieving their vision's objectives and to define values for the desired development up to 2030 and 2050. In the following section, we briefly present initial results in tabular form. The results of the survey can be seen in Table 1.

Table 1: Suggested indicators and their evaluation by the stakeholders

Indicator	2024	2030	2050
I1: Being able to heat living space adequately	moderate		
I2: Labour climate index	moderate		
I3: Real GDP/capita	not meaningful		
I4: Greenhouse gas emissions in million tons of CO2 equivalent	very good		
I5: Work-life balance	very good - moderate		
I6: Gender Pay Gap (as indicator for gender equality in the workplace)	very good		
I7: Soil sealing (as indicator for biodiversity)	moderate		
I8: Material footprint (as indicator for circular economy)	very good - moderate		
I9: Free access to holisitc education	very good - moderate		
I10: Embedding education for sustainable development in schools (ESD)	very good - moderate		
I11: Transparency	moderate		
I12: Governance	moderate	inductive question	

The last column of Table 1 shows the direction of the indicators according to the targets set by the stakeholders in the survey.

Having originally sorted our indicators according to the story of our workshop participants, we are now regrouping them to form indices on four relevant dimensions, namely social, economic, ecological, and institutional dimensions.

The social goals mentioned were distribution justice and adequate living space (indoor climate). The economic goals formulated were 'limits to growth/degrowth' as well as work-life balance and gender equality in the workplace. Biodiversity, climate neutrality, and circular economy were categorised as ecological goals.

This way we can organise the indicators according to the four dimensions of sustainability, social, economic, environmental and institutional in order to relate it to the concept of the aforementioned doughnut economy.

Social dimension

Our survey respondents' target for I1 (Being able to heat living space adequately) is a reduction from 9.3% to 3,6% by 2030 and 1,3% by 2050. For I2 (Labour climate index) they have formulated an increase from 104 to 120 by 2030 and 152 by 2050 as their target and for I6 (Work-life balance) an increase from 14,5 hours devoted to leisure and personal care to 16.44 hours by 2030, and to 17.78 hours by 2050 as their target. In terms of gender equality in the workplace (indicator I6), the participants' target for the gender pay gap is a drop from 18.4 to 9.6 in 2030 and 1.9 in 2050.

Economic dimension

The majority of our respondents did not want to see any further growth in real GDP/capita (I3) in the future.

Environmental dimension

Greenhouse gas emissions in million tons of CO2 equivalent (I4) are envisioned to decrease to 30.22 million tons by 2030 and to 5.89 million tons by 2050 while soil sealing as the Indicator for biodiversity (I7) should decrease to 14,4% by 2030 and to 13,1% by 2050 according to our participants' formulated vision.

The material footprint (I8) indicator for the circular economy in terms of raw material consumption in tons per capita is formulated to drop by 2030 to 16, by 2050 to 9,22 tons.

Institutional dimension

In contrast to the previous indicators, there is no statistical baseline for indicators I9 to I12. Instead, we asked respondents to what extent the objectives Free access to holistic education, Embedding education for sustainable development in schools (ESD), and Transparency were fulfilled on a scale from 0 (= not at all) to 10 (= completely) now, in 2024. Then, as with the previous indicators, we asked about the vision for the indicator's target value in 2030 and 2050.

For I9 ('Free access to holistic education') a mean value of 6.3 in 2024 was assigned by the participants of the survey. On this basis, access is envisioned to rise to 8.3 by 2030 and to 9.7 by 2050. For I10 ('Embedding education for sustainable development in schools; ESD') three sub-categories, which were tested separately, comprising the socio-cultural context, the institutional setting, and the educational setting. When asked to what extent ESD 2024 is already fulfilled, respondents gave an average score of 4.2. The vision for the future would be an increase to 6.6 by 2030 and to 9.5 by 2050.

The fulfilment of our indicator for transparency (I11) was rated with 2.9 - the lowest mean value of all of our indicators. By 2030, our respondents have formulated a rise to 5.6, and to 8.29 by 2050.

The aim of an indicator for governance (I12) is, according to our workshop participants, to be able to show in which areas and to what extent citizens' councils make decisions. As this indicator was exclusively surveyed qualitatively, we can hardly identify any tendencies from the few responses. In addition, some of the responses related to the functioning and others to the sphere in which citizens' councils are to be used. In other words: the question was understood differently, but based on the inductive orientation of the question, a more precise, deductive question can now be formulated. In addition, the areas in which citizens' assemblies are used can only be named post-hoc, as there are no such assemblies at the moment.

According to our participants, citizen's councils should

- make decisions when it comes to questions that set the direction for the future
- influence supraregional mobility development,
- be involved in urban planning, land sealing decisions, and the development of the circular economy,
- influence decisions that enable the redistribution of wealth, and
- decide on subsidies in the agricultural sector.

Notably, all our respondents were able to comment on the indicators. Some indicated a certain ambivalence towards the selected indicators. This is particularly true for the indicators for which there is no statistical baseline (Indicator 9 - 12) and we are dependent on the respondents' assessment of the status quo.

3.2 The visionpath index

Our 12 indicators can be categorized into the sustainability dimensions supplemented by a fourth, institutional, dimension (Valentin and Spangenberg, 2000) as follows (see Figure 1):

- **Social dimension**
  - I1: Being able to heat living space adequately
  - I2. Indicator: Labour climate index
  - I5. Indicator: Work-life balance
  - I6. Indicator: Gender equality in the workplace
- **Economic dimension**
  - I3. Indicator: Real GDP/capita
- **Ecological dimension**
  - I4. Indicator: Greenhouse gas emissions in million tons of CO2 equivalent
  - I7. Indicator for biodiversity: soil sealing
  - I8. Indicator for the circular economy: material footprint
- **Institutional dimension**
  - I9. Indicators for 'free access to holistic education'
  - I10. Indicators for embedding education for sustainable development in schools (ESD)
  - I11. Indicator for transparency
  - I12. Indicator for governance

To make an example, we present indicator 1 (I1): the target is 1.3 and the initial value is 9.3 then the gap would be closed by 50% at a value of 75. The value of the corresponding indicator "Percentage of Austria's population unable to keep home adequately warm" would then be 0.5. In order to calculate a 'distance to target' value, the indicators now are combined using a mean value calculation. Calculation of the index will crucially depend on data availability.

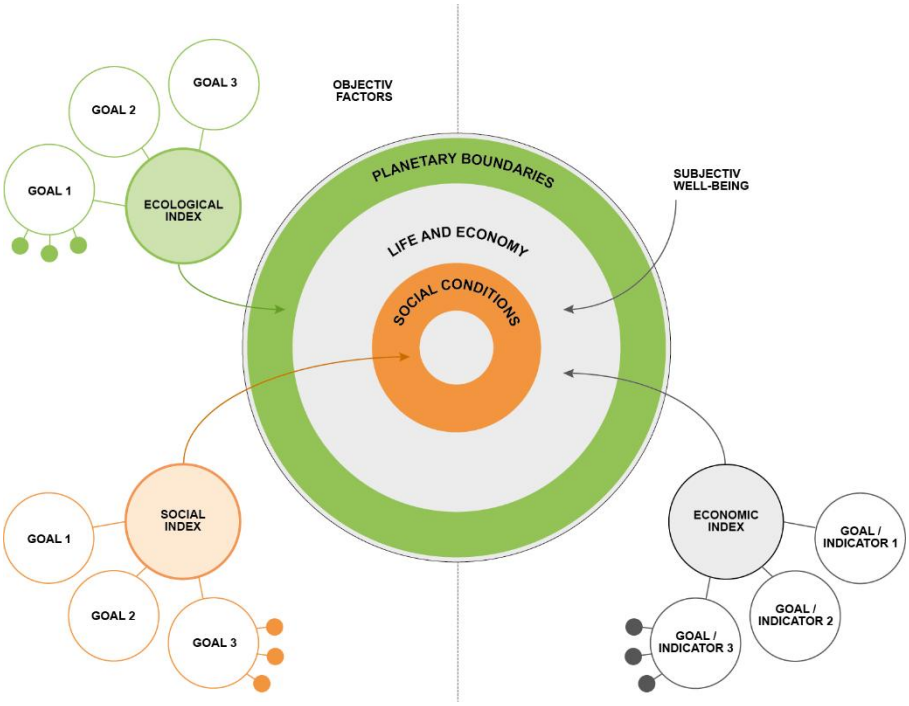

Figure 1: Indicator framework

4 Discussion, Conclusion and Outlook

The results showed that the indicators suggested were evaluated to be appropriate by the stakeholders. The final selection of targets and indicators was used in modeling to qualify and quantify stakeholders policy recommendations (Bukowski et al., 2024a; Wretschitsch et al., 2024a) and thereby translated into an SDG context.

Combining the results of this project with similar processes on micro and meso levels can deliver a basis for further developing a comprehensive methodology of visioning and indicator development with tools from artistic research, systems analysis and participatory indicator development for a broad range of applications (Hinterberger, 2025; Hinterberger and Bukowski, 2024).

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