

Report on „The Sustainable Development Goals and the Systems Approach to Sustainability”

The authors discuss the system approach to operationalize measuring progress against the Sustainable Development Goals (SDGs). They suggest rather standard microeconomic theory to assess trade-offs among the SDGs and provide a quantitative example with a set of indicators for each of these targets. The identified result between the No Poverty Goal and Good Jobs/Economic Growth is interesting and puzzling at the same time. Despite the rather economic standard approach I recommend the paper for publication (if the caveats listed below are addressed) because the overall SDGs debate clearly lacks such theoretical approaches (with empirical application) to assess trade-offs.

Major issues:

- 1) The authors claim as contribution of the paper the application of the system approach. However, their assessment of trade-offs does not require the assignment of goals to one of the three dimensions. For that reason the relationship/motivation for the introduction of the system approach should be better linked to the second part. For example, the system approach could be used to discuss the distinction between weak and strong sustainability by for example arguing that within a system (e.g. the economic system) a weak sustainability concept could be considered to be sufficient while between the three systems a concept of relatively strong sustainability would be advisable. Maybe the authors could apply this extension then to their illustrative example.
- 2) The assignment of Goals to the different system is not that unambiguously as claimed by the authors, in particular if one would look at the target level of the various goals. Accordingly, the authors should state that the presented assignment is based on their assessment and an assignment which cannot be resolved by science but requires stakeholder interaction/democratic justification.
- 3) Given the earlier work of the authors it appears somewhat puzzling that they choose an theoretical framework which totally neglects any dynamic aspects of underlying capital stocks (related to the SDGs) (which is crucial to assess sustainable development). For the sake of the paper and the illustration of trade-offs, the chosen theoretical framework can be justified (cost-minimization problem and derivation of Hick's demands), but is required to at least discuss the other available concepts (in particular given the authors work on inclusive wealth) (like for example Edward B. Barbier (2013). Wealth accounting, ecological capital and ecosystem services. Environment and Development Economics or the appendix in the IW2014 report).
- 4) Furthermore, neglecting dynamic aspects, the framework also neglects price effects. For example, improving SDG 14 might require more restrictive catch shares, increasing the consumer prices for fish, making it likely that the WTP to increase SDG14 shrinks. This needs to be acknowledged.
- 5) The authors miss somewhat to relate their work to recent publications/comments dealing with trade-offs/synergies related to SDGs, for example:
 - a. Nilsson et al. (2016): Policy: Map the interactions between Sustainable Development Goals, Nature.
 - b. Christoph von Stechow et al 2016 Environ. Res. Lett. 11 034022, 2 °C and SDGs: united they stand, divided they fall?

Minor Issues:

- 1) Page 5/ third paragraph, Holmberg and Sandbrook. Would be an opportunity to cite/discuss shadow prices to measure the wealth contribution (See major issue 3) above.
- 2) Page 9, the condition $\partial s / \partial s_i$: I think it is rather obvious that an increasing individual indicator has positive partial influence on the overall SDG (s) level; the direct beneficial effect arises from the assumption that the utility function has also the normal concave properties to s.
- 3) Page 18, as shown by Arrow et al. (2012) => I think you could/should cite here Weitzman (1976). Furthermore, using ANNI, implies that you account for the decline in natural capital. Certainly, the ANNI information is anything else than complete but given your stylized framework, one could argue that you not need to account for the environmental system.