



SDG PUSH PROCESS

A BRIEF ON PARTICIPATORY MODELLING

Why do we need modelling?

Modelling provides a structured language to explain how we think the world works and improves research and decision-making across different disciplines. For example, in the context of the SDG Push process, building from the dialogues and decisions on potential accelerators to explore, is a costing and analytical modeling exercise. The cost of the acceleration options is critical for planning and feasibility of the proposed interventions.

A participatory modelling approach will be applied that develops customized analytical tools for evidence-based policymaking. The potential accelerators emerging from this stage can be fed back into dialogues and validated with country partners. The acceleration proposals emerging from the dialogue are considered to be hypotheses that needs to be subjected to rigorous modeling and analytics. Modelling helps increase confidence in the potential accelerators to move the country in the right pathways.

What is Participatory Modelling?

Participatory modelling is a purposeful learning process for action that engages the implicit and explicit knowledge of stakeholders to create formalized and shared representation(s) of reality.¹ In this process, the participants co-formulate the problem together and use modelling practices to help with the opportunities, bottlenecks, solutions, and decision-making actions of the group later in the process. It is an innovative approach that includes a high level of ownership of the decided structure so that goals and outcomes are transparent and flexible for evaluation and revision. In the context of the SDP Push process, active engagement among stakeholders through structured dialogues aids us in gaining knowledge from the ground and formulating an inclusive and holistic set of accelerators/pathways for achieving the 2030 SDG goals. In particular, it is incorporated directly through the economist listening in to the dialogue process and working with policy specialists if there is need to probe further.

What are the types of Participatory Modelling? ²

There are many types of participatory methods, sometimes known as collaborative modelling, spanning various fields and research groups. The most commonly used are: group model building, companion modelling, and shared vision planning (see Bale, n.d. for more details). They are defined below:

¹ For more detail, see <https://participatorymodeling.org>.

² Bale, Catherine, n.d. Participatory modelling: A review of applications in energy whole-systems modelling to support decision making. Online at: <https://www.birmingham.ac.uk/Documents/college-eps/energy/research/ascend/ascend-participatory-modelling-review-final.pdf>

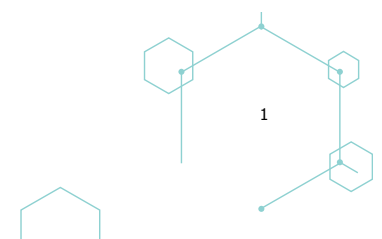




TABLE 1. PARTICIPATORY MODELLING TYPES AND DEFINITIONS

Group model building	A process in which “decision makers with a stake in the outcome of the project are involved in crafting the scenarios” (Schmitt Olabiisi et al., 2020). It is a lengthy process, mostly practical for strategic long-term decision-making.
Companion modelling	A process that actively engages stakeholders through agent-based models and role-playing games. Most suitable for exploring policy options that have integrated, multiplier effects in various areas.
Shared vision planning	A process that relies mostly on quantitative approaches using excel and numerical modelling; mostly suitable for academic work.

For the SDG Push, the group model building will be applied where the decision makers (i.e., government partners) will be consulted in dialogues through a lengthy process and scenarios will be crafted in the form of potential accelerators.

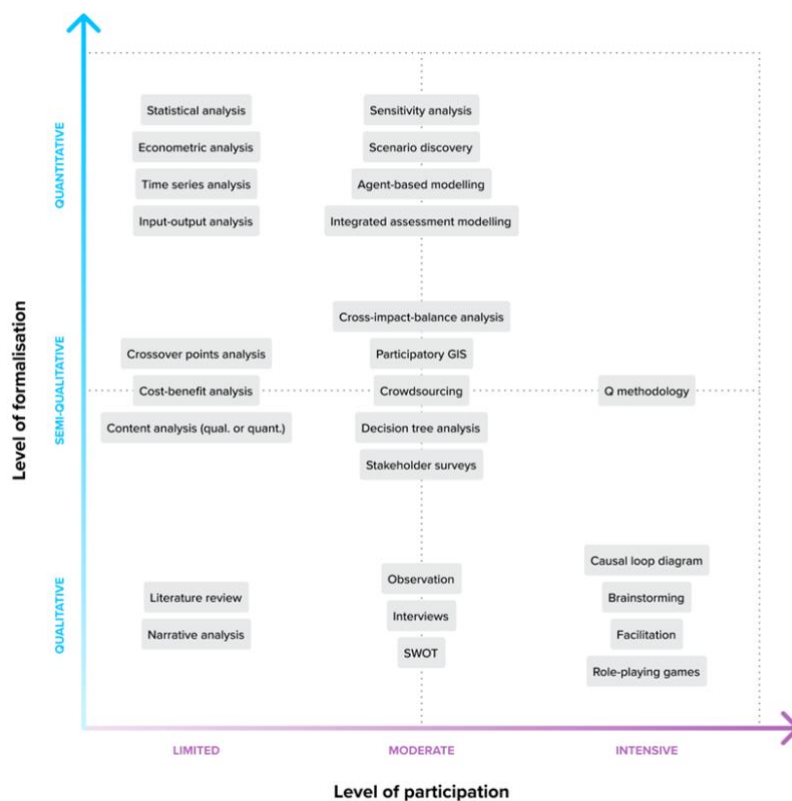
How does it work?

To effectively use participatory modelling to one’s benefit, it needs to be structured into five components: engagement, model application, identifying capabilities, specify requirements, and assessing model suitability. Each step requires [detailed planning](#); they are presented in more detail below in the context of SDG Push.

Engagement. A limited to moderate level of participation could be conducted with stakeholders to extract necessary knowledge for informing the potential accelerators. For example, a cost-benefit analysis method obtains stakeholder preferences for competing solutions to incorporate into the evaluation, but the analysis itself is performed independently. Alternatively, a moderate to intensive level of participation is conducted with stakeholders through a process of genuine engagement and co-learning. For example, role-playing games are centered around stakeholder engagement to create a shared understanding about solutions to a widespread problem. The role-playing will be based on understanding tradeoffs and interlinkages between policies. Then after, the analysis would be performed with the proposed solutions either independently or together with the stakeholders. In the Diagnostic process, we will engage in intensive level of participation in two phases, both in person and online.

Model Application. After the engagement process, either a qualitative or quantitative modelling method can be applied, depending on the level of formalisation and preference. A Qualitative method usually relies on conceptualisation and assumptions about scenarios, actions, and the way the system works. In contrast, a quantitative method consolidates input assumptions into a structured language for greater analytical rigor. While the level of quantification and formalisation of assumptions in quantitative method implementation gives us the ability to reproduce system behaviour and to validate results, relying too much on quantitative information may lead to diminished cultural and cognitive richness of the information (compared to qualitative assessment). Alternatively, there is a third method, a hybrid of the two, called mixed methods, or semi-quantitative methods, where some qualitative data (e.g., human values and preferences) are processed using a quantitative technique, or a set of numerical values is analysed using standard calculations (e.g., weighted average). In the Diagnostic process, we will engage in mixed methods where stakeholders’ SDG priorities and related potential accelerators will be considered, together with quantitative methods such as CGE, microeconomic analysis, partial equilibrium, etc.

Identifying Capabilities. Together, the engagement and model application create four general sets (quadrants) of participatory modelling methods with different capabilities that can be used for co-creating potential accelerators for meeting the 2030 SDG agenda, as shown in figure 1 below:



Source: Adapted from Moallemi et al., 2021 Evaluating participatory modelling methods for co-creating pathways to sustainability

In figure 1 above, the first quadrant (top-left) lists techniques for developing computational models and analysing modelling results. Most of these techniques (e.g., statistical and econometric analyses) use available knowledge. Moving clockwise (towards the second quadrant), it lists quantitative techniques (e.g., integrated assessment models) to facilitate stakeholder participation for the acquisition of knowledge in decision-making (e.g., crowdsourcing). The third quadrant (bottom-right) lists techniques for obtaining knowledge from stakeholders (e.g., interview and survey), communicating it between different groups (e.g., facilitation), and processing it (either qualitatively or semi-quantitatively) with stakeholders to reach a collective understanding (e.g., causal loop diagram). The fourth quadrant (bottom-left) includes techniques suitable for collecting and analysing information (e.g., literature review, content analysis), rather than relying on self-reported information through participatory methods (e.g., surveys). In the Diagnostic process, each country can assess their needs and capability (e.g., economists, experts, policymakers) to choose the level of formalisation and level of participation in consultation with UNDP SDG acceleration team.



Specify requirements. The choice of method for co-creating accelerations can be influenced by several requirements in practice but they can be summarised in three primary categories of outcome-oriented, research-oriented, and stakeholder-oriented (see Moallemi et al., [n.d.](#) for further reading).^[3]

First, the *outcome-oriented* requirements are those pertaining to choosing analytical objective in the context of expected results. For example, features such as agenda setting, scenario exploring (i.e., accelerators), analysing solutions, and vulnerability analysis fall under analytical objective. Likewise, working with quantitative and qualitative indicators, capturing heterogeneity and transparent communication of results fall under results.

Second, the *research-oriented* requirements are related to the scientific rigour of methods to cope with the problem and the availability of resources such as data and expertise for method implementation. For example, working with limited data, building on participatory and computational experiences, and working with limited technology access fall under resources whereas dealing with problem complexity (conflicting trade-offs) and uncertainty (limited knowledge) fall under problem characteristics.

Lastly, the *stakeholder-oriented* requirements are related to stakeholder characteristics in method implementation. This requirement needs to account for stakeholder characteristics (fatigue, maturity, value divergence, and result buy in) along with engagement type (interviews, focus groups), participation timing (front-end versus back-end), and stakeholder type (cross-sectional, sector practitioner, policy makers).

Therefore, based on the stakeholder requirements (I.e., focus on outcomes, research, or stakeholder) and resource availability, one can design the participatory modelling process that is the most practical and suitable for their context in achieving the SDG targets.

Assessing method suitability. Once the method capabilities and practical requirements (via the strengths and limitations of methods) for the participatory modelling process have been identified; the general suitability can be assessed. For example, a robust optimisation method can help in making effective trade-offs between multiple conflicting objectives and hence it is suitable for conditions with stakeholder disagreement about priorities and trade-offs between SDG goals. This general assessment of method suitability is particularly useful in two ways: (a) enabling the selection of methods in practice under 'what-if' scenarios, and; (b) highlighting the opportunities for integration between different methods in practice. In the Diagnostic process, this will be done after the Dialogues component where potential accelerators will be explored through a costing and analytical modelling exercise.

How to use the Framework in Practice?

The framework for the assessment of method suitability can be curated to the specific requirements of decided potential accelerators by the government such that researchers can choose a mix of methods with capabilities that can effectively address the problem at hand. There are three steps for using the framework: (1) select a subset of practical requirements that are most relevant to the accelerators; (2) evaluate and select a priori a subset of method capabilities that meet case requirements; (3) re-evaluate and adjust the methods selected initially over the course of the case study project. A more detailed step by step process is presented below in table 1³:

³ Note: adapted from Moallemi et al., [n.d.](#) Figure 7 An overview of the steps in developing pathways towards sustainability goals (p. 21)




Utilising participatory modelling methods throughout the SDG diagnostic process (example)

SDG diagnostic stage	Action and goal	Applicable participatory modelling methods from Figure 1, based on level of participation & formalisation
SCOPING	VISIONING To envision desirable SDG target(s)	Limited Moderate / Qualitative Quantitative
	TARGET SETTING To identify locally relevant goals and set measurable targets	Limited Moderate / Qualitative Quantitative
	PROBLEM ANALYSIS To assess bottlenecks and vulnerabilities	Limited Moderate / Qualitative Quantitative
ACCELERATION DIALOGUES	ACTION POINT Identify short/long term actions to cover gaps and meet target	Moderate Intensive / Qualitative Quantitative
	POTENTIAL ACCELERATORS Propose potential accelerators based on identified actions and targets	Limited Intensive / Qualitative Quantitative
MODELLING	MODELLING TRADEOFFS Implement modelling to assess tradeoffs and interlinkages across SDGs	Limited Moderate / Semi-quantitative Quantitative
	ROBUST ACCELERATORS Finalize accelerators based on modelling and further discussions	Moderate Intensive / Qualitative
	IDENTIFY INTERLINKAGES ACROSS SDGS Explicitly address tradeoffs & interlinkages across SDGs from chosen accelerators	Moderate Intensive / Qualitative
ACCELERATION ROADMAP	ACCELERATION ROADMAP Draft an acceleration roadmap that contains actions, partner roles, financing, and timeline	Intensive / Qualitative

What are the benefits and challenges of Participatory Modelling?

Participatory modelling has numerous benefits including collective decision-making, reducing conflict, informing collective action, enhancing learning, gaining common understanding, and formulating strategy and policy.⁴ While one of the primary drawbacks of Participatory Modelling is time commitment, costs and

⁴ Bale, Catherine, n.d. Participatory modelling: A review of applications in energy whole-systems modelling to support decision making. Online at: <https://www.birmingham.ac.uk/Documents/college-eps/energy/research/ascend/ascend-participatory-modelling-review-final.pdf>



level of engagement required when implemented as a standalone model, integrating it into the SDG Push makes it easier to implement and limits the effect of the other shortcomings of the approach.

Good Practice for Participatory Modelling for the SDG Push process⁵

1. The participatory modeling approach is not just the model and numbers crunching by the economists but democratizes the scenarios and what is important to model.
 - The economist should be involved in the selection of participants for the Dialogues.
2. Gauge pain points and issues that may influence selection of appropriate models – for example, the mere fact that we can put an economic value to a life applying the value of statistical life and similar methodologies is distasteful to most and unethical to some even though it is needed to understand tradeoffs and used in many countries.
3. Incorporate stakeholder knowledge and discuss potential uncertainties in potential accelerators selected with stakeholders during Dialogues sessions.
4. In conjunction with stakeholders, interpret results, facilitate development of new policy and management ideas, and clearly report results.
5. Treat the model as a process and reflect and reevaluate where necessary.

⁵ Bale, Catherine, n.d. Participatory modelling: A review of applications in energy whole-systems modelling to support decision making. Online at: <https://www.birmingham.ac.uk/Documents/college-eps/energy/research/ascend/ascend-participatory-modelling-review-final.pdf>