Decision support tools (DST): Brief step-by-step guide[1]

By FiBL, University of Aberdeen, Thünen Institute of Farm Economics, 2021

Purpose. Along with other methods to describe the status quo in the case studies, the three decision support tools (DST) were applied to provide information sustainability performance of current agro-ecological farming systems.

What are decision support tools (DST)?
Decision support tools (DST), sometimes also referred to as sustainability assessment tools (SAT) provide information on the environmental, economic and social performance at farm level. The identified strengths and weaknesses can serve as a basis for the decision making of the farm manager and other stakeholders (farmer association etc.).
In UNISECO, three decision support tools (DST) were applied: SMART, COMPAS and Cool Farm Tool. Whereas SMART performs a multi-criteria analysis (MCA) and covers a wide range of sustainability themes, COMPAS focuses in depth on economic parameters, and Cool Farm Tool calculates the carbon and water footprint for a given farm enterprise. Cool Farm Tool also offers a biodiversity rating of the whole farm, based on a multi-criteria assessment, similar to SMART.

Project background. In the UNISECO project three decision support tools (DST), SMART, Cool Farm Tool and COMPAS, were applied in case studies in 15 European countries to provide information on the environmental, economic and social performance of current agro-ecological farming systems. This status quo assessment formed the basis for assessing sustainability trade-offs and synergies of the implementation of new agro-ecological practices. In each UNISECO case study area, the project partners defined pathways of agro-ecological transitions. Different stages of achievement of the agro-ecological transition characterized these pathways: stage 0 (not agro-ecological) served as the conventional baseline with which comparisons could be made. The subsequent stages defined represented states along the ecological transition pathway on a continuum from weak agro-ecological to strong agro-ecological, whereas strong agro-ecological represented a redesign of a system (Prazan and Aalders, 2019). From each of these stages, farms were assessed with the three decision support tools.

[1] If you have any questions about this methodological approach, please contact the author(s) by e-mail: Jan Landert (FiBL) jan.landert@fibl.org .

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Step-by-step guide to applying the methodology.

1. Training phase

If the the three DST are applied by project partners not familiar with the tools, training needs to be carried out to ensure data quality. This training should optimally include:

- Introduced into the workflow and the three DST.
- Preparation webinars (theory part)
- Face to face training including practical on-farm training.
- Training webinar on how to interpret DST results

At least a full working week is recommended to allow sufficient time for training.

2. Farm selection

To ensure a common basis for the farm selection process in all case studies, the project partners will need a guideline outlining the preferred workflow. It should include a common farm typology[2] to define agro-ecological transition pathways and to conceptionally group farms in each case study according to their stage along the transition pathway. Figure *1* illustrates such a grouping of farms in a case study according to their stage along the transition pathway.

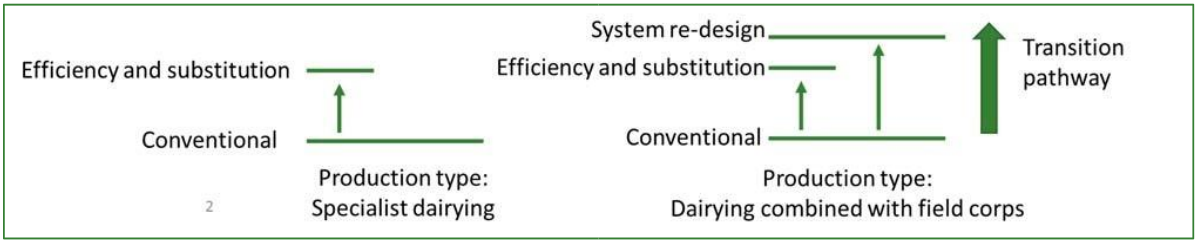

Figure 1. Example for two transition pathways for two farm production types defined in a case study (total of 5 farm groups)

To further characterise the different farm groups in the case studies, a set of attributes needs to be defined. In the UNISECO project the definition was driven mainly by key modelling input parameters (e.g. based on Muller *et al.*, 2017) of:

- Agro-ecological practices, structured in accordance to Prazan and Aalders (2019)
- Utilized agricultural area (UAA) in ha

[2] See Prazan and Aalders (2019) for more information on the development of a typology.

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- N- and organic fertiliser source
- Fodder source
- Irrigation
- Plant protection
- Yields of main product case study
- Crop rotation of the main crop
- Common crops
- Common livestock
- Broad socio- ecological contexts (dimension 3 from Prazan and Aalders, 2019).

Project partners can obtain the data from official statistics and expert interviews or, where data do not exist, estimate the missing values based on the first two sources. The aim of such survey is:

- to gain a structured overview of the farm groups being assessed with the DST across all case studies,
- to deepen understanding how the chosen farm groups represent the whole farming system with regard to certain attributes in the whole case study area,
- to provide information that can be used for the upscaling case studies to territorial level analysis.

For each farm group, at least two farms should be selected for the assessment with the DST. In some cases, the farm groups defined will need to be adapted later to account for the willingness of individual farmers in the farm groups initially selected to participate in the project. *Note:* If the analysis aims for representativeness, the farm number in the sample needs to be increased based to the number of farms in each farm group.

3. Data collection phase

The first step in the data collection procedure involves the collection of existing documents from the farmers to pre-fill the three DST as much as possible already before the interview with the farmer (Figure 2).

In a second step, a common data collection tool[3] ("Excel survey" in Figure 2) during an initial field visit and then transfer the data to Cool Farm Tool, and where relevant also to SMART. To avoid interview fatigue, it is recommended to visit the farm a second time to complete the SMART assessments.

[3] Newly developed in UNISECO.

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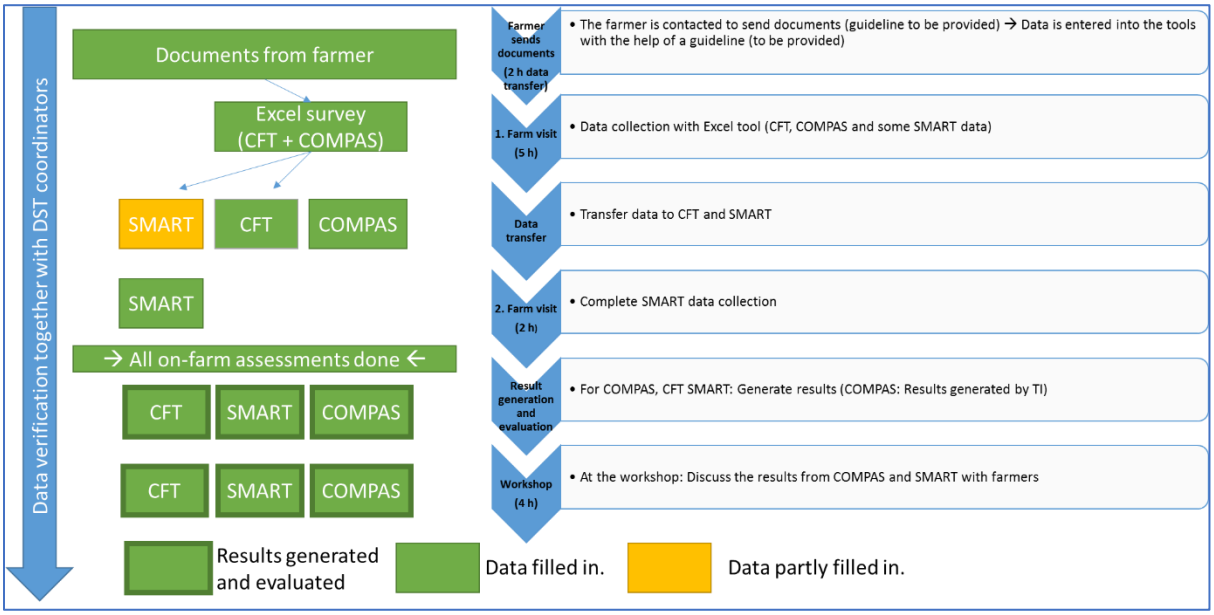

Figure 2: Workflow of steps of data collection and verification (the common data collection tool is referred to as "Excel survey")

During the data collection, project partners should have the possibility to engage in an online support forum to exchange on certain issues.

4. Data generation and plausibility checks

After the results are collected, the project partners will generate the results for SMART and Cool Farm Tool (see Figure 2) while the COMPAS calculations are done by the model coordinator (in the UNISECO project the model developer, the Thünen Institute (TI)). During the latter process, plausibility checks on the data will be done and feedback needs to be provided to project partners.

For SMART, FiBL will provide at least one SMART questionnaire for plausibility in each case study and including a list of common errors to all partners to check. The same is the case for Cool Farm Tool for which the University of Aberdeen provide feedback to partners regarding data quality.

5. Result validation

To increase the potential of generalization for a sample with a low number of farms, project partners need to validate the results together with farmers and / or experts in the case studies and explored the extent to which they could be generalized with regard to typical farms in the region. The validation can be done through interviews or a workshop based on the key findings of the assessments which needed validation.

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Additional information:

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SMART: https://www.fibl.org/en/themes/smart-en.html

Coolfarm Tool: https://coolfarmtool.org/

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