MASC, a model to assess the sustainability of cropping systems: Taking advantage of feedback from first users

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CONTEXT & OBJECTIVES

The first version of MASC model (for **Multi-attribute Assessment of the Sustainability of Cropping Systems**) has been designed initially to select newly designed Cropping Systems (CS) before testing them in field trials (Sadok et al., 2009). Different users in the field of agriculture tested MASC in various contexts and commented its use and its usefulness. We recorded comments from these users in order to gain greater insight of their requested needs and in order to improve the model.

MATERIAL & METHODS

MASC is a qualitative multi-criteria model based on criteria that are hierarchically organized into a decision tree. These criteria are aggregated in order **to assess the three usual dimensions of sustainability** (economic, social and environmental). Two types of criteria can be distinguished in this tree (Figure 2):

- **basic criteria** which correspond to the inputs of the decision tree (filled thanks to specific indicators).
- **aggregated criteria** which are located at a higher level in the hierarchical tree, depending on those at lower levels.

Aggregations are based on weights (%) according to utility functions defined by "If-Then" decision rules.

After a test of the model in real situations for three years by various users, designers gathered feedback from them by organizing **a workshop, sending out a survey**, **interviewing users** and **holding a consultation meeting**.

RESULTS

The model was used in somewhat differently than expected and lead to identify improvements:

- Users targeted much **more varied purposes** than the one initially planned by the model designers **(Table 1).**

  ⇨ **A need for enlarging the scope of the model**

- Users also **led *ex post* assessment** thanks to the simple indicators based on the description of planned practices.

  ⇨ **A need of simple indicators to make easier & faster *ex post* assessment**

- Users **replaced the suggested indicators** with better suited to their context (such as field measurements).

  ⇨ **A need of flexibility to assess basic concerns**

- Users **modified the set of weights** to integrate both local issues and their own perception of sustainability (Craheix et al. 2012)

  ⇨ **A need of flexibility in parameter settings**

- Users **suggested new criteria** to enhance the relevance of

  ⇨ **A need of a more detailed analysis of the sustainability** (Figure 2 ; Craheix et al., 2011)

Table 1: Initial purpose and new purposes the model served

Purposes of the assessment	Actors implicated*	Ex ante/Ex post	Number of projects
Assessment and selection of CS defined with expert knowledge before testing in situ	E-R-F	Ex ante	6
Diagnostic/Assisting strategic thinking of farmers on the evolution of their CSs	E-F	Ex post	4
Diagnostic/communication of results obtained on CSs field experiment	E-R	Ex post	5
Assessment of farmers' CSs in a prospective approach	E-R	Ex post	1
Identification of barriers to adoption of innovative CSs	E-R-F	Ex ante/Ex post	2
Training about the application of the sustainability concept at the CSs level	E-F-R-S	Ex ante/Ex post	+10

*E = Extension workers; F = Farmers; R = Researchers; S = Students

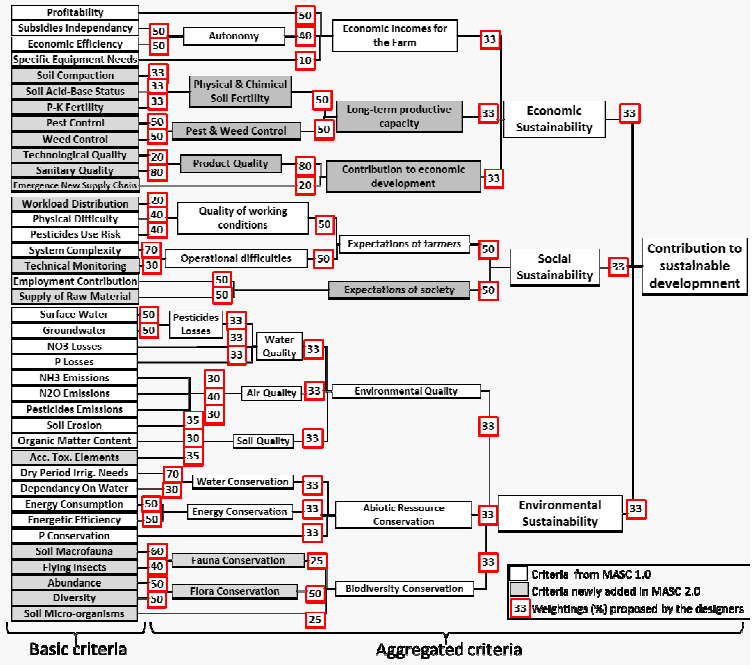

Figure 2: MASC 2.0 : decision tree, proposed weights and new criteria

CONCLUSION

- Analysis of users' feedback played a key role in the **development of MASC 2.0.**
- The main improvements have involved **specifying the domain of validity, extending the range of concerns** by adding new criteria**, and enhance flexibility to facilitate both appropriation by stakeholders and adaptations to the local socioeconomic and pedoclimatic context.**

References

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