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BOOK OF ABSTRACTS

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Tailoring technical options: case studies of intangible and tangible supports in advisory approaches in West Africa

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Short abstract

Purpose To support the sustainable development of smallholder farms, bridging the gap between generic scientific knowledge and local knowledge relevant to farmers' socio-ecological niches represents a challenge for advisory services. We explore two approaches supporting farmers in the tailoring of technical options to their own farm systems.

Design/Methodology/Approach We present two case studies in which farmers are supported in the adaptation of sustainable cropping practices and describe the mechanisms at play for the tailoring of technical options using the concept of tailoring effort.

Findings In the case of Farmer Field Schools (FFS), the tailoring occurs during discussions with the farmers, when the facilitator contextualizes technical options to suit farmers' expressed priorities and constraints. Each farmer can then choose what is relevant to their situation. In the case of crop models (CM), the tailoring happens when researchers parametrize the model as closely as possible to farmers' environments and practices, and then use simulation results in discussions with farmers.

Practical implications Possible complementarity between FFS and CM could be explored for advisory services. Advisors need to acquire the skills for collaboration with farmers and facilitation approaches that support the tailoring of generic knowledge to farmers' priorities and constraints.

Theoretical implications We highlight the importance of considering what is required from the different stakeholders to make the tailoring process to a socio-ecological niche effective, when supporting farmers in transition towards sustainable agricultural systems.

Extended abstract

Purpose

The transition of agricultural systems is tied to many issues related to environmental, social and economic sustainability, especially in sub-Saharan Africa (Côte et al. 2022). Several authors stressed the need for adaptation to local circumstances (Descheemaeker et al. 2019) in paradigms such as agroecology (Altieri 2002) or ecological and sustainable intensification (Doré et al. 2011). Indeed, diverse cropping and farming systems ask for site-, space- and time-specific management to increase ecosystem services delivery. However, uncertainties associated with the performances of agroecological practices may hinder their use by farmers. This calls for new ways to accompany locally relevant agricultural innovations (Duru et al. 2015). For farmers, the idea of an agroecological transition translates to the localized adaptation of agroecological principles to their own pedo-climatic and socio-economic constraints (Duru et al. 2015). Farmers should be at the centre of their transition process (Altieri 2002). Accompanying farmers in local adaptation of knowledge and practices is expected to generate credible, salient and legitimate results (Cash et al. 2003).
Moreover, especially in sub-Saharan Africa, smallholder farming is characterized by a large diversity of individual situations created by a multi-dimensional and multi-level socio-ecological context. In a reflection about the tailoring of options to local conditions, Descheemaeker et al. (2019) identified socioecological niches (Ojiem et al. 2006) as a concept incorporating the agro-ecological, socio-cultural, economic and institutional factors at various spatial and organizational levels.
However, within the agricultural innovation systems (Klerkx et al. 2012) in West Africa, advisory services face challenges linked to the quality of human resources delivering advice and the characteristics of the

advisory methods (Faure et al. 2011). In this context, which approaches are relevant to support farmers in the tailoring of technical options to their own farm systems?
Depending on the approach chosen by farmers and advisors, the efforts necessary for locally adapting generic knowledge may rely mostly on farmers or on advisors. Through "tailoring effort", we refer to the mental and communication efforts required for the clarification of the objectives and assessment criteria, the translation of generic scientific knowledge into relevant technical options, and the extraction of information, allowing the "customization" to individual needs and constraints.
We present two case studies of approaches aiming at accompanying farmers in the adaptation of their practices towards more sustainable cropping practices. We hypothesize that both case studies, relying on different processes for scientific knowledge contextualization, require different implication and tailoring efforts from farmers and advisors.

Design/Methodology/Approach

We use the distinction between advisory approaches based on tangible support objects (a plot, for example) and approaches based on intangible objects such as models or videos. We selected two case studies located in the cotton production area of West Africa, and conducted interviews with key stakeholders of the project and with participant farmers.
In northern Togo, we studied the use of Farmer Field Schools (FFS) from a project focusing on the degradation of arable land and the promotion of farm resilience through agroecological practices. The implementation of collaborative FFS, as described in Bakker et al. (2021), constitutes a tangible support for the advisory approach.
In Burkina Faso, the CLEMATIS project (2022-2023) aims at using models in co-learning approaches with farmers to assess the contribution of crop diversification to ecosystem services. A first step of the project explored the use of crop models as a tool to discuss changes that could be expected from practice changes in a given cropping system (Cheriere et al, in prep.). This approach based on a crop model (CM) constitutes the second case study.

Findings

a. Tangible support: collaborative Farmer Field Schools in northern Togo

Farmer Field Schools (FFS) are a participatory field-based extension approach that seek to support farmers' competences. FFS are best described as intensive, season-long programs in which farmers collectively experiment, observe and learn with a facilitator about a crop or topic of their choice (Davis 2006). The FFS field, with its different sub-plots each dedicated to a technical option, constitutes the tangible support on which groups of farmers meet routinely with a trained facilitator (technician or farmer) discuss and undergo experiential learning.
The case study in Togo focused on three FFS. By means of a description of the FFS implementation process, we identified that the tailoring occurs in the discussion with the FFS group, when the facilitator contextualizes technical options to suit the particular pedo-climatic condition of the FFS's field location and farmers' expressed priorities. Each farmer can then retain what is relevant for their own situation.
Two mechanisms for contextualizing generic knowledge are at play. First, farmers can choose the most suitable option for their own situation through examples from the FFS sub-plots, which harbors testing of a variety of technical options. Farmers are exposed to the technical options during activities (field visits, soil profile description…) occurring during the cropping season. The fact that the field is collective allows to test and take more risks than on farmers' own fields. Second, opportunities to contextualize knowledge stems from the facilitation during the FFS cycle, as the discussions taking place during the activities can give farmers information on what options might be the most suitable in their context. The facilitator's role is therefore to include all farmers (including women, poorer farmers etc) and discuss farmers' criteria on the technical options (e.g.: regarding labor or cash requirements at different cropping stages).

b. Intangible support: crop modeling with farmers in central Burkina Faso

The potential for the use of crop models (CM) for extension and education with smallholder farmers has been explored (Carberry et al. 2004). The CLEMATIS project was guided by the idea that crop models could be used to simulate a number of scenarios of change, contextualized to farmers' field environment and crop management practices, from which each farmer can select and discuss with the facilitator specific simulations that are relevant to them.

The first mechanism for contextualizing generic knowledge relied on crop models' intrinsic characteristics. They are built around generic scientific principles and offer the opportunity to define the environment and management of the virtual crop. CM parametrization aimed at being as close as possible to farmers' environments and practices; a group of farmers described 4 soil types they encountered in their fields, an average sorghum crop management and technical options to explore (3 organic amendments x 5 application rates).
The second mechanism relied on using simulation results to support discussions around the effects of technical options with farmers. Matching a simulated situation to the farmer's actual situation aimed at anchoring the discussion within the farmer's reality. From there, farmers were offered to explore the technical options of their choice. The facilitator's role was to present the effects of the technical option considered within the chosen context, commenting on relevant processes associated with practice's change effects and answering the farmer's questions.

Practical Implications

Despite the differences in mechanisms allowing the tailoring of generic scientific knowledge to farmers' context, FFS and CM approaches aim at generating a change in agricultural practices through the comprehension by farmers of agronomic interactions and mechanisms occurring within specific socio-ecological niches. FFS can touch on subjects ranging from crop management and cropping system scale all the way to farm level, and sometimes more integrative topics (Bakker et al. 2020). Whilst the CM used in Clematis was centered on the cropping scale, whether a modelling-based approach is adapted to various scales relies on appropriate model availability.
The differences between FFS and CM echo the tangible and intangible aspects of the two approaches. The physical nature of FFS means that the approach is constrained by the pedo-climatic characteristics of the FFS field and the duration of the project. The technical options (at the scale of practice in crop management and/or cropping system) that are displayed in the FFS field are however a true and tangible representation of a considered option. On the other hand, the abstract nature of CM outputs is reinforced by the virtual representation of processes in CM which are not an exact representation of reality. Nonetheless, CM offer the possibility to develop scenarios encompassing a wide variety of environment and management settings. These differences reveal the possible complementarity of FFS and CM that could be explored for advisory services. For example, CM approach could be used preliminarily to FFS in order to facilitate the selection of the technical options to be tested in the FFS field, or CM could be used to illustrate scenarios without increasing the number of plots implemented in the FFS field.
Additionally, we argue that FFS are more appropriate for the exploration of locally innovative practices or risky options for farmers because most results are palpable and can be directly assessed by farmers themselves, while CM outputs of an innovative practice that cannot be tied down to farmers' own experience may meet more mistrust. This last hypothesis may be challenged by the facilitator's ability to build trust in CM outputs and by mobilizing other complementary sources, notably using digital communication tools. Both in FFS and CM, facilitation and participatory diagnostic phases are cornerstones of the tailoring process. Assisting farmers from the formulation of the problem to the interpretation and discussion of the results while letting farmers chose the main orientations of the project, aims at insuring legitimacy and saliency of the results. The practical implication is that advisors need to acquire the necessary skills (such as interpersonal communication skills, discussion and collaboration with farmers, pedagogy) for collaborative facilitation approaches that support the tailoring of generic knowledge to farmers' priorities and constraints.

Theoretical Implications

Our comparison of approaches highlights the importance of considering the different steps in the tailoring process and what is required from the different stakeholders to make this tailoring process effective. It asks the question of whether a disproportionate tailoring effort expected from farmers affects their adaptation of a practice. FFS's field environment may not correspond to farmers' fields environments, thus extra tailoring efforts remain for farmers in adapting FFS's learnings to their context. CM's outputs were designed to match as much as possible farmers' own system and reducing the number of extra steps necessary to tune the technical option to farmers' context, but using CM requires building trust. Ultimately, farmers remain the ones in charge and bear the risks when trying a new practice. Nonetheless, the nature of the information (tangible and intangible) may affect the remaining efforts for the adaptation of the technical option, especially considering the fact that farmers tend to experiment and validate in their fields a technical option before using them at large scale (Hansson S. 2019; Catalogna et al. 2018). A research perspective would be to investigate how considering the tailoring effort in the design of advisory services can help support farmers in the transition toward more sustainable farming systems, and how combined use of tangible and intangible support objects can be explored for this purpose.

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