

Which advisory system to support innovation in conservation agriculture? The case of Madagascar's Lake Alaotra

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Abstract

To promote sustainable agriculture, various development projects are encouraging farmers around Madagascar's Lake Alaotra to adopt conservation agriculture techniques of direct-seeding, mulch-based cropping systems (DMCs). The increase in area under coverage where these new techniques have been applied, though real, remains modest and calls into question the relevance of the support currently being extended to farmers, especially in the form of advice. This article's objective is to advance a method of designing advisory services suitable for supporting complex innovation (the adoption of DMCs for rainfed crops) by promoting learning, access to services and the empowerment of actors. Results of farmer surveys and advisory actors highlight the current domination of technical advice provided by projects dedicated to promoting conservation agriculture methods, amongst which DMCs, based on recommendations arising from a technician research. Nevertheless, these advisory actors have shown a recent willingness to promote advisory services which address overall farm complexity in interaction with the proposed technical changes. Results not only call into question the advisory method used but also the ability of advisors to adopt an advisory system built jointly with the farmers. But the farmers and farmers' organizations have a limited ability to influence choices made by the projects. They question the sustainability of the advisory mechanism beyond the end of the project in the context of external funding of the advisory system.

1. Introduction

To promote sustainable agriculture, several projects in Africa are encouraging adoption of conservation agriculture techniques, including direct-seeding, mulch-based cropping systems (DMCs) (Serpantié, 2009; Giller et al., 2009). According to their proponents, DMCs can, by eliminating tillage and promoting the maintenance of mulch between two crops, improve soil fertility, promote soil humidity, reduce erosion and thus stabilize, or even increase yields (Giller et al., 2011). Farmers adopting DMCs have to radically alter their farming systems in terms of crop rotations, agricultural calendar, practices implemented, use of inputs and organization of their work. Such a change forces a farmer to take a longer view of his farm's operations than he is normally used to. While, on the one hand, the DMC's benefits are generally experienced after three years of practicing it, on the other, it is necessary to plan DMC crop rotations at least two years in advance (Domas et al., 2008; Penot, 2009). Thus the innovation at play can be considered "radical" and "systemic" and one which breaks

with the traditional farming systems. Not only do the farmers concerned require new knowledge and skills, they also require new inputs (seeds and herbicides). The development of DMCs in such a context thus requires access to quality and targeted services (advice, supply of inputs and credit, marketing). Promoting radical and systemic innovations need to address two points. First it requires a process of co-construction of solutions with farmers through a long learning process taking into account uncertainties and individual needs because turnkey solutions are rarely suitable across a diversity of farms (Cerf and Hemidy 1999). Second it requires coordinating diverse advisory activities and several types of services because farmers' needs are very diverse (Birner et al., 2009).

Since 2003, the Lake Alaotra Watershed project (BV Lac in French) in Madagascar, supported by CIRAD and funded by the French Development Agency (AFD), has been mainly involved in the development and dissemination of agro-ecological techniques promoting DCM in sloping areas. In 2009-2010, the area under DMCs exceeded 1500 ha involving around 2500 farmers. However, fewer than 100 farmers have more than 3 years of experience with these new cropping systems, representing 410 ha under DMCs in 2010 (Fabre, 2010). The dropout rate during the first two years has remained substantial, varying from 30 to 60% depending on the year. A majority of farmers drop out after the very first year of DMC introduction and therefore cannot be said to have really practiced DMC since it is based on crop rotations spanning at least two years. Farms that do adopt DMCs are typically small- to medium-sized farms with a majority of their cultivated area being rainfed (1 to 2 ha) and with a very small area of irrigated rice fields (less than 0.5 ha).

To support this process of adopting DMCs, the project trains and advises farmers so that they can implement these new techniques, promotes access to agricultural services (inputs, credit, marketing) and supports farmer organizations (FO). From the very beginning of the project, research is undertaken to help facilitate these changes by, for example, defining agricultural techniques to popularize, training of technicians and, more recently, improving advisory methods. The limited development of DMCs at Lake Alaotra has led the actors involved in promoting them to call into question the relevance of services, especially advisory services, provided to the farmers to help them implement agro-ecological techniques within the framework of a sustainable and innovative farming system.

In this paper, we propose to analyze the capacity of a project-funded advisory system to accompany a radical and systemic innovation and especially to design and implement an advisory method aiming at fostering learning process for sustainable changes at farm level.

In the first part, we present the analytical framework and the method used. In the second, we analyze the organization of the advice provided to farmers and linkages with other services. In the third part, we discuss the relationships between the governance scheme and the efficiency and suitability of the advisory method. We then propose possible ways of improving the advisory mechanism for facilitating the adoption of complex innovations.

2. Analytical framework and method

To analyze the functioning and dynamics of the advisory mechanism, we use the concept of the "advisory system" (Birner et al., 2009), understood as a social system (Crozier and Friedberg, 1977) which takes into account all the actors involved in the advisory activities and their inter-relationships. In addition to the political and institutional context, three components are responsible for this system's performance: (i) governance mechanisms, understood as rules for organizing advisory activities and for ensuring its funding, (ii) methods for generating advice, characterized by its technical or economic nature and tactical or strategic goal and by intervention modalities that can manage the relationship between the advisor and the farmer, and (iii) the capacities of advisors and, in particular, the competence of actors involved in the advisory process (advisors, advisory organizations). Swanson (2006) addressing the issue of governance compares advisory services oriented by farmer demand

(demand-driven advisory system) and advisory services oriented by market requirements (market-driven advisory system). Both options have consequences on the provision of advice by advisory organizations both in terms of content and method used to provide advice. Kidd et al. (2000) show that the origin of funding (public or private) is linked to the nature of services to be provided and the channel of funding have an impact on the access to advice and the method to provide advice. Gadrey (1994) explains in detail the nature of relationships between actors involved in the supply of a service, with emphasis on the “service relationship” between the recipient and the service provider. He shows that the service is jointly produced by the supplier and the client, with each contributing his own knowledge, and that this relationship is jointly controlled by them, with each helping guide the advisory work. Cerf and Hemidy (1999) show that for complex issues, it is necessary to establish a dialog between the farmer and the advisor to co-construct questions to address and solutions to implement and to help farmers’ representations evolve. Cerf and Meynard (2006) stress the necessity of constructing the right tools with the farmers’ involvement to provide effective support, in the form of advice, for guiding the production systems. On this basis, we consider that the design of an advisory method is dependent on the advisory system in which it is inserted (figure 1), in particular on the characteristics and skills of the actors involved and on the rules that define their relationships (Faure et al., 2011).

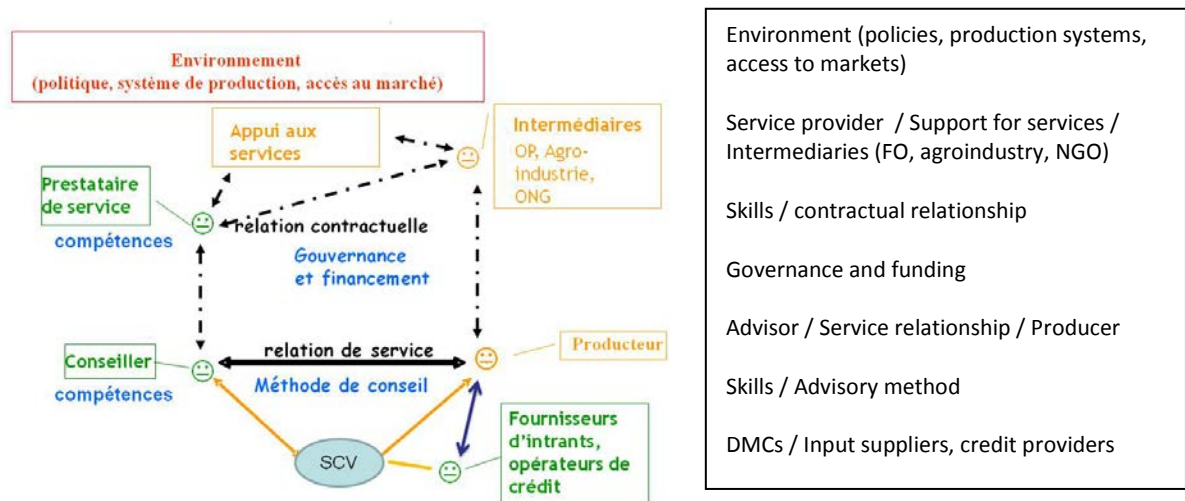


Figure 1: Advisory system. Diagram based on Gadrey (1994), Birner *et al.* (2009), Faure *et al.* (2011)

To explore the capacity of the existing advisory system to accompany radical and systemic innovations, we conducted three types of survey. We first identified the actors involved in the advisory provision in the Lake Alaotra area. A survey was conducted with these actors (one manager per advisory organization and two advisors per advisory organization) in 2010 by using a guide for a semi-structured interview (history of interventions, organizational structure, skills of technicians, planning and evaluation of activities, description of advisory activities, funding of activities). A second survey was conducted among the 32 farmers with experience in DMCs (for three years or more) to understand the dynamics of DMC adoption, the role played by access to advice and other services within those dynamics, and the participation of farmers in the service provision (level of interaction with the advisor, adaptation of the advice based on the needs of the farmer). A final, third survey was conducted among all FOs in which the surveyed farmers were members (the basic ones, the 3 federations and the VIFAM umbrella organization) to understand the indirect role played by FOs in the orientation, evaluation or direct supply of services (Ramahatoraka et al., 2011). One workshop with

actors of the advisory system was organized to present, discuss and validate the main results of the research. We didn't carry out quantitative surveys to assess the impact of advisory services on farm performances.

3. Presentation of the advisory system

3.1 The advisory actors

The supply of advice is notable for the low level of diversity of the actors involved. The Ministry of Agriculture is no longer actively involved on the ground, the input suppliers disseminate information on their products but do not deploy field advisors and the Federation of Associations of Network Users (FAUR) provides its members with only technical advice on irrigated rice. For sloping areas, it is the BV Lac project that plays a major technical advisory role for popularizing DMCs and for promoting some other technical innovations through two operators: BRL and AVSF-ANAE (see table 1). Another operator, BEST, providing advisory and training support for FOs, has recently expanded into providing advice on farm management.

Table 1: Characteristics of operators acting on behalf of the BV Lac project (up to June 2011)

	BRL	AVSF-ANAE	BEST
Type of personnel	4 agricultural engineers	3 agricultural engineers	1 socio-economist
	15 agricultural technicians	6 agricultural technicians	1 credit facilitator
		4 livestock technicians	9 FO facilitators
	19 LEA (Local Extension Agent)	4 trainer farmers	
Type of service	Agricultural and livestock training		Training in functioning of FOs for staff and elected officials (FOs working with the project, 3 federations, 1 umbrella organization)
	Support for preparing for the agricultural season (planning, credit, inputs)		
	Support for implementing, monitoring and assessing different DMC		
	Support for assessing results at the end of the cropping season		
	Farm-management advice		Training in maintaining farm documentation and calculating techno-economical indicators
	Organization of visits to farms representative of different local conditions		
	Ad-hoc support to FOs and other local organizations		
	Training of farmer-community leaders		Support to FOs for drafting applications (credit) and setting up projects (group marketing)
Collection of data from farmers' fields			

BRL Bas Rhône Languedoc-Madagascar ; AVSF-ANAE : Agronomes et Veterinaires Sans Frontières-Agence Nationale d'Actions Environnementales ; BEST : Bureau d'Expertise Sociale et de Diffusion Technique

3.2 Contribution of research to the design of DMC and advisory methods

With a strong participation by CIRAD agronomists, the project's coordination unit first tested, in representative farm conditions, a range of DMCs suitable for a variety of situations (farm type, soil type) in order to avoid a standard solution. With the project's coordination unit the CIRAD agronomists participated in the designing of the method to provide technical advice to farmers. The project's

coordination unit, with the help of one social science researcher, also established a Network of Reference Farms (NRF) consisting of agricultural farms representative of the diversity encountered in the Lake Alaotra area (Penot, 2008) to provide up-to-date information on these farms (practices, techno-economic results). This NRF was used from 2007 to 2010 to test various scenarios of evolution of farms based on the evolution of certain parameters (introduction of new technologies such as DMCs or forage crops, changes in prices of agricultural products or inputs, etc.). These analyses allowed the technicians to establish technical references for cropping systems, to measure the risks associated with adopting innovations, and to orient their advice based on the diversity of farms. Then, from 2009 onwards, the social science researcher developed a series of activities aimed at improving the advisory approach by promoting a holistic farm approach within the project. It did so by (i) training technicians of the three operators and (ii) creating tools useful for developing farm advisory approaches, which will be implemented from the 2011/12 farming season.

3.3 Method to provide technical advice

The annual program of activities of operators BRL and AVSF-ANAE depends mainly on the contracts entered into between the operators and the project unit. Each contract specifies targets not only in terms of area to be brought under DMCs but also in terms of a few other innovations: manure pits, improvement in livestock housing, etc. These objectives are broken down to each technician's level and are adjusted to the dynamics of the particular area under his ambit and thus to the potential demand from producers for innovations proposed by the project. In order to meet the multi-year program of the BV Lac project, quantitative objectives are increased every year. To meet the objectives set for him, the technician conducts an awareness campaign among the producers on the project's proposals and, in this way, recruits new farmers. As far as DMCs are concerned, he makes a proposal to each interested farmer. Choosing from a range of possible cropping systems identified by research, he fine tunes the proposal to take into account the farmer's specific situation (farm type, soil type).

The technician then prepares an Annual Work Program (AWP) for each farmer listing the innovations implemented (number, area) and the input requirements necessary for them (seeds, fertilizer, etc.). In general, during the first phase of the project, farmers newly adopting a DMC are encouraged to form a FO based on that particular DMC or, if such a FO already exists, to join it. This facilitates access to credit for funding labor and inputs. Indeed, AWP's consolidated at the FO level and signed by the technician are necessary to access credit from local micro-credit organizations. It is possible for an opportunistic farmer to take advantage of this system: for example, he could access credit and certain inputs with only one DMC field and then use the credit for other crops or activities.

The technicians' annual programs are used to consolidate the operator's program of activities and to determine whether the contractual annual targets of the operator can be achieved.

Technical advice is provided during individual visits or during monthly meetings with all the concerned farmers and their neighbors on a demonstration field belonging to a farmer. It has been observed that technicians are more interested in imparting "what-to-do-on-the-field" knowledge than in acknowledging or capitalizing on the farmers' own knowledge. They rarely encourage sharing of experiences or base their advice on an analysis of the farmers' practices, even of those practicing DMCs for several years. At the end of the agricultural season, the technician organizes and conducts a review meeting with the farmers and/or a PAI (Participative Acceleration of Innovation, Penot 2008) session to collectively assess the results and identify the limitations of the innovative cropping systems adopted. The principles behind the PAI session are noteworthy because they encourage the farmers to think, discuss and capitalize on their experiences. The PAI session is organized by a BEST coordinator in the presence of a technician who is supposed to hold back. However, it has been observed that many technicians struggle to stay quiet and just listen.

3.4 Method to provide farm management advice

Because of the difficulty of understanding farm operations and the many interlinked processes implemented when a complex innovation such as a DMC is introduced, an approach for providing advice on farm management was developed in 2008. This approach relies on (i) a farm notebook filled in by the farmer (main technical and economic data relating to farm production and activities) and (ii) collective training in the use of data to calculate a set of simple economic indicators (production costs, gross margin, evaluation of a workday's output and return on investment). BEST facilitators, themselves trained by the BV Lac project, have thus trained producers to maintain notebooks. Some producers have also helped the technicians in DMC implementations. Of the 300 notebooks distributed, about 50 are properly maintained and 70 have been filled in partially. These are modest numbers compared to the total number of farmers who have received technical advice, i.e., about 2500 farmers. Furthermore, regular meetings to discuss the data collected and the indicators calculated and thence to take decisions at the farm level remain rare. There is therefore not enough learning of farm-management processes (diagnosis, planning, monitoring, and assessment) and no discussion on the changes brought about at the farm level by the introduction of DMCs.

3.5 Balance related to advisory methods

The following table shows that farmers who have been using DMCs for several years still benefit from training and technical advice which relate to DMCs but which could also be expanded to slowly encompass other themes such as short-cycle animal husbandry, manure production or the use of phytosanitary products. End-of-season assessments and PAI sessions are however less frequent than provided for in the theoretical planning of advisory activities.

Table 2: Types of support received by farms during the 2009-2010 campaign (32 farmers surveyed)

Type of support	Farm with 3 to 4 years of DMC experience	Farm with over 4 years of DMC experience	Total (%)
Technical training	92	60	72
Inter-village visit	75	70	72
Intra-village visit	83	75	78
Individual follow-up	92	85	87
End-of-season assessment	17	20	19
PAI session	0	5	3
Farm notebook	0	45	28

This analysis shows that technical advice developed by the BV Lac project is mainly oriented towards the promotion of technical “packages” at the field level. Even though it is not participatory in nature,

insofar that farmers cannot truly orient it to their requirements, it has been favorably received by them: 33% are very satisfied by it, 48% somewhat satisfied. This analysis also shows the desire of the BV Lac project to take the farm better into consideration and to calibrate innovations to the farmers' objectives and limitations. But the advisory method faces some limitations. On one hand the farm-oriented approach is still not applied extensively because the tools are too complex (farm notebook, economic calculations) to be widely adopted by the producers. On the other the technical advice still lacks of tools to link the technical proposals to the farm characteristics (farmers' needs and resources). The establishment of an AWP at the individual level, and consolidated at the FO level, can be considered a first step in a management approach (foresight of what we want to do) but it still lacks the phase of monitoring and evaluation of the results based on the AWP. Sessions of type PAI which analyze the obtained results also is part of a farm-oriented advisory approach.

One has to ask whether an advisory system based on such advisory methods would be capable of meeting the requirements for the development of DMCs, for which the farmer has to make a radical change in his cropping system, perhaps even in his overall farming system. This change requires the farmer to acquire new skills (master new technologies, monitor his fields, analyze his results) and to plan production activities over several years. Working with complex innovations entails a long learning process for the farmer during which his representation gradually changes leading to a shift in the values that govern his behavior and decisions. It is a matter of engaging the farmer in reflective activity where the external knowledge supplied by the advisor is combined with local farmer knowledge.

Working with complex innovations also requires a process of co-construction of solutions; turnkey solutions are rarely suitable across a diversity of situations. Offering a range of DMCs only partially meets the challenge of satisfying the diverse situations encountered. In reality, each proposal has to be constructed jointly by the advisor and the farmer taking the specifics of the farm and the objectives of the farmer into consideration. The proposal should incorporate livestock systems in addition to cropping systems. Another important factor to include is the scale of the territory. This allows the issues of range grazing and management of runoff and erosion to be addressed.

4. The influences of advisory system components on the advisory method

This part presents the elements explaining the choices made by the actors to design and put in practice the advisory method.

4.1 Governance mechanisms predominantly controlled by upstream actors

The analysis of the advisory system highlights the dominant role that the project has in controlling it. The promotion of conservation agriculture may be a legitimate objective but it has been made part of BV Lac project by the funding agency. The BV Lac project is not an exception; in other countries too, such as Benin or Burkina Faso, funding agencies and development organizations have a strong influence on the choices made at advisory system level (Faure et al., 2011). It is the project that sets the quantitative objectives for the operators in the form of results that they have to achieve. It also provides the technical references on which the advice is based, the support extended to technicians in the form of training, and the advisory method to be used by the operators. Local actors have almost no capacity to influence the choices being made. Operators (AVSF-ANAE, BRL, BEST) too do not have much leeway to change advisory practices since these are defined in their contracts.

For historical reasons, Lake Alaotra FOs do not have the ability to participate in the governance of the advisory system to orient the priorities and to participate in the planning or evaluation of the advisory activities. Apart from FAUR, which has gained in autonomy, most FOs – created almost always by projects – are small in size, with only 5 to 15 members. They remain shaky since they lack the focus of a collective project and almost always suffer from a critical shortage of human and financial resources. In the area covered by the project, approximately 10 FOs have passed this initial stage and have managed to set their own goals, to provide services to their members and to manage their own resources (Andriafanomezana M., Andriamiharisoa J.A, 2011). These FOs' priorities are the supply of

inputs, access to credit via micro-credit organizations and group marketing. At present, they have no interest nor involvement in advisory systems even though they do participate in some related activities (drawing up of consolidated AWP's at the FO level, organizing of PAI sessions).

The State, through the local representative of the Ministry of Agriculture, remains silent in the debate on advisory systems and is not in a capacity to intervene on the ground. The Ministry's new strategy has the goal of setting up Agricultural Services Centers to act as intermediaries between demand and supply of services. It could be that these new organizations do indeed take on a coordinating role regarding advisory services. But this type of approach seems inadequate to stimulate a process of radical and systemic innovation since the new advisory mechanisms and their contents need to be jointly constructed and cannot simply emerge from a framework that simply matches supply of advisory services (assuming that the providers have relevant proposals) with demand for them (assuming farmers have been able to formulate their requirements suitably).

4.2 Funding mechanisms of advisory services providing a key role to a few actors

Funding of advisory services remains a critical issue. Farmers cannot be reasonably expected to pay for advice, except in a symbolic way for the majority of them, though some with bigger farms may be willing to do so for specialized advice. With the exception of FAUR, the FOs are not currently in a position to contribute towards the cost of advisory services since they have no large scale economic activities. This situation contributes to the fact that FOs are not able to influence the advisory system. A Rural Development Fund to channel budgetary allocations by the State for financing local development activities and advisory services would be an interesting development since it would mean public funding for public goods such as the development of environmental-friendly agricultural practices. But questions remain about the ability of the State to sustain such an initiative once the EU's support winds down. The fund cannot rely for support on economic activity in the lake region since there is no system of sales tax on agricultural products there. However, bases on a study carried out in Netherlands Klerkx and Jansen (2010) indicate that effectiveness to stimulate advisory service provisioning on sustainable farm management depend on an adequate mix of push measures (promoting facilitative advisory styles and optimizing knowledge system linkages) and pull measures (awareness building and economic incentives).

Projects funded by international aid are thus the main, if not the only, source of current funding for advisory services, thus constantly raising the issue of the sustainability (Kidd et al., 2000). This method of funding explains the influence the projects have in making choices regarding advisory services and the fact that priorities are being set by actors who are not of the Lake Alaotra area. Operators under contract are forced to develop strategies to attract and stabilize this funding by providing quality services, most notably by relying on the quality of their advisors' skills but without questioning the appropriateness of the advice these latter actually deliver. Finally, the limited funding of the projects themselves defines the size of the advisory system that can be put in place, mainly in terms of the number of technicians recruited.

4.3 Capacities of technicians and service provider organizations limiting the evolution of advisory services

In line with the objectives that are set for them, advisors are recruited and trained to deliver information to farmers and to educate them in the use of new agricultural techniques. They do have real knowledge and technical skills about agricultural practices and are trained to provide farm-management advice. However, they are required to implement a top-down advisory approach to attain the objectives set for them, even if this includes some interactions with the farmers (field visits, review meetings, etc.) and requires them to tailor their advice to the farm type based on a range of DMC options. Furthermore they lack the operational tools (and often the concepts themselves) which would allow them to identify the needs of the farmers using a structured dialog (Magne et al., 2004) which would allow them to diagnose the farm and to maintain a service relationship in a one-to-one or one-to-group context. They also lack the skills required to manage advisory interactions and to put in

practice the joint construction of the advice being delivered. It must be admitted that developing an attitude of listening in the advisors – including the ability to recognize the validity of knowledge of all actors (including that of farmers) – requires a real substantive work since academic training imparted to the technicians is not always appreciative of this way of learning. Ingram (2008) highlighted this difficulty to build relationships based on trust to address sustainable practices with a diversity among advisors. In England he showed that, although many advisor–farmer knowledge exchange encounters are characterized by an imbalance of power, distrust, and the divergence of knowledge, other encounters provide a platform for the

facilitation of farmer learning in their transition to more sustainable practices. Beyond this diversity Furthermore the operators prefer to use standard method they well know and are relevant to be sure to achieve the objectives and results detailed in their contract with the project. In such a situation the advisors both don't have enough room to adapt the advisory method they are ask to use by the project and lack the skills or attitude to adopt more participative advisory methods.

4.4 Recommendations for local actors and public policies

In conclusion the advisory method finally implemented largely depends on the choices made by the projects to define the purpose of the advice and the ability of operators and technicians to master the new concepts of conservation agriculture. The BV Lac project shares this diagnosis of the advisory system and, with the support of CIRAD scientists, has undertaken substantial work since 2011 to improve its advisory approach. However, the interactions between governance mechanisms, funding, strategies and skill of operators and advisors are strong and determine the possible evolutions in the future. All the options are not open but there is some room for maneuver, the answers are not easy to come by. The project must make some hard choices when improving his advisory methods: (i) choosing between educating farmers to adopt conservation agriculture so that the quantitative objectives of the funding agency are met and providing support to strengthen the initiative of some farmers found to be more dynamic than others and (ii) choosing between reaching a large number of producers by relying on standardized proposals and promoting a radical transformation of the farming systems by providing quality individual support. Technicians can suddenly find themselves destabilized between following new instructions for in-depth work with a limited number of farmers and quantitative objectives that guided them for the past few years and on which their reputations are based. Indeed, no turnkey solutions exist and it is necessary to co-construct advisory system innovations with all the actors involved.

Initial reflections on the topic suggest several courses of action for local actors. The first option is to focus on strengthening the capacities and professional practices of the technicians. They must be made to change their practices, from merely prescribing technical recommendations with quantitative objectives to holistically building farmers' capacities including qualitative objectives. The technicians must then be provided with tools to better analyze the farm and translate findings into operational terms. The AWP's could be used for initiating discussions on improved management of agricultural activities in order to better link and combine the technical advice and farm management approaches. New equilibriums must also be found between training, face to face advice and group work. Davis et al (2004) identified factors that are associated with group success in dissemination of technologies and some interventions that may increase the success of groups in such dissemination.

The second option is more ambitious and focuses on strengthening FOs who are partners of the project so that these actors increase their influence in truly participating in the orientation and evaluation of project activities and agricultural advisory systems in particular.

Our analysis suggests several policies recommendations. The first one is related the governance mechanisms. More relevant interactions between advisors and farmers are not sufficient to facilitate a better adaptation of advisory services to farmers' needs. Farmers' representatives have to participate in the governance mechanisms to set up priorities, orient funding mechanisms, and assess the

performances of advisory systems. In some cases FOs may directly provide advice to their members being a service provider it-self. To achieve this goal there is a need to design and implement programs and projects to strengthen FOs' capacities.

The second recommendation concentrates on developing forums for sharing and coordination (workshops, platforms, committees) at various levels (local, regional) and with different actors (FOs, advisors, operators) to capitalize on experiments in progress and to participate in planning and assessment of advisory activities. In this framework of a partnership approach, the research have to play a key role to analyze the processes underway, to promote learning process for advisors and operators, to participate in the design and testing of new advisory methods and tools useful to promote conservation agriculture and, finally, to help improve the criteria for evaluating advisory activities.

The third recommendation deals with the training of advisors and beyond advisors all the agents in charge of supporting rural people to promote a sustainable development. Academic training doesn't properly address the methods to support rural people (communication, participation, surveys, etc.) and doesn't fully recognize local knowledge as a valid knowledge. There is a need to improve the curriculum as we can already witness it in some African countries.

6. Conclusion

The advisory system developed for the Lake Alaotra region is mainly project-oriented, originally granted legitimacy by a desire – not necessarily that of the region's actors – to encourage and develop sustainable agriculture. This legitimacy does not guarantee that the proposals offered to the farmers are relevant, either in terms of the development of sustainable agriculture or in terms of the farmers' own interests. Technical advice which is provided is prescriptive and while it can introduce farmers to or improve their DMC-related practices, it cannot by itself monitor changes in the overall operation of the farms, nor implement learning processes relevant to the issues at hand. However, one must acknowledge the BV Lac project's significant efforts towards promoting a comprehensive farm approach and empowerment for FOs with a view to imparting sustainability to the actions being undertaken. Nevertheless, promoting a complex innovation process – the insertion of DMCs into farming systems – requires a different type of advisory method aiming at implementing learning processes for the farmers, strengthening their knowledge and enhancing their technical skills. Such lessons are useful for other experiences aiming at promoting conservation agriculture.

Also needing promoting is the joint definition of problems and identification of solutions between advisors and farmers, a fundamental aspect of a true participatory approach. Given that technical solutions have to be adapted to different situations, they cannot remain just DCM-oriented but have to encompass wider and more comprehensive solutions to improve production systems. Joint construction of the advice involves taking interactions at various levels into consideration: between the advisor and the farmer to define problems and identify solutions and between farmer representatives and advisory system actors for joint planning and assessment of advisory activities undertaken by the operators and the BV Lac project. At this level of intervention, it appears that the advisory system cannot be designed only in terms of innovation-oriented advisory methods and tools. Questions of governance, of the competence of advisors and advisory system managers and of funding have to be addressed. Furthermore, all these components interact with each other to describe and regulate the advisory system. There are no unique solutions for designing an advisory mechanism to promote complex innovation processes but there does exist a need to co-design, with the various advisory systems actors, new modalities of interventions by advisors.

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Bibliography:

- Andriafanomezana, M. and Andriamiharisoa, J.A. (2011). Evaluation des organisations paysannes appuyées par BEST depuis 2003 à juillet 2010, Ministère de l'agriculture, Cirad, AFD, Madagascar, 124 p.
- Birner, R., Davis, K., Pender, J., Nkonya, E., Anandajayasekeram, P., Ekboir, J., Mbabu, A., Spielman, D., Horna, D., Benin, S., Cohen, M., (2009). From best practice to best fit. A framework for analyzing pluralistic agricultural advisory services worldwide. *J Agric Ext Edu* 15(4): 341-355.
- Cerf, M. and Hemidy, L., (1999). Designing support to enhance co-operation between farmers and advisors in solving farm-management problems. *Journal of Agricultural Education and Extension* 6: 157-70.
- Cerf, M. and Meynard, J.M., (2006). Les outils de pilotage des cultures : diversité de leurs usages et enseignements pour leur conception. *Natures Sciences Sociétés* 14: 19-29.
- Crozier, M. and Friedberg, E., (1977). *L'acteur et le système*, Paris : Ed. du Seuil
- Davis, K E., Franzel, S., Hildebrand, P., Irani, T., Place, N T. (2004) Extending technologies among small-scale farmers in Meru, Kenya: ingredients for success in farmer groups, *Journal of Agricultural Education and Extension*, 10(2):53-62
- Domas, R., Penot, E., Andriamalala, S., Chabierski (2008). When uplands join the rice fields in lake Alaotra. Agriculture conservation diversification and innovation on uplands zones, in regional workshop on conservation agriculture, 28/10 to 1/11/2008, Phonsavan, Laos PDR (25 p.)
- Fabre, J., (2010) Evaluation technico-économique des effets des systèmes de culture sous couverture végétale dans les exploitations agricoles du lac Alaotra, Madagascar, Mémoire d'ingénieur de spécialisation en agronomie tropicale, IRC SupAgro, France, Montpellier, 97 p.
- Faure, G., Dugué, P., Beauval, V., (2004). Conseil à l'exploitation familiale, Expériences en Afrique de l'Ouest et du Centre. Paris : GRET-CIRAD
- Faure, G., Rebuffel, P., Violas, D., (2011). Une analyse systémique des dispositifs de conseil à l'exploitation familiale en Afrique de l'Ouest, *Cahiers Agricultures*
- Gadrey, J., (1994). Les relations de service dans le secteur marchand. In: Bandt, J., Gadrey, J., eds. *Relations de service, marchés de services*, Paris: CNRS Editions
- Giller, K.E., Witter, E., Corbeels, M., Tittonell, P., (2009) Conservation agriculture and smallholder farming in Africa: the heretics' view, *Field Crops Research*, 114(1): 23-24
- Giller, K.E., Corbeels, M., Nyamangara, J., Triomphe, B., Affholder, F., Scopel, E., Tittonell, P., (2011). A research agenda to explore the role of conservation agriculture in African smallholder farming systems, *Field Crops Research*, 124(3): 468-472
- Ingram, J., 2008. Agronomist-farmer knowledge encounters: an analysis of knowledge exchange in the context of best management practices in England. *Agriculture and Human Values*, 25(3):405-418.
- Klerkx, L., Jansen, J. (2010) Building knowledge systems for sustainable agriculture: supporting private advisors to adequately address sustainable farm management in regular service contacts. *International Journal of Agricultural Sustainability* 8(3):148-163.
- Kidd, A.D., Lamers, J.P.A., Ficarelli, P.P. & Hoffmann, V. (2000) Privatising agricultural extension: caveat emptor. *Journal of Rural Studies*, 16: 95-102.
- Magne, M.A., Ingrand, S., (2004). Advising beef-cattle farmers: problem-finding rather than problem-solving. Characterization of advice practices in Creuse. *Journal of Agricultural Education and Extension*, 10 (4): 181-192.

- Penot, E. (2008). La méthode API, document de travail BV-Lac n°1, AFD, MAEP, 27 p.
- Penot, E. (2009). Des savoirs aux savoirs faire, l'innovation alimente un front pionnier : le lac Alaotra de 1897 à nos jours, document de travail BV-Lac n°27, AFD, MAEP, 37 p.
- Ramahatoraka, A., Rakotondravelo, J.C., Penot, E., Faure, G., (2011). Analyse des services agricoles liés à l'adoption des systèmes de culture sous couverture végétale (SCV), cas de la zone du lac Alaotra, CIRAD-ESSA, 109 p.
- Serpantié, 2009. L'agriculture de conservation à la croisée des chemins en Afrique et à Madagascar. *Vertigo* vol 9 n°3
- Swanson, B.E. (2006) The changing role of agricultural extension in a global economy. *Journal of International Agricultural and Extension Education*, 13: 5-17.