Can we strategically manage multistakeholder innovation processes in agriculture? Insights from case studies in Burkina Faso

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Abstract

This article aims to understand what are the managerial challenges to enable multistakeholder' network to emerge as structured and efficient innovation community and how to meet them.

We developed a theoretical framework which seeks to link managerial action with innovation as a process and outcome of inter-organizational and organizational level, using network, learning and innovation management perspectives. Our assumption is that strategic innovation management can be a resource for the emergence as well as the strengthening of innovation community.

Based on six innovation case studies in Burkina-Faso, we identified four types of innovation situations that we defined as locus where different organizations interact with each other around activities and results that feed the innovation process, and where innovation management practices are developed. The four types are discriminated against intensity of innovation management practices, organizations' capabilities and network structure. They face different managerial challenges focused either on issues at the level of organizations (disaggregated innovation situations) or on issues at the inter-organizational levels (dispersed innovation situations) in order to fill network functional gaps.

In each case, our results question the proclaimed feasibility of innovation network facilitation at the sole inter-organizational level. They call for more strategic management not of the innovation process itself but of multi-organizations regarding innovation process.

Keywords: innovation situation, organization, managerial challenges, innovation community, agriculture, Burkina-Faso

Introduction

As a result of both rapidly changing political and economic conditions and a dynamic technological environment, the use of innovation to achieve competitive advantage is gaining relevance in the agricultural sector. In developing countries, facilitate innovation processes is then considered as one of the solution for improving value chains performances and also accelerating agricultural development while meeting the challenges of population growth, climate change and environmental degradation (TAP, 2016).

In the last decade, the question of how to enable agricultural innovation has been mainly researched within the innovation system perspective (Klerks *et al.* 2012). The prevailing view is about ensuring that conditions that nurture eclectic approaches to innovation exist, and that competitors join forces with each other to constantly adapt institutional and policy framework conditions for innovation (Hall *et al* 2007). This view led to the implementation of multistakeholders' innovation platforms as a silver bullet (Kilelu *et al*, 2013). It is supposed to create or facilitate broad network of actors: not only research institutes, but also businesses, government and non-governmental organizations in processes of social learning and knowledge co-creation between scientists and other stakeholders (Leeuwis and Pyburn, 2002; Röling and Wagemakers, 1998; Van Bueren et al., 2003). Emphasis is put on unsupervised learning processes, mainly through facilitation and the processes of human interaction from which learning should emerge. However empirical evaluations showed that innovation platforms are not always effective for all types of innovation process (Jatroe *et al*. 2013) and that some innovation may benefit from more structured support, through strategic management and supervised learning (Kilelu *et al*, 2013). In practice there is a real lack of tools, methods and skills which are suitable to organize exchanges and work within a diversity of stakeholders in order to improve their innovation activity and performance.

The research of abstraction and generalization impoverished knowledge on innovation support mechanisms themselves. Most part of literature explore how well structured innovation communities work but very few document on how to make them emerge and support them. Laperche *et al* (2009) argue that the very collective nature of the innovation process requires specific efforts aiming at coordinating coherently and dynamically the actors and resources contributing to the whole process. Collaborative and networking-clustering dynamics cannot simply be initiated overnight by the sole virtue of political volunteerism or by the strategic aim of a single firm or institution. These dynamics build on a specific "alchemy" between various organizations or individuals that makes them able to engage in innovative activities, accept risk and uncertainty, and able to build on local or more distant collaborative relationships (Hamdouch, 2008).

Yet, the literature tends to separate both dimensions: the functioning of well-established innovation networks on the one hand, and the management of innovation process on the other hand. There are few empirical studies addressing the relationships between the emergence of structured innovation communities and the existence of innovation management practices at the collective level. In order to bridge this gap, the purpose of this research is to develop an empirically-based comprehensive model of successful innovation management practices that facilitate multistakeholder innovation process. What kind of innovation management practices do exist at inter-organizational level? What are they good for? Do they apply for any kind of agricultural innovation processes? In order to address those issues, we proposed to explore a diversity of innovation situations, defined as locus where different organizations interact with each other around activities and results that feed an innovation process, and where innovation management practices are observable.

The paper proceeds as follows. In the next section, we present the theoretical background of innovation management issues in collective innovation processes and we develop our hypothesis accordingly. The following session presents the research settings, sample attributes as well as the set of prevalent explicative variables and items that we use to describe innovation situations, management practices and their relationships with the functioning of innovation communities. We then report our empirical findings in two steps: firstly, the existing innovation management practice and functional gaps in innovation situation, and then the influence of organizational features on the type of innovation situations and managerial challenges to make work innovation communities in practice. Finally, we

discuss the validity of our analysis model, the perspectives for improvement and the implications of our study for future research and management practice.

Strategic management in collective innovation: hypothesis

In order to answer to our questions we merge two perspectives usually disconnected: on the one hand, inter-organizations network perspective on the key processes that take place between organizations within an innovation situation (Hermans *et al*, 2011) ; on the other hand innovation management perspective on key mechanisms and processes that have to be used to align the motivations and activities of individuals and organizations towards innovation project objectives (Aghion and Tirole, 1994).

We defined an innovation situation similar to a management situation (Berry 1983; Girin, 2016), in order to empirically address ongoing innovation processes. An innovation situation is a set of activities in interaction, associated with the idea of collective action and results which are submitted to an external judgment. Individuals or organizations are considered engaged in an innovation situation when they recognize that they participate, at various degrees, to the production of those results. However, reaching these results is not necessarily the main goal of their own activity. All elementary activities of these organizations are not necessarily oriented toward the achievement of those results; some of them might even run counter to or undermine common objectives.

These situations are particularly suited to information exchange or knowledge transfer which increases the risk of opportunist behavior (Goerzen, 2007). Furthermore, tacit dimension of knowledge or low level of predictability of results as well as on innovation achievements create uncertainties that imped engagement of stakeholders. Literature on inter-firms network show that generally pivotal organizations manage to come off in order to propose cooperation modes that limit bias and difficulties inherent to inter-organizational collective action (Dhanaraj et Parkhe, 2006). Their objectives are to create arrangements or to implement mechanisms that facilitate action collective modes so that to decrease individual risks and uncertainties; keep down opportunist behaviors; create spaces for exploration and creativity; mobilize needed resources (Grandori et Soda, 1995). Cohendet et al (2008) also showed that a key objective of managing in collective innovation process is to reduce the duration of its initial stages, that is, to minimize the critical path of innovation across the network. In terms of the reduction of the innovation cycle a particularly important is the problem of the variability increasing of the network structure taking into account the specificity of different stages' results of the innovation process with the aim of temporal parameters' minimizing of innovations' implementation and optimization of the resource component of the network. These kind of strategic responses have mainly been identified in open innovation approaches (Chesbrough 2006; Loilier, et al. 2016) whereas multistakeholder innovation situations in agriculture differ by the possible existence of multi-centered activities, overlapping roles or diverging interests among involved organizations.

Hermans *et al* (2013) showed that in successful innovation network, a set of key functions (production and circulation of knowledge, design and experimentation, promotion with external actors for scaling innovation) are performed, independently of the nature or number of organizations engaged in the process. It means that organizations can enhance or limit their capacity to perform certain functions within the network. We therefore think that strategic innovation management could help collaborating actors to perform different functions, along with the evolution of the innovation process. We assume then that IM is itself a resource for the strengthening and functioning of innovation community.

Based on this literature review, we made two assumptions: i) there are management practices that help stakeholders of an innovation situation to emerge as a coordinated community and to fulfill expected functions (knowledge creation and circulation, innovation design and experimentation, promotion with external actors for scaling innovation); ii) there are inter-organizational and organizational features which facilitate or impede the implementation of those practices.

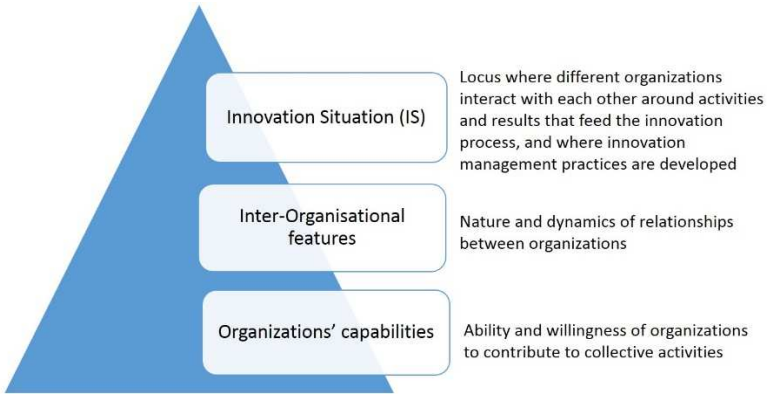

Figure 1 : Analysis framework

Research method

Analysis model

We combined three levels of analysis: 1) the innovation situation (IS), where innovation management practices applied and network functions are performed 2) the level of organizations and their capabilities to contribute to the innovation process; 3) inter-organizational level described from a network perspective, where organizations are nodes. From our literature review, we identified a set of prevalent explicative variables and items at each level (Table 1).

Table 1 : Variables used and data collection

Levels	Variables to be explained	Items and description	Data collection
Innovation situation (IS)	Innovation management Intensity	- Coordination practices (shared vision, collective strategy, mechanisms of engagement) - Knowledge management practices (identification of knowledge gaps, strategy and tools for knowledge production and sharing) - M&E practices (documentation of the process, use of lessons learnt) - Resources allocation practices (fund raising, task sharing, training, planning)	Individual questionnaires addressing collective issues (scoring tool)
	Functions of the network	- Creation of spaces for creativity and experimentation - Circulation of knowledge or information - Promotion with external actors to facilitate upscaling	Participatory evaluation at the IS level
Levels	**Explanatory variables**	**Items and description**	**Data collection**
Innovation project	Innovation process	- Step: initiation, up-scaling - Nature: incremental, radical	Participatory evaluation at the IS level
Organization	Capabilities of each organization to contribute to the innovation process (potential of resources)	- Motivation (level of priority given to the innovation) - Available resources invested in the innovation process (capital and human resources) - Level of acceptance of risks and uncertainty - Endorsed role (nature of activities and results feeding the innovation process: design and experimentation; new knowledge production; partnering)	Individual qualitative questionnaires addressed to each organization
Inter-organizations	Network structure	- Degree of mutual constraints between organizations - Frequency of interactions between individuals (daily, monthly, rare) - Existing Pivot (leading activities)	Individual questionnaires addressing their own collaborative practices with partner organizations Participatory net mapping at the IS level

Case studies

To validate and refine our analysis model, we selected 'case studies', that is to say a set of innovation situations, which are representative of the diversity of innovation processes in the agricultural sector in Burkina-Faso (organizational innovations, service innovations, market innovations). We firstly

identified a dozen cases of on-going innovation projects addressing key issues for agricultural development in Burkina-Faso according to a consultative group of experts and representants of the government. Among them, we selected six cases studies that were discriminated against the stage and the nature of the innovation process (Table 2). For each case, we identified core organizations and individuals known as leaders or key intervenants in the innovation process. We interviewed them to gather further contact organizations they worked with, thus building a snowball sample of key stakeholders and partners in each innovation situation. Between 12 and 20 organizations have been identified per innovation situation, composed of a wide range of actors (Table 3).

Table 2 : Innovation case studies

Stage of innovation	Nature of innovation process	Selected Innovation Situations (IS)	Short name	Main obstacles identified by stakeholders	Starting date
Initiation (data collection and development of suitable resources for experimentation)	Radical	**Development of sunflower value chain**	SUNF	- Lack of R&D to create adapted hybrids varieties - Competition with low cost imported palm oil	2009
	Incremental	**Drip systems for small family farms**	DRIP	- Technological gap in the country - Too isolated experiments	2000
	Radical	**ICT in advisory services provided by farmers' organizations**	ICT	- Too expensive technologies - Lack of spaces for experimentation and adaptation	2013
Up-scaling (use, modification or adaptation of innovation-product)	Incremental	**Family Micro-firms innovative in food processing, and led by women**	FMF	- Lack of access to appropriate financial instruments and services to develop business - Unsuitable contractualization tools between producers-processors-sellers - Lack of quality of products	1985
	Incremental	**Local land charter for breeding-agriculture integration**	LLC	- Lack of shared vision at local level of land use issues and local land charter usefulness - Lack of political coordination at national level - Too many intermediairies and expert preventing appropriation by municipalities	2012
	Radical	**BioSPG: national label for organic farming**	BioSPG	- Lack of evidence for policy support - Lack of suitable support for farmers - Poorly organized organic value chains	2011

Table 3 : Stakeholders' composition of each innovation situation (IS)

	SUNF	DRIP	ICT	FMF	LLC	BioSPG
Research institutions	4	0	1	1	0	1
Technical and financial support agencies	3	7	2	6	10	8
Policy maker	1	1	0	1	6	2
Value chain actors	9	7	9	12	3	6
Tot nb of organizations interviewed	17	15	12	20	19	17

Data collection

In order to collect data, we combined participatory assessments of innovation situations (IS) and individual semi-quantitative questionnaires (tab.1).

For each IS, we organized two-days multistakeholder workshops in order to assess challenges that organizations faced collectively and individually in achieving innovation. Firstly, we used participatory learning tools (innovation timeline, problem/solution tree, netmap) in order to help individuals participating to the workshop to figure out the diversity of actors and activities engaged in the innovation process before evaluating obstacles and capacities of their organization to face them. Secondly we applied three individual questionnaires: one dealt with organization's capabilities, another one dealt with collaborative practices of individuals with their partners concerning the innovation, and the last one was an individual evaluation of the existing innovation management practices at the collective level. We used a scoring tool focused on the four items describing innovation management practices (tab.1),

captured by 16 indicators. To mark the intensity of innovation management practices, a score is assigned to each indicator. It goes from 0 (inexistent) to 3 (efficient).

Results

Intensity of innovation management practices and network functional gaps

In each case, innovation management practices have been identified by stakeholders. The analysis of the scores showed that the six case studies can broadly be divided in two main groups (Fig.1): one where innovation management practices are considered advanced (BioSPG, ICT, FMF) and the other one where they are considered limited (LLC, SUNF, DRIP). Advanced innovation management practiced applies mainly to radical innovation situations (BioSPG, ICT) with emphasis on coordination and M&E practices. Poor management concerns mostly incremental innovations (DRIP, LLC) with particularly very limited M&E and resources allocation practices.

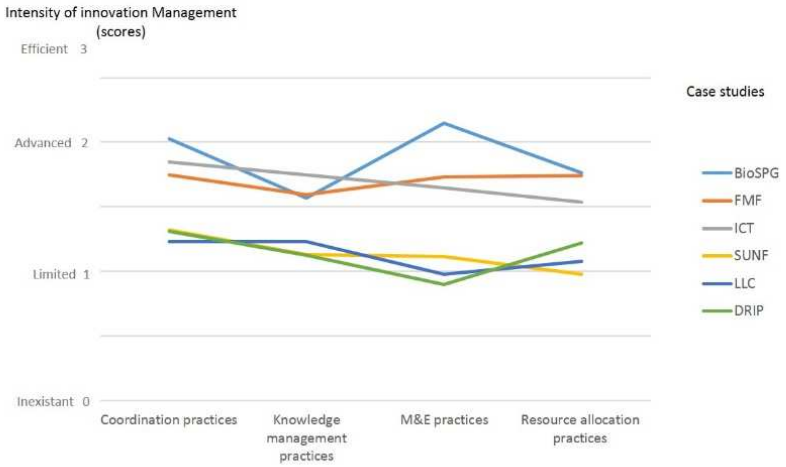

Figure 2 : Intensity of innovation management practices in each innovation situation

It also appears that networks performed more functions when innovation management practices are more advanced (Fig. 2). Functions are also directly linked to the step of innovation processes: in initiation phase, promotion activities with external actors are quasi-inexistent; in up-scaling phase, all functions are occurring, and networks mainly performed the creation of spaces for creativity and experimentation.

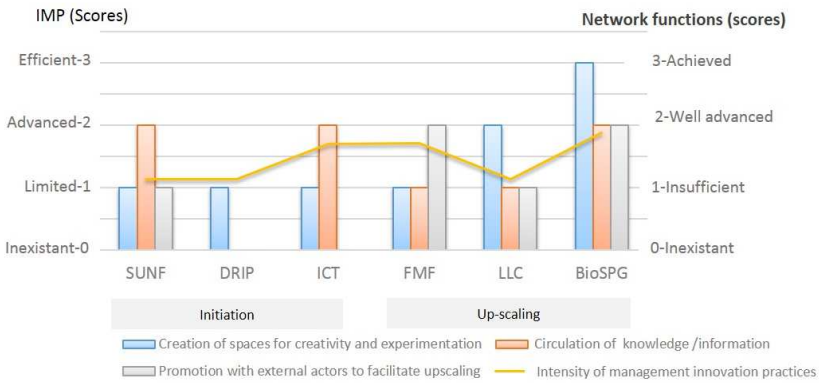

Figure 3 : Intensity of innovation management practices (IMP), network functions and innovation step

Surprisingly, in IS where some functions are limited or inexistent (DRIP, ICT) a high part of organizations indicated that they produce results or implement activities contributing to these functions (Fig 4). Those gaps between organizational and inter-organizational levels are less important when intensity of innovation management is higher (BioSPG, FMF).

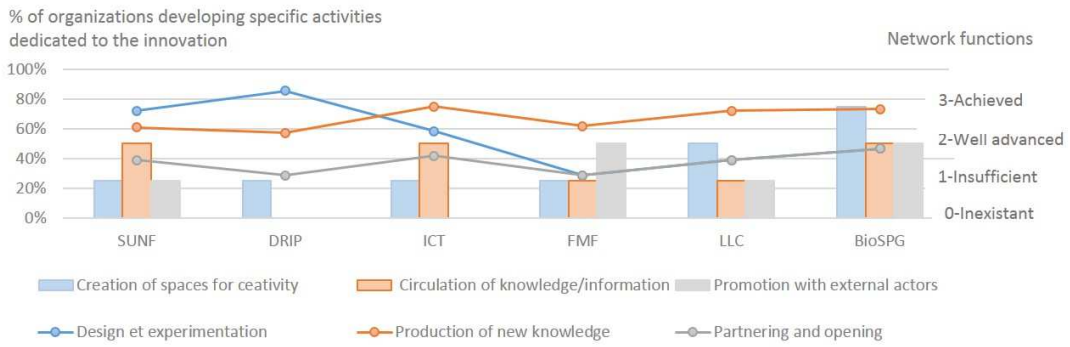

Figure 4 : Relationships between network functions and actual activities implemented by organizations engaged in IS

Four types of innovation situations and managerial challenges

The analysis of organizations' capabilities and network structures give insights into the relationships between the intensity of IMP and functions performed by networks. The application of multiple correspondence analysis helped us to cluster four types of innovation situations leading to different managerial challenges.

Existing pivot organization in network as well the average level of capabilities of each organization involved in the IS are correlated with the intensity of innovation management (Fig 5).

IS where advanced IMP occur are mainly composed of organizations with moderate ability and strong willingness, independently from the types of organizations involved. The achievement of the innovation was priority for almost all organizations involved in IS. Half of them invested own resources (funds and human resources) in the innovation.

Existing pivot in three innovation situations (BioSPG, FMF, SUNF) is linked with high frequency of daily interactions between organizations and also numerous mutual constraints (alliance, contracts). Networks are formal (BioSPG, FMF) or well-established within a value chain (SUNF). Whereas in other case studies (ICT, DRIP, LLC), interactions about the innovation project are most often monthly or rare with competitiveness or antagonisms between organizations own objectives. For instance, the development of drip systems for family farms (DRIP) is dominated by two private firms competing for introduction, adaptation and diffusion of bucket drip irrigation kits. The dissemination of local land charters (LLC) faced political locking that seeks to protect land grabbing and speculation in some rural areas.

As from those results we distinguish dispersed and disaggregated innovation situations, with low or high potential to make advances in the innovation without changes at organizational or inter-organizational levels.

Dispersed innovation refers to a situation made of numerous loosely connected organizations with disconnected similar activities linked to the innovation process.

Disaggregated innovation refers to cooperative interactions (task sharing) between specialized organizations addressing specific technical or organizational challenges to make advance in the innovation process.

In both cases, organizations engaged in IS are largely self-reliant. When a pivot exists, in disaggregated situation (FMF, BioSPG, SUNF) we observed that pivotal organization waited a "proactive followership" from innovation community members: it is upon community members to actively and individually seek feedback from within and outside the community regarding appropriateness of their own task strategies and to initiate corrective action as needed. Organizations must ensure that their contribution to the innovation integrates well with other activities. IMP are there to give to them a framework in which they can make their self-assessment. Then, if organizations' capabilities are low, collective managerial action could appear useless while blocking factors at the organizational level have not been explored and solved.

Without a pivotal organization, in dispersed situations (ICT, DRIP, LLC), engagement and motivation of each organization appear as key drivers for the implementation of IMP that allows each organization to make significant progress. Managerial action relies mainly on the stimulation of mutual influence so that each organization be able to consider how other organizations' activities may be impacted by their own work strategies and processes, as well as to environmental changes. As such, information and knowledge circulation as well as spaces for experience sharing are main issues of managerial action. Without these opportunities, in low potential situation, organizations might disengage easily from the collective process if they don't have enough partners align on the same objectives.

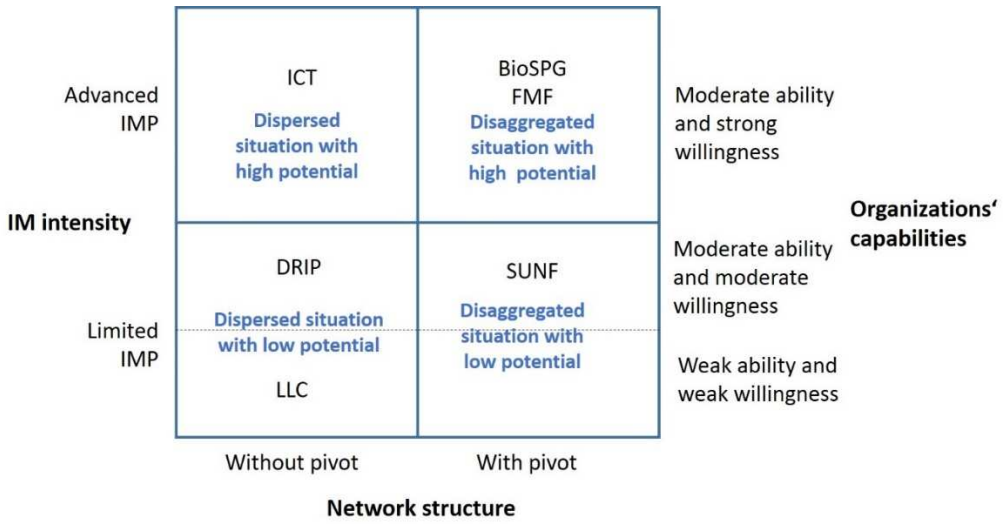

Figure 5 : Innovation management intensity and organizational features of four types of innovation situation

Discussion and management implications

Our exploratory study aimed at understanding what are the managerial challenges to enable multistakeholder' network to emerge as structured and efficient innovation community and how to meet them. Results at the level of innovation situations showed the diversity and complexity of the relationships between organizational factors and actual activities that constitute the fabric of innovation. Innovation management practices did exist and their intensity appeared as a cross-level construct, i.e. rooted in activities implemented at organizational and inter-organizational levels. The four different innovation situations raise different managerial challenges considering functional gaps, the structure of innovation network and organizational capabilities. These results mainly question the model of open innovation and the importance of pivotal organization in innovation networks as well as the feasibility of managerial support from the outside of the community.

Roles of pivotal organizations in the emergence and maintaining of innovation community

In both types of innovation situation (dispersed or disaggregated), we observed that these are a few organizations who initiated a mode of collaboration (that we called proactive followership or mutual influence), which in turn involve one, several, or all other organizations involved in the innovation process. Thus it led to the emergence of a "structured" innovation community where all stakeholders recognized the existence of innovation management practices, or at least the need to further develop them in order to fill functional gaps (innovation design, new knowledge production or promotion for innovation scaling-up).

We didn't find correlation between IM intensity and the nature or the step of innovation process. Collaboration modes seem rather to be linked to former collective action undertaken by a core group of organizations engaged in the innovation situation. Organizations involved in ICT, BioSPG and FMF innovation situations did have common objectives (develop and modernize extension services provided by famers organizations, promote agro-ecology or promote women entrepreneurship) and more or less

formal engagements before engaging in the innovation process. This might explain why they manage to introduce advanced management practices at the collective level, independently from the characteristics of innovation. For instance, we didn't observe that incremental innovation (FMF) were subject to more supervision than radical ones (ICT, BioSPG) but the data suggest the contrary. Collective efforts seem then to be more focused on maintaining the innovation community despite obstacles and demotivating long-term processes.

In dispersed situation, core organizations admitted that they don't apply intentional innovation management strategies but rather that they navigate in a complex situation in which they try to develop their own activities depending on what the others are doing, without a formalized way to proceed. Disaggregated situation relied more strongly on intentional management, generally generated thanks to a development project handled by pivotal organization. In these cases, management contribute mainly to the emergence of the innovation community but fall short at the end of the project in maintaining it (SUNF) excepted if former collaboration modes were existing (FMF).

These results question the feasibility of leader centered-approach in open innovation and network facilitation, considering that a sole organization seems to have very limited influence in dispersed or disaggregated situations. In context where communication networks are still weak (with expensive and slow internet or cell phone), mediation between remote organizations is a considerable additional obstacle.

How to support strategic innovation management

In all of our case studies, participatory assessment workshops that we made contributed to give insights to all stakeholders in the functioning of their community and to increase their understanding of how they could better manage it in order to deliver more significant results and achieve innovation. Participatory tools, individual questionaries' as well as presentation of findings helped to build a collective vision of what they are achieving together and also provided a framework for self-assessment at organization level regarding innovation performance.

This opens the way for designing and experimenting new approaches, tools and methods that can support improvements in innovation management practices in multistakeholder innovation process. In context where we often start from scratch regarding innovation management, one of the primary challenges is to give to individuals basic understanding of the underlying general principles of managerial action so that they became able to discuss and reflect on their own innovation situation.

Lenfle (2004) showed that complex management situations require to implement sort of support committees that will act as a management and investigation body in order to strengthen overarching innovation capacity of organizations and individuals in a continuous and targeted manner. The objective is not to manage the innovation process but to manage the organizations' capabilities and interactions about the innovation process.

Ways to develop such multi-skilled committees, with shared language on innovation management and long term commitment on the side of organizations in innovation situations have to be further explored. It implies to develop a body of knowledge on collective innovation management in agricultural, with practitioners, which is still very limited. It implies also to pay more attention on "invisible technologies" (Berry, 1983; Toillier, 2015) that allow to organize collective action around a process, with temporalities, a lifespan and evolving support needs.

Limitations and suggestions for further research

Our study has certain limitations that may guide future research.

Although we distinguished between innovation type and step, we did not integrate a dynamic view of the process; our descriptions of innovation situation are a picture at a given moment whereas innovation communities are not stationary. Moore and Westley (2011) insist on the fact that the relationships between organizations may evolved throughout the innovation process: creative phase may require lots of weak and diverse links, but the adoption of the innovation requires strong bonds and trust so the network structure must evolve throughout the process. In parallel, the group of stakeholders is not

necessarily stable. According to Van de Ven (1999) innovations take place in a process in which many stakeholders fluidly engage and disengage as their interests and need for inclusion dictate. Pivotal role may be played by different organizations. Then our case studies might switch from an innovation situation type to another, involving structural changes either at the organizational or inter-organizational levels. It requires further exploration of the managerial dynamics within innovation situations in the long-term.

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