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Bringing farmers into the game. Strengthening farmers' role in the innovation process through a simulation game, a case from Tunisia

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ABSTRACT

While farmers are recognized as equally weighing sources of innovation in the Agricultural Innovation Systems (AIS) framework, their participation in knowledge co-production within multi-stakeholder settings such as innovation platforms is still often limited. Farmers participate more in implementing than in designing innovations or in shaping innovation process. Drawing on the companion modeling approach and critical companion posture, we designed a simulation game based method that we tested with dairy farmers in the irrigation scheme in the North-West Tunisia. The objectives were to engage farmers in a research project as equal knowledge producers, to support the process of collective construction of improved farm strategies and to create conditions for farmers to get empowered to pursue their innovation ambitions. The LAITCONOMIE game, based on the self-design principle, creates conditions for farmers to mobilize their knowledge and knowledge of others to respond to their local innovation needs. Despite a modest scale, the game experiment brought results in terms of knowledge co-production and of change in farming practice of the participants.

1. Introduction

The shift from the linear technology transfer model towards systemic approaches to innovation such as now widely used Agricultural Innovation Systems approach (AIS) (Hall, 2007; Spielman et al., 2009; Adekunle et al., 2012) theoretically changed the position of farmers in the innovation process. Instead of being perceived as passive recipients of science-produced technologies, farmers are now considered equally weighting source of knowledge among diverse interacting actors of innovation systems (Hall, 2007). How does it look in practice? The most common operationalization of AIS approach are innovation platforms (IPs) (Adekunle and Fatunbi, 2012; Ngwenya and Hagmann, 2011; Ergano et al., 2010), multi-stakeholder settings orchestrated to generate innovation. Platforms bring together different key actors, related to an innovation process and organize their interaction aimed at production, exchange and use of knowledge. Farmers are among these actors. However, their integration as equal participants in knowledge production still leaves much to be desired, despite their new theoretical positioning, and despite a large body of participatory methods and tools to draw from to organize their participation. Platforms are sometimes misunderstood as dissemination tools (Kabambe et al., 2012; Cullen et al., 2014) while farmers are considered consumers and not producers of knowledge and technologies (Mugittu and Jube, 2011). An overview of various case studies (Nederlof et al., 2011; Cullen et al., 2014) shows that more often than not, farmers are assigned a role to implement, but not to design innovation, and their participation in establishing the platform's agenda is weaker compared to other actors. As in the example coming from Oladele and Wakatsuki (2011), they may participate as testers of innovations, while platform's success is being measured by the number of farmers willing to provide their plots for experiments. Analyses (Dangbegnon et al., 2011) typically emphasize what farmers learned through their participation in platforms and not what platforms learned through farmers' participation. Furthermore, their knowledge and experience may be openly judged by other IP members as less adequate than their own (Cullen et al., 2014). As the actual position of farmers in knowledge production and dissemination (Fløysand and Jakobsen, 2011) and in shaping innovation practices and processes (Friederichsen et al., 2013) is object of concern, some authors call to explicitly address power issues in IPs (Swaans et al., 2014; Cullen et al., 2014).

It is clear that platforms may suffer from some of the limitations of participatory approaches. These include: mechanically incorporating participation into top-down approaches to serve external agendas (Cornwall et al., 1994); formatting local knowledge instead of truly taking it into account, when expert-designed methods determine what and how can be “known” (Mohan, 2001; Hailey, 2001) and finally,

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disempowering instead of empowering local communities, when they are involved in problem diagnosis but not in constructing solutions (compare Nelson and Wright, 1995). At the same time, innovation platforms seem to avoid some of the possible traps of participatory approaches, such as overemphasizing insider/outsider divide, romanticizing local knowledge, underplaying the contribution of external actors or neglecting links to wider processes and institutions (Kesby, 2005).

Criticism over how participation is implemented in practice has been voiced since the concept became widely used (Cooke and Kothari, 2001), also by its proponents (Guijt and Shah, 1998). At the core of the criticism are very often questions of power and empowerment. Some authors argue that participation itself is a form of power (Cooke and Kothari, 2001; Hickey and Mohan, 2005). Others, like Kesby (2007), believe in the potential of participatory methods to empower participants by providing them with resources that can be used to make a change in their lives (Kesby, 2007). From this perspective, the objective of participation goes further than to allow non-experts to articulate their knowledge, values and preferences in a group process (Van Asselt and Rijkens-Klomp, 2002), until modification in the distribution of power itself becomes the objective of participatory approaches (D'Aquino, 2007) and researchers choose to address the question of power directly in the design of participatory methods (D'Aquino et al., 2002a; Barnaud et al., 2010). This is the case of a type of participatory modeling known as companion modeling or ComMod, (Antona et al., 2005; Etienne, 2011). In this perspective on participation, derived from critical systems theories (Ulrich, 1995), dialogue and communication are considered insufficient in multi-stakeholder environments characterized by power asymmetries (such as innovation platforms). A strategic intervention on the side of less powerful is advocated instead. Such posture is named *critical companion* (Barnaud and van Paassen, 2013).

We have experimented with the integration of the framework, posture and some methods of companion modeling in the activities of an innovation platform at a local level. Through this experiment, we investigated the possibility of engaging farmers in a research project as equal knowledge producers. We describe our experience of designing and implementing a tool to mobilize and valorize farmers' knowledge in the context of a research project in an irrigation scheme in Tunisia - a simulation game-based method focused on facilitating a process of collective construction of improved farm strategies. Despite its modest scale, the method brought results not only in terms of learning but also of change in attitude and in farming practice of the participants.

1.1. Co-constructing knowledge with farmers

Production, exchange and use of knowledge are central to innovation. A lot of research has been done on how farmers learn. Many authors point out the group dimension of farmers' learning, be it inside farmer groups (Darré et al., 1989; Darré, 1991; Goulet, 2013) or in networks composed of farmers and other stakeholders (Chiffoleau, 2005, Oreszczyn et al., 2010). It is recognized, that learning through shared experience is particularly effective (Cristóvão et al., 2009) and that learning in a group improves analytical skills (Schad et al., 2011). The idea that farmers learn in groups has been used in setting-up farmer field schools (Davis et al., 2012; Friis-Hansen and Duveskog, 2012) or in the attempts to engineer farmers' communities of practice (Ison et al., 2014, Dolinska and d'Aquino, 2016). In innovation platforms, groups of farmers are typically present only through their representatives.

Next to the group dimension of learning, many scholars emphasize the role of dialogue (Chantre, 2011). This is consistent with the idea that informal communication plays an important role in innovation process (Sligo and Massey, 2007; Leeuwis and Aarts, 2011). Darré (1991) describes how farmers, through dialogue inside what he calls *localized professional groups*, develop and decide to adopt new ways of practicing agriculture. Before any change is incorporated into local practice, arguments to support it have to be formulated, communicated and defended inside these dialogue groups.

Experimentation is another recognized dimension of farmers' learning (Hocdé and Triomphe, 2006; Darnhofer et al., 2010) and has been used as part of on-farm research and farmer field schools' activities (Coudel, 2009).

Within the perspective of IPs, experimenting doesn't necessary mean learning by doing – it can be replaced with learning by simulating, which according to some authors has advantages over actual practice (Senge, 1990; Isaacs and Senge, 1992; McCown et al., 2009). Linking theories of experiential learning, simulation and gaming, Ulrich (1997) lists the characteristics of simulation that make it potentially more conductive for innovation development than other methods: an immediate feedback, a possibility to experiment without negative consequences and a learning situation that is abstracted and simplified. He points out that simulation creates an environment in which established perceptions can be challenged easier than in real life (Ulrich, 1997). Simulation allows self-reflection and questioning of one's own practice (Martin, 2014), exploration of new perspectives (Conjard, 2003) and discovery (Axelrod, 2003).

Simulation has been used in relation to farming in the field of Decision Support Systems or DSS (Nguyen et al., 2007; Matthews et al., 2008). In typical DSS scientists build precise hard models to indicate to farmers the best strategies to manage their farms, which is obviously prescriptive and not participatory. DSS has never become widely used by farming advisers (Farrié et al., 2015), and has been criticized for not addressing farmers' specific concerns and excluding experiential knowledge (Derner et al., 2012), among other things. A critical self-reflection in the DSS field led some researchers to shift away from using simulators to design the best practice for farmers towards other uses: to enable farmer discovery learning (McCown et al., 2009), to enhance learning of both farmers and advisers (Duru et al., 2012), to make farmers reflect on their strategies while exploring and simulating innovations to their farming systems (Le Gal et al., 2013). The group and dialogical dimensions were incorporated, and researchers started to use simulation models interactively in a discussion with farmers (Carberry et al., 2002) as well as in group workshops rather than individually. The models are sometimes used in a form of games (Martin, 2015, Farrié et al., 2015), which allows some integration of farmers' knowledge into the process, for example to parametrize a game or to fill-in the gaps in the game design by adding new elements (Martin, 2015).

These developments can be seen as a step towards modeling with stakeholders (Lynam et al., 2007; Daniell, 2008; Renger et al., 2008; Voinov and Bousquet, 2010), where one of the main objective and challenges is to incorporate plurality of values, epistemologies and knowledge (Ravera et al., 2011). Participatory modeling, next to promoting creativity and innovation, allows integration of analysis and deliberation, makes it possible to explicate tacit knowledge and to investigate both individual behaviors and collective dynamics (Squires and Renn, 2011).

Among different types of participatory modeling (Antunes et al., 2006; Voinov and Gaddis, 2008; Sandker et al., 2010), companion modeling or ComMod (Antona et al., 2005; Etienne, 2011) is the one that applies in practice the *critical companion* posture. ComMod is a participatory approach developed in 1990s, used mainly in natural resources management. It applies short lived simulation tools (agent based models and role-playing games) to deal with interactions among actors and between actors and their environment in complex systems. As it can be used both as a method to explore with stakeholders the functioning of their socio-ecological systems and as a decision support tool (Barreteau et al., 2003), its expected outcomes are social learning and/or technological/organizational innovation (Voinov and Bousquet, 2010). The level of participation can go from interactive participation, where participants share diagnostic tools and results, to self-organization where participants transform lessons from participatory process into decisions, according to the scale by Pretty (1995).