

RESEARCH ARTICLE

Building a Knowledge Commons: Evidence from the Participatory Guarantee System for an Agroecology Label in Morocco

Sylvaine Lemeilleur¹ and Juliette Sermage²¹ UMR MOISA, CIRAD, FR² Free-lance expert in agroecconomics, FRCorresponding author: Sylvaine Lemeilleur (sylvaine.lemeilleur@cirad.fr)

For want of public regulations for organic agriculture in Morocco, stakeholders chose to develop their own label and a Participatory Guarantee System (PGS). In this paper, we present the Participatory Action Research that led to the emergence of a PGS for local markets. Theoretically, we consider this mode of governance – by delegating to the peer community the definition of what is the local norm, and the control of this one – as a type of knowledge commons. Based on an evaluation of the Participatory Action Research, we question to which extent it could lead to a common vision, influence the design, appropriation and improvement of rules for the PGS schemes and, lastly, contribute to the emergence of a commons. We applied the grammar of institutions to describe the outputs of the participatory process. Substantial results show that the different components of the knowledge commons are now available to the community and are fairly well appreciated by the participants. Operational results suggests that the PGS still faces challenges, especially when it comes to scaling-up. We finally propose a critical analysis of the participatory approach used to build this type of socio-economic innovation as a knowledge commons and discuss the conditions required for replicating a knowledge commons in and beyond the context of Morocco.

Keywords: participatory guarantee system; organic farming; knowledge commons; Participatory Action Research; Morocco

Introduction

Third-party certification (TPC) for organic farming labels represents a significant financial outlay for many family farms. As a result, in many parts of the world, farmers' communities are developing their own private labels and participatory guarantee systems (PGS) to certify their socially responsible eco-friendly practices. PGS is a new form of association whereby a label is governed by the community.

Following Hess and Ostrom (2007), the information provided by organic farming labels can be considered as a knowledge Common-Pool Resource (CPR) (Lemeilleur & Allaire, 2018). First, the values, knowledge and reputation of organic production practices represent the shared collective resource, which different communities around the world take years to build.¹ Second, the use of this information through the resource units, i.e. logo and name which appear on the products, adds value for the users (in the same way as products harvested in a forest or fishery). Third, producers use labels in an interdependent way, i.e. the behaviour of individual producers can influence the quality of the shared resource. Therefore, labels may be subject to social dilemmas (i.e. situations in which there is a conflict between immediate individual self-interest and long-term collective interest), when users label their products without complying with the specifications. This "overuse" or "misuse" may jeopardize a part of the common resource by damaging the label's reputation and implies managing access to and use of the label. When a resource is managed collectively by a user

¹ We consider that the common resource is the information on production practices denoted by the label, rather than the food or traditional agricultural knowledge (Reyes-García et al., 2018; Vivero-Pol et al., 2018).

community, which applies a set of rules established in the framework of a PGS, it can be analysed as a type of knowledge commons² (Lemeilleur & Allaire, 2018).

Some scholars point out that participatory approaches complement commons management (Poteete et al., 2010). Indeed, when user groups are involved in designing rules of use, the rules have greater legitimacy and relevance for the participants. Thus, they are often more sustainable as a result (Becker & Fortmann, 2009; Hassenforder et al., 2015). Nonetheless, few academic works explain how knowledge commons may emerge through participatory approaches. We seek to contribute to the literature by proposing an empirical argument that illustrates how Participatory Action Research (PAR) helped a community to craft the standards for their own label, design their guarantee mechanisms using a PGS and, ultimately, preserve their collective resource.

While some PAR have supported the implementation of PGS in different parts of the world, very few provide a reflexive examination of the role of this approach when it comes to developing such institutional innovations (Cuéllar-Padilla & Calle-Collado, 2011). Our analysis of the PGS for Agroecology in Morocco, implemented as part of a PAR project and set up at the request of the Moroccan Network of Agroecological Initiatives (RIAM), provides the opportunity to help fill that gap.

In the next section, we present how the PGS became an alternative to certification. We describe the Moroccan context, which justifies the PAR project. In the second section, we outline the theoretical framework supporting the idea that knowledge can be governed as a commons and we present their key characteristics as described in the literature. In the third section, we describe the participatory methodology used to implement the PGS in the Rabat region, including a monitoring protocol. The substantial results drawn from the PAR are presented in section four. Operational and procedural results are presented in section five. Simultaneously, we discuss synergies and tensions that developed between community members when crafting this knowledge commons. To conclude, we propose a critical analysis of the participatory approach used to build this type of socio-economic innovation as a knowledge commons and discuss the conditions required for replicating a knowledge commons in and beyond the context of Morocco.

A Participatory Guarantee System in Morocco

PGS as a community-based management system for organic farming

Organic farming has a long history and has emerged from the accumulation of scientific knowledge and the practical experience of local and international communities. The latter are united in their criticism of agricultural industrialization and how it affects food quality, as well as in their concern about protecting nature (Becker & Fortmann, 2009). The knowledge about organic farming practices is codified through different organic farming standards and labels around the world. It has achieved global notoriety thanks to its four founding principles (health, ecology, fairness and care³), which are endorsed by IFOAM, the International Federation of Organic Agriculture Movements. The existence of standards and labels generates an economic advantage for users, as long as the value of the resource is maintained, i.e. as long as the knowledge about organic production practices is valid and the values and reputation upheld by the label remain in demand and credible for buyers. Through standards, independent users benefit from shared resources. However, users have to deal with problems of crafting institutional design, monitoring and enforcing access rules and avoiding free-riding (Maze, 2017; Simcoe, 2014).

On a global level, the methods of guarantee and attribution for the different labels have their own logic. Most labels, which are often public, require an inspection by a private, independent certification body designated to attribute the right to use the label. PGS represent an alternative to common and widespread private TPC (Fouilleux & Loconto, 2017). PGS are defined as “*locally focused quality assurance systems. They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange*” (IFOAM, 2008).

This participatory non-market certification is based on peer-to-peer evaluation (producers) and social control by other members of their community (including consumers, retailers, etc), who are considered

² The term “knowledge commons” refers to the application of the commons approach to governing the production, use, management and/or preservation of knowledge or information (Frischmann et al., 2014; Hess & Ostrom, 2007).

³ “Organic Agriculture should sustain and enhance the health of the soil, plant, animal, human, and planet as one and indivisible. Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them. Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities. Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.” (IFOAM, 2008).

capable of measuring compliance with the agreed norms. PGS are more than just a certification process. They provide a framework to facilitate individual or collective marketing activities and contribute to a continuous learning process. Practical problems can be solved through farm reviews and regular exchanges, thus, creating a sustainable local community network in a given territory.

As PGS are generally less expensive than TPC and more appropriate for small local entrepreneurs, they have developed in many countries. There are more than 223 PGS initiatives in 76 countries, of which 166 are fully operational (IFOAM, 2019). Overall, these PGS represent hundreds of thousands of peer-certified producers. PGS were first developed by local social movements. Today, many NGOs and some governments are investing to promote this alternative inclusive certification method. An increasing number of governments officially recognize PGS as a means to verify organic agriculture practices (Brazil, India, Vietnam, Costa Rica, Uruguay, New Zealand, etc).

Many recent empirical studies, mainly by sociologists, document the context and rationale underlying the development of PGS in different countries (Home et al., 2017; Niederle et al., 2020). While some cases have benefited from the support of PAR, no published work provides an in-depth analysis of the set of rules chosen to manage the resource (i.e. values, knowledge and reputation through the credibility of the guarantee), or the heuristics of this choice (i.e. how governance rules are established and stabilized through compromise, which reflects the community's heterogeneity). No research has focused on how PAR may contribute to the construction of a knowledge commons.

The Moroccan context for PGS

In Morocco, a growing number of farmers want urban food markets to be aware that their production practices reflect their social and ecological commitments. Simultaneously, consumers have expressed growing concern about issues of socio-environmental quality. Consumers must rely on quality signs (or labels), which indicate the origin, methods of production and/or processing of the products they buy.

The public regulation for Organic Agriculture in Morocco (law 39–12) entered into force in the autumn of 2018. Until that time, only certification linked to European or US standards on organic agriculture was available. These are obviously expensive and inappropriate for producers who sell their products locally. Although many Moroccan consumers have heard of organic farming, it remains a niche market nationally. According to a consumer survey (Marzouk & Gbemenou, 2014), the main obstacles to the expansion of the organic market are linked to very high prices, the difficulty of finding organic products and the lack of information on and guarantee of production methods.

In this context, a PGS could help resolve these difficulties. It may allow permanent social exchanges within the community network through regular collective farm visits, an inventory for selling outlets (markets, grocers, etc) and the opportunity to take part in the guarantee system itself. In addition, the PGS may significantly reduce the cost of certification for producers.

The use of the term “organic” has been ruled out by the TPC requirements defined by Moroccan law. Consequently, the Rabat pilot PGS project aims to qualify agroecological practices. Agroecology is a systemic approach to agricultural production, based on a set of techniques that correspond to the natural characteristics offered by ecosystems.⁴ Other dimensions of agroecology may include a philosophy of ethics and societal issues (Wezel et al., 2009). RIAM has developed a vision of agroecology that combines a community of practices encompassing all alternative, environmentally-friendly agricultural practices. Thus, when the PGS project began, stakeholders were relatively heterogeneous and the term agroecology was used like in many cases “to describe, in a sometimes very vague manner, a way to produce more ecologically sound agricultural products in the field, or at the farm level” (Wezel et al., 2009) and even used as a synonym for organic or ecological farming (Loconto, 2020; Wezel et al., 2009). Since organic agriculture is largely rooted in agroecological approaches, FAO recommends that agroecology and organic farming are considered in terms of their synergies and co-evolution (Loconto & Fouilleux, 2019). The PGS for Agroecology in RIAM was set up on this basis.

Certifying quality through PGS: a commons approach

The concept of the commons emerged from various academic works describing how communities use collective governance to manage natural Common-Pool Resources (CPR) to avoid their depletion (Ostrom, 1990). The most recent academic works focus on a new form of commons, which concerns shared information

⁴ In this sense, agroecology goes far beyond organic farming, which is based merely on a substitution of environmentally damaging inputs (agrochemical products, as well as GMOs), rather than a new system (Rosset & Altieri, 1997).

and knowledge (Frischmann et al., 2014; Hess & Ostrom, 2007). These new commons are human-made or technology-driven. They exist at local, regional or global levels. They have similar characteristics to “traditional” natural CPR and face similar problems, such as free-riding, congestion and degradation. However, these resources also have unique properties. One major difference stems from the fact that intellectual resources are not physically subtractable (non-rival). Therefore, new commons frequently refer to organizations designed to care for public goods or large-scale club goods (Berge & Mckean, 2015). Nevertheless, these resources are threatened by depreciation in terms of the quality of the information (linked to error and embezzlement), the risk of non-renewal (their non-adaptation to uses) or by privatization (individuals wrongfully excluded from using the CPR) (Boyle, 2003; Hess & Ostrom, 2007).

Few studies have considered standard-setting activities as coordination and governance issues (Maze, 2017) or regarded the content of a label as a CPR (Lemeilleur & Allaire, 2018). However, following Hess and Ostrom’s proposition (2003), the content of the label combines the different components of a knowledge commons (Lemeilleur & Allaire, 2018):

- (1) *Ideas*: encompass both the scientific and moral arguments (including the founding principles of organic farming), as well as knowledge about organic farming practices and their effects;
- (2) *Artefacts*: the logo and name of the label: embody and conform to the underlying ideas, allowing producers to sell their labelled products to consumers who value these principles. The artefact itself is not sold, but is available for use through an accreditation scheme;
- (3) *Facilities*: are responsible for preserving the principles and ideas of the label by codifying them in the form of a charter and technical specifications. They monitor and make artefacts available to qualified users, thanks to a guarantee mechanism. In most cases, the guarantee mechanism for public organic agriculture labels relies exclusively on private TPC. The privatization of the guarantee system may prevent some organic farmers from benefiting from part of the CPR because they cannot afford to use the resource units (i.e. the artefacts). Artefacts can be expensive because of the cost of inspection and related procedures (e.g. complex traceability). As pointed out by Hess and Ostrom (2003), resource facilities are the most prone to privatization.

In the global institutional context, developing a PGS can be interpreted as a return to the principle of the collective management of common resources because a PGS simultaneously aims to define a standard collectively, generate knowledge and ensure the credibility of a label. This collaborative mode of social production and the reproduction of knowledge among peers is qualified as “commons-based peer production” (Benkler & Nissenbaum, 2006). According to Bauwens (2005), peer production is based on voluntary self-aggregation, rather than wage dependency. Peer production is fundamentally different from the traditional hierarchy of corporate structures because it involves sharing unpaid effort (limited by the reality of full-time volunteering). Thus, peer production processes are based on the distribution of tasks, rather than the division of labour, and on characteristics of inclusion, rather than exclusion. They allow anyone with the required skills to produce value without prior agreement. Generally, peer production produces assets that constitute intangible information, which are not rivals (Bauwens, 2005). While this type of model was first observed in the sphere of information economy, some authors have highlighted similar patterns of production in the agricultural economy (Community-Supported Agriculture, urban gardening projects, traditional agricultural knowledge, seed banks, etc.) (Euler, 2018; Kostakis & Bauwens, 2014; Reyes-García et al., 2018).

In this paper, we draw on the experience of setting up a PGS for Agroecology in Morocco to examine how PAR could lead to the development of a common vision linked to community attributes, encourage the design, appropriation and improvement of rules, and help build a commons.

Data and Methodology

Description of the case study: the participatory process

The case study concerns a PAR project involving stakeholders in a PGS for agroecology in Morocco. In a PAR approach, researchers act as facilitators (Becker & Fortmann, 2009) to encourage the emergence of consensus among local users in order to build the common resource and define *a priori* appropriate rules for locally perceived needs and problems.

The PAR was implemented in the region of Rabat in Morocco. The region was chosen because of the existence of a community of producers and consumers already involved in organic farming or agroecology through local initiatives (community-based agriculture, farmers’ markets, etc.).

The project was launched at a public conference organized by RIAM, where the PGS principles, advantages and their global development were presented (**Figure 1**). The methodology was iteratively adapted to ensure

that it could be applied practically. A survey was then conducted with producers (26), consumers (26) and intermediaries (eight restaurants, grocers, etc.) to highlight individual visions of agroecology (values and practices) and to identify individual expectations and representations of the PGS. The surveyed participants included regular consumers at Rabat's main farmers' market, regional farmers and intermediaries in the

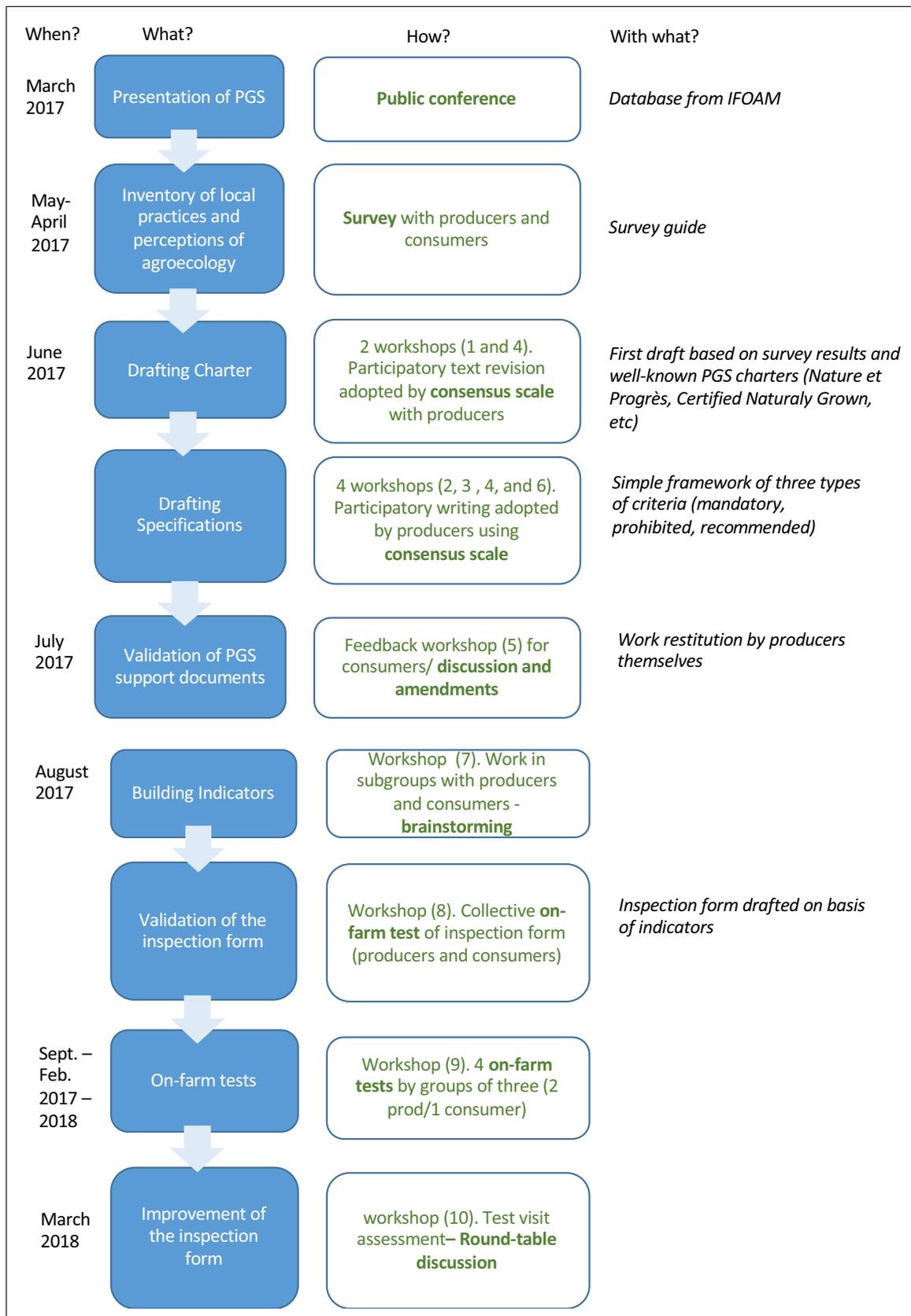


Figure 1: Timeline for the PAR process.

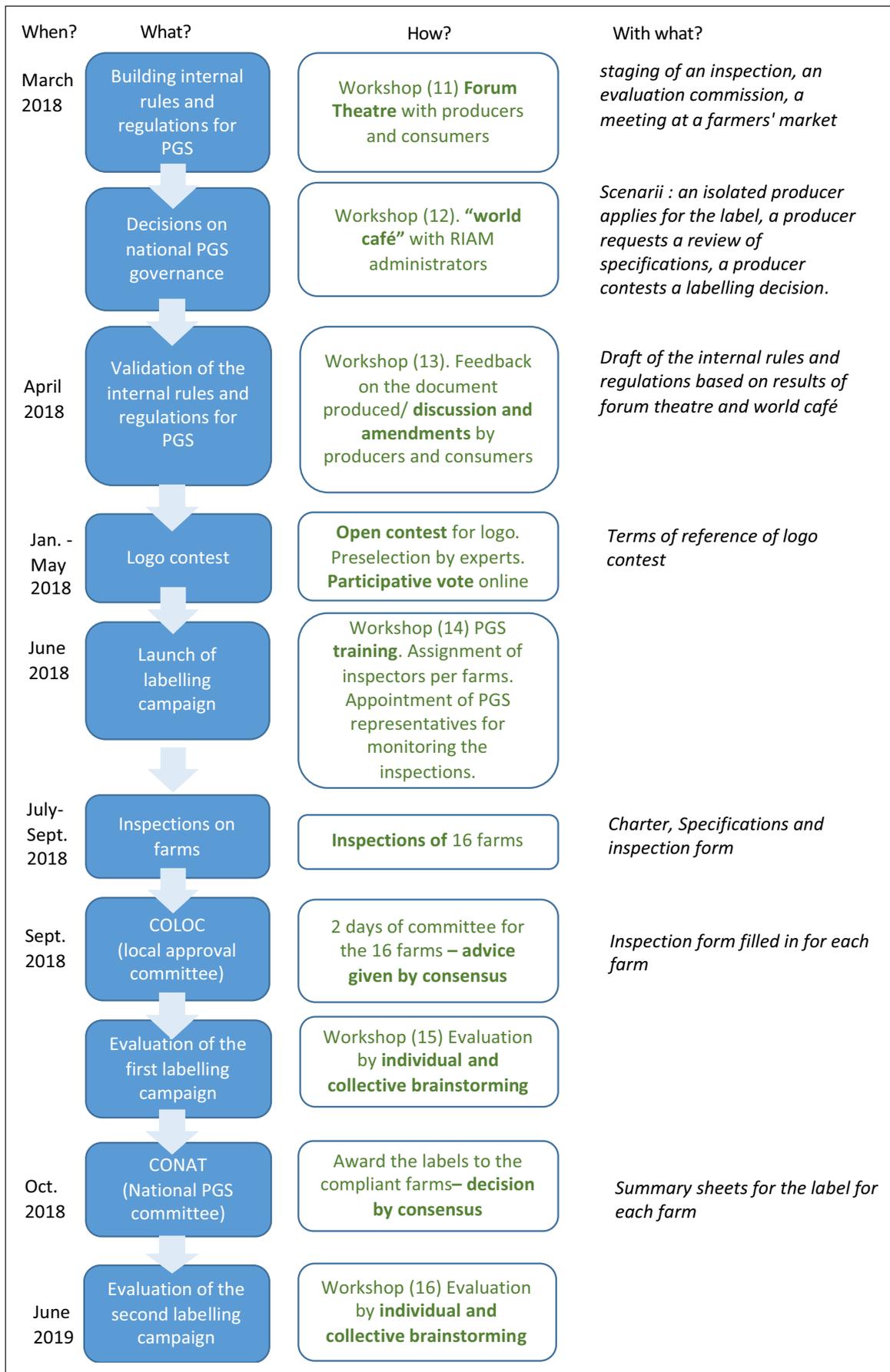


Figure 1: Timeline for the PAR process (continued).

RIAM network. A series of 16 workshops was organized over a period of 25 months, from March 2017 to June 2019. Stakeholders were notified and invited either directly at the Rabat farmers' market or by email (from a list provided by RIAM and the Rabat farmers' market committee) and via WhatsApp groups. Participation was organized on a volunteer basis and the number of participants was not limited. Nonetheless, not all types of participants were invited to attend all the workshops. For example, the first four workshops focused on the initial proposals for technical specifications. It was only open to farmers because it required some very technical knowledge. A workshop was held subsequently to enable the producers to present and discuss their work with consumers/intermediaries, who were invited to give their feedback. The workshop focusing on the national governance of the PGS was only open to RIAM administrators. The other workshops were open to all participants.

Different participatory tools were used during the workshops. The charter and technical specifications were drafted collectively: each participant's proposals had to be adopted by "consensus scale". A forum theatre was used to draft the internal rules and regulations for the PGS. A "world cafe" workshop involving RIAM administrators was organised to reflect on how to govern the PGS nationally. In parallel, an open contest was launched for the label's name and logo design.

Since all the participants were bilingual or francophone, the workshops were conducted in French. All the documents produced were also translated into Moroccan Arabic (Darija).

The whole participatory process involved about 68 participants: 37 farmers and 31 consumers or retailers – including 12 from the RIAM administrative committee.

Data collection: Evaluation of the participatory process

The Monitoring and Evaluation (M&E) sets out to assess the participatory process objectives, the accessibility of the decision-making process (whether the process is fair) and the tools used. To inform variables, different methods were used: attendance lists, workshop recording (audio or video) and participants' evaluation sheets (3 questionnaires for different stages). The evaluation was completed using our direct observations and participants' comments, as reported in the minutes of the workshops. Elements based on the open evaluation in the debriefing workshop at the end of the first and second labelling campaign were also used for M&E (**Table 1**).

The findings drawn from the evaluation are presented in relation to the substantive, operational and procedural results of the participatory process. They provide elements for the discussion on the role of the method chosen for building this kind of knowledge commons.

Framework analysis

To analyse the results, we follow Kostakis and Bauwens' proposal (2014), which uses four interlinked components to describe the commons: (1) the community, which shares the resource, (2) the resource itself, (3) the rules and property regimes that govern people's access to the resource; and 4) the use value created through the social reproduction or preservation of the resource. The first three components are presented in the substantial results of the PAR and the fourth is presented in the operational and procedural results.

We drew on Ostrom et al. (1994) and applied their typology of operational rules to analyse a set of rules chosen by a participant community to regulate the use of their label. Indeed, they highlight the importance of seven operational rules that structure specific actions to govern commons (boundary, position, choice or allocation, aggregation, information, payoff and scope rules). The rules set out the level of participation and the responsibilities of each user, as well as how to monitor and avoid free-riding.

The Substantial results of the PGS implementation process

As proposed by Kostakis and Bauwens (2014), we describe the participant community's attributes in order to clarify certain synergies and tensions, before presenting the resource that was built and the rules and property regimes established to govern access to the resource.

The participant community

The study includes almost all the producers known to RIAM, who claim to use agroecology or organic practices in the Rabat region. Within this community (26), we distinguished two main types of production systems.

The first type comprises small mainly non-commercial farms (about 10), with an average surface area of 3 hectares. Vegetables are grown on 0.75 ha and the rest is allocated to fruit, poultry or beekeeping. The

Table 1: Variables used for each evaluation indicator.

Direct objectives	
Understanding and acceptance of the PGS principles	The workshop objectives are clear to you (1, 2, 3)
	The project objectives are clear to you (1, 2, 3)
Producing documents and tools for their PGS (charter, specifications, inspection form, PGS rules and regulations, etc.) (substantive results)	The workshops were useful (1, 2, 3)
	The charter proposals are relevant (1)
	The specifications' "obligations" and "prohibitions" are realistic (1)
	The criteria recommended by the specifications are achievable by all (1)
	The proposals made for PGS improvement are globally relevant (3)
Indirect objectives	
Exchanging knowledge (procedural and operational results)	You learned about agroecology practices in these workshops (1)
	You learned about organizing participatory certification in this workshop (2)
	During the inspections, you learned about practices in agroecology (3)
	During the COLOC, you learned about practices in agroecology (3)
Strengthening a community of practice (procedural and operational results)	Attendance lists for workshops (1–16)
	You learned about the other producers in the network at these workshops (1, 2)
	During the inspections, you learned about the other producers in the network (3)
	During the COLOC, you learned about the other producers in the network (3)
Reflexive understanding of the process	
Assessing whether the process is fair: participants' representativeness and ability to express their opinion (procedural results)	Attendance lists for workshops (1–16)
	The interests of all producers (in agroecology) were represented at the workshop, if not who was missing? (1)
	The interests of all members of the PGS were represented at the workshop, if not who was missing? (2, 3)
	You could express your ideas
	You are ready to get involved in the next steps (1, 2, 3)
Assessing the tools used (procedural results)	Attendance lists for workshops (1–16)
	The facilitator was neutral about the content of the discussions (1, 2, 3)
	The way of working was effective (1, 2, 3)

Note: The questionnaire's number is shown in brackets.

owners are urban dwellers, who have invested in a plot of land and rely on one permanent farm worker. They go to the farm regularly to give instructions on production, which is primarily for self-consumption. The surplus is sold at farmers' markets or in the neighbourhood. The owners are either retired or have another source of income. Their farming activity is experimental. It provides a source of home-grown food and a leisure activity. They have a philosophical, political or even spiritual approach to agroecology. They are interested in the PGS project, particularly for reasons linked to access to the exchange of knowledge. They support the development of agroecology in Morocco and an alternative certification method. Six of these farms were PGS-certified in 2018.

The second farm type includes medium-sized commercial farms (about 16) with about 12 hectares. Vegetables are grown on 1.85 hectares and the rest is allocated to cereals and/or cattle or sheep production. Three farms exceed 40 hectares (as a result of inheritance). The owners of these farms are often urban dwellers, who have gone back to their family's land. These farms employ an average of 2.5 permanent workers. All of them sell products locally either through farmer markets, baskets (Community-Supported Agriculture) or specialized grocery stores. Three of the farms are certified by a certification body for European Organic Agriculture. While the owners also promote an alternative approach to agriculture, which respects the environment and people, their discourse is far more pragmatic. This is largely because the farms' production

costs are such that they cannot rely on external sources of income on an ongoing basis. These farmers are interested in the PGS for the same reasons as mentioned above. In addition, the economic advantage of PGS labelling is an important issue. Ten of the farms were PGS-certified in 2018.

The charter as a shared resource

The charter presents the moral obligations that the participants agree to respect. It codifies the idea of agroecology in Morocco. Developing a common vision of agroecology is not easy. The definition of the concept is polysemous. Its meaning varies depending on the scales of analysis, the contexts and the participants' trajectories.

Nonetheless, despite the participants' heterogeneity, the process of drafting the charter was relatively consensual. It integrates three dimensions:

- 1) agriculture that respects the environment and ecology: 10 commitments, such as soil fertility, seeds and local breeds, crop diversity, rational use of on-farm resources, etc.;
- 2) equity and economic sustainability of farming systems in the territories: two commitments related to autonomous and resilient production systems (multifunctionality), socio-economic development of the territory (act locally);
- 3) agriculture that is the source of social well-being and includes four commitments related to farming on a human scale: equitable distribution of income; food security and health; decent working conditions for workers and the provision of training.

Therefore, the charter's orientation clearly shows a vision of agroecology that is linked to a societal project not merely a matter of production or consumption. The only dissention among participants concerned their different perception of the charter's role: between utopia and pragmatism. Initially, the charter was compiled by 11 farmers (four from small farms and seven from medium-sized farms), 10 of whom considered that the charter's proposals were relevant.

The sample of workshop participants may seem small given the challenge that RIAM has set itself in terms of disseminating agroecology. However, some of the producers involved in Rabat's pilot PGS are leaders of Morocco's agroecology movement and, therefore, essential mediators for disseminating this approach at national level. The charter was validated following a workshop that was open to consumers and intermediaries. The latter highlighted the importance of making the PGS accessible to the smallest Moroccan producers, as well as giving priority to transmission and support. As the issue of access was already explicit, no changes were made to the charter. The issue of training (over and above farm inspection visits) was considered to be beyond the scope of the PGS and to correspond to RIAM's general mission instead. A political and social vision of agroecology was manifest once again.

The technical specifications for plant production as a shared resource

Specifications convey the idea of agroecology in terms of concrete practices with obligations, prohibitions and recommendations.

The final specifications reached by consensus include eight categories: 1) Farming organization and crop selection; 2) Soil management and fertilization; 3) Prevention and control of weeds, pests and diseases; 4) Plants and seeds used; 5) Farm equipment; 6) On-farm water management; 7) On-farm waste; 8) Working conditions for farm workers.

Reaching a consensus when writing the specifications was far more difficult than it was for the charter. The main reason is linked to the group's heterogeneity in terms of their knowledge, financial capital and the importance of the farm's economic profitability. These differences are reflected in the diverse agricultural practices, which range from a farming system that simply does not use chemical inputs to a strict permaculture system. The greatest tensions arose over the use of heavy mechanization (tractors should be allowed for producers with large areas of land), external fertilizer use (irrelevant for permaculture systems), irrigation water (deep drilling should be permitted for some producers with scarce water resources), investment (difficulty for some producers to invest in wastewater treatment or water storage tanks). The discussions about seeds were complicated (very few certified organic seeds are available in Morocco, but growing self-produced seeds is very time-consuming) and packaging (ecological or reusable packaging).

The second reason is linked to the fact that participants are very aware of the heterogeneous level of education among producers. They are split between the idea of including a high level of demanding practices and not wanting to deter small poorly educated farmers from making a commitment to agroecology.

Despite the “consensus scale” approach, only 9 of the 11 farmers involved in drafting the specifications actually stated in the evaluation sheet that the “obligations” and “prohibitions” set out in the specifications were realistic.

PGS rules and regulations

We describe the seven operational rules adopted collectively for the Moroccan PGS (Ostrom et al., 1994). These rules are set out in the PGS’ internal regulations.

Boundary rules specify “how participants enter or leave a position”. Local groups gather members from the same geographical area, who want to take part in the PGS. The delimitation of the geographical area is defined by the RIAM national committee, based on various criteria, such as administrative boundaries and/or distance between members, etc. A local group must include at least seven producer members and three non-producer members (consumers, buyers, agronomists, technical agricultural advisers, etc.), to promote exchanges, share responsibilities within the group and to ensure that the rule of non-reciprocity is respected for inspections.

To obtain the label, the producer must be a member of RIAM (annual fee), complete the label application form, giving details of their farm and sign a pledge to respect the PGS rules. In so doing, they accept peer inspection visits and agree to carry out at least two inspections per year on other farms. The local group then mandates a voluntary “facilitator” (producer member) to visit the new member, ensure they adhere to the values set out in the charter, help him/her understand the PGS specifications and the documents required for labelling. This first step takes 1 year, the time required for the “period of conversion”. Once this step is completed, the producer farm receives a PGS inspection for labelling.

In addition to on-farm inspections, soil and product analyses are conducted annually for 10% of randomly-selected producers in the group. RIAM covers the costs of analyses, which serve to strengthen confidence in the label.

Position rules specify “a set of positions, each of which has a unique combination of resources, opportunities, preferences, and responsibilities”. Each inspection involves three inspectors, namely, two labelled producers and one non-producer member of the local group. A farmer cannot be inspected by the producer that they have inspected the same year (no reciprocity) or by the same inspectors 2 years in a row.

Local PGS groups provide the opportunity for technical, social and human exchanges. Each group has a local approval committee (COLOC), which organizes the facilitation and inspections. It designates three volunteer referees each year to organize and take part in all of the committee’s sessions.

At national level, a PGS committee from RIAM (CONAT) includes volunteer members and representatives from each local group. This commission is in charge of all PGS activities at national level, including: membership procedures, allocating a local group for each member, collecting certification fees, online PGS support documents, conflict resolution, etc.

Allocation rules specify “what a participant occupying a position must, must not, or may do at a particular point in a decision process”. PGS-certified farmers must comply with all the mandatory and prohibited criteria set out in the specifications. They must show that their activity is conducted in accordance with the charter. They are not allowed to mix compliant and non-compliant produce from the same crop type. There is an inspection every year for all producers who want to be certified.

Aggregation rules specify “who is to decide’ which action or set of activities is to be undertaken”. COLOC meets once a year (in several sessions) to give an opinion on the current year’s inspections. The producer’s presence is required when their farm’s file is reviewed. At least one of the three inspectors who visited the farm is also required in case further clarification is needed. The COLOC’s decision is reached by consensus (involving all the session members). If a consensus is not reached, the position of the majority of members prevails. The opinions range from: (1) Favourable opinion on the use of the label (2) Favourable opinion on the use of the label, with necessary improvements (minor non-conformity) (3) Temporary negative opinion on the use of the label, with required corrective measures (major non-conformity), (4) Negative opinion on the use of the label (too many non-conformities or too much divergence with the charter). For each farm, the COLOC opinion is reported on a summary sheet for the label and sent to the CONAT. The expected improvements will be carefully considered at the next annual inspection. If there is any risk of pollution from outside the farm, soil and product analyses may also be required.

The CONAT meets approximately 1 to 2 months after local committees to award the labels to farms. In general, the commission verifies that the opinions conform with the data on the inspection summary sheets.

In the event of disagreement (if a producer disagrees with the opinion stated by the COLOC), he/she can appeal to the CONAT within 1 month after the COLOC. The CONAT examines the case and can organize a further inspection with three new inspectors and a RIAM administrator. Soil and product analyses may also be requested at the producer's expense. Sanctions are applied in the case of major non-compliance: no improvement following repeated recommendations; non-compliance with an obligation or prohibition set out in the specifications; non-respect of confidentiality; misuse of or fraudulent logo. They are applied gradually: written warning, suspension of the label, exclusion from the PGS.

The revision of PGS documents must be discussed in the local group before being submitted to the CONAT. The latter examines the proposal and decides whether the proposed changes will be put to the vote at the RIAM's next general assembly.

Scope rules specify "which outcomes may, must, or must not be affected within a situation". The PGS pilot experiment was only implemented in the Rabat region. In time, it will be developed nationally. There will only be one technical specification per production type at national level. Specifications will evolve continuously as certified farmers develop skills through technical exchanges and training.

Information rules specify "the information available to each position". The CONAT gives local groups the list of newly certified producers. It sends the signed and sealed certificate to each certified farm by post. The producer can then present their certificate at the selling points. The list of labelled farms is available online to allow buyers to verify that the products they purchase come from certified farms. All PGS documents are freely available online on the RIAM website.

Payoff rules "affect the benefits and costs assigned to actors in the light of the outcomes achieved and the actions chosen by the actors". The cost of PGS labelling is kept to a minimum to enable small producers to join the scheme. It is much cheaper than TPC (almost a tenth of the cost).

The set of PGS rules and regulations has been developed thanks to a forum theatre workshop (25 participants) and a "world café" workshop (eight RIAM administrators). The 15 participants who answered the evaluation questionnaire declared that the workshop was effective and useful. Nevertheless, among the 25 participants, two producers decided not to participate in the PGS because of their concerns about the efficacy of control to ensure the label's credibility.

In practice, during the first labelling campaign, a number of situations arose that the regulations had not provided for. Two farms did not have a buffer zone between agroecological and conventional production areas because the plot belonged to several brothers. On another farm, an inconsistency was observed between what was produced on the farm and sold at the farmers' market. Consequently, additional inspections were organized.

The CONAT also requested a production monitoring report from farmers for future labelling campaigns. In addition, if there is ambiguity regarding indivisible plots, the producer will be required to sign a pledge of honour and conduct soil analyses. These new rules have recently been incorporated into the PGS regulations.

At the debriefing workshop for the second campaign, problems were raised about how the PGS functions, in particular the involvement of producers in inspections and COLOC meetings. Although producer involvement is explicitly mandatory, a grid of sanctions will be drawn up to enforce the rules.

Lastly, several participants suggested that there was some confusion about the responsibilities of the RIAM's national bodies and the local group's autonomy because local groups had no legal structure. Clarifying the structure of the nested governance of the PGS and the responsibilities will be essential for scaling-up the project.

The Operational and procedural results of the PGS implementation process

We describe the last component proposed by Kostakis and Bauwens (2014). By examining the operational and procedural results of setting up a PGS, we shed light on the link between the commons scheme and use value. When a PGS governs a resource, an exchange value is generated and transferred to the market through the resource units. In addition, it produces use value in terms of knowledge exchanges, cooperation and group trust.

Operational results of the labelling campaigns and the use value

In spring 2018, the first labelling campaign was launched. Only 16 of the 26 farms involved in the PAR actually applied for the label. In general, these farms had been involved in agroecology and the PGS implementation process for the longest. All farms obtained certification in the first year. In November 2018, the local group in Rabat had 41 members, including producers, consumers and intermediaries (restaurants, grocery stores, etc.). In 2019, 26 of the 27 farms that applied for labelling were certified (one

farm was refused for non-compliance). It should be noted that five of these producers also obtained the Moroccan Organic Agriculture label, which has been available since the end of 2018.

PGS-certified products are sold mainly at the farmers' markets that have developed in Rabat. They are also sold through specialized shops in the city and pre-ordered baskets.

In 2019, 12 new farms in the Rabat region applied for PGS-certification in 2020. PGS facilitators visited their farms before the inspection planned during the next labelling campaign. In 2019, RIAM presented the PGS in the Marrakesh and Casablanca region. Participatory workshops were held with a group in Marrakesh to enable new participants to understand and potentially modify the PGS' facilities.

In practice, apart from a couple of conflicts between individuals during inspections (conflicts are an inherent part of the collective action process), the first two labelling campaigns went smoothly.

However, the first campaign debriefing workshop raised problems related to the inspectors' attitude. For example, difficulties may arise when verbalizing criticisms and recommendations on farms, if they do not explicitly concern genuine non-compliance with the specifications. All participants stressed that one of the PGS' main roles is to help producers improve their practices through exchanges, i.e. the PGS is not simply a certifier. Drafting a code of ethics and professional conduct was proposed and adopted for the second campaign. Following the workshop, 12 of the 15 participants considered that the proposals to improve the PGS were relevant.

Lastly, beyond the posture of inspectors, the campaign debriefing workshops reveal the recurring problem regarding the inspectors' lack of expertise in agroecology. Consequently, as was pointed out, the PGS will have to introduce additional training under RIAM supervision.

Procedural results of the participatory approach

Regarding access to the decision-making process, no participants attended all of the 15 workshops. However, the number of participants was constant over time. The first four participatory workshops reserved for producers were attended by an average of 10 participants. There were eight participants at the RIAM administrators' workshop and an average of 22 participants at the other workshops. In addition, all questionnaire respondents indicated that they were interested in the next steps. The turnover of participants at workshops appears to be largely due to their availability, which depended on the workshops' date and schedule.

The different questionnaires on the participatory process revealed the following: all respondents (41) stated that they were able to express their ideas publicly during the workshop; 95% stated that the facilitators were neutral about the content of the discussions; 95% considered that the working method was effective. Nevertheless, many participants (36%) expressed concern about the representativeness of the workshop participants. Indeed, all the producers invited were identified from the exhaustive list of producers provided by RIAM. Therefore, participants are inevitably producers that already claim to belong to the agroecology movement. However, some producers, who farm traditionally and respect agroecology practices unwittingly, could be eligible to join the PGS. However, they did not take part in the workshops.

In cognitive terms, 58% of participants reported that they had learned more about agroecological practices during the participatory workshops. Most participants claimed to have learned new agroecological practices during the implementation of the PGS: 82% during inspections and 92% at the COLOC sessions.

In terms of relations and strengthening the community, most participants stated that they had learned about other members of the network: 71% in participatory workshops, 82% during inspection visits and 100% in COLOC sessions. Contacts were established between producers and between producers and consumers (who are often disconnected). Mutual understanding was facilitated. During the first campaign debriefing workshop, participants highlighted the fact that there was greater collaboration and trust within the group. However, the causality between this observation and the PGS was not fully demonstrated. It may be due to other collective actions, such as the farmers' markets in Rabat, which were created a few months earlier with more or less the same participants. During the second campaign debriefing workshop, a couple of participants declared that the principle of trust had not yet been put to the test. There is still some doubt about the cause of an issue of non-compliance, which could be due to a genuine difficulty (external contamination, lack of competence, etc.) or deliberate cheating.

Discussion and Conclusion

On a global level, organic farming labels now represent far more than a niche market. They are known and recognized by many consumers, producers and citizens throughout the world, despite the fact that not all countries have public regulations for organic agriculture. As there was no public label in Morocco until the

end of 2018, some stakeholders, who were already part of an organic farming and agroecology community in the Rabat region, chose to develop their own label and PGS. In this paper, we describe the PAR that led to the emergence of a PGS for local markets.

From a theoretical point of view, we consider the shared resource and the PGS governance, whereby the definition and control of local agroecological norms are assigned to the peer community, as a commons. We examine how the PAR accompanied the emergence of this type of knowledge commons.

A key issue in the commons approach is to clearly identify the community we are talking about. In our case study, we examined whether the participatory methods used actually led to the emergence of a community. While almost all the producers known to RIAM, i.e. those who claim to use agroecology practices in the Rabat region, were more or less actively involved in the process of building the commons, does it genuinely constitute a community? Like many knowledge commons described in the literature (Hess & Ostrom, 2007), the community boundary remains fuzzy. However, 2 years on, it can be considered that a growing community of users – producers and consumers who abide by the rules of common management— is taking shape. Despite their heterogeneity, participants have a common vision and a shared interest in the resource that is being developed.

The results also show that the resource's facilities are now available to this community of users (charter, specifications, rules and regulations). According to the typology of rules set out by Ostrom et al. (1994), the rules chosen by the community seem relatively complete. The M&E shows that the participants appreciate the outputs and the decision-making process used to build them. In addition, the first operational results show that by enhancing the rules, the organization managed to deal with unexpected situations on its own (indivisible plots, inconsistency between what is produced and sold, etc.). Less tangible outcomes were also highlighted, such as capacity building and greater collaboration and trust within the group. However, the causality of these outcomes is not fully demonstrated. Indeed, it may actually stem from other parallel collective action, such as the farmers' markets that have been in place for 2 years. Moreover, after the second campaign, participants reported that there was a degree of distrust and suspicion between them. This has already been highlighted by Kaufmann and Vogl (2018) in situations where PGS producers are not only colleagues and peers, but compete on the same market.

The construction of this common appears to combine several success factors described in the literature. However, our non-longitudinal study does not allow us to draw conclusions about its sustainability over time. Moreover, participants repeatedly expressed concerns about making it easier for smaller producers to join the PGS. A special entry system should be devised to address this issue. There are many examples of more inclusive PGS elsewhere. For instance, the cost of obtaining the label could be progressive or reduced for smaller farmers (Dorville et al., 2019), a solidary fund and/or community volunteering projects could be set up at local group level (Home et al., 2017), a support service could be implemented to help farmers fill in the administrative documents, etc. Otherwise, the PGS still faces challenges in Morocco, particularly regarding a change of scale and the legal recognition of this common. If the development of PGS in Morocco is compatible with the new public regulations on Organic Agriculture, producers will be allowed to switch from one system to the other depending on their target markets. However, it is impossible to predict whether public support for PGS will be forthcoming. The main threat is that the public device for organic standards could end up competing directly with the common. Another threat, that frequently occurs with knowledge commons, is the risk of misappropriation by government or some private actors of the PGS for their sole benefit, e.g. through intellectual property rights. Although this has not yet been discussed in the literature, it is a concern for many PGS advocates throughout the world.

We discuss the conditions of replicability and sustainability of this approach for this type of socio-economic innovation – or knowledge commons – beyond the particular context of Morocco.

PAR seems to be suitable for constructing a commons, as suggested by Poteete et al. (2010). It is even more so when it is a commons linked to agroecology. Méndez et al. (2015, 2017) underline the convergence of PAR and agroecology's principles, inasmuch as both aim to: empower populations; adapt to the local environment; and consider multiple scales and long-term benefits, as well as the heterogeneity of actors and knowledge.

This research was conducted in response to the demand expressed by an existing network. Thus, we were able to avoid the common pitfall, namely, the lack of producer participation in the development of the initial objective. This is often a limiting factor when it comes to producers' engagement and the outcomes of research and action (Mendez, 2017). Nonetheless, a number of criticisms of the process and outputs have emerged. Although the workshops were open to all locally-known producers involved in agroecology, as well as to consumers and intermediaries interested in the subject (generally, RIAM members), only one

group actively took part, i.e. made genuine proposals for constructing the common. These differing levels of participation inevitably generate a bias in terms of the representativeness of participants (Méndez et al., 2017). Participation or non-participation may be due to the producers' availability, their ability to work in groups or the language and methods used by facilitators. The emerging community's boundary is not simply fuzzy, it is biased by the participatory methods chosen. Similarly, PAR does not necessarily entail shifting power relations (Van Dyck et al., 2018). The fact that the leaders of Morocco's agroecology movement took part in the workshops was an asset for building the legitimacy of the regulatory tool. However, when it came to agreeing on the content, their strong influence may have limited the participation of other actors. The approach has an additional bias: all the results are based on the users' local expertise. Scholarly or academic expertise were not included. Loconto and Hatanaka (2018) show that the PGS mechanism favours farmers' knowledge, which is based on indigenous and acquired agroecological knowledge, rather than independent expert knowledge. This posture is criticized by some Moroccan stakeholders, who consider that the PGS community has little genuine agroecological knowledge.

To conclude, our findings converge with the literature that, compared to traditional research, PAR can improve the on-the-ground value and accuracy of research. Traditional research strives to be objective and avoid data contamination, by excluding the studied communities from the analysis, which may limit our understanding of existing processes (Bacon et al., 2013). As suggested by some authors (Prost et al., 2019; Van Dyck et al., 2018), our results show that the community's continuous reflexive appraisal was crucial to understanding the relevance of substantial and operational results.

As with other PAR, this case goes far beyond a one-off collaboration to meet an immediate need. Thus, researchers and community actors have been able to develop an ongoing relationship since 2018. This has helped support the establishment of the Marrakech group, develop poultry and beekeeping specifications, as well as a digital tool to facilitate the management of the inspections (Barrot et al., 2020).

Acknowledgements

The authors thank anonymous reviewers for the thoughtful suggestions and comments, which have greatly enriched the quality of the manuscript. They also thank SCOP LISODE (<https://www.lisode.com>), a cooperative consultancy specialized in designing and implementing participatory approaches, and CoTéAct (<https://www.coteact.com>), specialized in Forum Theatre, for their methodological support. The *Fondation Crédit Agricole pour le Développement Durable* from Morocco provided a financial support for this Participatory Action Research.

Competing Interests

The authors have no competing interests to declare.

References

- Bacon, C., deVuono-Powell, S., Frampton, M. L., LoPresti, T., & Pannu, C. (2013). Introduction to empowered partnerships: Community-based participatory action research for environmental justice. *Environmental Justice*, 6(1), 1–8. DOI: <https://doi.org/10.1089/env.2012.0019>
- Barrot, N., Lemeilleur, S., Paget, N., & Saffidine, A. (2020). Peer Reviewing in Participatory Guarantee Systems: Modelisation and Algorithmic Aspects. *AAMAS 2020*, May 9–13, Auckland, New Zealand.
- Bauwens, M. (2005). *The political economy of peer production*. Ctheory.Net. <http://www.ctheory.net/articles.aspx?id=499>
- Becker, D. D., & Fortmann, L. (2009). Participatory Research in Conservation and Rural Livelihoods. Doing Science Together. *International Journal of the Commons*, 4(1), 597–598. Hoboken, NJ: Wiley-Blackwell. DOI: <https://doi.org/10.18352/ijc.205>
- Benkler, Y., & Nissenbaum, H. (2006). Commons-based Peer Production and Virtue*. *Journal of Political Philosophy*, 14(4), 394–419. DOI: <https://doi.org/10.1111/j.1467-9760.2006.00235.x>
- Berge, E., & Mckean, M. (2015). On the commons of developed industrialized countries. *International Journal of the Commons*, 9(2), 469–485. DOI: <https://doi.org/10.18352/ijc.650>
- Boyle, J. (2003). The second enclosure movement and the construction of the public domain. *Law and Contemporary Problems*, 66(1/2), 33–74. DOI: <https://doi.org/10.2139/ssrn.470983>
- Cuéllar-Padilla, M., & Calle-Collado, Á. (2011). Can we find solutions with people? Participatory action research with small organic producers in Andalusia. *Journal of Rural Studies*, 27(4), 372–383. DOI: <https://doi.org/10.1016/j.jrurstud.2011.08.004>

- Dorville, C., Lemeilleur, S., & Niederle, P.** (2019). Interactions Between Self-Managed Communities and Government rules: The Case of Legally Recognized PGS to Certify Agro-ecological Products in Brazil. In *13emes journées de recherche en sciences sociales INRA-SFER-CIRAD*.
- Euler, J.** (2018). Conceptualizing the Commons: Moving Beyond the Goods-based Definition by Introducing the Social Practices of Commoning as Vital Determinant. *Ecological Economics*, *143*, 10–16. DOI: <https://doi.org/10.1016/j.ecolecon.2017.06.020>
- Fouilleux, E., & Loconto, A.** (2017). Voluntary standards, certification, and accreditation in the global organic agriculture field: A tripartite model of techno-politics. *Agriculture and Human Values*, *34*(1), 1–14. DOI: <https://doi.org/10.1007/s10460-016-9686-3>
- Frischmann, B. M., Madison, M. J., & Strandburg, K. J.** (2014). *Governing knowledge commons*. Oxford University Press. DOI: <https://doi.org/10.1093/acprof:oso/9780199972036.001.0001>
- Hassenforder, E., Smajgl, A., & Ward, J.** (2015). Towards understanding participatory processes: Framework, application and results. *Journal of Environmental Management*, *157*, 84–95. DOI: <https://doi.org/10.1016/j.jenvman.2015.04.012>
- Hess, C., & Ostrom, E.** (2003). Ideas, artifacts, and facilities: Information as a common-pool resource. *Law and contemporary problems*, 111–145.
- Hess, C., & Ostrom, E.** (2007). *Understanding knowledge as a commons: From theory to practice* (Vol. 59). The MIT Press. DOI: <https://doi.org/10.7551/mitpress/6980.001.0001>
- Home, R., Bouagnimbeck, H., Ugas, R., Arbenz, M., & Stolze, M.** (2017). Participatory guarantee systems: Organic certification to empower farmers and strengthen communities. *Agroecology and Sustainable Food Systems*, *41*(5), 526–545. Scopus. DOI: <https://doi.org/10.1080/21683565.2017.1279702>
- IFOAM.** (2008). *One earth, many hands*. Annual report.
- IFOAM.** (2019). *Global Online PGS Database and map*. A Website of IFOAM- Organics International and Its Action Group. <https://www.ifoam.bio/en/pgs-maps>
- Kaufmann, S., & Vogl, C. R.** (2018). Participatory Guarantee Systems (PGS) in Mexico: A theoretic ideal or everyday practice? *Agriculture and Human Values*, *35*(2), 457–472. DOI: <https://doi.org/10.1007/s10460-017-9844-2>
- Kostakis, V., & Bauwens, M.** (2014). *Network Society and Future Scenarios for a Collaborative Economy*. UK: Palgrave Macmillan. DOI: <https://doi.org/10.1057/9781137406897>
- Lemeilleur, S., & Allaire, G.** (2018). Système participatif de garantie dans les labels du mouvement de l'agriculture biologique. Une réappropriation des communs intellectuels. *Économie rurale. Agricultures, alimentations, territoires*, *365*, 7–27. DOI: <https://doi.org/10.4000/economierurale.5813>
- Loconto, A., & Hatanaka, M.** (2018). Participatory Guarantee Systems: Alternative Ways of Defining, Measuring, and Assessing 'Sustainability'. *Sociologia Ruralis*, *58*(2), 412–432. DOI: <https://doi.org/10.1111/soru.12187>
- Loconto, A. M.** (2020). Labelling Agroecology: A Study of Valuation Processes in Developing Countries. In B. Laurent & A. Mallard (Éds.), *Labelling the Economy*. Palgrave Macmillan. DOI: https://doi.org/10.1007/978-981-15-1498-2_3
- Loconto, A. M., & Fouilleux, E.** (2019). Defining agroecology: Exploring the circulation of knowledge in FAO's Global Dialogue. *The International Journal of Sociology of Agriculture and Food*, *25*(2), 116–137.
- Marzouk, H., & Gbemenou, B. S.** (2014). *Consommation des produits biologiques: Analyse de marchés et comportement du consommateur marocain*. Institut Agronomique et Veterinaire Hassan II.
- Maze, A.** (2017). Standard-setting activities and new institutional economics. *Journal of Institutional Economics*, *13*(3), 599–621. DOI: <https://doi.org/10.1017/S174413741600045X>
- Méndez, V. E., Bacon, C. M., Cohen, R., & Gliessman, S. R.** (2015). *Agroecology: A transdisciplinary, participatory and action-oriented approach*. CRC press. DOI: <https://doi.org/10.1201/b19500>
- Méndez, V. E., Caswell, M., Gliessman, S. R., & Cohen, R.** (2017). Integrating Agroecology and Participatory Action Research (PAR): Lessons from Central America. *Sustainability*, *9*(5), 705. DOI: <https://doi.org/10.3390/su9050705>
- Niederle, P., Loconto, A., Lemeilleur, S., & Dorville, C.** (2020). Social movements and institutional change in organic food markets: Evidence from participatory guarantee systems in Brazil and France. *Journal of Rural Studies*, *78*, 282–291. DOI: <https://doi.org/10.1016/j.jrurstud.2020.06.011>
- Ostrom, E.** (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511807763>

- Ostrom, E., Gardner, R., Walker, J., Agrawal, A., Blomquist, W., Schlager, E., & Tang, S.** (1994). *Rules, games, and common-pool resources: Ann Arbor*. University of Michigan Press. DOI: <https://doi.org/10.3998/mpub.9739>
- Poteete, A. R., Janssen, M. A., & Ostrom, E.** (2010). *Working together: Collective action, the commons, and multiple methods in practice*. Princeton University Press. DOI: <https://doi.org/10.1515/9781400835157>
- Prost, L., Chizallet, M., Taverne, M., & Barcellini, F.** (2019). Towards a reflective approach to research project management. In J. E. Bergez, E. Audouin & O. Therond (Eds.), *Agroecological Transitions: From Theory to Practice in Local Participatory Design*. Springer. DOI: https://doi.org/10.1007/978-3-030-01953-2_10
- Reyes-García, V., Benyei, P., & Calvet-Mir, L.** (2018). Traditional agricultural knowledge as a commons. In J. L. Vivero-Pol, T. Ferrando, O. De Schutter & U. Mattei (Éds.), *Routledge Handbook Of Food As A Commons* (1^{re} éd., pp. 173–184). Routledge.
- Rosset, P. M., & Altieri, M. A.** (1997). Agroecology versus input substitution: A fundamental contradiction of sustainable agriculture. *Society & Natural Resources*, 10(3), 283–295. DOI: <https://doi.org/10.4324/9781315161495-11>
- Simcoe, T.** (2014). Governing the Anticommons: Institutional Design for Standard-Setting Organizations. *Innovation Policy and the Economy*, 14(1), 99–128. DOI: <https://doi.org/10.1086/674022>
- Van Dyck, B., Vankeerberghen, A., Massart, E., Maughan, N., & Visser, M.** (2018). Institutionalization of participatory food system research: Encouraging reflexivity and collective relational learning. *Agroecología*, 13(1), 21–32.
- Vivero-Pol, J. L., Ferrando, T., De Schutter, O., & Mattei, U.** (Éds.). (2018). *Routledge Handbook Of Food As A Commons: Expanding Approaches* (1^{re} éd.). Routledge.
- Wezel, A., Bellon, S., Doré, T., Francis, C., Vallod, D., & David, C.** (2009). Agroecology as a science, a movement and a practice. A review. *Agronomy for sustainable development*, 29(4), 503–515. DOI: <https://doi.org/10.1051/agro/2009004>

How to cite this article: Lemeilleur, S., & Sermage, J. (2020). Building a Knowledge Commons: Evidence from the Participatory Guarantee System for an Agroecology Label in Morocco. *International Journal of the Commons*, 14(1), pp. 465–480. DOI: <https://doi.org/10.5334/ijc.1020>

Submitted: 27 December 2019

Accepted: 30 August 2020

Published: 25 September 2020

Copyright: © 2020 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <http://creativecommons.org/licenses/by/4.0/>.

]u[*International Journal of the Commons* is a peer-reviewed open access journal published by Ubiquity Press.

OPEN ACCESS 