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Challenges in organizational and institutional innovations for agroecological transition of food systems.

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Abstract :

The article presents an introduction to organizational and institutional innovations that can be mobilized for an agroecological transition of food systems. After a brief recall of the key terms underlying such innovations, we discuss the link between agroecological transition and organizational and institutional innovations, and in particular the obstacles to such transition, the question of scale and coordination with public policies. Finally, two examples of innovation are presented and discussed: market initiatives by agri-food industries in favour of agroecology, and the use of public procurement to foster the transition to agroecology. The article opens with reflections on the conditions for characterizing the transformation of agricultural practices necessary for organizational innovations, on possible cross-views regarding emergence and dissemination conditions for innovative experiences, and on how actors organize themselves to design and disseminate organizational innovations leading to agroecological transition.

Keywords : organizational innovations; agroecology; transitions

1. Introduction

For many countries, the agro-ecological transition is presented as a project to develop agricultural systems towards greater sustainability and health, which raises questions about the facilitators and barriers to this transition, and about the appropriation of the concept by stakeholders. Seen as a dynamic process in which all the links in a socio-technical system evolve, the agro-ecological transition (AET) mobilises a significant number of innovations. These are of various kinds: agronomic in terms of agricultural systems and practices, technological in terms of agricultural and livestock equipment, and organisational and institutional. Of course, the range of innovations involved in AET is not exclusive, and in general the success of AET will depend on a coherent combination of different elements from this range. The aim of this article is to provide an overview of innovations in the organisation of agricultural and food systems, as well as institutional changes, which are compatible with AET.

Rather than claiming to be exhaustive or to systematically promote agroecology as suitable for all types of territory, this article will discuss innovations in favour of agroecology that highlight the link between technological modifications and changes in the organisation of agricultural, processing and distribution activities. The following questions will therefore be addressed: what is the purpose of innovation in agroecology? What role do organisational and institutional innovations play in AET? What conditions are necessary for innovations that can be transposed to a wide range of contexts? What role can and should research play in the design, analysis, evaluation and support of agro-ecological innovations?

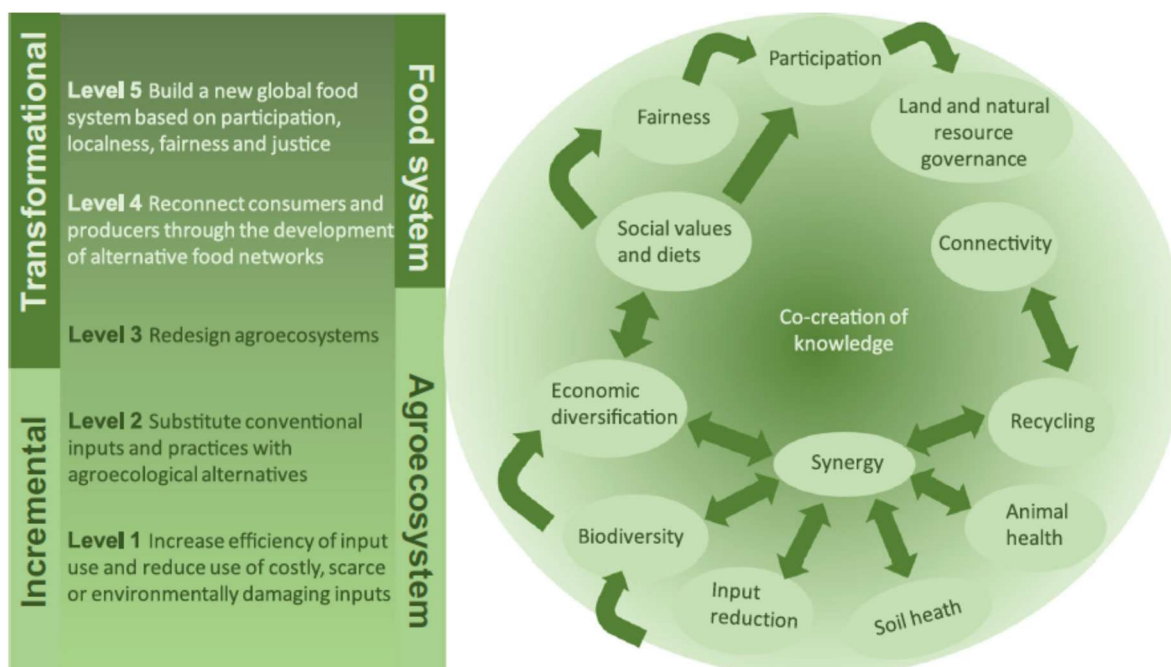
The article begins by setting out definitions for the various terms that make up organisational and institutional innovations for AET. With these definitions and clarifications of concepts in hand, the second section looks at the agroecology-innovations interface in more detail, detailing the levers and obstacles to AET in terms of the different facets of agroecology. The third section of the article then details two examples of innovations, the first driven by private initiatives within food systems (agri-food industries) and the other concerning public ordering in territorial food projects as a lever for AET.



2. A few definitions

2.1 Agroecology

Agroecology can be presented as a scientific knowledge base aimed at designing production methods based on the use of principles and concepts derived from ecology (Altieri, 1995; Mauguin, Caquet et al., 2019). Based on strengthening the ecosystem services provided by agrosystems, in particular supply and climate regulation services, agroecology enables better compliance with environmental regulations (see Figure 1). The aim is to make the most of the 'virtues' of diversity, rather than aiming to simplify and homogenise farming practices. By rethinking an entire farming system to achieve greater sustainability and resilience, agroecology naturally aims to achieve a number of objectives that are compatible with the goals of sustainable development. In particular, reduced dependence on chemical inputs and natural resources (fossil fuels, nutrients, pesticides, water) helps to limit the negative impacts of agricultural production and livestock farming. Rethinking production systems, by favouring diversification and the use of local resources, aims to achieve greater resilience in the face of climate change and the increased volatility of agricultural and food prices.



Source: adapted from Wezel et al., 2020. Agroecological principles and elements and their implications for transitioning to sustainable food systems. A review. *Agronomy for Sustainable Development*, (2020)40: 40.

Figure 1: Links between Gliessman's five levels of food system transition (2016), the FAO's 10 elements (2018) and the HLPE's 13 principles (2019).

Although agroecology is often presented as a new version of sustainable agriculture, the precise formalisation of the concept still comes up against a number of difficulties. First, there are still differences of opinion in the scientific literature as to what practices would be acceptable as agroecology specifications. In fact, several forms of agriculture can be mobilised and claim to be agroecological, each with a set of practices associated with precise agronomic (and/or socio-economic) objectives. Examples include soil conservation agriculture, ecologically intensive agriculture, peasant agriculture, etc. To build up a coherent typology of agro-ecological practices based on these different forms of agriculture, we need to check for the compatibility and internal coherence of the combination of practices used together.



Second, agroecology is still facing difficulties in gaining greater social acceptance, not least because its definition is still polysemous and has not yet stabilised. Agroecology can be distinguished from organic farming (AB), for which precise specifications and a range of certifications have existed for a long time, making it easier for the general public to understand the practices involved (zero synthetic pesticides, zero synthetic fertilisers, etc.). Attempts to define agroecology do exist (agricultural law of 13 October 2014), but they are not yet stabilised and there are as yet no precise specifications as in AB (Lamine, 2012). Finally, agroecology is often judged by farmers as either too political or too technical, combining criteria of sustainability (durability) and resilience linked to ecosystem services, with societal and transformative ambitions (respect for the well-being of small producers, Thénard and Triboulet, 2017). It could even represent the general interest of agricultural policies, as a guarantee of the resilience and sustainability of food systems, provided that it is translated, for example, as a guiding principle of national strategic plans (applications of the Common Agricultural Policy). In the final analysis, agroecology represents a horizon of expectations integrating militant demands and agronomic experiments, in search of a new scientific paradigm that has been stabilised and adapted to different agricultural contexts and a diversity of agro-ecosystems (Duru, Sarthou and Théron, 2022).

2.2 Innovations

An innovation can be defined as the marketing of an invention and/or its integration into a given social environment, according to methods and speed of dissemination specific to the invention and the environment. According to Alter (2000), it is "the articulation between two universes: that of discovery and [that] of market logic and/or social use, which represents the means of profiting from inventions". Four forms of innovation are generally accepted: product, process, marketing and organisational innovation (OECD, 2018). In an agricultural value chain, a typical innovation process will include, for example, an initial stage in which the invention is conceived, followed by its adoption in the value chain (referred to as the "incentive" phase), its appropriation by the players in the value chain (in particular, dissemination among farmers, acceptance of products from the value chain by processors, distributors and consumers) and finally its institutionalisation. While innovations are often seen as aiming to disseminate a purely 'technological' invention (including agronomic ones, such as a new manufacturing process, limiting the environmental impact of a human activity, preserving a natural resource or limiting a toxicological risk), it is important to emphasise that 'non-technological' innovations (social, organisational, institutional) can be involved in both the design and adoption-dissemination stages. Such innovations respond in particular to the need to accompany the breakthroughs of technological innovations, but they go much further, as we shall see later in the article.

2.3 Organisational innovations

We start with the definition of organisational innovations, which relate to the economic and social relationships between actors within systems (in our case, food systems, between different producers, or between producers and consumers). The Oslo Manual (OECD, 2018) cites several examples of organisational innovation, first and foremost the adoption of advanced management techniques that may concern a total quality service. Other examples fall into the category of significant changes in organisational structures, and the adoption of entirely new strategic directions or a significant change in a company's strategic directions. In the case of agricultural and food systems, a first example concerns new channels for supplying consumers with food products (e.g., adoption of digital technologies for product selection, product information searches and purchasing patterns, see Magrini, 2023). With regard to agricultural production in the strict sense, organisational innovations include the provision of observation data on the state of crops and the weather before planting crops or the definition of a calendar of cultivation practices. Finally, this category of innovations includes new systems for certifying agricultural or food products using multi-criteria specifications, as well as checking that products comply with these



specifications (see, for example, Loconto, Poisot and Santacoloma, 2016, on market innovations in developing countries, towards sustainable agricultural systems).

2.4 Institutional innovations

We now look at institutional innovations, which are often considered to be special cases of organisational innovations, but which are directly linked to government and public policy. According to Hargrave and Van de Ven (2006), these are "new rules and ways of organising relationships between different actors within a system. These innovations occur when actors and organisations mobilise strategically via networks to reform or replace existing institutions. They help to redefine sustainable practices and link up players in food systems who were not used to cooperating". According to Berriet-Sollicec (2011), "they generally fall within the scope of public intervention, and focus on the content of the systems implemented and the way they are organised by local players". Moreover, for Delpuech (2016), "an institutional innovation can [] be defined as the process of collective action by which a new institutional arrangement is introduced into a specific social system." An example of institutional innovation is the design or reform of a regulatory environment by a region, in order to adapt European or national policies to the needs of a territory (Petit, 2015).

3. The intersection of agroecology and innovation

In this section, we look in more detail at the intersection between agroecology and organisational and institutional innovations, starting with a discussion of the factors likely to promote or, on the contrary, hinder the transition to agroecology.

3.1 Agroecology and innovation

Because the various agricultural and agri-food sectors are so closely interwoven and interact on a regional or national scale, a successful transition to agroecology necessarily means that the concept and its practical applications must be adopted by all the players in the food system. These include, of course, all those involved in agricultural production (including agri-supply and farm advisory services), as well as all the subsequent stages (from farm to fork): processing, distribution, marketing, wholesale and retail trade, catering, waste management, etc. From this systemic perspective, it makes sense to focus on organisational innovations that enable a renewal of contractual and commercial relations between players, to ensure a shared transition to agroecology.

By renewing the relationships between stakeholders in food systems, AET presupposes a new sharing of the value generated by the market sphere associated with marketed food products, but also of the non-market value of the ecosystem services that it enables to be preserved. It is therefore not surprising that, as with any innovation, the opportunities but also the obstacles to adoption are perceived differently by the stakeholders to whom adaptation is required by the introduction of this innovation. Some success factors or obstacles may be generic to any type of agro-ecological system, or may be specific to a particular agro-ecosystem (for agro-pedoclimatic reasons, for example). In the vast majority of cases, the success of AET depends on the balance between the cost of implementing it and the intensity of consent (to accept the technological aspects by producers and processors, to pay for food products by distributors and consumers), as well as on a vision shared by all the stakeholders of the organisational aspects.

A major research challenge, particularly because of its operational implications, concerns the need to analyse the conditions for the design and development of different complementary or substitutable agricultural models (agroecology, conventional agriculture, organic agriculture, etc.). This issue also includes examining the factors that explain transitions from one system to another and the potential for stabilising a system such as agroecology once the transition has been completed.



As a corollary, the obstacles to the transition to agroecology need to be analysed in terms of the organisational and institutional innovations that can be implemented to remove these obstacles, by acting on all or some of the factors underlying the consent linked to the adoption of agroecology (Fares, Magrini and Triboulet, 2012). A prerequisite for MT is the existence not only of individual and collective interests but also of the means available to ensure them. In general, therefore, the starting point has to be technological solutions that already exist and are financially accessible to those who request them. However, even if the willingness of these players to adopt is sufficiently high, the transition must not be blocked by financial constraints, which are sometimes beyond the control of the players.

The structure of the financial assets and/or level of debt (over-indebtedness) of certain players is an often overlooked restraint on the agro-ecological transition, for two reasons. First, the level of public debt may be the source of the State's limited capacity to ensure that environmental regulations are applied, and to finance programmes of measures to support this transition (training, conversion aid, etc.). Second, as far as producers are concerned, their ability to change their production system may be reduced or even annihilated because of financial constraints linked to their indebtedness to players in the sector (cooperatives, for example). A policy to support the agro-ecological transition will therefore have to be based on organisational and institutional innovations aimed at reviewing the financial structure of players with an interest in the ecological transition. Such innovations in financial engineering will enable a critical mass of players to emerge who will have the financial resources to implement the agro-ecological transition.

3.2 The many facets of innovation in agroecology

The previous sections have presented arguments in favour of innovations that are not only technological in origin, but also organisational or institutional. While the former aim to enlist all the players in the farming world in the agro-ecological challenge by relying on federating groups, the latter are often dedicated to the implementation of cross-disciplinary public action, going beyond the logic of specialisation by industry or sector. In both cases, the design of innovations and the assessment of their expected impacts cannot be considered independently of the objective assigned to agroecology. In this respect, the role of innovation in the agro-ecological transition is open to question: is it a question of reorganising the relationships between players in such a way as to return to the agricultural and food systems that existed before the phase of high levels of post-war specialisation? Should we be promoting forms of agroecology that use digital techniques (for agricultural production, plant and animal health, anticipating and managing climatic events, etc.), or should we be promoting tried and tested farming practices that combine productivity and environmental conservation? Organisational innovation in agroecology does not, in fact, mean the systematic use of technological innovations, but can be based on agricultural practices associated with greater diversification and/or resilience.

Another aspect of innovation in agroecology is the question of the scale at which it is supposed to develop. Reasons linked to the potential existence of economies of scale (lower average production costs with the total volume produced) and scope (with the range of products), as well as the wider and faster dissemination of technical knowledge, militate in favour of an increase in the scale of agroecology. Organisational innovations should facilitate or even stimulate this movement, provided, of course, that the principles of agroecology are respected at all levels of production. This question is linked to the complex issue of the trade-off between the development of agroecological systems in small areas, aiming for resilience through disconnection from global value chains (supply of inputs, integration into international markets) on the one hand, and the risk of confining agroecology to market 'niches' on the other.

Finally, as with any dissemination of innovations aimed at transforming food systems towards improved sustainability and health, public policy objectives need to be aligned. More specifically, the set of regulations and measurement instruments faced by stakeholders in food systems must be globally coherent (i.e. there must be no contradictions between objectives and issues). Such an alignment of public



policies (agriculture, environment, health, etc.) should ideally ensure effective sharing of the efforts and risks associated with the development of innovative sectors, with initiatives from the private sector. The distinction between organisational innovations (relating to the renewal of interrelationships between industry players) and institutional innovations (associated with public action and policies) should be able to feed off each other.

4. Examples

In this section, we present two examples of organisational innovations in favour of MT in France. The first is actually a set of initiatives from agri-food companies, and the second concerns contractualisation in collective catering as a lever for the transition to agroecology.

4.1 The agro-ecological transition and the market

This first example concerns the appropriation of the concept of agroecology by the agri-food sectors, via organisational innovations aimed primarily at promoting such appropriation among consumers. Insofar as food purchasing decisions, which ultimately determine the market share of the agri-food industries, depend on a range of factors including information on the origin, composition and production methods of the final product, the strategies of the agri-food industries (AFIs) naturally play a central role in AT.

A detailed analysis of agroecology initiatives by the agri-food industry has been proposed by Magrini et al (2023). Using 28 case studies based on some sixty interviews conducted in 2022 and cross-referenced with industry reports and documents, the authors analyse the way in which agroecology principles are implemented by suppliers to the agri-food industry in order to build a market. Central aspects of such a construction include the actions through which the LPNs and distributors transmit information to consumers, mobilise resources, extend their network and develop knowledge. The aim is for the food industry to build differentiating supply chains, defined as networks of innovative operators organised around the production and marketing of agroecology-based products.

Organisational innovations are then proposed by the players, to make the sharing and transmission of information along the agro-ecological supply chains more effective, in particular via innovative approaches in terms of communication and differentiating labels. Such approaches can be positioned according to the corresponding link in the food system, associating farms with cooperatives, cooperatives with manufacturers, and the latter with the distribution sector.

The conclusions of the study can be summarised as follows. First of all, the construction of change towards agroecology by the players in the sectors is based on different starting points: reduction of environmental impacts for the most part, as well as respect for animal welfare in livestock farming. The main direction of change depends on consumer expectations, the image and reputation of the food industry, the area in which it is located, regulations and the receptiveness of producers. Secondly, agroecology must be considered within an overall analytical framework that includes the way in which the communication strategies of the food industry are constructed. It emerges that communicating about agroecology is all the easier if the media highlight specific (production) practices, rather than the term agroecology itself. Agroecology is used unevenly by the sectors, which sometimes prefer the terms "eco-responsible", "pro-environmental", "sustainable", etc. The prevailing rationale is to develop a differentiation approach specific to the company, with specifications for suppliers (charters, collective brands).

This is all the more important given that the consumption of products derived from agroecological approaches remains limited in terms of market share. In addition to the problem of limited or even declining consumer purchasing power in a period of inflation and/or wage stagnation, there is also the problem of consumer preferences. While consumers may perceive the environmental benefits of the agro-ecological approach, their perception of it is less immediate than in the case of organic farming, especially when it



comes to health benefits. Several channels need to be mobilised to make agro-ecological approaches easier to understand: firstly, public authorities, in their role of providing guidance and support through agricultural, environmental and health policies; secondly, inter-sector groups and inter-professional organisations, which can organise the sharing of knowledge and feedback; thirdly, farm advisers, who can incorporate the concept of agroecology into their training courses and farm support (De Tourdonnet and Brives, 2018). One example of organisational innovation could be a rethink of the way specifications are drawn up as a basis for contractual relations between producers and processors (or distributors), favouring a systemic approach and better adaptation to local constraints (climate, natural resources, etc.).

4.2 Collective catering in favour of agroecology

The second example of organisational innovation concerns public procurement as a lever for the development of agro-ecological systems supplying local food to local authorities (e.g. the contract catering sector). The latter are increasingly involved in Territorial Food Systems (TFS), the aim of which is to enhance the value of food products from local supply chains, while promoting a better sharing of the value created in the area. TFSs also aim to design agricultural production and food consumption models that are more respectful of the environment and health, by reducing waste within the food chain. Local authorities' commitment to local food follows on from the Milan Pact (2015) and the Rennes Declaration (ARF, 2014), and in some cases extends territorial sustainable development projects (local Agendas 21, for example). It is worth noting the driving role played by local players in giving impetus to TSS projects; most often these are associations and local elected representatives, services operating in the agricultural sector, or school catering. Over the last fifteen years, public policy in this area has been progressively organised around the National Food Programme (2008), the first call for TAP projects (Territorial Food Projects, in 2016) and the General States on Food (2017). The TAP scheme, initiated in the Law on the Future of Agriculture, Food and Forestry of 13 October 2014, is an innovation on a territorial scale, mobilising partnerships between the private sector and local public authorities (Chiffolleau and Paturel, 2018).

However, there are a number of limitations and difficulties associated with the organisational innovation of using public procurement for contract catering. First, contract catering involves a large number of uncoordinated players, with significant coordination costs as a result. For example, some structuring tools are sometimes absent from the region, such as vegetable centres, and there is a risk that they will remain so because of the limited investment prospects if collective catering is not enough to make them profitable. Second, it is difficult to re-anchor the food sector in the region through mass catering alone, partly because the creation of value and wealth remains relatively limited in most regions. This is because collective catering (particularly in schools) is restrictive: the prices charged are relatively low because of pricing constraints, and the volumes contracted are generally too low to benefit from economies of scale. Finally, specifications that include the need to use seasonal production and/or specific crops (field vegetables, for example) are additional constraints for producers, who may prefer to find outlets elsewhere for their products.

In any case, the organisational innovation represented by the use of public procurement as part of territorial food projects also concerns contractual practices between producers and suppliers. Economic relationships, formalised by contracts containing quality specifications and clauses relating to volumes sold over a more or less long supply period, need to evolve in tandem with technical innovations and consumer preferences and living conditions.

5. Conclusions

This article provides an introduction to the organisational and institutional innovations that can be mobilised in the transition of food systems to agroecology. Starting with a brief reminder of the definitions of the main terms used, we then discuss the link between (the transition to) agroecology and



(organisational and institutional) innovations, in particular the obstacles to the agroecological transition (including the limits to the implementation of private strategies or public policies due to financial constraints), the question of scale, and coordination with public policies. The article concludes with two examples: the agri-food industry's market initiatives in the field of agroecology, and the use of public procurement to encourage the transition to agroecology.

Without claiming to be exhaustive of the different dimensions of organisational innovation in the agro-ecological transition of agricultural and food systems, this article opens the way to the following reflections. What conditions are necessary for organisational innovations to contribute to the transformation of farming practices? What lessons can be learnt from cross-disciplinary studies on the conditions for the emergence and dissemination of innovative experiments? How do stakeholders organise themselves to design and disseminate organisational innovations that promote the ecological transition of sustainable agri-food systems?

Ethics

The authors declare that the experiments were carried out in compliance with the applicable national regulations.

Declaration on the availability of data and models

The data supporting the results presented in this article are available on request from the author of the article.

Declaration on Generative Artificial Intelligence and Artificial Intelligence Assisted Technologies in the Drafting Process.

The authors used artificial intelligence in the translation process from French to English

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Declaration of interest

The authors declare that they do not work for, advise, own shares in, or receive funds from any organisation that could benefit from this article, and declare no affiliation other than those listed at the beginning of the article.

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