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Innovative governance and dynamics of cognitive models for agriculture in territorial development – Lessons from a collaborative research program

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Abstract: For and About Regional Development (PSDR) is the largest French research program focused on the analysis of rural and periurban dynamics. It is designed as both a process of scientific knowledge production, and building methods and tools for decision and action in the territories. In this paper we intend to analyze the contribution of the PSDR program in the construction and diffusion of agricultural and rural development models. The specificity of PSDR research devices and their integration in regional arrangements on research and action for regional development is analyzed. We show what kind of knowledge is produced, how it questions agricultural practices and rural development policies at regional level, and also the influence of these processes in terms of structuring networks and cognitive communities at local and interregional levels. In that way, we can assess the innovative role of the PSDR program concluding on its influence on “niches” organization standards diffusion, or transition process. The mobilized data to lead our analysis consist of a detailed knowledge of the PSDR device from our experience of management of the program and various documents produced by projects and animation teams in each of the ten regions involved in the program.

Keywords: PSDR program, innovative governance, agriculture, rural development, cognitive models, partnership, Territorial development

Introduction

For and About Regional Development (PSDR) is the largest French research program focused on the analysis of rural and periurban dynamics. It is designed as both a process of scientific knowledge production, and building methods and tools for decision and action in the territories.

The governance of the program consist in the implementation of an original method and the sequence of specific steps: multidisciplinary, partnership between local actors and researchers, co-building of research questions between researchers and with partners involvement; common production of the shape and calls for proposals, co-definition of experimentation field, working together within the framework of partnership projects , production of scientific results on the basis of back and forth between the research laboratory and the field; valuation and dissemination of these outcomes: Scientific publications; Teachable content; Management tools for partners; Precepts for action of policy makers.

In this paper we intend to analyze the contribution of the PSDR program in the construction and diffusion of agricultural and rural development models. The specificity of PSDR research devices and their integration in regional arrangements on research and action for regional development is analyzed. We show what kind of knowledge is produced, how it questions agricultural practices and rural development policies at regional level, and also the influence of these processes in terms of structuring networks and cognitive communities at local and interregional levels. In that way, we can assess the innovative role of the PSDR program concluding on its influence on “niches” organization standards diffusion, or transition process.

The mobilized data to lead our analysis consist of a detailed knowledge of the PSDR device from our experience of management of the program and various documents produced by projects and animation teams in each of the ten regions involved in the program. The first part of the paper is devoted to some reflections about the question of innovation in regional development analyses and policies. The second part sheds light on the main peculiarities of the PSDR programs and its growth during the late 90's and the early 21ones. The conclusion opens ways for the new PSDR4 program and its recent developments.

The issue of innovation in regional development

Development as a dynamic process linked to innovation

For two decades, an increasing part of scientific papers have been dealing with the idea that regional or territorial development is closely linked to the occurrence of dynamic ruptures with the past due to innovative or creative processes. This explains the varying speeds and amounts of development of different regions or territories (Dunford, 1993; Scott and Storper, 2003). Analyses of regional development based on processes of innovation and regulation, as well as some systemic approaches, thus conclude that local systems are subjected to successive phases of growth and stagnation, even of recession (Colletis *et al.*, 1999). It is the internal shocks which can transform systems and lead to the appearance of spatial concentration of people and wealth, as well as of zones of social and spatial exclusion. Innovation, its creation and its dissemination are therefore at the heart of these approaches (Cooke and Morgan, 1998).

During the last decade, the analysis of spatial dynamics has been enriched by work rooted in evolutionary theory (Frenken and Boschma, 2007). It considers the uneven distribution of activities in space as resulting from largely contingent historical processes. The Evolutionary Economic Geography accords a predominant place to the entrepreneurial dimension, whether based on genealogy or on processes of emergence, growth, decline and cessation of business activity (Boschma and Franken, 2011). The focus is mainly on the roles played by spin-offs and labour mobility in territorial development processes (Maskell, 2001) and on mechanisms for replicating routines within the local industrial system. Taking advantage of geographic, industrial and technological proximity between sectors (Torre, 2008) and of institutional mechanisms and network structures, these technologies spread by the snowball effect between the companies and technologically related industries, and eventually lock local systems into spatial dependencies on the growth path. This process works particularly well when the industries are emerging or are based on related technologies, with low cognitive distances being particularly conducive to the circulation of knowledge spillovers (Nooteboom, 2000).

Technological innovation within poles of development

Approaches dealing with the role of innovation in the dynamics of territorial or regional development are based on taking into account the importance of R & D or innovation in local development. Partly inspired by Schumpeter's work, these approaches rely on the idea that innovations are key to development processes and that R&D efforts and incentives for innovation can play an important role in the establishment and success of the dynamics of growth. It is often a matter of a systemic approach, one which emphasizes the role played by innovation transfer and dissemination at the local level (Feldman, 1994; Autant-Bernard *et al.*, 2007). It also underlines the importance of face-to-face relations and of expansion phases by setting up of spin-offs and via support of creative efforts (nurseries, incubators, etc.). The engine of development is thus found in the presence of localized spillovers of innovation or knowledge, which spread within the local system and can give rise to very competitive local systems such as technology hubs or competitive clusters. It is innovation that powers development and differentiates dynamic systems from those that are not.

These analyses draw support from the changed perception of innovation processes: from a purely linear model to the interactive one (Lundvall, 1992). The question of the scale at which the innovation process takes place in association with the dynamics of development is also an essential element of the debate. Studies have been conducted on how these systems are deployed at the regional scale. They have sought to understand under what conditions local and regional networks and institutional mechanisms were more or less favourable to innovation and what were the conditions propitious to their adaptation and permanence over time (Lundvall and Maskell, 2000). These studies resulted in approaches of regional innovation systems (Cooke and Morgan, 1998) seeking to find ways to anchor innovations in territories and attempting to identify conditions leading to efficient and successful systems. The role of regional and local institutional mechanisms appears essential to reduce uncertainty and to support coordination and collective action conducive to innovation processes.

Innovation through knowledge creation

More recent works highlight the central role played by knowledge and its implications for territorial and regional development in association with innovation processes. According to these studies, development can be understood as the transformation of a set of assets consisting of products poorly developed and exploited by an under-qualified workforce into a set of knowledge-based assets exploited by skilled labour, with information regarded as an essential raw material (Lundvall and Maskell, 2000). Learning ability is thus revealed to be essential to the adaptive potential of territories and regions for their development. Learning is considered a collective, social and geographical process which brings about an improvement in individual or organizational understanding and capacities.

Interdependent non-market relationships between institutions are key to a territory's or region's performance as measured by innovation, productivity growth and development. Relationships of trust – as well as high levels of tacit knowledge and the existence of routines – determine the structure of local mechanisms of cooperation and coordination. They can then be viewed as relational resources conducive to an increase in learning abilities and to the creation of benefits that other territories will find hard to replicate. In such a perspective, urban spaces and, more generally, urban territories are considered favourable to innovation and to knowledge creation due to the cognitive externalities they can generate (Scott and Storper, 2003).

The recognition of the role of innovation, knowledge and learning in the processes of regional and territorial development has had an impact on the evolution of development policies, which are now most often characterized by a set of infrastructure-oriented interventions (transport, high-speed telecommunications, etc.). These policies also extend support to less tangible elements such as network structuring and knowledge transfers in order to strengthen collective capacities of knowledge creation and learning. The challenge then remains to build assets that are endogenous to the territory. Nevertheless, any examination of strategies pursued at the territorial or regional level (in addition to within a same national framework) shows the relatively low creativity of solutions put in place and the difficulty of most territories to differentiate themselves clearly and sustainably.

Towards territorial innovation?

The theoretical models therefrom advanced are still characterized by an unfortunate lack of clarity in messages destined for decision makers seeking to improve public policies. Often based solely on high-tech activities, oriented by technology and by a market-focused corporate culture, these proposals narrow the field of innovation to the most technological of dimensions. In this way, they neglect not only incremental innovations but also ignore many territories which do not adhere to high-tech principles but are still characterized by other sorts of vibrant innovation activities (social, organizational, institutional, etc.).

A way forward on these issues, and in particular on including the question of innovation in an analysis that encompasses all territories, including rural ones, would be to broaden the debate to take into account the concept of territorial innovation in all its dimensions. Such a debate should lead to an improved understanding of the progress of humanity at the territorial scale (Moulaert and Sekia, 2003) and to permit analysis of innovation models actually useful to local communities. Some approaches, for example the work of the Group for European Research on Innovative Environments (GREMI) on the concept of the innovative milieus (Camagni and Maillat, 2006), have investigated the concept of territorial innovation in the most rural or underdeveloped territories based on organizational innovations and on the mobilization of local populations. The rules for collective action and institutional mechanisms are then considered as factors explaining innovative territorial dynamics. Innovation is viewed as a social construct conditioned by the geographical context in which it occurs; rooted in practices, it is therefore necessarily located in the space. The issue of territorial innovation is also addressed by the emerging fields of social and solidarity-based economy and sustainable development (Zaoual, 2008). New concepts have been created such as that of social innovation (Klein and Harrison, 2007; Hillier et al., 2004) which describes a set of corporate innovative practices in response to social needs which have been little met or unmet and/or implementing processes to incorporate an approach for social transformation over time.

This increased complexity requires the issue of territorial governance to be addressed not only with an objective of helping innovative processes to emerge but also of incorporating the various aspirations and wishes of the local populations and to link them with overall policies and regulations. Today territorial governance processes shape the phases of territorial innovation and thus constitute an engine of development and growth in rural or urban territories. They can be viewed as laboratories of change because they accompany and sometimes anticipate the changes underway in the territories by giving them shape, by helping maintain a dialogue and expressions of opposition and by preventing violent confrontations or failures of development due to sluggishness or expatriation. These changes are embodied in the opposing and twin forms of conflict and consultation which constitute the modes of expression and the vehicles of transmission of ongoing innovations at the territorial level.

The PSDR program: a collaborative research device for regional development

The research program "For and About Regional Development" (PSDR) examines the role of economic activities (primarily agriculture, agro-food, transport) and of rural and peri-urban areas in territorial development dynamics. Supported by INRA⁶⁹, Irstea⁷⁰ and Ifsttar⁷¹, in collaboration with French Regional councils, PSDR is intended to contribute to regional and territorial development through research and development operations conducted in partnership with local actors. This program analyses the dynamics at work in the territories, including innovation processes in the field of resource development and competitiveness of supply chains, preservation of ecosystems and adaptation to climate change, changes in urban-rural relations, or the development of territorial governance mechanisms and their integration into public policy.

PSDR program is in line with integration devices between research and development reinforcing for a decade. They result in interdisciplinary research devices enrolled in a proximity relationship with the practices and techniques, in reference to what Gibbons (Gibbons et al. 1994) described as Mode 2 of knowledge production, next to the more traditionally academic Mode 1. The relationship between these two modes of development of knowledge unfolds through redrawn organizational forms between research organizations and higher education, economic actors and public

⁶⁹ Institut National de la Recherche Agronomique : <http://www.inra.fr/>

⁷⁰ Institut National de Recherche en Sciences et technologie pour l'Environnement et l'Agriculture : <http://www.irstea.fr/>

⁷¹ Institut Français des Sciences et Technologies des Transports, de l'Aménagement et des Réseaux : <http://www.ifsttar.fr/>

authorities across territories, as formalized by Etzkowitz and Leydesdorff (2000) in the model of the triple helix.

Since the first generation of PSDR programs, to ensure the integration of knowledge in the practices and policies of regional development, the issue has focused on the ability to equip this device to define a set of partnership research configurations allowing both a variety of useful knowledge for action and innovation, and the mobilization of professional and institutional actors at the level of sub-regional territories and regions. The third phase of the PSDR program (PSDR 3) was initiated in 2007 and completed in June 2012. Scientific contributions and recommendations concerning regional development were provided and applied at regional and national levels.

Analysis of regional and territorial development processes: Foundation of the PSDR research projects

The originality of the PSDR Programs lies in their being designed and developed within the regions and in relation to the concerns of the interested parties. The collaborative research aims to describe and analyze the processes of regional development, and to provide tools to development actors. The research rests on a mechanism of selection and evaluation of the quality of the research conducted. The Scientific quality is ensured by the joint development of the projects and an evaluation by an independent scientific committee

In operation since the 1990s and constantly being improved, the PSDR programs differ from other research devices in that they use a method and an engineering approach that ensure the joint development of partnership, as well as an evaluation by an independent scientific body; they help monitor progress of the research at each stage of the project, and make it possible to develop tools to promote knowledge transfer and utilization. The selection of the projects and the research works produced for their duration follow a precise itinerary:

- 1) The research themes and projects are discussed and selected in regional forums. The call for proposals is addressed to all interested researchers: Large research organizations (CNRS ...), Universities, Schools of engineering. The projects are co-developed by researchers and partners, under the guidance of local coordination units.
- 2) Teams are invited to respond to the national call for proposals, which comprises regional components taking into account local specificities. Research and project proposals are rated by an independent Scientific Council, composed of international experts in social sciences and biotech.
- 3) The projects listed in the A and B categories are examined in each region by the steering committee, who determines their eligibility and the amount of funding to be allocated to them. The C-listed projects are eliminated.
- 4) A team of permanent partners monitor the projects on a regular basis throughout the four years of work. The Scientific Council monitors the progress and quality of the research work, and conducts the final evaluation. Cross-cutting teams promote exchanges between regions and disciplines, reinforce the program's coherence and help create a common culture.
- 5) The use of adapted materials facilitates the dissemination of the results and their comprehension by the partners and researchers. The posters provide a synthesis of the questions raised in a project, and present the methods and resources used to address them. The 4 pages provide a compact description of the research objectives and the main results obtained in the course of the work.

PSDR: a multidisciplinary approach to understanding territorial dynamics

PSDR involves the joint participation, in each region concerned, of Universities and Schools of engineering's researchers/lecturers and the researchers and engineers of the institutes. It is based on a complex multidisciplinary approach, involving three main compulsory layers.

- 1) Identification of the key regional and territorial development issues. The PSDR projects provide insight into regional and territorial development processes, and in-depth analysis of the role and place of agriculture and the food industry in rural and peri-urban areas. They have increased scientific knowledge, at local level, about some key societal issues associated with global and environmental change.
- 2) Development of analytical approaches to regional development combining different scientific disciplines. Combining biotechnology and social sciences, the projects provide comprehension frameworks and the results of cross-cutting analyses. The diversity of approaches, in different regions, to the same issue helps to broaden understanding of development challenges in the territories.
- 3) Interregional scientific activities. The desire to promote knowledge exchange, to develop a common culture and collaborations between research teams from different disciplines in the regions, has led to the launching of several parallel permanent workshops (Governance and Development of the Territories, Partnerships and working methods within PSDR, Forms of Regional and territorial Development). They were intended to coordinate the groups of researchers and partners involved in the projects around a framework of topics considered of major interest.

Knowledge transfer and utilization at regional level – at the heart of the PSDR's genome

One of the originality of the PSDR Programs lies in their being designed and developed within the regions and in direct relation with stakeholders' concerns. About 300 partners spread in the ten regions of the program were involved in selected projects. The collaborative research aims to describe and analyse the processes of regional development, and provide tools to development actors, whether they be private sector partners (farms, enterprises, cooperatives ...) or public actors (local and regional authorities, decentralized state services, training institutions).

The PSDR programs use a method and an engineering approach that ensure the joint development of partnership, help monitor progress of the research at each stage of the project, and make it possible to develop tools to promote knowledge transfer and utilization.

Co-construction starts prior to project commencement. It is founded in the collected views of field partners and institutional actors such as regional councils, and in exchanges between researchers and professionals during discussion forums. Joint project development rests on the participation of those directly concerned, in the collaborative process. The selected projects are monitored on a regular basis throughout the four years of work, by a team of permanent partners, who ensure the effectiveness of the partnership, the conformity of the scientific work conducted with the stated goals, budget compliance, etc. The monitoring work is based on building a tool for an annual review and forecast activities for the following year. This note allows researchers and project stakeholders a reflexive reading of the work undertaken and governance, and for steering bodies, verification of compliance with commitments, including a possibility of intervention for rapid adjustment.

The development phase consists in the production of a set of standardized dissemination tools, preserving the identity and coherence of the program. Technical data sheets describe the main operational tools designed for use by the professionals in each project. A number of focus groups provide more detailed insights into some methodological aspects or results of the projects, but also offer a large number of technical documents for use by partners in the regions.

Partnership assessment of PSDR3

The analysis of concrete situations of partnership in PSDR projects allows highlighting the role of relational paths rooted in the long term as well as the context in which this partnership fits. Thus, the first steps of building a collaborative project and forms of inter-existing knowledge (often from previous projects or common routes) as well as partners' belonging organizations, thematic concerns or use of methodological tools are all common terms of proximity that will guide the shape and direction of the project and partnerships within it. The process of mutual recognition, common language building, and adjustment of temporalities between research and action, and legitimization of people investment in the project and within their own institution also contribute to dynamics required for the effectiveness of the project.

The construction of knowledge in partnership relies on a complex work of translation and hybridization of existing knowledge (Chia and Soulard, 2010) to allow their passage between disciplines but also between research and practice in response to the needs of stakeholders. These needs are of two kinds: on the one hand, the distancing and better explanation of stakeholders' practices, or an understanding of the evolution of systems and contexts in which they work; on the other hand, dealing with more technical aspects and seeing in the collaboration with researchers an opportunity to develop new tools and enhance their technical skills.

Establishing trust relations appears essential for the success of projects. But analysis of PSDR program also demonstrates the dynamic feature of partnership arrangements throughout the project life, punctuated by the existence of key moments when can be redefined roles and expectations of each individual within the partnership. Provision of scientific results or definition of dissemination and transfer materials fall into this category. Chronological steps and evolution of the involved community influence the dynamic of the research project made of proximity and strengthening partnerships periods which are followed by moments of greater distance and less involvement of stakeholders, affecting processes of knowledge creation.

Thus, PSDR programs highlight that although rooted in a project device and marked by formalized relationships, partnership research remains largely dependent on contingencies and uncertainties related to any territorialized innovation process. It calls for a step by step engineering capable of supporting the adjustments and bifurcations that are sure to occur at each stage of the project. This engineering is based on three complementary figures: the "runner", which is often a person who provides an interface between differentiated social and professional worlds, supporting translation through its externality (PhD student, intern ...), his hybrid career, belonging to an interface structure, or having technical, leadership or managerial skills; the "binder" (Latour, 1995) consisting of objects (map, tool ...) crystallizing and materializing the exchange of knowledge; and the "device" that allows to structure and organize a meeting context between researchers and actors.

The main scientific results of PSDR3

The main scientific results are related to several main fields of regional and territorial development.

Some results are linked with the combination of environment and society topics, for the sake of territorial development, including the analysis of peri-urbanization processes, new sources of wealth creation (services, tourism, residential economy), efficient utilization and preservation of natural resources, location strategies and spatial mobility.

A second set of results is related to the use of local resources, such as consumption related issues and distribution channels, short producer-to-consumer food chains, innovation process, land use, sustainability of farming systems, creation of new activities, strategies of firms and cooperatives, functioning of commodity chains and management of local resources.

Another group of research is devoted to the identification of key regional or territorial development issues, taking into account common concerns but also the diversity of situations. For example, development of analytical frameworks to better understand and measure the impacts of climate change on water usage and farming systems, and pest risks for tomato production...

Several projects were intended to promoting territorial development through the production of agronomic and economic models that will help the actors concerned to better understand the effects of activities and of their geographic expansion; e.g. development of foresight scenarios and tools for analysing territorial governance and planning, construction of indicators - for example in the field of sustainability – taking into account the territorial dimension, regionalization of databases on climate change or innovation in small and medium agribusiness firms.

These analyses gained insight into the dynamics at work in the territories through a combination of disciplinary approaches. For example, a large number of studies on land use, combining the development of economic models addressing questions of land use regulation, or geographical, sociological and legal analyses of land management issues.

Some examples of the tools developed and operations conducted in the PSDR program

Several tools were produced during the PSDR program, and especially in the last phase of dissemination. Some of them were related to territorial engineering systems, like a guide intended to help players in action situations to develop an **Urban Planning program**: this guide combines reflective syntheses, concrete examples and tools for monitoring the actions engaged at territorial level, to facilitate initiatives in situations of multi-level and multi-actor governance. Another tool is a practical guide for farmers and agricultural technicians (CUMA, cooperatives, chambers) as well as elected officials and local communities representatives or planning consultants on the construction of multi-partner bio-methanization projects at territory level. It provides territorialized repositories of information on management of organic waste and residues, and the evaluation of the environmental impacts of bio-methanization. It also proposes adaptive methodologies for each stage and operation involved in the implementation of the project.

Several models were used for helping local farmers, agricultural technicians and teachers, like a patented tool for adapting farming and forage systems to climate change and hazards: the “Rami fourrager” (or “fodder board game”), which combines a board game and an Excel interface. This group facilitation tool helps initiate reflection on how to reduce sensitivity to climate variability and achieve fodder or protein self-sufficiency. Another model is designed for evaluating organic cropping, developed in a partnership between researchers (management and agronomy) and advisors from Chambers. Constructed using 49 indicators, it helps to consider all components of farming systems’ sustainability, including social acceptability and health risks for farmers. In particular, it provides knowledge to help lift barriers to the development of more environmentally friendly systems.

Last but not least, short producer-to-consumer food chains were studied and developed in the framework of the program. One project has served to create a diagnostic tool for testing relations between the actors of the short food chains and consumers. The other one served to implement a system for governing short food supply chains, in consultation with an tripartite advisory committee (elected representatives, traders, consumers), as well as a simple labelling system for indicating the geographical and social origins of the products offered.

Conclusion. Towards a fourth generation of PSDR programs

In the future, INRA, Irstea and Ifsttar wish to continue the PSDR program and launch a new generation of projects (PSDR4) in an effort to address the current challenges related to agricultural, territorial and regional development, and the evolution of public policy. The main topics to be addressed evolve to reflect the concerns of economic, social and public actors at territorial level,

while integrating the main structuring orientations of EU regional policy (including smart specialization and bio-economy challenges in the context of Horizon 2020 and of the great European transport infrastructure projects) and the CAP, as well as the drivers of wealth creation, in the territories, such as residential economy and tourism.

The program will lead to reinforcement of partnerships and of the knowledge transfer effort. Closer ties could be developed with the Rural Network and its regional affiliates, and the projects could be prolonged by one year to promote knowledge transfer and utilization, thus extending them to four years. The new projects should be organized in such a way as to promote interregional interaction between the various participants. To enhance the coherence of the program, a small number of key topics could be selected in each region. The principle of articulation between a national steering and coordination mechanism and regional mechanisms will be maintained. Finally, a particular effort will be made to meet the scientific quality requirements while ensuring that useful solutions are provided to the regions. Multidisciplinary partnership – a strong defining characteristic will be reinforced.

PSDR 4 aims to strengthen the ambition to better utilize scientific results and convert them into effective tools and mechanisms that help address the concerns of stakeholders, while taking into account the development issues identified across each region. The extension of the projects by one year in order to reinforce the diffusion and practicability of research outputs, symbolizes this commitment. Another goal, relative to the key issues common to different regions, is to better articulate the results so as to consolidate the scientific gains and transform them into operational tools, transferable between regions.

The new program intends to fill four main goals: reinforce the means of transferring scientific results to territorial actors; improve the co-construction of projects and of conversion tools; articulate the PSDR projects and other research mechanisms (CASDAR⁷², GIS⁷³, UMT⁷⁴ and RMT⁷⁵, etc.) to better identify its characteristics and added value, and finally raise the awareness of the research teams and partners about the challenges of knowledge transfer and innovation.

Several new research themes have been proposed for PSDR4. These suggestions for topics are to be discussed with the Regional Authorities first, and then with research partners. They draw the main lines for the future PSDR projects, over the 2015 – 2018 period, on the following items: Land uses and pressure in rural and peri-urban areas; Greening agriculture and global change; Territorial autonomy and agricultural development; Innovation at the service of man, the food supply sectors and the territories; Territorial development, urban-rural relations and strategies for increasing the attractiveness of the territories; New challenges and forms of public intervention and territorial development.

⁷² Compte d'affectation spéciale développement agricole et rural (Special Allocation Funds for agricultural and rural development)

⁷³ Groupement d'intérêt scientifique (Scientific Interest Group)

⁷⁴ Unités Mixtes Technologiques (Mixed Technological Units)

⁷⁵ Réseaux Mixtes Technologiques (Mixed Technological Networks)

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