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# Policies and actors in the agriculture innovation system

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**Abstract.** There is a long tradition of State intervention to support agriculture, and this has to do as much with national security issues (*food security*) as with the need to respond to market failures caused by the specificities of agricultural systems, especially in very recent times. The justification for public action aimed at supporting the innovation system in agriculture is that the results and implications of agricultural research are often a “public asset”, that the actors in the agrifood system - particularly those in the primary sector – are often fragmented, and that long time lapses frequently occur between the creation of an innovation and its adoption. Nowadays, active involvement of the final users of innovation is the key point, and this contributes to definitively overturning the view of agricultural innovation as a “supply driven” process. The chapter documents this transition at the European level, as reflected in the tools provided by the agricultural innovation policies. Within the initiatives promoted for the 2014-2020 programming period, it mentions the European Innovation Partnerships (EIPs) as the tool that most favours the new approach.

**Keywords.** European Union – State – AKIS approach – Innovation broker – Mission-oriented innovation.

## **Les politiques et les acteurs dans le système d'innovation agricole**

**Résumé.** *L'intervention des Etats en faveur du secteur agricole s'inscrit dans une longue tradition liée à des objectifs de sécurité alimentaire ainsi que, plus récemment, à la nécessité de remédier aux échecs du marché causés par les spécificités des systèmes agricoles. Dans le cas des initiatives publiques visant à soutenir le système de l'innovation agricole, la justification relève de la nature de “bien public” qui caractérise souvent les résultats de la recherche agricole et leurs implications, de la fragmentation qui marque souvent les acteurs du système agroalimentaire – en particulier ceux de la phase primaire – et des temps assez longs qui séparent la création de l'innovation de son adoption. Aujourd'hui, la participation active des utilisateurs finals de l'innovation devient un élément clé et contribue à renverser définitivement la vision de l'innovation agricole comme un processus axé sur l'offre. Le chapitre documente ce changement au niveau européen, qui se reflète dans les instruments mis en œuvre par les politiques pour l'innovation agricole. Parmi les initiatives promues pour la période de programmation 2014-2020, il est fait mention des partenariats européens d'innovation (PEI) comme de l'instrument qui favorise le plus cette approche.*

**Mots-clés.** *Union européenne – Etat – Approche AKIS – Intermédiaire de l'innovation – Innovation investie d'une mission.*

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## **I – Introduction**

Innovation has traditionally been the main driver of productivity growth in all economic sectors, and there is plenty of evidence to support the theory that public expenditure on agricultural research and development (R&D) has significant impacts on the total productivity of its factors (Fuglie, 2007; Alston *et al.*, 2010). At present, it is also the main stimulus towards combining the growth of economic performances with the growth of positive externalities generated by the agricultural sector and - to a larger extent - by the agrifood system (De Castro *et al.*, 2011).

The actors and organisations involved in the system of knowledge creation and transfer may be classified in three main groups according to their functions: researchers together with private businesses and farmers who create innovation; input and service providers who contribute to its diffusion; and the actors at the end of the chain who stimulate demand.

In the case of the first group, one of the main aspects that has been changing over the last few years is the recognition of farmers as co-creators of innovation. This vision identifying the farm as a source of demand and also as innovation producer, supports a more traditional approach, in which farmers are essentially beneficiaries of the products developed by industry and research. Among the actors in the second group, a very dynamic process of disintermediation and re-mediation is under way, regarding players and innovation transfer protocols. Within the last group, special attention has been directed over the last few years at consumers, who are increasingly called on to certify the effectiveness of innovation (Grunert *et al.*, 2008). Consumers were quite reluctant to change their food and buying habits at least until the 1980s, but are increasingly considered as proactive parties in the innovation process. The members of these groups constitute a dynamic system based on actions and interactions around which innovation is produced and activated and which are the heart of innovation systems (Hall, 2012).

This is the framework within which state action defines the objectives of innovation and directs its efforts by providing specific financial resources and policies that influence the evolution of the economy and of the tangible and intangible infrastructures available to the innovation system.

There is a long-standing tradition of government action to support the agricultural sector in connection with food security objectives and more recently with the need to respond to the market failures caused by the specificities of agricultural systems. In the case of public initiatives aimed at supporting the innovation system in agriculture, these may be justified by the “public good” that is often a characteristic of research outcomes in agriculture and their implications (OECD, 2013), by the fragmentation that is often a characteristic of the actors in the agrifood system, especially those in the primary phase, and by the consequent time lapses occurring between the creation and adoption of innovation.

## II – Public support for innovation in agriculture

Knowledge-based systems in agriculture are very diversified, not only due to the level of economic development achieved by different nations, but also to the existing differences in institutional frameworks. The structural and organisational polymorphism found even in advanced economies is the result of multiple approaches that have had to tackle and are still tackling widely differing economic policies and production scenarios. To summarise and simplify, we can say that different contexts produce different approaches and “paradigms”. Despite these differences, it is possible to indicate trends common to nearly all national innovation systems that have mostly emerged in the last twenty years.

The first trend concerns the strengthening of supranational cooperation mechanisms, which have been particularly boosted in the years following the 2007/2008 recession and the recommendations on this theme formalised in the G8 and G20 statement<sup>1</sup>.

The second trend relates to the general trend towards decentralisation of services for the transfer of innovation in agriculture and the subsequent emergence of new actors and new knowledge brokers. The last trend concerns the progressive increase in resources and initiatives directed at developing public/private partnerships for the solution of specific problems.

It is generally thought that all of this has improved the flows along the knowledge chain, and widespread application of methodologies to assess the results achieved has provided increased opportunities to analyse and correct criticalities.

In all countries for which relevant statistical data are available, public sector commitment to agricultural research and development measured in terms of expenditure is massive. Once again, however, the dynamics are diversified: the amount of public investment in R&D for agriculture ranges from 45% of the total in the United States, to about 90% in New Zealand, Poland, Argentina

and Turkey. Based on the data of the “OECD R&D database”<sup>2</sup> public expenditure in agricultural R&D grew between 1985 and 2005 in over two-thirds of the countries examined. However, in the second half of the last decade, due also to the economic recession, expenditure has fallen in over half of OECD countries. In the case of private investments, the agroindustrial system is lagging behind other sectors in terms of R&D intensity (traditionally quantified as the ratio between R&D expenditure and turnover). The European food industry has an index of 1.9%, compared with 6.4% for the leisure industry, 2.7% for the chemical industry and 10.6% for the IT sector.<sup>3</sup>

Public expenditure is not the only measure of state commitment to supporting innovation in the agrifood system. There are actually many other elements to consider, starting from context macroelements. Long-term macroeconomic policies combined with strong institutional capacities actually promote the conditions for high growth levels; they favour low and stable inflation rates and consequently support the growth and adoption of innovation (OECD, 2010).

More specifically, institutional capabilities affect the quality of *governance* systems and their capacity to respond to market failures (Haisey *et al.*, 2010). The main areas in which this capacity is expressed include regulations, fiscal policies, strategies for competitiveness, financial market operation and trade integration.

Measures regarding taxation and competitiveness, for instance, can encourage the growth of investments in R&D and direct them towards particular objectives (environmental, social, etc.), facilitate collaboration between different stakeholders and different elements of the complex knowledge chain, and improve infrastructures for the creation and exchange of knowledge.

Financial markets and commercial exchanges can also provide an extraordinary stimulus to support innovation; by helping to mobilise capitals, goods and human resources, they also support the sharing of knowledge.

Lastly the role of agricultural policies. These exist in different forms and at different levels all over the world, and are aimed at supporting farmers’ incomes. On the one hand, this may positively affect farmers’ capacity to invest also in R&D; on the other, it may hamper competitive dynamics and slow down structural adjustments (Fanfani, 1996). For these reasons, a transition is taking place especially in developed countries from a protectionist approach not centred on specific market failures to a more focused approach which is attuned to the profile of public assets connected with agricultural production.

### **III – The justification of public intervention to support innovation**

The theory of market failures and the justification of state intervention are viewed from different positions which have created two main schools of thought: the neo-Keynesian school concentrates on the means of correcting market failures, such as imperfect information (Stiglitz and Weiss, 1981), while the public choice theory (Buchanan, 2003) prioritises the role of the market in efficient allocation of resources.

Moreover, it is worth noting that the discussion about market failures does not cover the entire issue of state intervention in the specific field of innovation. One of the main limitations to the explanation of public intervention by the theory of market failures is its basic assumption that once the reasons for failure are resolved, market forces will be able to drive growth and development processes efficiently. However, allowing the market alone to drive the change may actually lead to sub-optimal social results (Nelson and Winter, 1982), and this explains the importance of state initiative, particularly in managing big changes, including the transition from old to new technical and economic paradigms (Perez, 2002). The example of the so-called information revolution explains this importance well: state action and resources have been important not only in the achievement of specific technological objectives, but also and above all in allowing the benefits

of the results achieved (the innovations generated and their applications) to fully express their potential in all components of the economy and society (Perez, 2002; Block and Keller, 2011). This is related to the aim of state action, defined by Keynes (1926) as “to do those things which at present are not done at all”<sup>4</sup>, and to the so-called innovative role of the State, which has sufficient resources and an overall view enabling it to invest in areas that would be too risky for the business community, and to manage the process of change via medium to long-term strategies that clash with the shorter “return periods” usually required by private capitals (Mazzucato, 2013).

Two main visions of innovation policies have developed through history, i.e. the macroeconomic theory and the theory of innovation systems.

The former considers innovation as a linear process, which starts from basic research and reaches the user (businesses) passing through all the different steps involved in research and development. Market failures justify the state action that involves research-oriented policies as the major tool.

According to the second theory, the policy of innovation systems is based on the interaction between different stakeholders involved in the innovation process, and on solving the systemic problems that affect knowledge production and transfer processes in a given context (Smits *et al.*, 2010).

While the macroeconomic vision is centred on the economic notion of balance, the systemic vision is more oriented to examining phenomena in relation to the notion of imbalance. This latter vision, which stems from Schumpeterian creative destruction (1911, 1942), has gained a foothold over the last decades. The OECD has long embraced this approach, and in 2005 it issued a set of recommendations aimed to promote its diffusion.

## **IV – Establishment of the systemic vision and the frontier of the European partnerships for innovation in agriculture**

Criticism of the linear vision of innovation transfer urges a more complex and systemic approach even in agricultural and rural systems, where the social aspects related to innovation production and development have a special importance. The family/business overlap that often characterises agrifood operators, and the special link between agriculture and territories actually produce cause and effect relationships in innovation systems that involve not only technological and scientific aspects but also significantly involve social issues.

The active involvement of innovation's final users becomes the key element that helps to overturn the vision of a “supply driven” innovation creation process in the agricultural sector (Oudshoorn and Pinch, 2003). In this framework, the role of information and communication takes on even greater importance in facilitating the interaction between all different components of the knowledge-based system. This focus on the knowledge creation process and on the role of quality and organisation of information flows has actually been a key element in the conceptual shift from the AKS (Agricultural Knowledge System) to the AKIS (Agricultural Knowledge and Information Systems) and to the consequent inclusion of actors outside the research, education and technical assistance system. In this sense, the role of communication in innovation transfer processes is constantly changing, going beyond the traditional areas of information and dissemination (Sulaiman, 2012) to become a more complex tool of connection, mediation and brokering between the relations and processes within which innovation and the technical and institutional adjustments it requires can grow.

Europe has long embraced this vision, advocating within the framework of its innovation policies in the agricultural sector the mobilisation of existing knowledge via a bottom-up approach aimed at

strengthening the interactions between the different actors in the AKIS. A long series of initiatives launched in the early 1990s has progressively strengthened the importance of participatory approaches to innovation. The terms “co-production” and “co-generation” have thus become common in rural development policies.

Within the initiatives promoted for the 2014-2020 programming period, the European Innovation Partnerships (EIPs) are the tool that most facilitates the systemic approach. Designed to facilitate flows between the production and utilisation of research, EIPs involve all components of the AKIS, promote a multi-disciplinary vision, and strengthen opportunities for exchanges and fusions between different territories with common needs.

In this regard, it should be specified that among the terms used to describe the features of agricultural innovation systems, the AIS (Agricultural Innovation System) covers the widest group of actors. AKIS is used with the same meaning in the European Union, although its meaning in other contexts is more restrictive.

These differences can be explained, as mentioned before, by the eminently “contextual” nature of innovation and innovation-related policies. These features mean that the debate as to the rightness or wrongness of an innovation model or paradigm is sterile, and should instead invite reflection as to which model or paradigm can supply the best responses in a given territory or context. The central issue is now the demand for innovation and which tools can be used to meet and satisfy this demand.

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#### Notes

- 1 <http://www.mofa.go.jp/policy/economy/summit/2008/>; <http://g20.org/>
- 2 <http://www.oecd.org/sti/inno/researchanddevelopmentstatisticsrds.htm>
- 3 These data concern a survey conducted on the top 1400 world companies investing the largest sums in R&D, contained in “the 2011 EU industrial R&D Investment scoreboard”. European Commission, 2001 ([http://iri.jrc.ec.europa.eu/research/scoreboard\\_2011.htm](http://iri.jrc.ec.europa.eu/research/scoreboard_2011.htm))
- 4 The important thing for Government is not to do things which individuals are doing already, and not even to do them a little better or a little worse; but to do those things which at present are not done at all”. Keynes, *The end of laissez-faire*, 1926.