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The Agricultural Knowledge and Innovation System in Italy: dynamics, incentives, monitoring and evaluation experiences

The new challenges facing the European agricultural and rural sectors call for a review of the links between knowledge production and its use to foster innovation, and for a deeper analysis of the potential of the current Agricultural Knowledge and Innovation Systems (AKIS) to react to the evolving context. This paper highlights how the Italian AKIS places itself in the new emerging framework, with a particular emphasis on the incentives guiding the system and the experiences of monitoring and evaluating the national AKIS policy. It shows that important changes are needed to approach the new efforts Europe is adopting to match innovation demand and supply.

Keywords: AKIS, incentives, monitoring and evaluation, knowledge policy

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Introduction

The complexity of the national knowledge systems is the focus of current European and global discussion: the revival of attention to the issue of knowledge in agriculture is due to the emergence of the more demanding challenges the sector is facing, especially climate change and food security (EC, 2010; OECD, 2012). The current European context surrounding knowledge policy is in turmoil. Proposals for the new Common Agricultural Policy (CAP) for 2014-2020, the Europe 2020 Strategy for a smart, sustainable and inclusive Europe, the project of building a European Knowledge Based Bio-Economy (KBBE), and the creation of thematic European Innovation Partnerships (EIP) with the aim of channelling policies and resources into the creation of innovations about specific themes are just some of the milestones of a new context where research and innovation are the core principles that the development of knowledge systems should build upon (EC, 2011a; 2011b). Yet, at present, Europe does not seem to be able to transform knowledge into products to be offered on the market, so these strengths on which the evolution of knowledge systems hinges are unlikely to result in real economic growth (Flemish Government, 2010).

Experiences with the Agricultural Knowledge and Innovation Systems (AKIS) reveal large diversity corresponding to different country contexts (EU SCAR, 2012). Changes implemented in the last decade indicate a general movement from the traditional linear top-down approach (from research to innovation to adoption) to an innovation systems approach (Hall *et al.*, 2006), which is more reactive and interactive, and where agents contribute together to find innovative solutions. But, at the same time, incentives need to be in place for the systems' actors to generate, develop and exchange new technologies, knowledge and experiences (OECD, 2012). Measurement of AKIS must be multidimensional. Although there has already been significant work devoted to characterising the drivers of the system, very few studies have measured the output and results of these systems (OECD, 2012). Monitoring of the knowledge and innovation systems is generally fragmented, and for the moment a major inconsistency exists between the high level of attention to innovation in the policy domain and the lack of data and research for evidence-based policy.

Since meeting the challenges ahead requires an evolution of the role of innovation and technology and an efficient transfer of this knowledge to the actors involved, a process of rethinking the national AKIS is therefore ongoing worldwide (Bergeret, 2012; Poppe, 2012). The aim of this paper is to raise awareness of the experience of the Italian AKIS, which has a particularly articulated structure that represents a typical specificity in the general European framework and about which not much has been published in the international literature. This allows the possibility to discuss which strategy should be followed to address the current system weaknesses and to design and implement a more efficient and effective knowledge policy. The central research questions associated with this exploration are therefore to what extent the Italian AKIS is ready to meet the changes the new European knowledge policy context requires, which policy and governance approach and at what level (regional and/ or national) could be effective in addressing fragmentation between research, extension and education processes of knowledge sharing and what could be done to exploit its potential in the general AKIS domain. The recommendations deriving from this evidence-based know-how support the process of monitoring the European AKIS and their evolution.

Methodology

The paper describes the Italian AKIS, in the form of a case study, with a particular emphasis on its dynamics, incentives, and the monitoring and evaluation experiences. It therefore proceeds with an overview of the organisational issues concerning the system, presents the evolution of the underlying knowledge policy and then reflects on the experiences so far realised in order to check the 'health' of the system. From this framework derives a discussion about the strategic choices to be made.

The Italian AKIS: organisational issues

The Italian AKIS is characterised by different organisational models, contents and approaches in its three constituent segments as defined by OECD and FAO: Education (henceforth EDU), Research and Development (R&D), Extension and the Support System (EXT). There is no unique policy for the entire system; rather it is possible to identify a specific policy for each component, with different roles and objectives (Esposti *et al.*, 2010; Materia, 2012). The presence of different institutional levels of responsibility in terms of knowledge promotion and management, the national and the regional ones, witnesses this critical aspect: secondary and higher EDU are the responsibility of the State, professional EDU falls within the regional competence. R&D is the responsibility of the State, the twenty Italian regions and the two autonomous provinces (AP)[1]. EXT falls within the regional competence.

The resulting fragmentation reaches significant levels, making it difficult to give an overview of the entire system. The lack of a unique policy is also due to the absence of a central coordination agency regulating the national AKIS, a problem felt even today in most European countries (EU SCAR, 2012). The high level of fragmentation within the Italian institutional system, together with the fragmentation of incentives that drive the different parts of the system itself, limit the efficiency of the system, which leads to a duplication of efforts and stimulates the challenge to achieve vertical and horizontal coordination in a coherent way.

At an operative level, moreover, different actors and different policies coexist, each of them with a specific ratio that seems to elude any rational systematisation.

The education system

The current structure of the Italian EDU system derives from significant changes initiated in 2008. With regard to secondary education, the reform has dramatically reduced the hours of teaching in vocational schools and changed the structure of the school courses. Introducing the autonomous 'training and vocational paths' on which the regions have exclusive legislative competence has offered the schools the opportunity to promote the territorial organisation of the education supply according to the needs expressed by the labour demand and the territory, forming in this way professional profiles that meet the local needs.

Higher education, instead, is represented essentially by the university and responds to programmatic indications defined by the State through the Italian Ministry of Education, Universities and Research (MIUR). The Italian university system is organised around faculties: for the agricultural field, there are currently 24 agriculture and 14 veterinary medicine faculties, with a staff of almost 3000 among professors and researchers (in 2011). These faculties are distributed across Italy, with at least one for each region. However, other

faculties may also implement agricultural education and training activities (i.e. life sciences, economics, medicine, engineering etc.), and this witnesses the multidisciplinary feature of the same activities. The reform has reduced the number both of faculties and departments, increasing coordination of activities, and has proceeded towards simplification and greater administrative efficiency and transparency of the internal university management.

Research and development

Owing to its complexity, the description of the public National Agricultural Research System (NARS) goes beyond the typical vision of an 'organic system' (Figure 1). It is in fact fragmented between different actors (individual actuators and funding institutions) and several programmatic initiatives that lack central coordination (Esposti *et al.*, 2010). Both the State and the Italian regions are in charge of this component. The principal national funder and manager bodies involved are MIUR and MIPAAF (the Ministry of Agriculture, Food and Forestry Policies). The national research bodies, instead, are grouped into three different structures: (a) university, funded and supervised by MIUR; (b) National Research Council (CNR), funded and supervised by MIUR and carrying out research in all fields of knowledge including agriculture (through its Agro-food Department, 640 personnel units involved in 2010); (c) public research institutes funded by MIPAAF: the principal structures, with agricultural research as institutional mission, are the National Institute of Agricultural Economics (INEA); the National Research Institute for Food and Nutrition (INRAN); the Council for the Research and Experimentation in Agriculture (CRA). On average, in the last three years these institutes have together employed about 1600 units of which 506 are researchers.

MIUR and MIPAAF fund almost all of the fixed costs of the national structures (staff, instruments, offices) and sup-
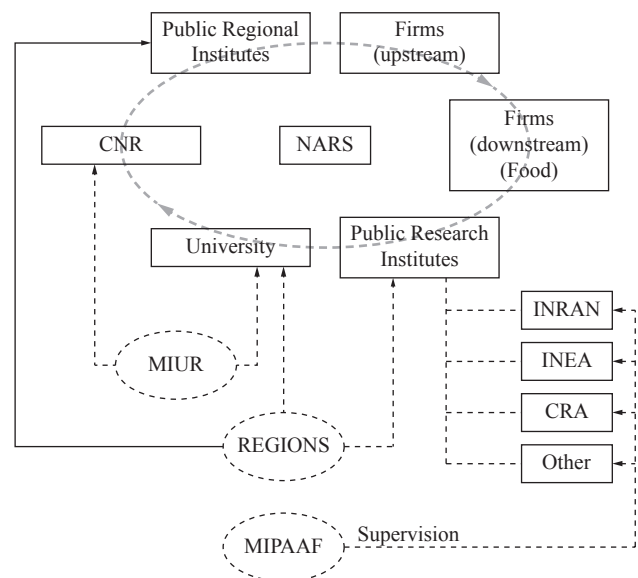

Figure 1: Structure of the Italian National Agricultural Research System.
Source: Own composition

port R&D directly or through national financial instruments (e.g. the National Research Programme). The Italian NARS is supported also by the regions, whose role in the field has increased as a result of important context stimuli (administrative decentralisation, generalised reduction in financial resources, the European Community rules on state aid) and since the Italian Constitution was in part changed in 2001 to explicitly recognise their relevance in the identification and promotion of research programmes, detection of territorial needs for research and innovation and in the autonomous funding for research projects tailored to the specific requirements of their local agriculture and agro-industry system. The twenty Italian regions and two AP fund agricultural research either directly or indirectly. Some regions have their own research structures, others implement their own research programmes through national structures (e.g. universities) situated in their territory. R&D represents however an example of the great distance and limited collaboration between the two levels of responsibility: the influence of the regional level on the system governance is low, although its role in promoting local research activities is crucial.

The role of the private sector, finally, seems to be not very influential: the upstream and downstream firms undertake some R&D activities, but sometimes they face structural difficulties which discourage them in realising research. Nevertheless, innovative firms are part of the NARS as knowledge carriers, feed-back generators, and leaders to which other firms look to innovate. Although there is little evidence on private expenditures, encouraging data on the innovation capacity of farms run by young farmers come from analysis the Italian 'Observatory on the innovation of agricultural firms' made during 2011[2] (Agri2000, 2011). The study shows that to be 'innovative' an agricultural farm should recur to a 'managerial administration' and be guided by a strategic path that makes training, networking and business organisation its strengths[3].

Extension and the support system

Extension and the support system in Italy refer to a unique, complex and evolving entity which usually covers basic/specialised technical and financial extension support[4] to farms and farmers, as well as all possible forms of information and innovation dissemination that enable farms to express their economic and social potential. The support system is a sub-system of extension: the first is supported exclusively by the public as it provides advanced

Figure 2: The extension and support system component of the AKIS in Italy and classification of services.
Source: Own composition based on Ascione and Vagnozzi (2011).

level technical instruments whose high cost could not otherwise be afforded; extension is coordinated by the public but managed and implemented by different organisations, including private ones in some cases. As the field of interest of the public extension is very broad and diverse, services have needed a complex system of classification which is briefly depicted in Figure 2. This component, therefore, consists of two parts, very different from each other: the private component, including professional agronomists assisting farmers and private industries producing inputs for agriculture[5], is targeted to medium-high income firms; the public one, supported by public institutions and implemented by both the public and the private, is motivated by economic policy objectives and promotes the development of agriculture and rural territories (Vagnozzi and Volpi, 2008). Each region autonomously manages programmes and funds policy interventions to promote public extension services in the context of a specific law that identifies areas of expertise, roles, actors and procedural arrangements for the funding allocation. It follows that the Italian AKIS lacks a 'national' extension system as each regional reality has organised the issue in peculiar ways both in terms of productive sectors and territorial typologies, and in terms of actors to be involved[6]. The regions support services for farms using European, national and their own funds. For more than ten years they have promoted public calls (for public and private bodies) that are specialised in different services to the farms.

The debate on the effectiveness of services provided by the various organisations involved has always been animated: both the public and the private sectors try to meet

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[2] Despite the overall decline in the number of farms, the share of farmers under 30 years old has increased (2.5% in 2010 against 2.1% in 2000); the same trend is found for farmers under 45 years old (18.6% in 2010 against 18.2% in 2000) (Istat). The Observatory covers a total of 90,000 young professional farmers, 11% of farms entering the Italian Chambers of Commerce and Industry, and 36% of the national agricultural production value. The sample analysed in the Report consists of 1,000 young entrepreneurs interviewed on innovation issues in October-November 2011.

[3] The main areas where the managerial profile of entrepreneurs appears to have innovated are production (89%), organisation and management (64%) and product marketing (52%). It is estimated that a farm management oriented to training, market openness, the use of the Internet and ICT, a strategic vision towards the future, the creation of collaborative networks and integration with other farms have resulted in a more than 30% increase in production for 75% of the sample (Agri2000, 2011).

[4] Technical supports are activities collecting and processing data useful to the agricultural processes by means of advanced level technical instruments (e.g. meteorological networks and chemical laboratories). Basic extension is an all-purpose assistance given to farmers, but nowadays its use has been reduced since farms are often specialised and they rather need expert advice.
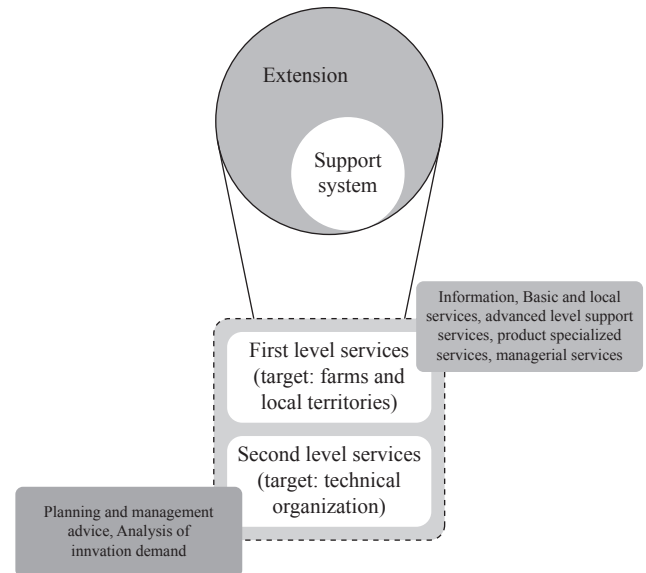
[5] For the diffusion of the varietal, chemical, mechanical etc. innovations produced, agronomists, biologists, engineers and veterinarians offer advice, technical assistance and training both to the farms and the network of technical means's wholesalers and retailers using technical journals, specialised exhibitions, fairs, websites and door-to-door contacts.

[6] Anyway, besides the regions, the farmers' professional associations (i.e. trade unions or agricultural products associations) also supply services to farms. They are private bodies but often cooperate with public institutions or receive public funding.

the farmers' needs concerning innovative and more rational productive processes, improvement of agricultural products, reduction of costs and environmental sustainability. However, these two parts of the national services system are separated and, seldom if ever, work together.

Dynamics and evolution of the Italian AKIS policy

The evolution of the Italian AKIS policy in the last decade has followed a specific path for each component that has adapted its own strategy and priorities to the changes that have occurred in the agricultural sector. As a consequence, topics have expanded towards non-traditional areas of expertise such as environment, climate, tourism, social issues etc. Interdisciplinary works have then increased, training activities for researchers, technical and administrative staff and advisors have been promoted, applied rather than basic research has seen a great expansion, but the advisory organisations have experienced some difficulties in adapting to the farm needs that change very quickly.

Education follows a single national policy that reflects the one generally valid for all sciences. In recent years it has aimed to provide theoretical and specialised training in agriculture, but it has failed to ensure a sufficient link with the productive world, which has rather been given to the research component. In addition, the Italian university suffers from an inability to attract talent from abroad, low salaries of researchers and teachers compared to other advanced countries, scarcity of employment opportunities commensurate with the capabilities of the best graduates, the fact that research in private industry is quantitatively and qualitatively lower than in other industrialised countries and often focused on the mere acquisition of government subsidies for research (Paba, 2010). The reorganisation of the education system planned through the abovementioned national reform has brought a new role for decision making bodies, the participation of society in these bodies, and a reduction of the number of chairs and specialisations.

For the R&D component coexist a national policy and a regional one: the first promotes both basic and applied research through national pluri-annual programmes or specific sectoral plans; the second promotes applied research and tests innovations at local level through planning and implementing regional programmes. The evolution of the NARS has focused on two objectives: evaluating research in terms of scientific output, organisation and management, and promoting a functional and more efficient link between research activities and policy guidelines. As a result of this new approach, three National Research Programmes have been issued since 2001, some official committees have been constituted (experts committee for research policy, science and technology councils etc.), a first national R&D evaluation exercise was carried out in 2004 (while another is still ongoing), new ways of funding research activities have been promoted, increasingly linked both to the possible forms of cooperation (partnerships aimed at submitting projects; permanent consultation groups defining the research question), and thematic priorities identified by the policy. Regional policy mobilises significant resources to meet local needs and follows a 'problem solving' approach with even an interregional coordination of activities, but the disconnection with the national level is high (Vagnozzi *et al.*, 2006). Although programming, evaluation and participation have been the milestones of the evolution of national and regional research policy, regional research lacks a scheduled and repeated monitoring and an *ex-post* evaluation procedure of research projects and outcomes. The problem of objectively quantified research results is not just regional, it is indeed a significant problem at national governance level.

Every region, in addition, has a specific extension policy regulated by regional laws that apply also to agricultural applied research. The main objectives of the regional extension policy regard technological transfer, farm competitiveness, cross-compliance, rural animation, diversification, food safety, environmental impact and with regard to the last three factors in more recent years it has become more connected with the objectives of the CAP (OECD, 2011). But the extension system still lacks a structured involvement in the definition of development policy, a greater effort on some issues relevant for the future (especially climate change) that also require the promotion of greater projects interdisciplinarity, a strong policy of innovation capable of increasing the uptake of research results and transforming them into competitive advantages for the agricultural sector and rural areas. Furthermore, EXT continues to suffer from fragmentation of actions that fail to aggregate around common goals.

Although the Italian AKIS is driven by different policies, in the last decade an approach typical of an 'agricultural knowledge network' has emerged enhancing collaboration among the components. The system evolution has then proceeded in the last decade towards specific objectives: connecting R&D and Higher EDU to the development policy through planning, evaluation and coordination; connecting R&D to EXT with experiences of common projects; promoting the competition between public, public and private, and private bodies through public announcements and other participated procedures; promoting coordination between the regions; implementing the European policy especially with regard to the new agricultural functions and the environmental impact. These activities have incremented products and actors of the system, have improved relationships between the components but have reduced the level of general coordination of the same activities (Materia *et al.*, 2012a).

Some critical issues remain, inherent to the lack of an institutional procedure that directly links the agricultural and food policy to the agricultural knowledge system. Extension and the support system, in particular, suffer in Italy from a sort of isolation, as they often are not able to organise their structures in order to interact more effectively and efficiently with the policy makers. As a result, the structural robustness of the system is jeopardised, especially with reference to the management and organisation of institutions that offer services to farms.

Incentives, monitoring and evaluating the Italian AKIS

Incentives for the AKIS represent the criteria on which its components are evaluated and rewarded (including financially), and on which they are allocated money. The principal common AKIS incentive instrument is therefore the dedicated funding. R&D and EXT, for example, at both national and regional levels, are mainly stimulated and evaluated based on the project which is mainly funded through public calls, direct assignments and negotiated procedures.

Evaluation is 'judging, appraising or determining the worth, value or quality of proposed, ongoing or completed programmes or projects, generally in terms of relevance, effectiveness, efficiency and impact' (Horton *et al.*, 1993, p.6). Monitoring goals are to ensure that implementation is proceeding according to plan, to provide a record for input use, activities and results, to anticipate deviation from initial goals and expected outcomes. It is useful to think of monitoring and evaluation as parts of a continuum of observation, information gathering, supervision and assessment. They are functional to accountability and decision making, and their role changes during the phases of the management cycle of a programme or a project (i.e. planning, implementation, review). Applying these concepts to the Italian AKIS requires distinguishing among different situations: if for EDU there is a consolidated evaluation system, for EXT and R&D only some experiences exist of more systematic monitoring and evaluation (M&E) not consolidated or efficiently linked to each other nor widespread. Therefore, there is no unique system of AKIS policies M&E and this causes extreme complexity when it comes to giving an overview of the efficiency of the system and its capacity to respond to the challenges ahead.

Incentives driving the AKIS

Secondary education evaluation is managed by the National Institute for the Education Evaluation (INVALSI), the reference for the international PISA system. It applies an evaluation model reflecting a systemic approach called CIPP after its four component types of evaluation (Horton *et al.*, 1993): context (population, scholar age, education supply, participation etc.), input (financial resources, human resources as teachers' number, absenteeism etc.) and structural resources (laboratories, students, territorial context), process (school organisation, teachers' professionalism, activities for the students, school-families-territory relationship), product (learning texts' results, students' outcomes). Funds come almost exclusively from public sources.

For Higher EDU, instead, the main incentive is the ordinary fund covering university's management fixed costs. It is distributed for less than 10% on a rewarding basis and the quota is decided on criteria such as research quality evaluation and didactics evaluation rather than its quality (e.g. professors/students, current students/graduates employed), and for more than 90% on a historical basis. At the institutional level an assessment of didactics quality is imposed, but it does not affect the appropriation of funds.

When it comes to research, for national applied R&D one can refer to a *system* evaluation. Some incentives regard the output and refer to: type and number of products (usually weighed on the researchers' number), quality, relevance, originality and innovativeness. Particular attention is devoted also to its internationalisation and/or the competitive potential, as to research exploitation (e.g. patents). Other incentives regard the researchers and structures involved, and then consider their mobility, training and access to national or European projects, and the capacity to attract resources. These criteria have been defined in the first experimental exercise of evaluation of the Italian research system, realised in 2004 with reference to research activities carried out in 2001-2003[7]. The second evaluation exercise is currently under way with regard to research carried out in the period 2004-2010, but these practices do not currently show that character of reiteration that would indeed be coherent in a system that looks at M&E as a guiding principle for its development and its evolution.

Evaluation of regional R&D, instead, is mainly based on the project and is *ex-ante*. The regions use competitive procedures to access funds, and selection criteria regard the project itself: quality and management; coherence with regional programming; results transferring/applying (involvement of EXT services and productive sectors). The fact that an ongoing and *ex-post* evaluation is completely absent represents a very critical aspect: the risk of moral hazard behaviour of some researchers is high (Materia and Esposti, 2010).

Finally, since EXT consist of several different activities, mainly immaterial and qualitative as they attain the improvement of human capital, they can be described only by qualitative indicators. It is then quite difficult to realise a complete and accurate monitoring. Since 1990, three monitoring exercises have been realised in Italy (Ascione and Vagnozzi, 2011), each of them different for organisational methods and contents, but with common aspects monitored, in particular the policy objectives they respond to, contents, methodology and users involved. In the last two years the National Rural Network has launched a new experience of monitoring the Italian FAS and it has been organised at two levels: the first relating to the recognition of human resources involved and the audience reached, the second aimed at verifying the implementation of the Rural Development Programmes' (RDP) measures related to the Farm Advisory System (FAS) (111, 114 and 115). Data collected have been: financial resources requested, criteria for selection of applications (e.g. presence of priorities, thematic advice, inclusion in integrated projects), number of both FAS advisors and beneficiaries, and related expenditure made (Cristiano and Ascione, 2010).

Some interesting M&E experiences from regional R&D

A concrete example of practices to monitor and evaluate the AKIS is offered by the regions with reference to their efforts in promoting, realising and assessing agricultural

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7   In total, 17.329 products were evaluated, 773 of which regarding the agricultural sciences scientific area (90% articles in English, the remaining 10% books, chapters and patents).

research. Some evidence comes from systematic attempts carried out at an interregional level to assess research in view of verifying the appropriate allocation of the available financial resources. Other evidence comes from studies individual regions promote to assess the efficiency and effectiveness (in terms of impact on the territory) of regional spending on agricultural R&D, or the diffusion of R&D results to farmers. Both of these assessments influence policy decisions at both regional and national level.

In the first case one can refer to an important initiative created and managed by INEA on behalf of the Regional Representative Network of Agricultural Research (RRN-AR), an interregional coordinating organisation playing a multiple role at interregional and national level since 2001[8] (Materia *et al.*, 2012a). This is the 'Information system on regional agricultural research', namely a network system consisting of an on-line database constantly updated aiming at collecting and disseminating statistics and information on regional research activities in the agro-food and agro-environmental sectors[9]. At present it consists of 1600 items of research for 15 regions for a total amount of EUR 200 million, 160 deriving from public co-financing.

The initiative started thanks to the regions' interest in coordinating their efforts in achieving a wide dissemination of knowledge and practices in the agricultural domain. The overall aim of the project is to provide regional policy makers with a multimedia information instrument supporting their policy decisions, but over time other operational objectives have been added, such as to promote an active participation of research institutes and to find a more efficient meeting point between agricultural research supply and demand (Materia *et al.*, 2012b). This instrument makes it possible to verify the evolution of regional agricultural research in terms of funds, objectives and contents, as it contains information regarding: actors (funders and researchers), costs, contents (basic or applied R&D; NABS and CRIS classification, productive sectors etc.), type of innovation and technical characteristics (product, process, mixed; agronomic, biochemical etc.), impacts (economic, productive, environmental, social); dissemination (software, papers etc.) and results transfer (methods, instruments). Regional support for agricultural research has focused in particular on experimentation or applied activities, aiming at practical applications to meet specific needs of farm and territories and, therefore, closely related to regional policies for agricultural development. Consistent with these data, most of the detected research provides demonstration and dissemination activities, in addition to or alternative to the testing of results[10].

For what concerns the second type of evidence, it is worth reporting the experiences of two regions. The Emilia Romagna Region financed a study focused on the analysis of the agricultural R&D co-financing carried by the region between 2001 and 2006 according to the pluri-annual programme established by its regional law supporting R&D (Esposti *et al.*, 2010). The Piemonte Region, instead, financed a study concerning the analysis of the innovation diffusion paths in the regional wine sector (Vagnozzi *et al.*, 2007).

Besides the regional application of methodologies and results, what emerged from these experiences was that, from one side, it becomes crucial for the future to implement a 'unique control room' which is the only national leader of interregional task forces, and that a stronger collaboration among the regions is desirable given the aim of defining common practices, such as common methodologies for assessing the impacts of research, testing of innovative forms of R&D funding and new methods of cooperation between research facilities. From the other side, for innovations to be disseminated and useful to farmers, some essential requirements need to coexist: a dynamic production background, rigorous scientific activity, a local agricultural knowledge network connected with the farming system, a regional governance of research/extension activities supporting processes and monitoring results.

Discussion

The new attention Europe is giving to knowledge and innovation requires governments of EU Member States to review their role and adopt new governance approaches and regulations in order to develop more effective AKIS and to better support and strengthen knowledge flows between research, extension and practice in agriculture. The specificity of the Italian case, i.e. the territorial characterisation of the sectors applying to the 'bio-economy', facilitates the development of a reticular approach in the agricultural knowledge field, but at the same time the high heterogeneity of actors and evolution together with a fragmented and dispersive structure of the AKIS itself risks leading to an oversimplification of the reality, which is instead peculiar of regional and local experiences. The evolution of the Italian AKIS has then proceeded consistently with the aim of responding to local needs but at the same time an integration and coordination among the actors and the institutional levels involved are still lacking. A rather top-down approach is still dominant (Esposti, 2012), and this is in particular evident for R&D, which is still too fragmented and scarcely linked to the other components[11].

The Italian agro-food and forestry sector therefore needs to innovate and promote human capital growth through a more fluid and rapid knowledge flow. Agricultural labour productivity grew at a relatively low rate in 2000-2010, gradually losing ground to the rest of the economy; 50% of human capital employed in agriculture (56% self-employed) is above the age of 45, compared to 40% of the total economy; about 67% of employees has only a primary education (INEA, 2011). Among multiple causes for this, the lack of a process of knowledge and innovation diffusion is the most crucial.

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[8]   RRN-AR creates synergies between the regions and AP to address common issues, identifies methodologies concerning detection, promotion, testing and transferring of innovation, and defines priorities at the core of regional and national R&D programming. It acts in this sense as MIUR and MIPAAF interface.

[9]   http://www.bancadatiregioni.inea.it:5454/index.html

[10]   It is possible to find a general heterogeneity with respect to the topic of the research: it regards for the most part plant production, a very small part animal production and food technology. In general, these items of research aim at developing new products or processes and/or improving existing products. In recent years a greater effort has been devoted to quality production, environmental sustainability and sustainable development.

[11]   Important institutional changes, especially in R&D, have moreover highlighted the role of regions which could be seen as autonomous AKIS themselves, often not integrated with each other.

The major challenge for the Italian AKIS to meet the future changes the European agriculture requires regards therefore three specific issues. Firstly, it becomes necessary to implement an institutional coordination that engages both public/private institutions and research structures in the definition of a shared strategic agenda that addresses priorities and approaches and verifies the necessary financial resources with a short-medium term perspective. Secondly, a major effort in the demand analysis and impact evaluation and, thirdly, a stronger investment in the skills of human resources involved are needed: it is important that public initiatives become more connected to a more structured system of monitoring and evaluation, even one per each component, and that researchers and technicians use a more efficient system of 'ongoing training' especially when it comes to choosing correct working methods that meet farmers' needs. In this sense the attempt made to formalise a monitoring system of the regional research activities has been of crucial relevance. The experiences reported suggest that to be efficient the monitoring systems should be coordinated, simple and directly involve the actuators of initiatives (as much as possible in real time), which must find in them benefit and interest.

The new European Rural Development and Research policies provide support and initiatives of knowledge transfer: this is an opportunity for Italy to assume as cogent this priority and to make crucial governance choices. If for the last two decades the knowledge dissemination issue has been handled involving all levels of government, it is now necessary to define a strategy resulting from coordinated action among national and regional levels, while the identification of actors involved and the implementation of interventions should be regional to take account of the specific and local needs and peculiarities. The knowledge and innovation promotion should build upon information, training and advisory measures and on the creation of partnerships for innovation diffusion, but the (intangible) interventions finalised to achieving human capital growth require also foresight methodology in their implementation. Hence, the need for the governance level to identify an institutional framework where methodological and procedural paths regarding actions to be taken are well defined. Aiming to diffuse knowledge and innovation and to bridge R&D to practice, the Operational Groups (OGs) in the EIP context represent an opportunity for concrete action. There are various possibilities to select, manage and implement the OGs[12]. At a regional level within the RDP, this would mean a direct connection between the OGs' objectives and those of the RDP, and a greater involvement of local actors, but the lack of a national strategic approach to innovation would fail to address problems that are trans-regional and/or common to different territories, cause replication of some of the innovation transfer objectives while missing other targets, and involve preferentially regional research structures. At the national level, instead, a strategic approach to innovation would identify research issues and actors involved and increase attention to the methodological quality of the innovation transfer projects. But the possibility of creating a national programme under

the RD policy is uncertain, some crucial measures for the OGs projects are typical of regional RDPs, the attention to local issues and the involvement territorial actors would be weak. A third solution would require a joint State-Regions model with a regional implementation, but this would mean a procedural complexity in the selection of OGs owing to differences in productive and territorial structures.

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[12] These possibilities represent the outcome of reflections made at the institutional level to support the Ministry in the definition of the OGs and are still under discussion.

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