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**The Agricultural Knowledge and Innovation System (AKIS) in
Campania Region: the challenges facing the first implementation of
experimental model**

Laura Mirra, Nicola Caputo, Ferdinando Gandolfi and Concetta Menna



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The Agricultural Knowledge and Innovation System (AKIS) in Campania Region: the challenges facing the first implementation of experimental model

^{1*}Laura Mirra

PhD student, University of Naples Federico II, Naples (IT)

*Corresponding Author's Email: laura.mirra@unina.it

²Nicola Caputo

Campania Regional Councilor, Naples (IT)

³Ferdinando Gandolfi

Campania Regional Official, Naples (IT)

⁴Concetta Menna

PhD, Council for Agricultural Research and Economics- PB, Naples (IT)

ABSTRACT

Purpose: In this context, the current study aims to carry out an implementation analysis of knowledge network in Campania region, Italy. This region has implemented, using Measure 1, Measure 2 and Measure 16 of Rural Development Plan 2014-2020, an experimental model of AKIS.

Methodology: The methodology was based on a living-lab approach where involved actors have an active role as co-innovators.

Findings: The results give hints to implement, in the last period of the Cap 2014-2020, others experimental AKIS based on the Rural Developments Plans.

Unique contribution to theory, practice and policy: The development of new agricultural practices and its spread to obtain more sustainable agriculture has become an important issue for researchers and policy makers. In particular, growing attention is paid to the Agricultural Knowledge and Innovation Systems (AKIS) expression used to describe the whole knowledge exchange system, the ways people and organisations interact within a country or a region. AKIS can include farming practice, businesses, authorities, research and can vary a lot, depending on the country or sector. However, the complexity of the AKIS implemented in Campania region requires particularly effective governance instruments and a continuous monitoring and evaluation processes to elicit innovation needs. Therefore, in the next CAP 2014-2020 measure related to advice (Art. 13 - COM (2018) 392 final) and 'knowledge transfer and information actions' (Art. 72 – COM (2018) 392 final) should be strategically integrated to implement modern and tailored advisory programmes based on different advisory work approaches to better meet the needs of all parties. This issue needs a testing time useful to better plan policy intervention for the next CAP.

Keywords: *Innovation, Knowledge, Co-creation, CAP (Common Agricultural Policy).*

1.0 INTRODUCTION

The development of human capital is the pillar of the ambitious European (EU) strategies to obtain a more resilient, sustainable and competitive agricultural sector. In the 2000s, the role of research system in the innovation development and dissemination was overestimated. Nowadays, well-established thinking upholds that research actors should elicit the needs of the economic and social systems in which they are located, carrying out coherent study activities (Brunori et al., 2013). Some important consequences derive from new approach to innovation process: the first one is related to the role of the consultants and the need to develop a personalized and local approach to promote change; the second one concerns the role of public institutions in the development of knowledge and innovation systems for agriculture. Public authorities and policies are important pillars of the innovation systems as stakeholders and authors of rules and incentives for the process. In the context of innovation system, the rationale of policy intervention is connected to new typologies of market failures (Arnold and Thuriaux, 2003; Dobrinsky, 2019) such as:

- Social institutions failures
- Network failures
- Failures of firms and stakeholders' capabilities
- Framework failures, related to difficulties in the broad framework conditions

Creating network and cooperation among innovation stakeholders is the most efficient strategy. To reach this aim, a large number of innovation policy instruments is implemented to foster cooperation among the actors in the 'innovation ecosystem' characterized by collaborative and dynamic interactions (Autio and Thomas, 2014; National Research Council, 2007).

Focusing on agricultural sector and related innovation process, some authors (Hall, 2005) underline that innovation in agriculture is rarely triggered by research. Opportunities offered by the market represent stronger innovation drivers for farmers. European Agricultural Policy post 2020 seems to adopt the framework of innovation ecosystem.

2.0 LITERATURE REVIEW

Among the general objectives of new CAP programming period post 2020 "modernisation of the sector by fostering knowledge, innovation and digitalisation of agriculture and rural areas" is a crosscutting aim. A more modern CAP is described in the European Commission's legislative proposals for the CAP post 2020. Its purpose is to make advisors, researchers, rural networks, consumers and citizen work together. Innovation in agricultural sector has to be implemented by the interactions among innovation adopters and knowledge organizations (Kilelu et al., 2013). In this process providers of extension services are important to inform potential adopters about the benefits and disbenefits of the innovation and how to manage it. (De Rosa, 2014). A more complex interaction among the different dimensions of the knowledge triangle (research, education and extension) and potential adopters of innovation in agriculture (Klerkx, 2015; Torquati et al., 2015) represents an Agricultural Knowledge and Innovation System (AKIS) (Hermans et al., 2015). According to this context, the current study aims to analyse and assess the impact of a first implementation of Knowledge network in Campania Region by the means of an experimental model of AKIS. The model has been implemented using Measure 1, Measure 2 and Measure 16 of Rural Development Plan 2014-2020.

Therefore, the empirical research is divided in two parts: The first one concerns the description of model proposed by Campania Region. Public and private involved actors will be described and their roles in the AKIS will be defined. In the second part of the study, primary data collection will be carried out using face-to-face semi-structured interviews to analyse connections between seekers and suppliers of knowledge and level and process of knowledge co-creation.

2.1 The Policy Intervention Model: Agricultural Knowledge and Innovation Model (AKIS)

AKIS is 'a set of agricultural organizations and/or persons, and the links and interactions between them, engaged in the generation, transformation, transmission, storage, retrieval, integration, diffusion and utilization of knowledge and information, with the purpose of working synergistically to support decision making, problem solving and innovation in agriculture' (EU SCAR, 2013).

Although it is a relatively modern concept, the AKIS has its roots already in the 1960s, when the agricultural policy aim was to establish a system of actors, the AKS (Agricultural Knowledge System), which would create and transfer knowledge in order to improve innovation and modernization in agricultural sector. The AKIS as defined above, was intended to overcome the purely institutional vision of the AKS, to represent rather the set of interaction networks between the actors involved in the creation, transformation, dissemination and use knowledge and information to support policy makers and innovation in agriculture (EU SCAR, 2013; Röling, Engel, 1991). More recently (Klerkx, Leeuwis, 2010), AKIS has evolved by acquiring the concept of "innovation" (Agricultural Knowledge and Innovation System). This new AKIS's dimension derives from the decentralization as well as privatization process of knowledge system and public extension services.

Services privatization is producing the development of new advisory services through involvement of NGOs (non-governmental organizations), producer organizations, private companies with the progressive differentiation of roles. This new approach related to Knowledge and innovation has been translated by EU policies thanks to European funds for rural development with specific measures to support the different AKIS components.

A major issue remains about farmers' participation in the AKIS and about the implementation of connections among research, education and extension. Weaknesses and lack of some strategic connections in the Agricultural Knowledge and Innovation System (AKIS), such as missing stakeholders, missing links between relevant stakeholders or ineffective knowledge transfer, causes a lack of farmers' ability to build their knowledge-base (EU SCAR, 2015). This is especially true for Italian agricultural sector characterized by small farms and rural areas with a high level of multifunctionality. Moreover, the framework developed in the next programming period 2021-2027, stresses the relevance of interactions between different operators working in systems of agricultural knowledge (van Oost, 2018). Indeed, the modernization of the agricultural sector by fostering knowledge, innovation and digitalization of agriculture and rural areas is a cross-cutting objective of the next CAP (Council of the European Union, 2019). The strategy to support modernization is based on setting-up the AKIS to foster advisory services, research actors and CAP networks to cooperate and provide knowledge flows and innovation services.

In the next programming period, the approach is articulated and well defined in the Proposal for a Regulation of the European Parliament and of the Council Com (2018) 392 Final. During the last planning period, several measures under the Rural Development Regulation 2014-2020 have been implemented to promote innovation and the AKIS creation. The intervention was articulated by

complementary and interrelated actions: information and training (art. 14 – Measure 1), advisory services (art. 15 – Measure 2), partnerships for the innovation (art. 35 – Measure 16) (Vagnozzi, 2015). However, these actions, although complementary, need a clear instruction of Regional Authority to act effectively with joined approach. AKIS vary widely among regional areas and agricultural sectors. Due to this diversity, there is no guarantee that AKIS network is able to answer the challenges posed by the need to increase productivity and sustainability in agriculture and food production (EU SCAR, 2012). In this scenario, the current planning period must be considered by analysts and policy makers as an opportunity to test new strategies and policy tools.

2.2 Agricultural Knowledge and Innovation System (AKIS) In Campania Region: An Experimental Model

Campania is among the few regions of Italy where this Public Authority is managing to implement an AKIS using measures of Rural Development Plan 2014-2020. AKIS activities will focus on more representative regional agricultural productions characterized by small farms distributed in rural and marginal areas. The future network will be based on a living-lab approach where involved actors have an active role as co-innovators (Knickel et al., 2009; Moschitz et al., 2015). This model has to be a public and private partnership because the Italian framework is more complex due to the coexistence of several institutional levels which are responsible for the different AKIS components. AKIS Campania will focus on specific geographical area characterized by socio-economic, productive and environmental peculiarities and will merge innovation and research processes. The applied framework is the so-called Quadruple Helix model (government – science/university – business/industry – civil society). This is a development of the Triple Helix concept. In the more recent approach, the dominance of industry government dyad in the Industrial Society is limited by a new relationship between university-industry-government in the Knowledge Society (Kolehmainen et al., 2016). In our approach, civil society, government, farms and research-training-advisory services are considered as four 'spheres' (Figure 1).

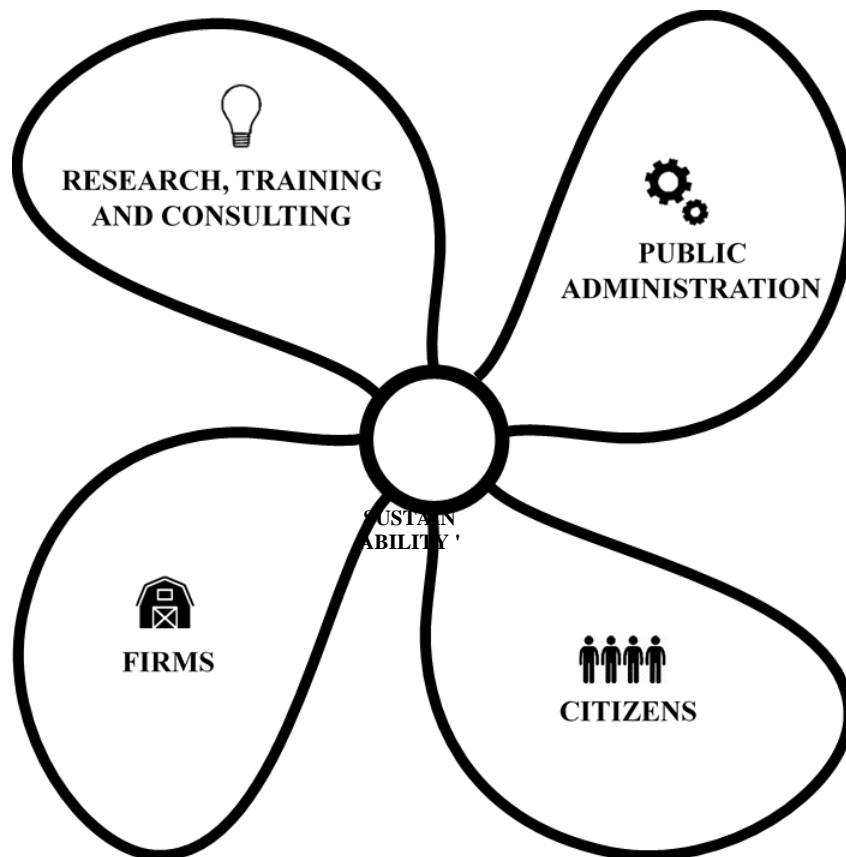


Figure. 1 – Quadruple Helix model for AKIS Campania

In this way the helix represents the perspective of the complex system for knowledge production and innovation through processes of co-design or co-construction and collaboration with society. The Campanian AKIS involves a huge number of actors operating at different levels. The model implemented by Campania Public Authority tries to answer the question how to implement a more dynamic and relational environment to enhance creativity and learning.

The model proposed is implemented through the EAFRD funds (Measure 2 sub-measure 2.3 of the RDP 2014/20). The activities founded by Measure 2 sub-measure 2.3 of the RDP 2014/20 - Continuous Professional Development (CPD) for Agricultural Advisors. Using described Measure as starting point to implement more complex system, the challenge will be founded other AKIS activities using Measure 1 and Measure 16 of RDP 2014-2020.

In the project, the responsible will create relationships among different partners of the AKIS, for information and dissemination activities addressed to beneficiaries of Measure 1.2 of the RDP 2014/20 – Demonstration activities and information actions, to certified advisory bodies and advisory bodies founded by public calls of RDP 2014-2020. These activities are based on direct needs of farmers. Needs will be elicited by an implemented information desk point and by analysis of the expressions of interest showed by farmers in the calls for Measure 2.1 - Support to help benefiting from the use of advisory services, 1.1.1 - Support for professional training activity and skills acquisition and 16.1.2 - Support for pilot projects and for the development of new products, practices, processes and technologies.

Using this continuous and dynamic monitoring approach for farmer needs, it will be possible to derive insights for “tailor made” public and private research activities. The information desk point will be the link between the available innovations and the involved companies and / or consultants / trainers. The system will be a reference point for companies, for advisors and trainers and will act to identify needs of innovation and the corresponding answers in terms of technology, knowledge, financing and policy, to facilitate the connections among AKIS actors, to strengthen the collaboration within heterogeneous networks of actors operating in different institutional systems and contexts.

AKIS by Campania region looks at five main actors with a focus on agricultural/rural development innovation (Figure 2):

- Research
- Extension services
- Education and training
- Support systems (all the organizations providing credit, inputs and producers’ associations, etc.)
- Civil society

The challenge of this potential network is to become a system. Different actors are responsible for different activities to act upon the knowledge of farmers and rural actors and generate innovations in to solve problems and to catch opportunities.

To assess the internal validity and to identify relationships and information/knowledge flows, multiactor dialogues will be also developed, based on reliable information and a transparent sequence of interactions and result-monitoring. AKIS stakeholders will work together during the whole process to implement AKIS structure in order to better align both the process and its outcomes with the values, needs and expectations of society’ (European Commission 2018). In this early stage, 7 semi-structured interviews were conducted with strategic AKIS partners. To select the respondents, the structure of a potential Regional Akis was first reconstructed. Subsequently, some stakeholders were identified in the various Akis groups: research, training, public administration, agriculture, citizens. In particular, 2 farms and 1 respondent for each of the listed categories were interviewed. The interviews were semi-structured. The interview procedure (Blee and Taylor, 2002) was based on 5 steps : introductions and introducing the research topic; (b) beginning interview question on the role of knowledge and innovation; (c) shifting into more in-depth questions on the relationships existing among the different Akis stakeholders; (d) moving about the shortcomings of relationships and how they could be improved; and (e) ending the formal interview (Baumbusch, 2010).

3.0 METHODOLOGY

The methodology was based on a living-lab approach where involved actors have an active role as co-innovators. Likewise, a qualitative approach was applied in this preliminary study to identify a shared scheme of AKIS.

4.0 FINDINGS AND PRESENTATION

Results showed the need of diverse components to be well connected and to bridge the gap among them. Different operative approaches and different technical languages characterized agricultural researchers and extension services, moving them from the real needs of the farmers.

The complexity of the AKIS implemented in Campania Region requires particularly effective governance instruments and a continuous monitoring and evaluation processes.

Interviewed stakeholders underlined the desirable requirements to obtain a useful system:

- adequate skills;
- designed and built to specific needs of involved geographical area;
- relationships with the Public Administration;
- relationships with research, both public and private
- relationships with producer organizations, with advisory bodies and training institutions (beneficiaries of measures 1 and 2 of the RDP Campania 2014 - 2020);
- ability to act as innovation broker
- to perform a new agreement with civil society

Stakeholders were asked to describe possible connections among actors based on specific roles, economic and human resources of different AKIS participants. As Figure 2 shows, the first attempt to build an AKIS provides a quite articulated model. The system is fragmented and subjected to a dynamic process of change. The educational system seems to have strong connections with all actors with different intensity.

Results show great interactions among traditional functions. For instance, research sector has begun to provide advisory services, advisors may perform applied research, university acts as facilitator in innovation processes. Civil society is a new strategic actor. It will be necessary to identify how citizens could participate in the information and knowledge flows.

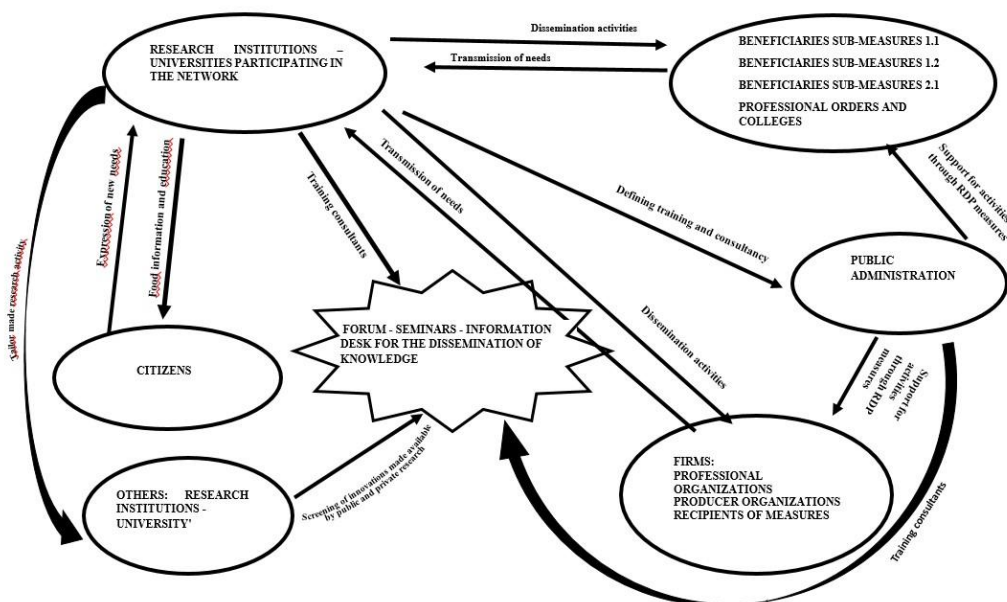


Figure. 2 - Overview and interaction of the main AKIS actors (first results by interviews)

5.0 CONCLUSIONS

The study of the first potential model of Agricultural Knowledge and Innovation Systems (AKIS) in Campania region could be useful to identify some networks characteristics to improve the level of AKIS performance in the next CAP 2021-2027. Moreover, results could give hints to implement, in the last period of the Cap 2014-2020, others experimental AKIS based on by Rural Developments Plans.

An AKIS is nothing more than a concept. It is the attempt to provide knowledge and innovation in agriculture trough an articulated system composed by farmers, agricultural educators, researchers, non-academic experts, public and independent private advisors, supply chain actors and civil societies. Yet many of the variables of these systems are unknown in terms of relationships, governance, strength and weakness. The study, supported by a more articulated multi actor analysis, provides an overview of a potential AKIS founded by Measures of RDP 2014-2020. The challenge faced by Campania region is to integrate different Measure of RDP 2014-2020 (Measure 1, 2 and 16) following an innovative interventions path.

Furthermore, results obtained allow to formulate some recommendations. The most important one is related to the implementation of tailored strategy to bring together diverse expertise and knowledge following a clear roadmap. This means all parties in the AKIS have to be involved from the beginning developing a clear and common vision on the innovation path. As showed by some Authors (van Oost et al., 2019; Zahran et al., 2020), interviewed stakeholders underlined that initial collaboration on innovation may start from a personal level so selecting the right partners is crucial. Another equally important aspect is connected with advisory services role to stimulate relationships creation among stakeholders. In the Akis structure, advisory services don't have to work as linear knowledge transfer services. They have to act as innovation facilitators.

However, the complexity of the AKIS implemented in Campania region requires particularly effective governance instruments and a continuous monitoring and evaluation processes to elicit innovation needs. Therefore, in the next CAP 2014-2020 measure related to advice (Art. 13 - COM (2018) 392 final) and 'knowledge transfer and information actions' (Art. 72 – COM (2018) 392 final) should be strategically integrated to implement modern and tailored advisory programmes based on different advisory work approaches to better meet the needs of all parties. This issue needs a testing time useful to better plan policy intervention for the next CAP.

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