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# THE KNOWLEDGE AND INNOVATION SYSTEMS IN AGRICULTURE - A.K.I.S. - CHALLENGES FOR LAGs

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**Abstract:** Agricultural Knowledge and Innovation Systems (AKIS) play a key role in promoting innovation, sustainability and resilience in agriculture and rural development. This paper explores the challenges and opportunities of AKIS for Local Action Groups (LAGs), particularly in the context of the European Innovation Partnership (EIP-AGRI) and the Common Agricultural Policy (CAP). Although AKIS aims to connect researchers, advisors, farmers and policy makers, significant barriers persist, such as fragmented knowledge flows, weak links between research and practice and low uptake of innovation by small and medium sized farms. LAGs are strategically positioned to facilitate co-creation processes, promote interactive innovation projects and integrate digital tools to support local development. For them to effectively contribute to AKIS performance, institutional support, capacity building and cross-sectoral collaborations are needed. Thus strengthening advisory services and including AKIS strategies in the CAP Strategic Plans are essential steps towards a more inclusive and effective innovation ecosystem at European level.

## • Introduction

Innovation is one of the key challenges facing agriculture in Europe, however, information on the effectiveness and functioning of agricultural knowledge and innovation systems (AKIS) is still limited. The structure and functioning of these systems vary significantly from one area to another and between different agricultural sectors, although diversity and ongoing transformations can support innovation and transition processes, there is uncertainty whether these systems are sufficiently well adapted to meet the growing need for productivity and sustainability in agriculture and the food industry.

AKIS components such as agricultural education, extension services and research activity face distinct challenges and are influenced by varying incentives. This fragmentation can limit the effectiveness of collaboration and synergy between stakeholders. In many cases, the educational system has weak links with scientific research, extension activities or the entrepreneurial environment, also applied research tends to be evaluated on scientific impact rather than practical relevance to farmers.

To increase the effectiveness and applicability of results, it is essential to encourage collaboration between researchers, agricultural advisors and producers, more than simply passing on research results to farmers, it is important that they together with actors in the agri-food chain actively contribute to setting research directions. This requires a clear differentiation between research oriented towards scientific knowledge and that focused on practical innovation. These two approaches differ both in the way they are planned and in the degree of involvement of farmers and economic actors, as well as in the role played by European institutions, and recognizing these differences in the motivation and purpose of research could lead to more effective policies and better management of innovation activities in agriculture.

## • Material and method

The concept of AKIS (Agricultural Knowledge and Innovation Systems) is an evolution of the classic AKS (Agricultural Knowledge Systems), which has been around since the 1960s. Initially, AKS referred to centralized structures, consisting of research, agricultural education and extension services, usually coordinated by public authorities, in particular Ministries of Agriculture, within an interventionist agricultural policy. These structures aimed to accelerate the modernization of the agricultural sector by coordinating knowledge transfer and innovation processes.

In the 1970s, the system was conceptually broadened to include the concept of "information", thus becoming AKIS: Agricultural Knowledge and Information Systems. This update reflected the growing interest in information processing and management in the context of the expanding use of information technology and the emergence of computers. The term AKIS has been enshrined in policy discourses and documents produced by international organizations such as OECD and FAO, and has subsequently been reformulated as "agricultural knowledge and innovation systems", emphasizing the dynamics of innovation.

The shift from the traditional AKS approach to the complex and adaptive AKIS model was driven by four major developments (Figure 1)

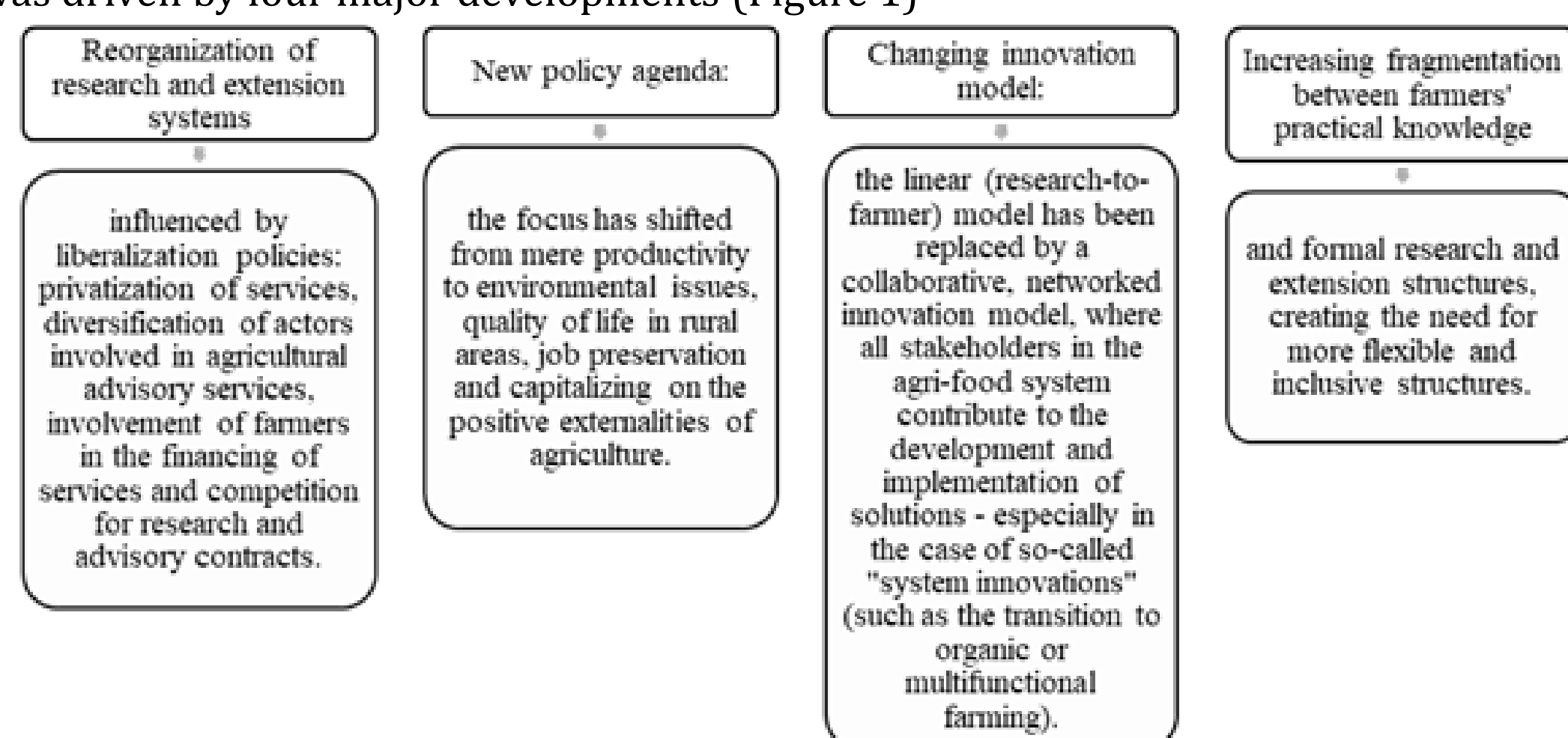


Figure 1. Developments between AKS and AKIS

## • Conclusion

- LAGs, by their participatory and multi-sectoral nature, are well positioned to act as intermediaries between the different AKIS subsystems. They can facilitate collaboration between farmers, researchers, agricultural advisors, educational institutions and local decision-makers, creating spaces for dialog and collective experimentation. Instead of being just passive recipients of scientific results, farmers can become co-creators of innovation, actively contributing to the formulation of the research agenda and testing solutions in the field. In this way, knowledge no longer flows one-way, but is developed collaboratively and adapted to realities on the ground. In addition, LAGs can support the transition to a new paradigm of rural development, which is no longer based exclusively on technological upgrading but integrates social, organizational and environmental dimensions. They can support the emergence of innovation 'niches' - protected spaces where innovative solutions can be tested, refined and then scaled up. They can also help to make the regulatory framework more flexible and create participatory governance mechanisms that are essential for community-driven innovation.
- Making AKIS systems more effective and relevant to today's challenges requires the strategic involvement of LAGs, which become catalysts of territorial innovation, facilitators of collective learning and architects of sustainable, resilient agriculture deeply connected to the needs of rural communities.

## • Results and discussions

In an attempt to adapt agricultural knowledge and innovation systems to the new realities of rural development, some authors have proposed an extension of the traditional AKIS concept, resulting in an integrated model known as AKIS/RD (Agricultural Knowledge and Innovation System for Rural Development) [8,10,14]. The proposed model recognizes that innovation in agriculture cannot be separated from broader rural development processes, being dependent on a more comprehensive network of actors and institutions. Thus, four key pillars are identified that interact in the process of innovation generation and dissemination (Figure 2).

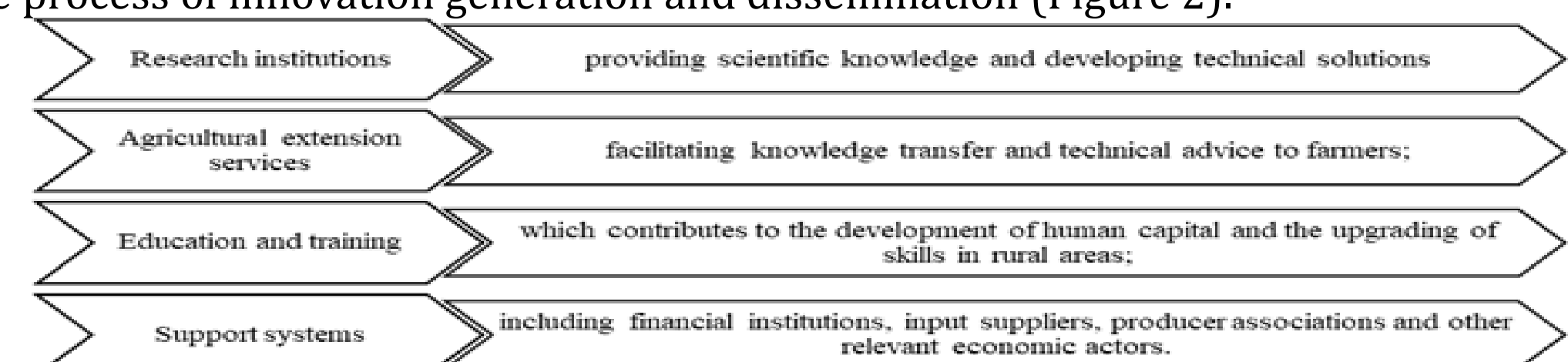


Figure 2. Interacting pillars in the process of innovation generation and dissemination

- In recent decades, the concepts that define the knowledge and innovation infrastructure in agriculture have evolved significantly, reflecting the transformations in the rural environment and the increasingly complex needs of farmers and local stakeholders. From classical AKS-type systems based on linear knowledge transfer to more complex and interactive models, such as AKIS, AIS and LINSAs, which emphasize collaboration, learning networks and co-creation of innovation. Table 1 highlights the key differences between these concepts, highlighting features such as the type of actors involved, the way they relate to each other, the approach to knowledge and the role assigned to innovation within each model.

Table 1.  
Developments and differences in approaches to knowledge and innovation in

Concept	Definition	Main actors	Type of relationships	Approach to knowledge	The role of innovation
Agricultural Knowledge System (AKS)	Network of researchers, advisors and educators involved in knowledge generation and transfer to farmers	Public research, agricultural education, extension services	Linear (research to farmer)	Knowledge is a stock to be transferred	Limited, modernization-oriented
Agricultural Knowledge and Innovation System (AKIS)	Network of organizations and individuals involved in producing, sharing and using knowledge to support agriculture and innovation	Researchers, advisors, farmers, input suppliers, authorities	Interactive, collaborative	Knowledge is created and used in networks	Central, driver of rural development
Agricultural Innovation System (AIS)	Network of organizations, enterprises and individuals focused on the introduction of new products, processes or models in agriculture	Public + private sector, farmers, industry, financial institutions	Dynamic and multi-directional network	Knowledge is a resource for innovation and competitiveness	Essential, main objective
Learning and Innovation Networks for Sustainable Agriculture (LINSAs)	Thematic networks including diverse actors co-producing knowledge for sustainability	Farmers, extension, NGOs, researchers, policy makers	Thematic, participative networks	Knowledge is built through interaction and adaptation	Innovation is co-created, oriented towards sustainability

- Innovation is, by definition, a risky process and requires openness to change, and many current AKIS structures discourage innovation, either through lack of funding, bureaucracy or institutional rigidity, so in this context LAGs can support the creation of a climate that is conducive to innovation (Figure 3).

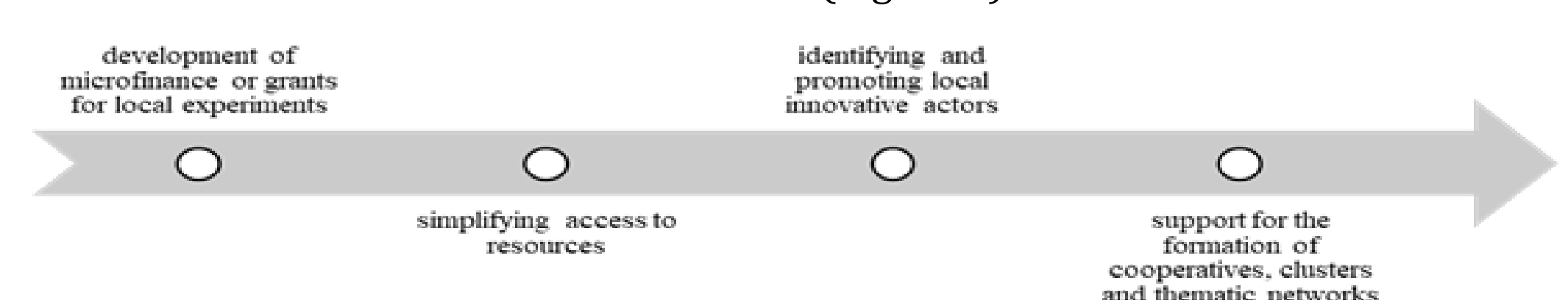


Figure 3. Key stages of the innovation process and the role of LAGs in facilitating them in AKIS