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THE ROLE OF THE SEASN NETWORK IN STRENGTHENING AKIS DEVELOPMENT IN EU AND NON-EU COUNTRIES: A COMPARATIVE REVIEW

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Abstract: Agricultural Knowledge and Innovation Systems (AKIS) are a central element of European agricultural policy, enabling knowledge and innovation to circulate effectively among researchers, advisors, educational institutions, and farmers. In Southeast Europe, AKIS structures have developed unevenly, revealing clear differences between EU Member States and countries of the Western Balkans. Slovenia represents a well-integrated AKIS, where cooperation between advisory services, universities, and research institutions supports rapid innovation uptake, strengthened by digital tools and EU-funded projects. Austria and Croatia show similar patterns, with structured advisory systems that link policy, research, and practice. In contrast, AKIS systems in non-EU SEASN countries remain fragmented. Bosnia and Herzegovina face limited coordination between advisory services and research institutions, resulting in slow knowledge transfer. Serbia's AKIS is still emerging and heavily shaped by individual projects, with inconsistent institutional collaboration. Comparable challenges persist across the Western Balkans, including gaps in digitalisation, innovation support, and advisory competencies. Within this context, the South Eastern European Advisory Service Network (SEASN) serves as a transnational bridge connecting diverse AKIS environments. SEASN strengthens regional knowledge flows, improves advisory competence, and encourages participation in European projects. By linking countries with well-developed AKIS structures to those still forming them, SEASN facilitates gradual alignment with European standards and supports broader regional cooperation and innovation capacity.

Keywords: SEASN network, Agricultural Knowledge and Innovation Systems (AKIS)

INTRODUCTION

Agricultural Knowledge and Innovation System (AKIS) refers to a network of organisations, institutions, and individuals involved in the generation, exchange, and application of knowledge and innovation in agriculture (*AKIS | EU CAP Network, 2025*). The AKIS concept is widely used to identify, analyse, and assess the diversity of actors in agriculture, as well as communication, interaction, and knowledge exchange in innovation among them. The identification of such actors and building of the network provides a framework that allows the mapping of the institutional settings, coordination structure, and policy environments shaping innovation at national and regional levels. Unlike linear knowledge exchange models, AKIS emphasises interaction, learning, and feedback among

multiple agricultural actors, including advisory services, research institutions, farmers, and policy bodies (Knierim et al., 2015).

The formation of AKIS can be explained by the increasing complexity of agricultural systems and the growing inadequacy of top-down models based on the one-way dissemination of knowledge. Such a linear model proved insufficient to address challenges related to climate change, environmental sustainability, development in agricultural technology, digitalisation, and market volatility (FAO, 2025). From a systems perspective, meaningful change in complex systems rarely occurs through isolated interventions or adjustments of individual parameters. Meadows (1999) suggests that the most effective (high-leverage) points in complex systems are information flows, feedback loops, rules, and system goals, rather than in simple changes in inputs or outputs. Traditional extension approaches mainly focused on high-impact inputs or outputs, and therefore, it was harder to achieve broader, systemic change. The AKIS concept responds to this challenge by strengthening knowledge and information flow, by strengthening interaction between research, advisory service, and farmers, thereby targeting higher-leverage points within agricultural systems and enabling more adaptive and innovation-oriented development (Knierim et al., 2015).

AKIS became a mandatory component in EU Member States' CAP Strategic Plans under the 2023-2027 Common Agricultural Policy (CAP), as a tool aimed at strengthening innovation capacity and improving the effectiveness of investments in agricultural and rural development. The European Commission highlighted that although significant resources are invested in development, knowledge flow often remains fragmented and insufficiently translated into practice. This mandate addresses the need for strengthening innovations to be translated into practice, and AKIS actors to support CAP goals for sustainability and competitiveness (Fanos et al., 2022; *AKIS | EU CAP Network*, 2025). AKIS represent networks of actors involved in generating, sharing, and applying knowledge and innovation in agriculture, including advisory services, research, education, farmers, and policy-makers. The effectiveness of AKIS depends primarily on the quality of interactions, coordination mechanisms, and feedback loops among these actors. Well-functioning AKIS are characterised by multi-directional knowledge flows and institutionalised cooperation, while weaker systems tend to rely on fragmented and linear knowledge transfer (Knierim et al., 2015).

The South Eastern Europe Advisory Service Network (SEASN) is a transnational platform connecting advisory services, chambers, research institutions, faculties, and NGOs across South-East Europe. SEASN supports capacity building, knowledge exchange, and dissemination of project results, while enabling participation of non-EU members in EU-funded projects. By bringing together countries with different levels of AKIS development, SEASN facilitates mutual learning and acts as a bridge between EU and non-EU AKIS contexts. AKIS in South-East Europe are characterised by considerable diversity and fragmentation, particularly between EU and non-EU countries. Differences are seen in institutional maturity, governance, funding stability, and the role of advisory services. In many non-EU countries, AKIS structures remain project-based or administratively oriented, with weak interaction and limited knowledge flows. Fragmentation reduces innovation uptake and constrains the ability of agricultural systems to respond to sustainability and development challenges.

Aim and Scope of the Paper

This paper analyses and compares AKIS in EU and non-EU SEASN member countries, focusing on the role of advisory services and institutional arrangements. It identifies key strengths, weaknesses, and structural causes of fragmentation, and examines SEASN's role as a bridging mechanism that supports knowledge exchange, capacity building, and the gradual convergence of AKIS in the region.

COMPARATIVE ANALYSIS AKIS EU MEMBER STATES vs. NON-EU MEMBER STATES

Structure and Role of Advisory Service

Recent European Union (EU) reforms of the Common Agricultural Policy (CAP) place a strong emphasis on strategic strengthening of national Agricultural Knowledge and Innovation Systems (AKIS) and promoting knowledge exchange and innovation in agriculture and rural areas (EU 2021/2025). Despite the growing policy importance of AKIS, its concept and governance mechanisms are not yet fully understood or consistently implemented, particularly in regard to the capacity of policy-makers to actively engage in AKIS coordination (Knierim et al., 2015). A comparative overview of national AKIS systems therefore provides valuable insights into how all main AKIS stakeholders (advisory services, researchers, educators and policy makers) are shaped in socio-economic, governmental and historic context (SWG SCAR-AKIS, 2017).

Advisory services are one of the key building blocks of AKIS. Future advisory work increasingly requires a holistic and farm-tailored approach, combining strategic guidance of the farm and penetrating the markets with specialised technical advice. While public advisory services continue to play a key role in many countries, there has been an increasing trend in recent years among farmers to seek additional support from private advisors in specific thematic areas. This emphasises the need for advisors to strengthen their methodological and technological competencies to face on-farm challenges like climate change, sustainability requirements, diversification of farm income and value addition (SWG SCAR-AKIS, 2017).

In both EU and non-EU member countries of SEASN, there is a variation in the institutional framework for advisory services. Farmer-based organizations and agricultural chambers are major players in agricultural advisory and are firmly embedded in stable frameworks in most EU countries. In some non-EU countries within SEASN, agricultural advisory has been and still is, to some extent, centralised, fragmented, and/or project-oriented with little continuity. Though there is a rising role for private sector advisory organisations, generally, public agricultural advisory organisations are still major interfaces for farmers. However, there is little continuity in the capacity for reactions to challenges (SWG SCAR-AKIS, 2017).

Relations and Compatibility Between Research and Innovation and Advising

Different actors of AKIS face different challenges and follow different incentives, which makes cooperation and synergy among them difficult. Education is often weakly linked to

research, advisory services, and business. Stronger cooperation and networking between researchers, advisors, and farmers is essential, as applied research is often not directly applicable at the farm level. Farmers and food businesses should have a stronger role in setting research priorities, not only in receiving research results. For this reason, a clear distinction is needed between science-driven research and innovation-driven research (DIGI-AGRI, 2009).

The European Innovation Partnership (EIP) for agriculture follows an interactive innovation model, which goes beyond the simple transfer of knowledge from research to practice. It promotes bottom-up cooperation between farmers, advisors, researchers, businesses, and other actors through Operational Groups and Multi-Actor Projects. This approach supports knowledge exchange, uses practical experience, and helps better target research to real needs (European Commission, 2025).

Public support is also needed for a strong “back-office” that connects advisory services with research. Public policy objectives in areas such as research impact, educational and training services, public goods such as climate change and biodiversity, and supporting digital adaptation. It should translate scientific results into practical and understandable information for farmers and advisors, at the same time collecting needs from farmers to inform future research and innovation programmes. In this way, a back-office can improve connectivity, sustainability, and cooperation in the AKIS whole system (SCAR, 2019).

AKIS Analysis in the “SEASN Region” AKIS Systems in EU Member SEASN Countries

AKIS systems in EU member states that are members of SEASN are generally characterised by higher institutional maturity, stable governance structures, and clearer division of roles among advisory services, research, education, and policy actors.

In Austria, the decentralized AKIS, centered on regional agricultural chambers, enables regionally adapted advisory services and strong links between farmers, research, and support institutions. The combination of public and private advisory services, together with institutionalised cooperation with universities and research centres, explains the system’s stability and effective knowledge flows (Florian Herzog et al., 2024).

In Bulgaria, the AKIS remains centralised under the Ministry of Agriculture and the National Agricultural Advisory Service. Advisory work focuses mainly on CAP compliance and administrative support, which ensures regulatory alignment but limits interactive, demand-driven innovation. Weak digital integration further constrains knowledge exchange, although EU-funded projects increasingly address these shortcomings (Todorova, 2024).

In Croatia, the AKIS is still developing, with advisory services coordinated by the Ministry of Agriculture. Advisors act as intermediaries between research and practice, but the system remains partly project based. Similar to Bulgaria, EU projects play an important role in introducing digital tools and interactive innovation approaches, compensating for limited structural integration (Lelaković et al., 2024).

In Greece, the AKIS is fragmented, despite recent progress in interactive innovation and advisory reform. Universities and research institutes contribute actively to knowledge exchange, but impartial advisory services remain weak. The dominance of commercially oriented private advisors undermines farmers' trust, resulting in limited advisory capacity and weak knowledge transfer (Koutsouris et al., 2024).

In Hungary, the AKIS is relatively well organised and coordinated by the Ministry of Agriculture and the Hungarian Chamber of Agriculture. Advisory services serve as a stable bridge between research, policy, and practice, providing farm-tailored and impartial advice. Although digital tools are increasingly used, further development of participatory approaches is needed (Jakab Gáborné et al., 2024).

In Slovenia, the AKIS is highly integrated, with the Slovenian Chamber of Agriculture and Forestry as the central advisory body, with the Ministry of Agriculture, Forestry and Food as the coordinating body. Strong links between advisory services and research institutions, combined with targeted AKIS interventions under the CAP Strategic Plan, support efficient knowledge flows and innovation uptake through stable public funding and digital platforms (Hrovatič, 2020).

AKIS Systems in Non-EU SEASN Countries

In non-EU SEASN countries, AKIS systems are generally less institutionalised and more fragmented. This reflects transitional policy contexts, limited and unstable public funding, and weak coordination mechanisms among key actors. In some countries, advisory services often operate in administrative or project-based frameworks, which constrain systematic knowledge exchange and long-term innovation support.

In Bosnia and Herzegovina, AKIS structures are highly fragmented due to strong entity-level autonomy. In the Republic of Srpska, coordination between research institutions, advisory services, and farmers is weak, and systematic knowledge exchange is largely absent. Advisory services are organised within the Ministry of Agriculture and mainly perform administrative tasks, which limit the provision of farm-tailored and impartial advice. Farm demonstrations partially bridge research and practice, but innovation uptake remains limited due to weak feedback mechanisms. At the national level, Bosnia and Herzegovina lacks coordination among AKIS actors. The country consists of two entities, the Federation of Bosnia and Herzegovina and the Republic of Srpska, and the Brčko District, each with its own institutional system. The absence of state-level ministries for agriculture, education, and science, combined with limited funding, represents a major barrier to stable knowledge transfer. Strengthening AKIS would require decentralised but better-coordinated systems at the entity level, similar to models in Austria or Germany.

In Serbia, the AKIS has largely remained unchanged and continues to rely on secondary and higher education, along with additional specialised training. Although numerous publicly funded institutions are involved in education, research, and information provision, coordination among them is weak, and knowledge transfer does not sufficiently meet farmers' needs. The limited role of private advisory services, NGOs, cooperatives, and producer organisations further contributes to system instability. Innovation is mainly promoted through public subsidies and demonstration activities, but weak institutional

cooperation and the lack of a stable interactive framework reduce long-term effectiveness (Stanković, 2024).

In Kosovo, the AKIS is evolving within a decentralised framework involving the Ministry of Agriculture, private advisors, universities, and NGOs. A strategic plan and a digital advisory platform support coordination, transparency, and professional development. Advisory services are delivered through public institutions and civil society, with private and NGO actors providing specialised support. Despite challenges related to limited funding and institutional fragmentation, digitalisation and strategic partnerships are driving progress, giving the system strong potential for inclusive and innovation-driven agricultural development.

In Montenegro, the AKIS is not yet fully established, but institutional capacity and interest exist. Most relevant institutions are public, placing the Ministry of Agriculture and Rural Development in a central coordinating role. Advisory services mainly provide technical support, while knowledge transfer remains limited. Further development requires a shift towards more innovative and demand-driven advisory approaches, supported by the establishment of a dedicated AKIS unit within the ministry to improve coordination, financing, and links among key actors (Hrovatič et. al., 2021).

In North Macedonia, the AKIS is under development, led by the Ministry of Agriculture and the National Extension Agency, and supported by EU-funded modernisation efforts. Legal reforms under the Law on the Advisory System have enabled professionalisation and digital integration, while training programmes and mobile advisory platforms are being introduced, including through SEASN-related projects. Despite this progress, the system remains fragmented, with unclear institutional roles limiting coordination and knowledge flows, indicating the need for further restructuring.

Comparative Synthesis of AKIS Characteristics in EU and Non-EU SEASN Countries

Comparison of AKIS structures in EU and non-EU SEASN countries (Annexe 1) shows that there are evident differences concerning the institutional development in both models. In fact, the structures that are in the EU member states are much more institutionalised and stable, with better coordination and a central position of professional advice services. These structures allow for a higher degree of knowledge flow between research, advisory services, and practices.

By contrast, AKIS structures in the non-EU SEASN member states are still relatively emerging or fractured, often project-based with a lack of institutional persistence. Advisory services tend to lack a systematic and institutional design, and thus, the knowledge streams tend to be weaker and more linear. Financing volatility and the absence of digitalisation affect capacity building.

In general, the differences that have been identified are a function of differences in the level of institution and policy alignment and not innovation capability per se, which lends weight to the notion that the development of an AKIS is a process and not a transition.

THE ROLE OF ADVISORY WORK AND EDUCATION IN SHAPING FUTURE AGRICULTURE, FORESTRY AND FOOD SYSTEMS

Agricultural, forestry and food sectors in Europe are increasingly confronted with complex and conflicting challenges, such as climate change, protecting biodiversity, food security and social demands. Addressing these challenges requires strong and well-functioning advisory and education systems that can effectively support farmers and other actors in effecting transitions in systems, such as AKIS. Advisory service networks (IALB, EUFRAS and SEASN) in Europe have highlighted several key areas in a shared position paper that are essential for the future development of key stakeholders, including effective research and knowledge transfer, giving independent and high-quality advice, methodological competencies, digitalisation and the use of artificial intelligence (AI), financing and bureaucratic hurdles (IALB et al., 2025).

Given the diversity of social interest and policy objectives, the public sector is an important factor in supporting advisory services, education, networking and knowledge exchange among AKIS stakeholders (EU CAP Network, 2024). Publicly supported advisory systems are necessary not only to promote issues of public interest, but to support the practical implementation of sustainability requirements at the farm level. Importantly, publicly supported high-quality advice is necessary to sustain social, environmental, climate protection and animal welfare (*AKIS Practices under CAP*, 2025; IALB et al., 2025).

The close linking of research, education and advisory services is a key factor in sustainable and innovative agriculture. However, the agricultural, together with forestry and food sectors, should include economic and social sustainability. This integration enables more effective knowledge transfer into practice and supports the uptake of innovation that addresses both productivity, environmental and economic sustainability goals. To achieve this, sufficient and stable public funding is needed, particularly for advisory services and education, to ensure their collaboration, and their quality, independence and long-term impact (EU CAP Network, 2024; IALB et al., 2025).

Often commonly emerging obstacles in everyday advisory, research and education work is the ever-complex bureaucratic approach. This obstacle can destabilize efficient knowledge exchange and practical support. Reducing administrative burdens and strengthening existing advisory frameworks are a necessary step toward improving the quality and the independence of advice, and with that, system effectiveness. In this context, three European Advisory Service Networks (IALB, EUFRAS and SEASN), with their activities, target further development of agricultural and rural advisory services and education with public support, promoting a whole-farm approach that enhances economic viability, environmental sustainability and social resilience (IALB et al., 2025).

SEASN'S BRIDGING ROLE IN THE DEVELOPMENT OF AKIS

The overview of AKIS systems of SEASN member countries shows a high diversity in their structure between EU and non-EU contexts. On the other hand, it reveals emerging patterns and shared challenges. EU member states such as Austria, Slovenia, and Hungary showcase more institutionalised and integrated AKIS, specified by established interaction between advisory services, research institutions, education, and practice, while still

promoting the use of digital tools. In contrast, AKIS systems in non-EU SEASN countries are often still emerging, due to the establishment of AKIS systems in pre-accession countries. Their systems are often fragmented, or project-based, with weaker coordination mechanisms, limited continuity, and poorly established connections between research, advisory service, and farmers.

Although there are visible differences between non-EU countries' AKISs, an overview of them indicates that fragmentation, insufficient coordination, and weak knowledge flows are present. Even in EU member states, challenges occur in terms of inter-institutional cooperation, digital integration, effective translation of research into practice, and interrupted communication in a bottom-up approach. This suggests that AKIS development should not be understood as a linear transition from underdeveloped to fully developed (or functional), but rather as a continuous process of developing and evolving, while adapting to current policy, environmental, and socio-economic demands.

Within this aspect of continuous development, SEASN plays an important role as a bridging mechanism between EU and non-EU AKIS systems. The inclusion of European members of two different policy contexts and environmental frameworks creates a unique space where they can interact and work within a single network. This enables mutual learning processes in which EU member states contribute experience related to CAP implementation, AKIS governance, and alignment with Green Deal objectives, which is particularly beneficial for pre-accession countries. On the other hand, non-EU countries can provide practical insights derived from more flexible, locally adapted, and often project- and innovation-driven approaches.

The SEASN plays an important role in the development of AKIS in South-East Europe by strengthening advisory capacities and fostering innovation-oriented knowledge exchange. Through joint training, dissemination of EU project results, and cross-border cooperation, SEASN improves knowledge flows among advisory services, research institutions, and education systems. Importantly, SEASN enables the participation of non-EU countries in European projects, thereby contributing to the gradual alignment of different AKIS contexts and the emergence of a transnational AKIS space.

By implementation of its activities, SEASN facilitates cross-border exchange of knowledge and practice among advisors, researchers, and educators. This supports the gradual convergence of AKIS principles without imposing the development of uniform models but rather presenting and sharing good practices of the AKIS system and its leverage points. With this, SEASN promotes contextual adaptation, allowing policy instruments, methodologies, and digital solutions to be tested and adjusted in a national setting. Rhetorically, SEASN functions as an intermediary arena where European agricultural and sustainability objectives are translated into regionally relevant practices, while national experiences give feedback into broader European discussion on AKIS development.

When we compare and analyse AKISes of SEASN member countries, we see that strong advisory service and education represent a high-impact leverage point for strengthening national AKIS. As emphasised in a joint position paper of IALB, EFRAS, and SEASN, presented to the European Commission, advisory work and education are crucial for addressing complex challenges such as climate change, agricultural sustainability, food

security and environmental protection. This is why the mentioned stakeholders should be a key focus in the CAP plan. Publicly funded advisory services are essential not only to disseminate technical knowledge, but also to mediate conflicting societal objectives and to support farms in balancing agricultural, environmental, economic and social sustainability. Considering both EU and non-EU countries, we can identify that closer integration of research, education and advisory services is essential for resilient agricultural, forestry and food systems. Key importance also lies in strengthening institutional cooperation, which leads to more effective knowledge flow, and reducing bureaucratic barriers, investing in digitalisation and ensuring stable public financing. All factors mentioned contribute to an effective AKIS functioning. Within this framework, SEASN, together with other advisory service networks, contributes by reinforcing regional cooperation, amplifying the advisory perspective in European policy recommendations, and supporting the long-term sustainability of advisory services as a strategic investment rather than a cost.

CONCLUSION

This paper analysed Agricultural Knowledge and Innovation Systems (AKIS) in EU and non-EU SEASN member countries to identify where systems differ, what their main weaknesses are, and why these differences persist. The analysis shows that EU member states generally have more stable and integrated AKIS, while non-EU countries face fragmented and less institutionalised systems. The key difference lies in institutional organisation and the role of advisory services. In EU countries, advisory services are well embedded within AKIS and closely linked to research, education, and policy, which enables effective knowledge transfer and innovation uptake. In contrast, in many non-EU countries, advisory services operate in administrative or project-based frameworks, with weak coordination and limited continuity. As a result, knowledge transfer remains inconsistent and often fails to meet farmers' needs.

Within this context, SEASN emerges as a key bridging mechanism between diverse AKIS environments. By connecting advisory services, research institutions, and educational actors from both EU and non-EU countries, SEASN enables the transfer of experience, practices, and governance approaches across different policy contexts. EU member states contribute institutional experience related to CAP implementation and AKIS governance, while non-EU countries bring flexible, locally adapted, and often innovation-driven approaches. This two-way exchange supports mutual learning and gradual convergence without imposing uniform models. Through capacity building, joint trainings, dissemination of project results, and participation in EU-funded initiatives, SEASN strengthens advisory competencies and improves knowledge flows across the region. As advisory services represent a central leverage point for effective AKIS, SEASN's bridging role contributes to reducing fragmentation, enhancing coordination, and supporting the long-term development of resilient and innovation-oriented AKIS in South-East Europe.

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ANNEX 1

Comparative synthesis of key characteristics of Agricultural Knowledge and Innovation Systems (AKIS) in EU and non-EU SEASN countries

AKIS dimension	EU SEASN countries	Non-EU SEASN countries
Institutional maturity	Largely institutionalised and stable AKIS structures (e.g. Slovenia, Austria, Hungary)	Emerging, incomplete or fragmented AKIS structures (e.g. Bosnia and Herzegovina, Serbia, Montenegro)
Governance and coordination	Clear governance frameworks aligned with CAP; coordination often shared between ministries and chambers (e.g. Slovenia, Austria)	Complex or centralised governance, often with weak coordination and limited national-level integration
Role of advisory services	Central and professionalised role within AKIS, with recognised institutional authority (e.g. Slovenia, Hungary)	Advisory services often operate ad hoc, project-based or with a limited institutional mandate
Research-advisory interaction	Formalised, continuous and embedded in institutional arrangements	Sporadic, weak or dependent on individual projects and initiatives (e.g. Bosnia and Herzegovina, North Macedonia)
Knowledge flow	Multi-directional and systematic knowledge exchange e.g. Slovenia, Austria)	Predominantly linear, intermittent and discontinuous knowledge transfer
Funding stability	Relatively stable public funding, largely supported by CAP instruments and EU programmes	Short-term and mixed funding sources, often donor- or project-driven (e.g. Kosovo, Montenegro)
Digitalisation	Increasingly integrated digital platforms and advisory tools	Uneven digital development, with limited access, capacity or infrastructure (e.g. Bosnia and Herzegovina)
Innovation support	Embedded within long-term strategies and institutional frameworks	Often innovation-driven but fragmented and lacking continuity (e.g. Serbia, Kosovo)
Policy feedback mechanisms	Established bottom-up feedback channels from practice to policy	Weak, informal or missing feedback mechanisms
Key drivers	EU policy alignment, institutional continuity, stable advisory systems	EU pre-accession incentives, donor-funded projects, local flexibility (e.g. Serbia, Kosovo, North Macedonia)
Key challenges	Increasing system complexity, coordination across multiple actors, capacity pressures	Fragmentation, limited coordination, lack of continuity and institutional stability (e.g. Bosnia and Herzegovina, Montenegro)