The State of Development of the Agriculture Knowledge and Innovation System in North Macedonia

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***Abstract* – This paper investigates the level of development of the AKIS in North Macedonia through seven key functions. Semi-structured questionnaire following the AKIS theoretical archetype was used in interviewing the key representatives of the national AKIS. The results revealed that the AKIS in the country is incomplete, partly functional, and disintegrated. New structures are necessary to enter the system and interconnections need to be established so to build a functional and integrated system for research, innovation, and technology transfer (RITT) in agriculture.**

INTRODUCTION

The agricultural sector in North Macedonia is technologically behind developments in the EU countries. Innovation does not occur in isolation, but several factors play a key role, such as policy, legislation, infrastructure, funding, and market developments (Fieldsen et al. 2021). Understanding the setting of the Agriculture Knowledge and Innovation System (AKIS), including identification of the AKIS actors, their organisation(s), and the knowledge flows between them, is an important step to understanding constraints and opportunities in the transfer of RITT (Knierim et al. 2015) to and in the agricultural sector in the country.

The main aim of the research is to identify the level of development of the national AKIS. Better understanding and improvement of constraints and opportunities in the RITT, would allow the development and application of methods and tools to increase the performance of the agricultural sector.

THEORETICAL FRAMEWORK AND METHOD

Following the analytical AKIS framework, we study seven interlinked key functions required to improve the uptake of knowledge and technologies for innovation in AKIS (SCAR AKIS, 2013) as presented in Table 1, upon which the questionnaire was composed.

Table 1. Theoretical framework and questionnaire composition (SCAR AKIS, 2013)

Creation of knowledge	Fundamental knowledge transfer processes are the learning processes related to developing and utilising new knowledge, technology, or a set of practices. The development of new knowledge can occur through formal education, and in the private sector.
Knowledge diffusion	The exchange of information through networks, where research and development meet government and markets. Policy decisions should be guided by the latest technological research and agendas should be adapted to changing environmental, market and social conditions.
Development of an AKIS vision	Creation of a vision for the AKIS and mobilisation of incentive structures to promote that vision. Incentive structures may change in response to factor prices and regulatory pressures, expectations in market growth potential, new knowledge, expression of interest by customers, cultural changes and external events, etc.
Entre-pre-neurial	Turn the potential of new knowledge, networks and markets into concrete actions to develop and capitalise business opportunities.
Market formation	Creating demand for the outputs of the development process. New technologies or practices often have difficulty competing with the status quo, so a market must be created via institutional change.
Creation of legitimacy	Necessary to overcome resistance to a new technology or set of practices from the existing production, trade and consumption systems.
Resource mobilisation	Closely linked to the creation of legitimacy and concerns financing investments, investments in human and social capital and the development of complementary products, services, infrastructures, etc.

The semi-structured interviews were conducted with representatives of the key institutions that are part of the (in)formal AKIS: i) Ministry of Agriculture, Forestry and Water Management: The Head of IPARD Managing Authority; ii) National Federation of Farmers: The Executive Director; iii) National Extension Agency: The Deputy Head of Sector; iv) The Agricultural Institute: A Research Assistant, and v) The Faculty of Agricultural Sciences and Food: University professors.

The data were summarised in a descriptive manner, enriched with analysis based on the researchers' analytic and integrative skills to examine the collected data, in line with the synthesis method.

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RESULTS

Creation of knowledge in the AKIS - The first step in enhancing RITT is providing solid ground for the AKIS system, starting with the enhancement of the education, research, and advisory systems. Improvement of the education and creation of training curricula tailored to the changing market and circumstances are necessary for creating a sound knowledge base in agriculture. The research community plays an important role in developing innovations and the relations between the education and other relevant stakeholders should be formalised so as to enable the smooth transfer of knowledge and technology. Research investments in the country need to be increased in line with the market demand. The country has a public advisory service (the National Extension Agency - NEA) and a limited number of informal private advisors. The existing advisory service needs to be strengthened and other possibilities to involve new advisory structures i.e. private advisory providers should be explored.

Knowledge diffusion in the AKIS - Certain cooperation between different stakeholders in the agricultural sector exists in regard to innovation and technology development, however still not at a satisfactory level. The cooperation is mostly based on an individual and informal network basis, thus establishing a formal network for active collaboration of all stakeholders in the agri-food sector is urgent. The results confirm that innovations are mostly adopted from abroad i.e. importing the technology etc. or 'imitating' the process, and very rarely, there are innovations invented in the country.

Development of an AKIS vision - The national AKIS system contains almost all elements and institutions in the visualization of the conceptual framework. But, the system is partial and mostly informal and weak. The main problems occur in the undefined roles, positions and links among the stakeholders. The system as a whole is not functional and integrated due to the lack of facilities, finances, technical preparedness, and legislation. The links between different actors involved need to be strengthened and formalised, and new structures to be established.

Entrepreneurial activities - The domestic private sector is the leader in innovations and usually, innovation is market-driven, although they are far less innovative than the other European companies. Large farm companies and processors predominantly adopt innovations from abroad. Most companies, especially those of a small scale, are not motivated to develop innovation because of the high-risk levels in the sector. With few exceptions, small-scale farmers adopt innovations slowly. The private sector should be the key factor in the technology transfer and innovation due to their business interest.

Market formation - The external factors (i.e. the economic situation, EU accession, current pandemic crisis, etc.) are thought to be key to enhancing RITT in the agri-food sector. The national economic situation and the current crises have a negative effect, while the EU accession has a positive effect on enhancing RITT. Interviewees agree that demand is partially driven by private requests. In most instances, the supply-side factors for RITT are market-driven or dependent upon the available support programmes and finances.

Creation of legitimacy - The identified incentives or disincentives present in the system (i.e. market incentives, regulations, financial instruments, and support for investment and transfer initiatives) are mostly characterized as impediments in terms of limited access to credits, concentrated markets on the demand side, problems in sustainability of innovation processes (monitoring), implementation of laws, programs, strategies, etc.

Resource mobilisation - The governance arrangements (i.e. coordination arrangements, interest of different actors, rules in place) for transferring RITT into practical applications are characterised as weak. There is a certain legal framework that needs to be adjusted and upgraded. In terms of modes of governance (i.e. regulatory, market-based), a market-based model is not incorporated into the regulatory model. Coordination is even weaker on a local level. IPARD program is one of the most important and stable instruments for promoting innovation and technology transfer. IPARD is a potential booster of innovation and new technologies in the agricultural sector.

CONCLUSION

This research gives a representation of the internal and external factors which influence the AKIS system and provides conclusions for using the opportunities and bypassing the gaps in the transfer of RITT in the sector.

It can be concluded that the AKIS system in North Macedonia contains almost all elements and institutions but is based on informal relations and undefined roles and positions of the existing stakeholders. There is a large number of institutions with the same or similar competencies, making their coordination process difficult. There is also weak cooperation and competitive relations among the education and research institutions. One of the main deficiencies of the system is the lack of infrastructure and finance to support contemporary research that would solve real problems and introduce innovative solutions in the agricultural sector.

What is needed is an improvement of the regulations, an increase in the budget allocations and inter-sectoral coordination, along with the consistent implementation of comprehensive measures in a number of areas to create competitive products, and investment in RITT. The Government should put the RITT issue on the top of their policy agendas.

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REFERENCES

EU SCAR, 2013, Agricultural Knowledge and Innovation Systems Towards 2020 - An Orientation Paper on Linking Innovation and Research. European Commission, Brussels (Be), http://ec.europa.eu/research/agriculture/scar/groups_en.htm.

Fieldsen, FA., Cronin, E., Varga, E., Biró, S., Rogge, E., 2021, 'Sharing the space' in the agricultural knowledge and innovation system: multi-actor innovation partnerships with farmers and foresters in Europe, Journal of Agricultural Education and Extension, Competence for Rural Innovation and Transformation, 27(4): 423-442.

Knierim, A., Boenning, K., Caggiano, M., Cristóvão, A., Dirimanova, V., Koehnen, T., Labarthe, P., Prager, K., 2015, The AKIS Concept and its Relevance in Selected EU Member States. Outlook on Agriculture, 44(1): 29-36.