

AGRICULTURAL KNOWLEDGE AND INNOVATION SYSTEM IN ALBANIA: INNOVATION PERFORMANCE, UNIVERSITIES AND TWO ARGUMENTS

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Purpose. The purpose of the article is to provide an assessment of the governance of the agricultural system in Albania, by analyzing the challenges for the future operation of Agricultural knowledge and innovation system (AKIS) under the influence of two main factors, such as (i) the country's innovation performance and (ii) universities and research institutions (URIs), for the rapid and effective adaptations of innovation and new knowledge.

Results. In the Balkan region, there is a rapid dynamic (according to the income group) of countries related to innovation (Bulgaria is the 2nd after China), and some of them (Slovenia, Croatia) have overtaken old members of the EU; we prove the importance of Albania's innovation performance and URIs for competitiveness and future operation of AKIS. Innovation and the frequent variability of technologies and effects on producers, consumers and markets can accelerate growth and competitiveness but can create also undesirable effects. The economic decisions, governance of the agri-system and resources under the influence of the rapid developments require an adequate research-decision-making focus. Science-based-guided institutions are essential for improving the country's innovation performance and the role of URIs for the efficient adaptations of innovation, new knowledge and techniques in agri-sector as two main pillars for the future of AKIS in Albania.

Scientific novelty. Most studies analyze the functioning of segments of the agricultural system (e.g. crop, livestock, etc.) or the value chain (e.g. producers, consumers) and identify the low presence of social capital in Albania, using the individual as the unit of analysis (e.g. farmer level) and the company (e.g. factors, sources). It is paid little attention to the renewal of social capital, especially in the context of current migration in Albania. Therefore, we provide an aggregate analysis of agricultural governance, by suggesting the efficiency of (formal) institutions for renewing (missing) social capital, improvement of innovation performance and the role of URIs to policy solutions and future AKIS.

Practical value. Through a functional AKIS, the problem of innovation, policy formulation in the agri-sector and centralization approach or centralized policies can be overcome, by creating premises for an efficient-scientific-entity and a smart-regional-approach, including new networks of researchers and the environment for business sophistication and innovation ecosystems.

Key words: AKIS, country's innovation performance, universities and research institutes (URIs), institutions.

Introduction. There is an ancient truism that knowledge and technology are basic sources for social progress. Prominent theorists at different times and ways agree on the causality of access to resources and factors as the opportunity for advantage and profits, at least from the level of (1) possession of the factors; and (2) the intensity of their use. However, the discussion has never been so rich with views from the perspectives of economies on the one hand (eg. LIC, MIC, HIC countries), and the same global implications such as the variability of climate change, energy prices, etc., and especially innovation as a “new three variable equation” on the other hand. Analyzes of the latest innovations such as AI and ChatGPT (Krugman, 2022), or the rapid development and future of 3D food printing (Burke-Shyne et al., 2020) evidence ethical and socio-economic complications, and here the questions arise: What we (don't) know properly about innovation and its impact on “privileged” sectors such as agriculture? Is there an overestimation of the innovation and new knowledge?

While considerations of the implications are wide-ranging, contemporary analyses of the agricultural production system often result in new capacitive adaptations (eg. technological, Hall, 2005), new networks and innovation systems. Food-agri-production works between a multitude of factors, such as organizations, institutions, farmers and companies, the climate and the soil, wealth, poverty, etc., and especially innovation. Discussions on new knowledge and the current dynamics of innovation in agriculture are mainly structured within a scientific neologism such as the concept of Agricultural Knowledge and Innovation System (AKIS). Factors such as openness, inclusiveness, cooperation, accountability, efficiency, coherence and dissemination are critical for a functional AKIS (Gouriveau et al., 2017). Measurements in the EU countries underline the growing importance of innovations, especially to agricultural-environmental system and that the evolution of AKIS is related to the pluralism of advice providers and comprehensive innovation processes (Schnebelin et al., 2021; Laurent et al., 2022).

Review of literature. Agricultural dynamics while expressing the quality of governance (Mandemaker et al., 2011) are a function of the knowledge system. The diversity of studies in addition to their validity for social problem-solving has enriched the theoretical debate, proving several times the interaction between the theories and the same laws in different sciences (eg. between the natural, anthropological and social sciences, etc.). So, the processing of knowledge in (living) labs related to problems, formulations and solutions constitutes an exclusivity among academic community circles: including the research institutes, advisory practices, farm supervision, etc., up to constitutionalism, ethics, culture and agricultural governance. Given the innovations and sophistications and the growing importance of agriculture for the environment and sustainability, such as the increasing demand for nutritious and standard food production, and the interdependence with international agricultural trade policies and the determining influence on other energy prices and critical importance for developing

countries, etc., its well-governance has been continuously characterized by an increase in the interaction between farmers, institutions and scientific information within the format of AKIS (Agricultural Knowledge and Information System) and in the light of findings and developments institutions and researchers, have sophisticated this interface (FAO, 2000; Röling, 2019).

However, the Agricultural Knowledge and Innovation System (AKIS) is a new contemporary concept in identifying, analyzing and assessing the various actors in the agricultural sector as well as their communication and interaction for innovation processes (Knierim et al., 2015). Considering farm diversity and new knowledge generated by farmers, AKIS represents a new and interactive model of networking systems that includes new knowledge production, adaptation, advice and education where the changes and findings of the researchers (basic and applied) can be reflected (Poppe, 2012). While the establishment of an effective national AKIS concept became a European policy imperative with important opportunities for researchers and involved actors, problems related to the analysis and academic thinking on innovation processes are observed (Sutherland et al., 2023). At the institutional level, especially the leadership factor has a significant (and positive) multi-dimensional relationship with the environment, ecosystems and problem-solving and especially innovation processes (Jung et al., 2003).

The progress of innovation in agricultural activity reflects the overall innovation performance of the country, which is expressed according to the GII index (Global Innovation Index). The innovation capability and efficiency levels of the country are very important to GII rank, and national innovation structure can be hypothesized among seven factors: representing inputs (institution, human capital and research, infrastructure, market sophistication, and business sophistication) and outputs (knowledge and technology outputs, and creative outputs) (Sohn et al., 2016). In the short term, every increase in GII has significant material effects on the Agriculture Value Added (AVA), affecting the knowledge system as well (Jiuhardi et al., 2022). Moreover, while the progress of agriculture system is closely related to sustainable national economic development and innovation processes, the GII ranking of the country is a representative indicator, considering it as related to costs, competitiveness and business environment and the degree of development and agricultural innovations (Graczyk et al., 2018).

Universities and research institutions are crucial components of AKIS for adapting new knowledge, innovations (and its frequent instabilities) and inventions to promote innovative processes and new networks (Hermans et al., 2012). While the importance of research and universities for providing new knowledge and technological innovation in the agri-system is well-supported, there is a standard in the theoretical discussion according to the methodological approach suggested by the EC, based on three levels, such as (1) strategic orientation, (2) gap analysis and (3) institutional comparative analysis for the best formulation of intervention needs in the framework of AKIS (Bachev, 2020a; 2020b; 2022). Moreover, AKIS currently

represents a basic instrument applied in key (smart) EU policies, including new educational curricula and innovations (Birke et al., 2021), and the current EU agricultural policy (2023–2028) and member states are particularly encouraged to use it to improve knowledge flows and links between research and innovation practices (Germundsson, 2021).

The discussion on the functioning of AKIS in Albania has continuously increased in recent years in the framework of cooperation with the European Commission and EU institutions (MARD, 2019), other partner associations with a focus on agricultural development (GIZ Albania), formalizing a draft action plan through the assistance of the research programs of the German Government (Zhllima, 2022). However, the interaction between actors and institutions in the framework of AKIS in the case of Albania includes complicated challenges related to the specifics of the agri-system, such as the (small) size of the farm and the low level of social capital, the capacity of service providers, markets and inputs, costs, prices, profits, losses, financing, farmers knowledge and technical-technological access, etc., the fragmentation (horizontal or vertical) or missed and unclear policies, and especially the difficulties for the exchange of new knowledge and innovation. A new important role in the exchange of new knowledge, the efficient adaptation of inventions and innovation in the framework of AKIS in Albania can be played by universities and research institutions in the field.

With the operation of AKIS, the discussion on development can be professionally structured, creating a process and new entity of governance of the agriculture system in Albania. In the conditions of a predominance of the family farm over the last 30 years, and between new/old structural tendencies (eg. individualist, cooperative, and corporatist), missing institutions or their reduction over time (eg. agrarian bank, research institutes) while the environmental-social implications have increased (eg. EU integration delays, climate and migration, energy prices, food insecurity, etc.), may have influenced in a multidimensional way on agricultural issues. Through a new format of all actors, the university institutions and innovative adaptations, premises can be created for the increase and evolutionary progress within the AKIS, by increasing efficiency and creating social positives. Theoretical and practical gap and the future multidimensional importance of the field of study (in Albania), justify a conceptual exploration and the research problem can be formulated: the potential for the future development of AKIS in Albania is affected by the country's innovation performance and the fast-efficient exchange of innovations and new knowledge of universities and research institutes and their interaction as an entity within the agricultural system.

Materials and methods. The purpose of the article is to provide an assessment of the governance of the agricultural system in Albania, by analyzing the challenges for the future operation of AKIS under the influence of two main factors, such as the country's innovation performance and universities and research institutions (URIs), for the rapid and effective adaptations of innovation and new knowledge.

Considering available sources (especially on innovation) and the research gap a systematic review of the literature has been done: firstly on the functioning of the agri-

governance in Albania during the last 30 years; and secondly exploring a theoretical approach within the new institutional economics to AKIS as a scientific neologism, its outcomes and the latest policy solutions for the operation. Facts, data and expertise are incorporated through the collaboration of researchers from Albania, Bulgaria, other EU countries and the USA about technologies and technical problems and specifics of innovations in various fields (eg. new curricula, digital mapping, etc.) and implementation problems, costs, and benefits, etc. Based on the database provided, the operation of AKIS is conceived within the multidimensional picture of the country's innovation performance, new technological dynamics and implementation challenges, and through the hypothetical method and expert assessment, we analyzed the impact of two critical factors, such as (1) the country's innovation performance (by GII); and (2) universities and research institutions.

The *research questions* of the study are:

RQ₁: How does the country's innovation performance interact with the agri-governance and the future functioning of AKIS in Albania?

RQ₂: How can URIs (e.g. theoretically, practically) affect to agri-governance and the future functioning of AKIS in Albania?

Results and discussion. The environment and economic governance increasingly depend on the level of innovation and the interaction of new knowledge to production units (Figure 1; Chang et al, 2004; Ahmedova, 2015) and given the wide multidisciplinary of agricultural issues (Figure 2), the importance of the above two factors to sustainability and agri-governance as an important part of the economic governance appears in a repetitive way and it is widely supported by the literature (De Boon et al., 2022; Sunding et al., 2001; World Bank, 2012; Rijswijk et al., 2019).

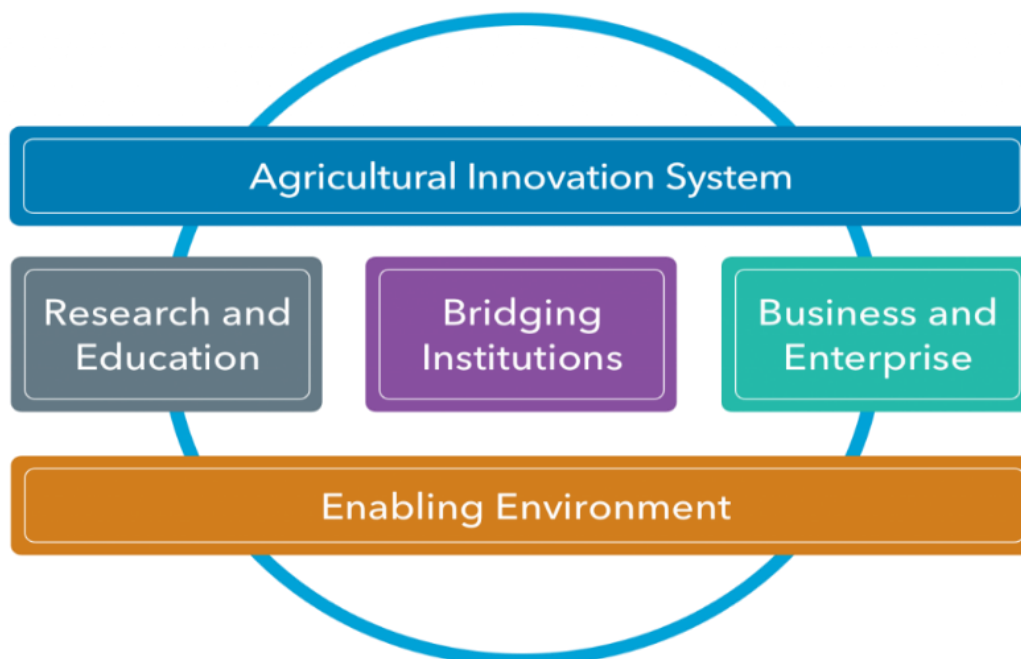


Figure 1. Network of actors, organizations and institutions and agricultural innovation system

Source: IFPRI (2020).

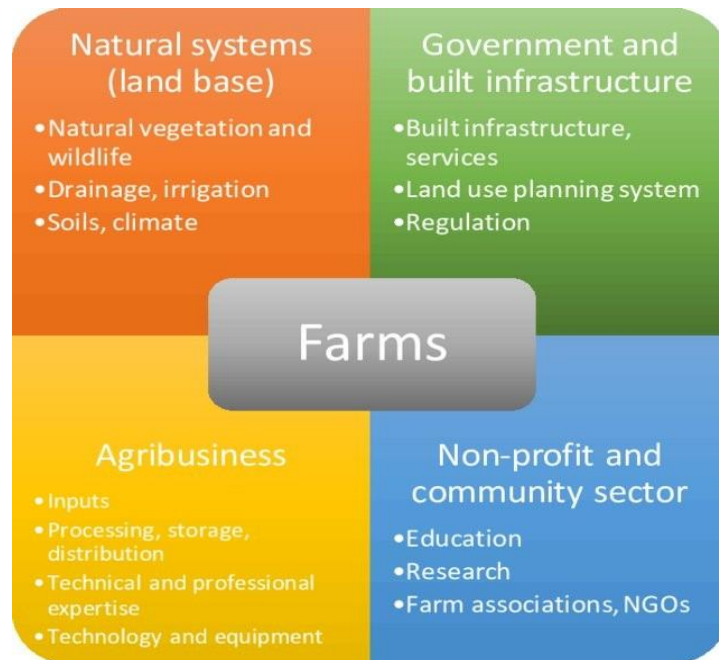


Figure 2. Schematic presentation of the farm within the agricultural system

Source: Schreiner (2017).

However, should be considered the conceptual and practical differences between the Agricultural Knowledge and Information System (AKIS, Figure 3, Table 1), as a systematic functional link between farmers and institutions for the transfer of agricultural knowledge and information (Dirimanova, 2014), and the Agricultural Knowledge and Innovation System (AKIS), a new key concept which includes main actors such as farmers, consumers, service providers, researchers, institutions (eg. local, central), media etc., given the growing importance of the innovation (changes and its frequency) as a leading indicator for the sustainability and broad agri-governance issues.

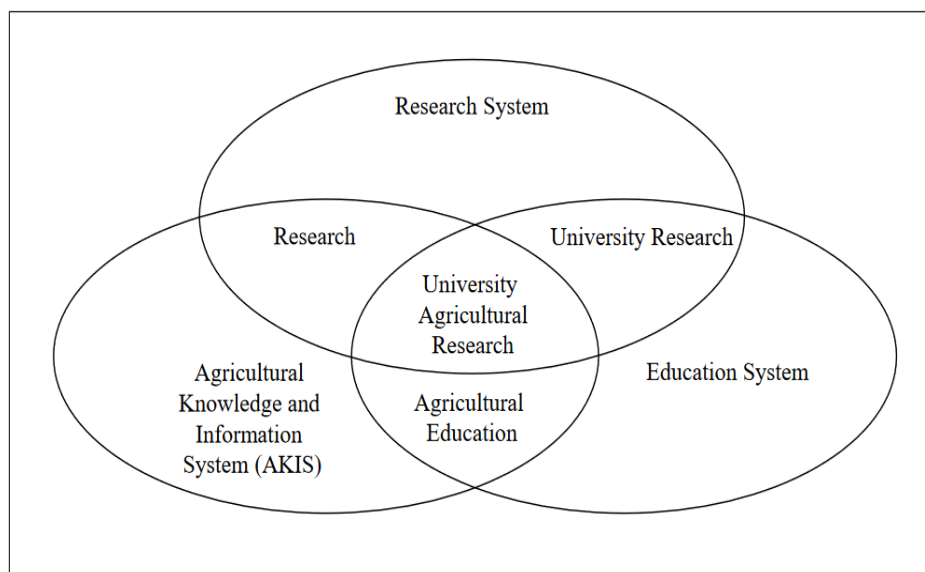


Figure 3. AKIS within the context of agricultural research

Source: Michelsen et al. (2004).

Table 1

The composition of the three systems

Research system	Agricultural knowledge and informative system (AKIS)	Education system
Scientific and research institutions	Agricultural research institutions	Primary and secondary schools
Universities and colleges	Universities and colleges	Technical institutes
Private sector research	Agricultural technical institutes	University and colleges
Science and technology policy units	Extensions organizations	Training institutions
Scientific press and information services	Farmers and farmers organizations	Adult education institutions
-	Private agro-based companies	Education policy units
-	Markets for agricultural inputs and outputs	-
-	Agricultural press and information services	-
-	Agricultural policy units	-

Source: Michelsen et al. (2004).

The use of innovation and scientific research (and reflection of changes), as basic resources for the quality of economic governance, public policies and agri-system in Albania (for many reasons) has functioned within a broad context of social complexities related to growth and wealth system, level of industrialization and human-relational capital, and as a result institutions, culture, etc. The developments and achievements (eg. income per capita) show to be true that the socio-economic transition (which is still ongoing) and its essence as a socio-technological transition towards efficiency, whose results are strictly measured by the increase in scale production and productivity in the economy and progressive development within the agricultural system (Martens et al., 2022; Renard et al., 2019) may not have been a simple task for economic governances over the years. While capacity-technical uncertainties (eg. the lack of professionalism), centralization and the dark side of dominant anti-competitive behavior, etc., in economic governance (or resources) have been widespread during the transition of post-communist countries (Goetz et al., 2001; Bachev, 2011; Luthans et al., 1998; Diaby et al., 2015), the institutional inadequacies (Sokoli et al., 2021), failures or inefficiencies (Karini, 2013; Osmani et al., 2021a), the problem of (high) costs (Alderman, 2002) and consequences to agri-system are highlighted in the case of Albania (Osmani et al., 2021b). While trade openness and the “invisible hand” during the country’s transition are predicted as the main source of growth, the critical approach as a culture and public policy evaluation instruments and designed policies for investments (and specific industries), production growth, capital concentration and specialization that would enable a growing potential to attract higher levels of innovation and qualified jobs have been insufficient. In fact, the economic governance model used has exhausted both: the static benefits from market opening and the

intensity of exchanges; and the dynamic effects from the missing specialization that the country should have benefited from in this (long-term) period of the EU integration. Moreover, this would contribute to the level of growth, innovation and higher market integration prospects: employment with high wages for younger generations, new ecosystems and standards development (than just numbers), etc. The theory of the Economics of European Integration explains that countries' long-term growth depends on the capacity of technological capital (Baldwin et al., 2012) and its sustainable expansion is decisive for successful economic governance, industrialization and the level of innovation and to the functioning of agri-governance.

The innovation and Albania. The problem of improving the country's economic governance and innovation, strengthening the network of stakeholders and companies, and efforts for improving input and export-markets, and farmers' social capital for creating a competitive business environment have been continuous for 30 years in Albania. However, the economic structure, the results and expectations for growth rates and implications to waves of migration, and the departure of the most qualified have created a model, by affecting the degree of economic modernization and the spread of innovation. It is often said that the country has still unused potential in the agri-sector. In fact, the problem of (high) costs (fixed and variable), the efficiency of institutions and policies for diversification and growth, human capital and the (missing) role of research in economic formulations, may considered as factors that have influenced the structure and the sophistication of businesses, functioning of markets, the low level of competitiveness, specialization of production and the lack of economies of scale, etc. These are also indicators characterizing the country's economic governance and the model and innovation performance according to the Global Innovation Index (GII).

Furthermore, considering the dramatic developments during the pandemic period (Covid-19) and the economic consequences, the current energy prices and inflation, the delays in the EU Integration process and the implications for small economies and markets not traditionally integrated with Europe and the region (also before the 90s), the novel of performances and innovation processes in Albania deserves less color and more light. The above problems actually appear (Figure 4) even in the performance of the last years (eg. 2020).

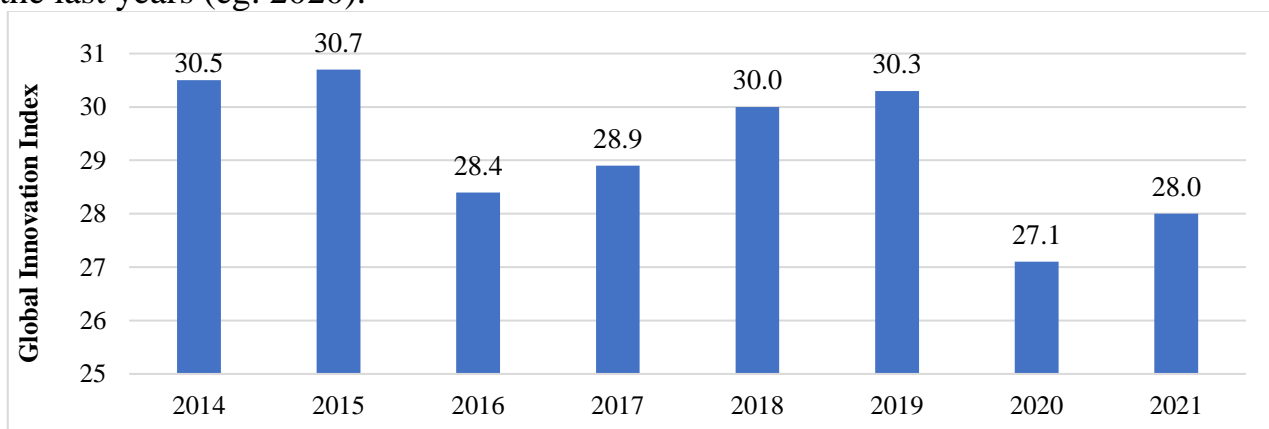


Figure 4. Dynamics of the Albania's Innovation Index, 2014–2021

Source: TheGlobalEconomy.com (2021).

While the indicators of the innovation index during the period 2011–2021 vary on average with 29.2 points with a minimum of 27.1 points (2020) and 30.7 points (2015), the latest data for the year 2021 ranks Albania with 28 points among 132 countries where the average is 34.3 points. Meanwhile, for the year 2022 among other countries of the world (Table 2) Albania is ranked in the 84th place and is listed in the table (with a difference) with other countries of the Balkan region.

Table 2

Global Innovation Index rank of the Balkan countries and Albania, 2022

GII rank	Country	Score	Income group rank
33	Slovenia	40.6	32
35	Bulgaria	39.5	2
42	Croatia	35.6	37
44	Greece	34.5	38
49	Romania	34.1	8
55	Serbia	32.3	10
60	Montenegro	30.3	13
66	North Macedonia	28.8	17
70	Bosnia and Hercegovina	28.5	20
84	Albania	24.4	28

Note. High – income group; upper middle – income group.

Source: developed by authors according to the Global Innovation Index (2022).

Losing a place in the global ranking (GII, 2018), the country faces strong dynamics and competitors for innovation (Bulgaria, Slovenia) from new members in the EURO area (Croatia) and other regional candidates for EU membership. EU members from the Balkan region and other Western Balkan countries have significantly improved their performance in the field of innovation, building new potential projections for economic structuring and competitiveness, regional competitiveness and future growth rates. Moreover, considering the impressive results of a number of innovations in the fields of economic engineering, etc., improving the country’s innovation performance may also be crucial for agricultural projections. In the global ranking in group-countries by income level: (1) high income; (2) upper middle income; (3) low average income; and (4) low income, consider that Albania (however) presents a performance consistent with the level of development (Table 3).

URIs within the framework of AKIS in Albania. Universities and research institutes have a primary role in growth, development and social progress. Their profiled role especially in the agricultural sector has made URIs have a unique role in the transfer of new knowledge and innovations in several critical areas for growth and sustainability. The Agricultural University of Tirana (AUT) is a unique research center of agricultural-excellence and the first-ranked university in Albania. Considering the inherited capacities and the new-challenging processes (eg. the pandemic period), AUT has adapted gradually by changing. The main orientations have been towards learning and practical research, the dynamism of labor markets and regulations, emergencies towards digitalization and access to new technologies (pandemic period), services to third parties, new research fields, etc. Some new results (2022), have been the

construction of new research laboratories (4), national projects won (10), growing participation in the mobility of researchers, students and administrative staff (235), and other international projects such as COST (45), etc.

Table 3

Innovation performance by income levels of the Balkan countries and Albania, 2022

Indicator	High-income group	Upper middle-income group
Performance above expectation for level of development	-	Bulgaria
Performance in line with level of development	Slovenia Croatia	Serbia Montenegro North Macedonia Bosnia and Herzegovina Albania
All other economies	Greece	Romania

Source: developed by authors according to the Global Innovation Index (2022).

Developments in the field of knowledge and new teaching-research practices and innovation have been made possible, especially in the framework of projects financed by the EU. Participation in Erasmus + projects has influenced the recognition and spread of new innovation practices, the increase of research cooperation, the benefit of soft-skills for students towards culture, etc. The SMARTAL project, with partner universities from France, Germany, Greece and Albania, has contributed to the growth and empowerment of capacities, promoting new innovative methods and approaches continuously. Through a new curriculum at the Executive Master’s level and based on the collaboration with professors from IAM Montpellier, has enriched fields such as sustainable development, circular economy, quality assurance, labor markets and food-agricultural products, administration systems, etc. The new research-training practices have certified the knowledge and competencies of the representatives of the state administration.

Considering the importance of the Environment as one of the pillars of Sustainable Growth (SG) and in the function of a new strategy for the expansion of activity towards innovation, AUT in cooperation with the Leibniz Institute for Tropospheric Research, for the first time has implemented in Albania a new technology based on the system innovative laser radar (Leibniz Institute for Tropospheric Research, 2022) for monitoring the atmosphere and air pollution. This technology can contribute to the enrichment of climate models and improve the quality of satellite observations of climate parameters from space. Innovations in social, environmental, veterinary and agricultural sciences are the focus of AUT researchers. Innovations in soil and environmental sciences such as DSM (Digital Soil Mapping), which has become a major tool used by researchers throughout the world (Libohova et al., 2023), economic implications at the level of farms, and institutional ones within the sector, etc. are the focus of the ongoing work of the AUT, EU and USA researchers.

URIs and the scientific community have the mandatory responsibility for the governance of the agri-system and are decisive for the functioning of agri-governance.

This importance is clearly determined by the level of interaction between them: developed agriculture is based on science and the degree of fast-new knowledge adaptations, and conversely can be understood as the need for more interaction, new organization, or other problems. The adaptation of new knowledge and innovations is characterized by the specifics of the regions, activities, dynamics (external, internal) etc., but nevertheless from the analysis, at least two conceptual limitations can be identified. They are complex and complementary and can be defined as theoretical and practical problems and with impact on the issue. Firstly, while new knowledge and innovation are important for problem-solving, growth and the agri-governance, they require time for implementation. New knowledge may have limitations for the generalizability and operationalization within different regions, etc., and as happens in the theoretical debate, their validity may be discussable. The same problem (eg. cooperation, financing, or climate) has specific differences in France, Bulgaria or Albania.

Moreover, even if there is a valid standard discussion (eg. discussion on the development of backward regions often has sophism rather than sophistication), anyway, research results and new technology “move differently in time”. Thus, the testing procedures of some innovations require hours, months or seasons, which delay their uses on the farm. Meanwhile, while the benefits from new technologies on the farm take (at least) years, the scientific research, theoretical discussion or (especially) innovative technology “get rich” much faster. In some new technologies, the dynamics within a few weeks are very impressive, but these developments may require theoretical re-evaluations or new-rapid-regional adaptations. While these cases can be investigated by scrupulous researchers, there may be delays in institutional formulations, adequate reactions and effective implementations. Thus, all these differences in time at best can be costs for agricultural producers, but as it is proven often they result in net losses, migration and wider problems, etc.

Secondly, despite the critical importance of human capital regarding the unique role of scientific research for analysis, formulations, relevant instruments and supervision, etc., the overestimated role of social capital in agri-production is well-argued. While new knowledge and innovations represent key factors for sustainability, competition and competitiveness, there is a natural difficulty in their transfer from-university to-farm. Explaining it simply, for example, the university cannot “build” a livestock farmer: let’s be clear, the heritable ability factor prevails over the possible primary importance that scientific research may have. Considering the specifics of livestock activity in Albania (where herd units predominate against modern stables), the transfer to livestock farmers may be even more complicated, because new tech and innovations often correlate with modernized forms of production. So, while the formulations can be assumed to be supported, the implementation based on various specifications can be inefficient and misdefinitions are accompanied by consequences.

The two above arguments discussed related to the issue of the applicability of new innovations and adaptation and the overestimated role of social capital against human

capital for agricultural production are well-supported and can be considered in future research. By Alex et al. (2000) the research outcomes and technology adoptions are by nature uncertain, and establishing a timetable for the results is difficult. Therefore, technology development and dissemination do not follow a linear path-the environment for innovation changes continuously with new research results or changes in institutional, market, or social conditions. Moreover, even if it is successful, lag times for the impact of agri-research is long to produce impacts on productivity.

Ostrom (2000), argues that social capital is strongly affected by institutions, applied mass-norms, operating rules in society, etc., and since it is considered a complement to all other forms of capital there are natural difficulties in its building, being that it is related to wider social dynamics.

Putnam (1992), emphasizes that social capital has a critical importance to social development perspective, and institutions are drivers of horizontal interaction between farmers and associations, mass open parties, etc., and the model of vertical-command relationships of the patron-client type prevents trust and cooperation, especially between interested clients. While the lack of social capital in Albania (and agriculture sectors) is well-documented (Skreli et al., 2011; Osmani et al., 2022, etc.), little attention has been paid to the discussion on the essence of its renewal: as an expression of the pluralism of institutions and (or not) their roots, and not to the simplified link with agriculture. The problem of social capital and trust are fundamental and related to the fulfillment of the functional tasks and quality of institutions and more often with economic-welfare governance or agricultural solutions, and the latter affect around 40 % of the population in Albania. Functional institutions are key to renewing social capital and sustainability, accelerating EU integration and new innovation processes.

While for Bourdieu (1986), social capital is an initial act of institution and an expression of power, the level of education and culture, and linked to the reproduction of class, social status, power relations, etc., according to Coleman (1994), under the influence of some factors such as the governance, it can be invalidated and not renewed. More sophisticated institutions can create sustainable added-value for growth (and future), rather than just numbers.

The problem of AKIS operation is complex and may include solvable and/or non-solvable issues. We support that the URIs are the apparatus for formulating proposals and building a vision of the future: offering the necessary theoretical adaptations to problems (eg. regarding the two above arguments), but the practical challenges in the terrain are also disturbing and dynamic. So, the last year (2022) provided important data that must be used to analyze the effects of climate change, but there aren't studies on what activities and new inventions and economic-environmental solutions should be built (or not) in the regions with new temperatures in Albania or the region; what are the suggested innovations (technological, social), or what can be cooperated with the neighbor countries of the Balkan region in a world that is becoming smaller due to common challenges and fast inventions and innovations, because cooperation in specific fields may be a necessary alternative for the region countries given the

dynamics. Moreover, during the year 2023, the effects of climate change have created large and unpredictable consequences for production, standards of agricultural products, etc. Until the final reports of the year (2023), these data deserve attention and research evaluations, but they are preliminarily confirmed in the academic circles in Bulgaria, Croatia, Greece, Kosovo, North Macedonia, Romania, and Serbia and these concerns have appeared in Albania as well. From the discussions of the researchers in the terrain with the retailers and farmers, it is ascertained significant decrease in production yields in field crops (eg. wheat, maize), fruit trees (especially cherries) and other (eg. viticulture, blueberries) in rural regions (Vlorë, Lushnjë, Korçë and Tropojë) in Albania. From market observations, it is also found that the standard of vegetable crop products (tomatoes, cucumbers, etc.) has decreased, which will affect the annual balance of the farmer's income, consumption patterns (changes and possible substitutions) and exports, exposing all (producers and consumers) to possible increasing risks. The coming year can be predicted as the year of rising climate effects: food prices and insecurities, malnutrition, poverty, etc.

The two above arguments and illustrated facts on (recent) climatic effects on the agri-environment are essential for the development of AKIS in Albania as a process with new expectations; where through the sophistication of stakeholder networks, or new mechanisms (eg. social innovations) it can also contribute in a complementary way to the sophistication of research and its predictability to economic achievements. This among others brings out a reasonable priority: the need for leadership and governance of the funding of scientific research from the main institutions. Current EU economic-innovations are science-based-guided, and it is explainable that the results are an increase in competitiveness and sustainability, business-eco sophistication, new stockholder networks and social innovation, etc. The improvement of governance efficiency and institutions can have a significant impact on competitiveness, foreign investments, sustainability and the country's innovation performance as well by reducing the gap (Table 4) with countries of the region.

Table 4

The governance efficiency index of the Balkan countries and Albania, 2022

Global rank	Countries	Score	Global rank	Countries	Score
9	Slovenia	65.1	46	Serbia	54.5
24	Greece	59.0	52	Montenegro	53.3
28	Bulgaria	57.9	53	North Macedonia	53.2
29	Croatia	57.7	64	Bosnia and Hercegovina	50.1
30	Moldova**	57.6	95	Turkey**	45.5
36	Italy**	56.5	98	Albania	45.0
43	Romania	55.6	-	Kosovo*	42.8

Notes. *Reported for the year 2021. Source: Trading Economics (by World Bank).

**Countries included for comparative purposes.

Source: developed by authors according to the Global Governance Index, 2022.

The worrisome challenges of climate change and its consequences require high

attention; they should be analyzed on a regional country basis. However, so that the findings better contribute to the growth of national production, public institutions are needed, and by this, we emphasize the importance of institutions as creators of processes rather than structures (Kimengsi et al., 2022); otherwise, the research repeats itself, creating more sophisms than validity about the market-business sophistication needed.

The efficiency of the research depends on the institutions. Smart approaches to future challenges for regionally smart problem-solving versus the old centralized approach, require new smart institutions. Empowering institutions and university life where solutions are produced, means the efficiency of AKIS (Box 1) as a European Policy.

Box 1. Empowering AKIS in Europe – key messages, 2021–2027

“...Knowledge and innovation have a key role to play in helping farmers and rural communities meet the challenges of today and tomorrow...

- Policymakers, farmers, researchers, advisors, associations and media need to step up their efforts to develop new knowledge and innovative solutions. Moreover, a conducive environment across the EU for quicker innovation and better valorization of existing knowledge to achieve the CAP objectives and deliver on international commitments needs to be set up.
- The European Innovation Partnership for Agricultural Productivity and Sustainability (EIP–AGRI) is a unique policy framework to support interactive innovation projects at local and transnational levels.
- Therefore, it is essential to build stronger Agricultural Knowledge and Innovation Systems (AKIS) to boost the initiation and development of innovation projects, to disseminate their results and to use them as widely as possible.
- Successful AKIS strategies include four main groups of actions:
 - Enhancing knowledge flows and strengthening links between research and practice;
 - Strengthening all farm advisory services and fostering their interconnection within the AKIS;
 - Enhancing cross-thematic and cross-border interactive innovation;
 - Supporting the digital transition in agriculture”.

Source: European Commission, EU SCAR AKIS (2019).

Discussing the results of the study, it should be noted that the analysis shows that the Balkan region is characterized by strong global competitors (Bulgaria is the 2nd after China) and new members at the EU level (Slovenia, Croatia) in terms of innovation rank better than some old members and Albania in the framework of a strategic orientation towards it should do better (eg. starting from its infrastructure, Kutlača et al., 2022). As is presented in the research questions, countries’ innovation performance and URIs affect the future operation of AKIS and this is supported by the literature (Nemes et al., 2016; Knierim et al., 2019; Gava et al., 2017).

We support the essential role of URIs in the transfer of innovation and new knowledge, by repeating the importance of efficient institutions for prioritizing and founding research in accordance with development objectives and its validity for agri-governance so that development becomes a process and sustainable. The analysis shows that the performance of AKIS interacts with the country’s innovation performance and the higher participation of the scientific community, which in the context of agri-governance can be effective depending on the governance efficiency.

Its essence is economic governance and therefore it constitutes the main responsibility at the highest level of government. So, while through the transfer the URIs can train new knowledge and apply possible innovations (within limitations or environmental unpredictabilities), in regions characterized by high migration the problems go higher and can be more complicated for the organization of production, the sustainable supply, and the operation of the farm. Universities will continue to offer expertise and training, but the migrating herdsman cannot be “created” with training certificates. In some activities (eg. livestock), social complexities (eg. migration) affect the sustainability of the economic system and may include broad-multidimensional and self-explanatory issues, such as national wealth, adaptations to regions where animals are sold and bought; diseases, treatments, ambient temperatures and water quality, food safety, etc. The institutional capacity of knowledge management (KM) is essential for the governance of wealth-creating sectors and new ecosystems (Holsapple et al., 2000; Moss, 2004; Liu et al., 2019). Knowledge management and research are necessary for the implementation of AKIS policies (Lamprinopoulou et al., 2014; Fieldsend et al., 2021) and the explainability of possible contradictions (Fieldsend et al., 2020).

The well-known sentence of J. Stiglitz “...the only real and sustainable welfare is to spread welfare...” is particularly explanatory regarding the importance of efficient and science-based institutions, considering the rapid spread of new knowledge, scientific neologisms (eg. AKIS) and new policies and their linkage to innovations for solving major emergencies and daily problems that require fast solutions. Critical climate challenges and the consequences in the environment, agriculture, food security, etc., or concerns about the social complexities and types of economic growth in Europe (eg. with increasing debt, growth worsened or towards declining industries, etc.) and implications for sustainability and well-being depends of controlling complexities (Tainter, 2006) and can be afforded with professional governance and institutions.

Conclusions. The paper provides an analysis of the potential for the operation of AKIS in Albania within the framework of agricultural governance, some discussible theoretical arguments and factological pieces of evidence from the terrain and the new role that the scientific community should play in the age of inventions and innovations. The research on the future functioning of AKIS in Albania can be expanded through the increase of funding and the creation of a necessary (broad sectorial) database on innovation (and indicators), and in their absence, this can considered a limitation of this study. The problem of the future operation of AKIS is related to the accessibility of the country and the agri-sectors to innovation and especially to the intensity of the use, and we argued (above) the theoretical conceptual specifications and illustrated with facts on practical problems in the terrain. So, the greater amounts of innovation suggest the increase of coordination with URIs and expertise in economic and agri-governance for profitable adaptations (and in time), because innovation and the variability of new-tech and effects on farmers, consumers and markets can accelerate growth and competitiveness, but can also create undesirable effects.

We emphasize that the quantity and quality of the transfer of innovations and new

knowledge within AKIS are clearly characterized by the multifaceted institutional specifics as part of the country's innovation performance (GII), underlining the importance of university and research institutes. URIs can make certain problems solvable and the functioning of AKIS as well, and their basic source is the scientific community. URIs have the necessary expertise, logistics, technologies, and solutions. In the EU countries, university expertise offered is a common daily practice for quick solutions, such as adaptations of innovation and new knowledge, where challenges of the economy and structuring and especially climate change are measured and evaluated rigorously by academic circles. On this basis, the necessary data for the problems, expectations and quick solutions needed in society are provided. Expertise includes the forms of theoretical, empirical, technical, innovative, procedural, practical, cultural, etc., which only the academic circles can provide. Considering this as a deficit of agri-governance in Albania, we suggest the creation of living-labs (by fields of study) according to regions, which intensively with main actors, chambers of commerce, companies, producers, institutions (central and local), etc., can/should offer expertise or lectures on the problems and that for many reasons (even traditional) may not be properly identified in time by institutions. They will also be an opportunity for the adaptation of researchers to new responsibilities, apart from just teaching with workshop practices (regular, frequent) and future agri-governance.

Within AKIS in a complementary way universities and academic circles are also expected to be enriched with new competencies and culture. By this, we mean the high professional profile of the debates in the new EU member countries on national policies or the formulation of important community policies, where the solutions are exclusivity of the academic community. Moreover, the future well-functioning of AKIS and the sophistication of the market-business networks, producers and retailers can contribute in many ways to improve the country's innovation performance, institutionalism and structural chronic problems (eg. power distance, etc.) and developmental issues.

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