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GOALS OF INNOVATIVE PLANT GROWING ECOSYSTEM MANAGEMENT

Hovhannes Asatryan
Institute of Economics after M. Kotanyan, NAS RA
Ph.D. student
hovikagro@gmail.com
ORCID ID: https://orcid.org/0009-0003-8110-6367

Abstract: The development of innovative plant breeding is facing new challenges in the modern world. The progress of this sector is interconnected not only with the opportunities for introducing innovations, but also with legislative support, behavioral attitudes of farmers, and the organization of business according to ESG principles, which are collectively presented as an innovative plant breeding ecosystem.

The research makes suggestions on how to make the efficiency of the innovative plant breeding ecosystem measurable and with what methodology to manage it in competitive agrobusiness conditions.

Keywords: innovative plant breeding, ecosystem, state support for agriculture, ecosystem efficiency indicators, legislation.

JEL codes: O3, Q5

Research aims: to present the framework of the innovative plant breeding ecosystem and identify opportunities for managing it in terms of competitiveness

Research novelty: a new approach to managing the innovative plant breeding ecosystem has been proposed, making measurable not only the goals of agricultural innovations, but also the results of implementing management decisions regarding their availability.

Introduction

The management of innovative plant breeding is multi-vector and multi-layered, conditioned by the specifics of the vital activity of the sector (O'Donoghue et al., 2022). And the sustainable vital activity of this sector depends not only on the availability of the necessary material and non-material resources, but also on the behavioral manifestations of beneficiaries, farmers' disagreements regarding innovative changes and reluctance to make changes, the high degree of riskiness of innovative ideas, and expensive investment programs, which must be taken into account during the management of innovative plant breeding transformations (Newton et al., 2020).

In particular, such management is effective if it is implemented within the framework of the organization of innovative plant breeding.

Research results

Any ecosystem in nature functions effectively if the components included in it are harmoniously interconnected with each other and mutually reinforce each other. And if this harmony of interactions is violated, then the ecological balance is also violated and as a result the ecosystem operating in the natural environment either collapses or loses its effectiveness (Martirosyan et al., 2025). The same is also

characteristic of innovative plant breeding, which, when considered as an ecosystem, comes with such components as legislative regulations that promote development, opportunities for business to generate innovative ideas and present them to the market, the profiteering of innovative solutions that promote sustainable development by beneficiaries, the organization of business with ESG approaches, the availability of financial, non-financial and quality labor resources. And if the listed components are either absent or do not function in a coherent manner, then the management of sustainable development of the innovative economy encounters difficulties and may even fail.

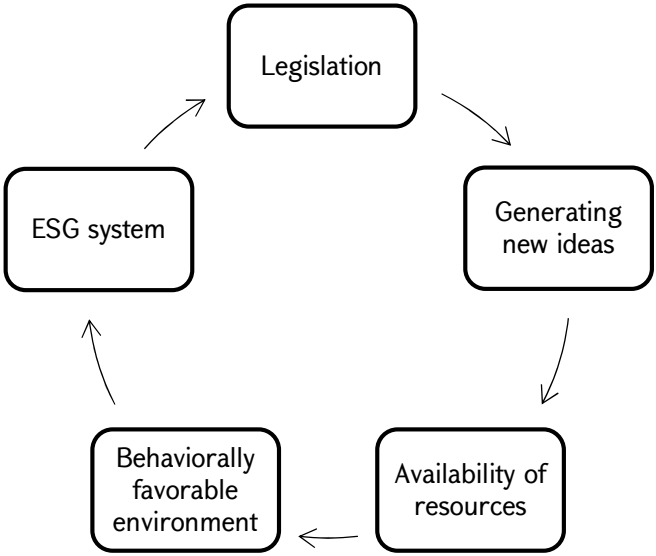


Figure 1. Interrelated components of the stability of the innovative plant growing ecosystem
Source: *Author's own work.*

Therefore, we propose the object of management study as the individual components that complement the innovative plant

growing ecosystem (see Figure 1). In this regard, the innovative plant growing ecosystem is mainly considered as a set of interconnected actors, technologies, knowledge, legislative and institutional arrangements, infrastructure and market mechanisms, which in a unified way ensure high productivity of the farm economy, resource saving, stability and competitiveness within the framework of agribusiness (Marcelis et al., 2013).

One of the key documents of the crop development policy is the Strategy for the Main Directions of Economic Development of the Agricultural Sector of the Republic of Armenia for 2020-2030, according to which the vision for the next ten years is to have a sustainably developing, innovative, high-added value-creating agriculture that cares for natural resources and is in harmony with the environment, creates ecologically clean products and guarantees the well-being of the farmer.

The programmatic basis of the state policy for the development of the agricultural sector is the Government Program of the Republic of Armenia. There are also three conceptual, strategic documents.

- ✓ "Strategy for the Main Directions of Economic Development of the Agricultural Sector of the Republic of Armenia for 2020-2030",
- ✓ "Concept for Increasing the Efficiency of Agricultural Land Use",
- ✓ "Strategy for the Development of the Food Security System and Action Plan for 2023-2026".

It is noteworthy that the legislative regulations of innovation policy in the Republic of Armenia were launched back in 2005,

when the 2005-2010 Innovation Development Program was adopted, and then the following year the RA Law "On State Support for Innovation Activities" was put into effect, thereby defining the priority areas of the innovation sector.

According to the adopted policy, the formation of an innovative system of management is targeted at market demand.

- ✓ The formation of an innovative economy implies a systemic approach. It requires close cooperation between various state structures, as well as between the private and scientific and educational sectors.
- ✓ Each source of demand implies the development of a unique group of elements of the innovation system.
- ✓ Human capital plays a central role in building a knowledge-based economy.
- ✓ One of the prerequisites for the success of the strategy is the correspondence of the scale, timeliness, and priority of initiatives to the goal.
- ✓ The state's investment should be significant at the initial stage of strategy implementation and then be reduced by changing the focus of initiatives.

In parallel, the tax policy implemented in the field of plant growing is assessed as preferential. Agricultural producers are exempt from profit tax and income tax, value added tax payments in the Republic of Armenia are subject to preferential regulations, including exemption from VAT on the import and subsequent sale of various products related to the sector, and preferential regulations on property taxes. However, at the same time, tax legislation continues to contain certain regulations that limit the

opportunities to achieve the strategic goals of agricultural development.

To reduce the impact of such restrictions, within the framework of the management of the innovative plant growing ecosystem, it is necessary to discuss and review those tax regulations that limit the possibilities of aggregation and commercialization of agricultural activity results, slow down the process of commodification of agricultural production, and limit the development of behavior in rural economies that creates high added value (Pirimkulov, 2005).

One of the most important directions of the management of the innovative plant growing ecosystem is the activation of the motivational field for the generation of innovative ideas. However, experience shows that new ideas aimed at innovative plant growing have problems of generation and especially application. Thus, the digitalization of agriculture is still relatively little used, and the level of adoption is very low. A number of digital agricultural solutions previously implemented in the country, mainly funded by donors, have failed due to their poor implementation by farmers and entrepreneurs or lack of ongoing funding and poor commercial sustainability. Currently, existing solutions are not interoperable, and it will be difficult to integrate them into a centralized digital agriculture ecosystem.

The availability of resources also plays a decisive role in the ecosystem of innovative plant breeding. While the main resources for the development of traditional plant breeding are material in nature, intangible resources are considered key in innovative plant breeding, including the availability of qualified human

capital, access to advanced technologies, and electronic management systems. In this regard, in addition to ensuring the collection of financial resources, governance in the ecosystem of the innovative economy aims to ensure the availability of non-financial resources (Jorasch, 2019).

It should be noted that in the process of managing the ecosystem of the innovative economy, ensuring a favorable behavioral environment is also important (see Figure 1.). In the Republic of Armenia, the level of awareness of innovation or new types of innovative technologies at the level of farmers and agrarian entrepreneurs as end users is generally low, especially in the case of small farms. As a result, public perception of innovative transformations may tend to hinder the introduction of technologies. Studies show that currently in the Republic of Armenia, the most problematic are the significant conservative attitude towards the use of new technologies and the low level of confidence of small farms in it.

Innovative crop production does not pursue only resource-saving and high-productivity agriculture. Here, it is also important that innovations are also directed towards environmental protection, improvement of social problems and application of transparent management systems, which are solved in the case of organizing production according to ESG principles. Therefore, without the application of ESG principles, the ecosystem of innovative plant breeding cannot function harmoniously. In this regard, the task before the management is to ensure preventive measures to mitigate greenhouse gas emissions, stimulating chemicals, and soil erosion as a result of plant breeding.

In addition, innovative plant breeding cannot bypass social problems that arise in the areas of employment security, participatory partnership relations in agribusiness, and state-private sector interaction.

And if innovations introduced in plant breeding cause social dissatisfaction, then the ecosystem of innovative plant breeding does not demonstrate stability. Therefore, there is a need to manage the risks of disagreements arising in the society around innovative plant breeding, in the ESG context, which can be formed throughout the value chain of plant breeding activities.

It should be noted that the RA Government is also interested in the formation of an effective ecosystem for innovative plant breeding, which envisages state support for the implementation of the 2020-2030 Strategy of the main directions ensuring the economic development of the agricultural sector of the Republic of Armenia in the 2020-2022 Action Plan (see Table 1). However, we believe that in terms of managing the ecosystem of innovative plant breeding, it would be more appropriate for the RA Government to define progress indicators (PIs) for the components forming that sector, in parallel with such information on state support.

The use of PIs gives the management system the opportunity to determine to what extent the goals aimed at progress have been implemented, where they have been most pronounced, and where they have slowed down.

Table 1. State support for the promotion of digital agriculture and technological innovations

Source: *Appendix 2 to the RA Government Decision No. 1886-L of December 19, 2019*

Support Directions	Sum AMD
Development of a strategy and action plan for digital agriculture	62,854,000
Implementation of provision (export) of new digital data on a single platform	52,500,000
Increase the capacity of the Ministry to analyze databases of farms, irrigated land, livestock, land identification works, payments, control results	31,000,000
Determine criteria, define disadvantaged areas, map them and develop measures for the further development of these areas	18,500,000
Develop digitized geographical maps of agricultural lands	3,472,000,000

Such management information allows for systematic decisions on progress, the formation of which is also possible within the framework of the activities of the innovative plant growing ecosystem, by defining appropriate progress indicators and presenting improvement management decisions based on their analysis.

The key indicators of the progress of the innovative plant growing ecosystem are presented in Table 2, the composition of which is not fixed and may change due to the situational changes in agribusiness, but their measurability is mandatory, which will be defined by the Government of the Republic of Armenia.

Table 2 . Key indicators of the development of the innovative plant growing ecosystem in the management process
Source: *Author's own work.*

Indicator	Mean-ing	Annual growth in progress		
		Targe-ting	Actual	Availa-bily
Legislative changes aimed at reforms	I_1	6%	4%	0,67
Increase in innovative investments in the field of crop production	I_2	8%	5%	0,62
Increase in innovative resources aimed at crop production	I_3	3%	2%	0,67
Increase in awareness of stakeholders, information and explanatory measures	I_4	12%	10%	0,83
Growth of business based on ESG principles	I_5	7%	5%	0,71
Growth in digitalization of crop production organization	I_6	9%	7%	0,78
Growth in market demand for innovative products	I_7	4%	3%	0,75

The ecosystem of innovative plant breeding cannot remain static and will show trends of progress. In this regard, the management is faced with the task of measuring the progress of the development of this system, which we propose to implement on an annual basis, with the help of a single comprehensive indicator. At the same time, we consider it necessary to present individual indicators of the

annual growth of progress (see Table 2) in the form of producers, considering their product as the overall assessment indicator of the progress of the ecosystem development for the reporting year (IE).

$$IE = I_1 \times I_2 \times I_3 \times I_4 \times I_5 \times I_6 \times I_7$$

Conclusion

When applying the overall indicator of the progress of the ecosystem of innovative plant breeding (IE), an opportunity is created:

First: to assess the growth of the development of the ecosystem of innovative plant breeding on an annual basis and thereby create a field of comparison in terms of progress over several years.

Secondly, to conduct a factor analysis of the impact of each component on the formation of the ecosystem, since the more the overall indicator tends to 1.0, the higher the progress will be assessed. And this indicator is formed by the cooperation of producers.

Thirdly, to review annually the composition of the components forming the ecosystem of innovative plant breeding development and implement management decisions aimed at its improvement, identifying the most influential indicators that significantly affect the development of the system and at the same time identifying weak links that hinder the innovation process.

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Հովհաննես Ասատրյան
ՀՀ ԳԱԱ Մ. Քոթանյանի անվան տնտեսագիտության ինստիտուտ, ասպիրանտ

Բանալի բառեր - ինովացիոն բուսաբուծություն, էկոհամակարգ, գյուղատնտեսության պետական աջակցություն, էկոհամակարգի արդյունավետության ցուցիչներ, օրենսդրություն:

Ինովացիոն բուսաբուծության զարգացումը նոր մարտահրավերների առջև է կանգնած ժամանակակից աշխարհում: Այս ոլորտի առաջընթացը փոխկապակցվում է ոչ միայն նորարարությունների ներդրման հնարավորությունների, այլև օրենսդրական աջակցման, ֆերմերների վարքագծային վերաբերմունքի, ESG սկզբունքներով տնտեսավարման կազմակերպման հետ, որոնք իրենց հավաքականությամբ ներկայացվում են որպես ինովացիոն բուսաբուծության էկոհամակարգ:

Հոդվածում առաջարկվում է չափելի դարձնել ինովացիոն բուսաբուծության էկոհամակարգի գործունեության արդյունավետությունը և ներկայացվում է մեթոդաբանությունը, որով այն կարելի է կառավարել մրցակցային ագրոբիզնեսի պայմաններում: Առաջարկվում է նաև յուրաքանչյուր տարի վերանայել ինովացիոն բուսաբուծության զարգացման էկոհամակարգը ձևավորող բաղադրիչների կազմը և իրականացնել կառավարչական որոշումներ՝ այն լավարկելու ուղղությամբ: Միևնույն ժամանակ առանձնացնել այն առանցքային ցուցիչները, որոնք առավել մեծ ազդեցություն կարող են ունենալ համակարգի զարգացման վրա և բացահայտել թույլ օղակները, որոնք խոչընդոտում են ինովացիոն գործընթացների զարգացմանը:

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