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INNOVATION PLANT GROWING RISK STRATEGIC MANAGEMENT ISSUES IN THE RA

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: Innovative plant growing is characterized by specific risks that are not typical of traditional agriculture. And since currently there are active transformations in the organization of agriculture from traditional to innovative plant growing, new approaches to risk management of this process are required. The study makes conceptual proposals on the management of risks in innovative plant growing, presenting the usefulness measurements of the advantages of organizing plant growing through transformations and, in parallel, managerial approaches to preventing possible losses.

Keywords: smart agriculture, plant growing, precision crop production, investment risks, innovative solutions, potential loss management, crop production risk prevention.

JEI codes: O3, Q5

Research aims: to define new approaches to innovative plant breeding risk management

Research novelty: based on the application of key indicators, a general coefficient of the effectiveness of innovative plant

breeding risk prevention management has been proposed, with its corresponding components, which creates an opportunity to make sectoral management decisions aimed at mitigating risks.

Introduction

Innovative plant breeding is the result of innovative transformations. In essence, it does not only pursue an increase in yield, an increase in labor productivity, which is also followed by traditional plant breeding (Ravishankar Narayana, Brianna Humphreys, Kyle Shelton 2023). Innovative approaches in plant breeding imply not only resource saving, but also high resource efficiency, based on the principles of sustainable development. And all this forms additional risks related to expensive investments in the field of plant breeding, new organizational approaches, the use of qualified human capital, advanced technological solutions, environmental protection and adaptation to and resistance to climate change (Adusumilli Varun Kumar, N. Jagadeesh Chandra, N. Venkatesh Raju 2025).

Thus, the listed base-vector risks require specific approaches to management, aiming to implement strategic decisions that will contribute to the sustainable development of innovative plant breeding (Himanshu Tiwari, Shubhendu Singh 2022).

Research results

Innovative crop production, first of all, pursues the effective use of agricultural resources through innovations in such a way as to ensure not only high yields, but also sustainable growth, environmental protection, organic agriculture, the use of modern

technologies, the inclusion of qualified human capital, and the presence of market demand (Oksana Mamai, Velta Parsova, Natalya Lipatova, Julia Gazizyanova, and Igor Mamai 2020). All this is accompanied by socio-economic risks, which are also recorded in the "Strategy of the Main Directions for Ensuring the Economic Development of the Agricultural Sector of the Republic of Armenia for 2020-2030". Moreover, in this document, agricultural risks are classified into four groups:

- ✓ Political;
- ✓ Environmental;
- ✓ Operational;
- ✓ Financial.

Moreover, a table of risk mitigation or neutralization criteria is also presented, which the relevant bodies should be guided by when making management decisions to prevent agricultural development risks (see table 1).

It should be noted that the table of agricultural risk management criteria adopted by the above-mentioned strategy does not, however, refer to innovative plant breeding organized in the Republic of Armenia.

Perhaps, this document only indicates a number of strategic indicators related to the innovative economy, such as targets for reducing the specific weight of uncultivated arable land, increasing the specific weight of irrigated arable land, and increasing the specific weight of eco-products in gross agricultural output (see Table 2), which, however, does not create an opportunity to assess

the strategic development risks of innovative plant breeding and the ways to mitigate them.

Table 1. Agricultural risk management criteria
Source: *Author's own work.*

Risk	Type	Im-pact	Like-lihood	Management activity
Politically motivated market loss	Poli-tical	High	Mid-dle	Market diversification
Frequency of adverse climatic conditions	Environ-mental	High	High	Development of toolkit for resisting weather conditions
Shortage of qualified human capital	Opera-tional	High	Middle	Launching a moti-vational system for attracting qualified specialists
Tightening certification requirements	Opera-tional	Mid-dle	High	Gradual implement-tation of international standards
Financial and monetary crises	Financial	High	Middle	Financial market research and on time forecasting

At the same time, we consider it necessary to note that the risks of the development of innovative crop production are the possible problems and uncertainties that may arise during the introduction of new technologies, methods and management approaches. Moreover, in the professional literature, these risks are usually divided into several large groups (see Figure 1).

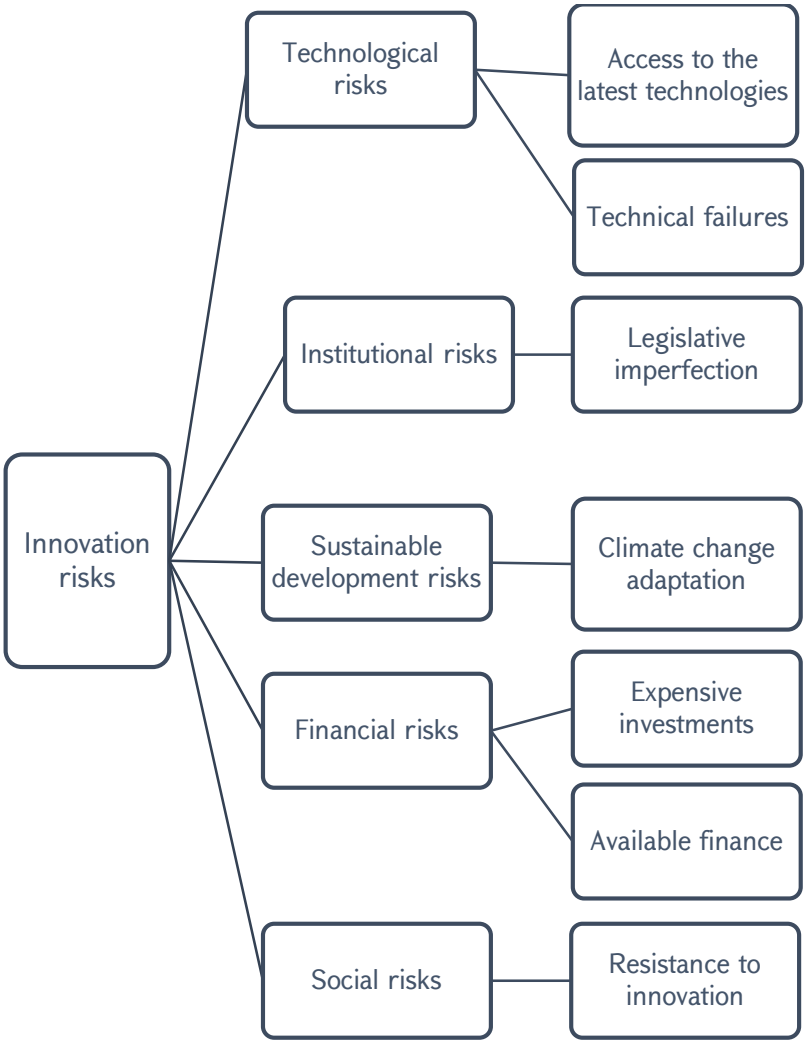

Figure 1. Classification of risks in innovative crop production
Source: *Author's own work.*

Table 2. Target indicators of agricultural development
Source: *Main Directions for Ensuring the Economic Development of the Agricultural Sector of the Republic of Armenia for 2020-2030*

Indicators	2019	2024	2029
Average annual income per agricultural unit (drams)	0,64 mln	2.0 mln	5,0 mln
Increase in the productivity of the homeowner	3%	45%	100%
Average annual growth rate of agricultural value added	2%	5,5%	7%
Percentage of uncultivated arable land	45,5%	35%	< 25%
Increase in agricultural land productivity	5%	25%	103%
The share of irrigated arable land	26%	> 35%	> 40%
The share of organic products in gross agricultural output	0,20%	1,0%	> 5%

It is necessary to record that the Strategy of the Main Directions for Ensuring the Economic Development of the Agricultural Sector of the Republic of Armenia for 2020-2030 presents target indicators for plant breeding and the necessary growth rates of their availability (see table 3).

We consider it necessary to emphasize that with the same logic it will also be possible to make the risks of innovative plant breeding manageable by first setting target targets, and then assessing the availability of risk prevention targets by implementing management decisions on sectoral improvements

Table 3. Target indicators of crop production in the Republic of Armenia (yield per hectare - centner)

Source: *Main Directions for Ensuring the Economic Development of the Agricultural Sector of the Republic of Armenia for 2020-2030*

Crop production Growth	Targeted indicators		Rate of access to targets	
	2026-2028	2029-2030	2026-2028	2029-2030
Cereal crops	40	42	18, 00%	3,87%
Potatoes	256	270	20,41%	5,51%
Vegetable crops	317	321	9,82%	1,31%
Vegetable crops	336	349	5,38%	3,90%
Fruits	128	135	18,85%	5,50%
Grape seedlings	145	151	8,18%	4,09%

In this regard, we propose to assess the risks of the development of innovative plant breeding with progress indicators, applying the following management steps (see figure 2). And the calculation of progress indicators is based on the components of the organization of innovative plant breeding, the formation of which contains specific risks (see table 4).

In fact, Table 4 not only identifies the scope of risks in innovative plant breeding, but also assesses the accessibility of the targets set for overcoming them using coefficient measurements. And such assessments of accessibility already provide an opportunity to make decisions based on information on indicators hindering risk management (see Figure 2).

Table 4. Assessment of the achievement of risk prevention targets for the development of innovative crop production

Source: *Author's own work.*

Innovative risk assessments in percentages and a 10-point system	**Prevention targets**	**Actual prevention results**	**Target reached ratios**
Access to the latest technologies (%)	85	75	K1 = 0,88
Technical failure prevention (%)	90	85	K2 = 0,94
Legislative support (point)	9	7	K3 = 0,78
Climate change adaptation (%)	80	65	K4 = 0,81
Ability to make expensive investments (points)	75	60	K5 = 0,80
Access to financing sources (points)	95	90	K6 = 0,95
Ability to overcome farmers' grievances (points)	8	6	K7 = 0,75

For this purpose, we also propose a new approach to the measurability of risk prevention in innovative plant breeding development, defining a coefficient with a common product and including in it coefficients related to the target accessibility of risk prevention.

$$K = K1 \times K2 \times K3 \times K4 \times K5 \times K6 \times K7 = 0.297$$

The higher the proposed common coefficient and tends to 1.0, the more effective the risk management process for innovative plant breeding development is considered during the analyzed period. By calculating a common coefficient for each year, it will be possible to assess the progress or regression of risk management in the development of innovative agriculture through their comparisons.

Figure 2. Risk management process for innovative crop production
Source: *Author's own work.*

Moreover, the number of factors for calculating the proposed general coefficient may constantly change due to structural changes in the risks of innovative plant breeding development over time. It is also important to consider how the targets for risk prevention management will be set and how the actual degree of their availability will be assessed. In this regard, we propose that the process of implementing these functions be carried out by the Department of Plant Breeding of the RA Economy.

Conclusion

The proposed approach to strategic risk management for innovative plant breeding development allows:

First, to consolidate the consequences of managing various and multi-vector risks in one general indicator and give a general assessment of the risk prevention process.

Second, to make the availability of innovative risk prevention targets comparable in the case of different measurement units

(points, %), which creates an opportunity to conduct a factor-based comparative analysis of risk prevention.

Third, by calculating the coefficients, identify the weaknesses and strengths of innovative plant breeding risk management and implement appropriate management decisions.

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ԻՆՈՎԱՑԻՈՆ ԲՈՒՍԱԲՈՒԾՈՒԹՅԱՆ ՌԻՍԿԵՐԻ ՌԱԶՄԱՎԱՐԱԿԱՆ ԿԱՌԱՎԱՐՄԱՆ ՀԻՄՆԱԽՆԴԻՐՆԵՐԸ ՀՀ-ում

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

Բանալի բառեր - խելացի գյուղատնտեսություն, ճշգրիտ բուսաբուծություն, բուսաբուծություն, ներդրումային ռիսկեր, ինովացիոն լուծումներ, հավանական կորուստների կառավարում, բուսաբուծության ռիսկերի կանխարգելում:

Ինովացիոն բուսաբուծությանը հատուկ են առանձնահատուկ ռիսկեր, որոնք բնորոշ չեն ավանդական գյուղատնտեսությանը: Եվ քանի որ ներկայումս գյուղատնտեսության կազմակերպման ակտիվ փոխակերպումներ են գնում՝ ավանդականից դեպի ինովացիոն բուսաբուծություն, ապա այդ գործընթացի ռիսկերի կառավարման նոր մոտեցումներ են պահանջվում:

Հետազոտությունում հայեցակարգային առաջարկներ են արվում ինովացիոն բուսաբուծության ռիսկերի կառավարման գծով, ներկայացնելով բուսաբուծության փոխակերպումներով կազմակերպման առավելությունների օգտակարության չափումներն ու դրան զուգահեռ՝ հնարավոր վնասների կանխարգելման կառավարչական մոտեցումները:

Հետազոտությունում սահմանվել են ինովացիոն բուսաբուծության ռիսկերի կառավարման նոր մոտեցումներ:

Առանցքային ցուցիչների կիրառման հենքով առաջարկվել է ինովացիոն բուսաբուծության ռիսկերի կանխարգելման կառավարման արդյունավետության համընդհանուր գործակից՝ իր համապատասխան բաղադրիչներով, որով հնարավորություն է ստեղծվում կայացնելու ռիսկերի կանխարգելման բարելավման ոլորտային կառավարչական որոշումներ:

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