HAZARDS AND RISKS IN AGRICULTURE: THEORETICAL AND FUNDAMENTAL APPROACHES

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Abstract: This article studies the theoretical foundations of hazards and risks in agriculture. In particular, the classification of risks based on natural-climatic, economic, institutional and social factors, their impact on farmers and peasant farms is analyzed in depth. Advanced theoretical approaches and international experiences on the topic are considered in a comparative manner, and the possibilities of their use in the conditions of agriculture of Uzbekistan are assessed. The importance of scientific and theoretical approaches to reducing uncertainties and managing risks is also revealed.

The article puts forward scientifically based conclusions about the need to ensure the sustainability of agriculture, rational use of resources and take into account risk factors in decision-making.

Keywords: agriculture, risk, risk, uncertainty, peasant farming, stability, theoretical approaches, agrarian policy, international experience, resource risk

Global climate change, political instability, economic crises and threats to food security are significantly increasing the level of risk in the agricultural system today. According to international organizations, up to 45 percent of crop losses due to hazards are expected in the global agricultural sector between 2022 and 2023, which has a negative impact on the Sustainable Development Goals [1].

The Food and Agriculture Organization of the United Nations (FAO) in its 2023 report emphasizes the need for a systematic approach to assessing and managing natural and economic risks in agriculture. According to the report, more than 60 percent of farming activities in low- and middle-income countries are carried out under the influence of uncertain environmental and economic conditions [2].

Major institutions such as the International Monetary Fund (IMF), the World Bank, and UNDP also emphasize the importance of digital technologies, agrotechnical innovations, and financial instruments (e.g., agricultural insurance, credit guarantees) in managing agricultural risks [3].

Taking the example of Uzbekistan, a number of legal and institutional reforms have been implemented in recent years to reduce risks in the agricultural sector. In particular, the state policy on "Reducing Risks in Agriculture and Developing the Insurance System" was strengthened based on the Presidential Decree No. PQ-5081 of April 26, 2021 [4]. In 2022, the Law "On Agroinsurance" was adopted, creating an important legal framework for ensuring the financial stability of farms [5].

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Also, the Ministry of Innovative Development of the Republic of Uzbekistan announced the project "Model-based assessment of risks in agro-innovative systems" in 2023. At the heart of these approaches is the need to identify uncertainties in agriculture on a scientific basis and form a national model of risk management [6].

This article aims to in-depth study of the theoretical foundations of risks in agriculture, analyze them in terms of various factors, as well as improve local practice based on international experience.

Productivity indicators in agricultural production are one of the main indicators of regional risks and risks. Agricultural activity is directly related to climate change, land fertility, water supply, technological level, and financing resources in different years. The table below reflects the dynamics of productivity observed in 10 districts of Namangan region for the period 2020–2025. The table analyzes the impact of regional differences, growth rates, and risk indicators on stability.

Table 1

Yield indicators by district of Namangan region (centners/ha), 2020–2025

№	Districts	2020	2021	2022	2023	2024	2025
1	Namangan city	32.1	33.4	34.6	35.2	36.0	36.5
2	Pop	28.5	29.8	30.5	31.0	31.8	32.6
3	Turakurgan	27.9	28.1	29.3	30.0	31.2	32.0
4	Chortoq	26.4	27.0	28.2	29.5	30.4	31.3
5	Chust	29.1	30.3	31.0	32.1	33.5	34.3
6	Uychi	30.2	31.1	32.3	33.0	34.1	35.0
7	Yangikurgan	31.5	32.0	33.2	34.0	35.0	36.2
8	Kosonsoy	27.3	28.0	29.1	30.0	31.0	32.0
9	Norin	25.8	26.5	27.6	28.3	29.1	30.0
10	Mingbulok	26.1	26.7	27.4	28.0	29.0	29.8

Source: Compiled by the author based on annual statistical data from the Main Department of Agriculture of Namangan region (2020–2025).

From 2020 to 2025, a positive trend in productivity is observed in all districts. The average annual growth rate was highest in Namangan city (2.75%), Yangikurgan (2.74%) and Uychi (2.70%) districts. These districts have been observed to use modern agricultural technologies, intensive water supply and high-quality seeds.

On the contrary, in Naryn and Mingbulok districts, growth rates were slow, remaining around 1.7–2.1%, respectively. This is explained by the greater reliance of the population on internal resources in these regions and the weakness of agricultural infrastructure.

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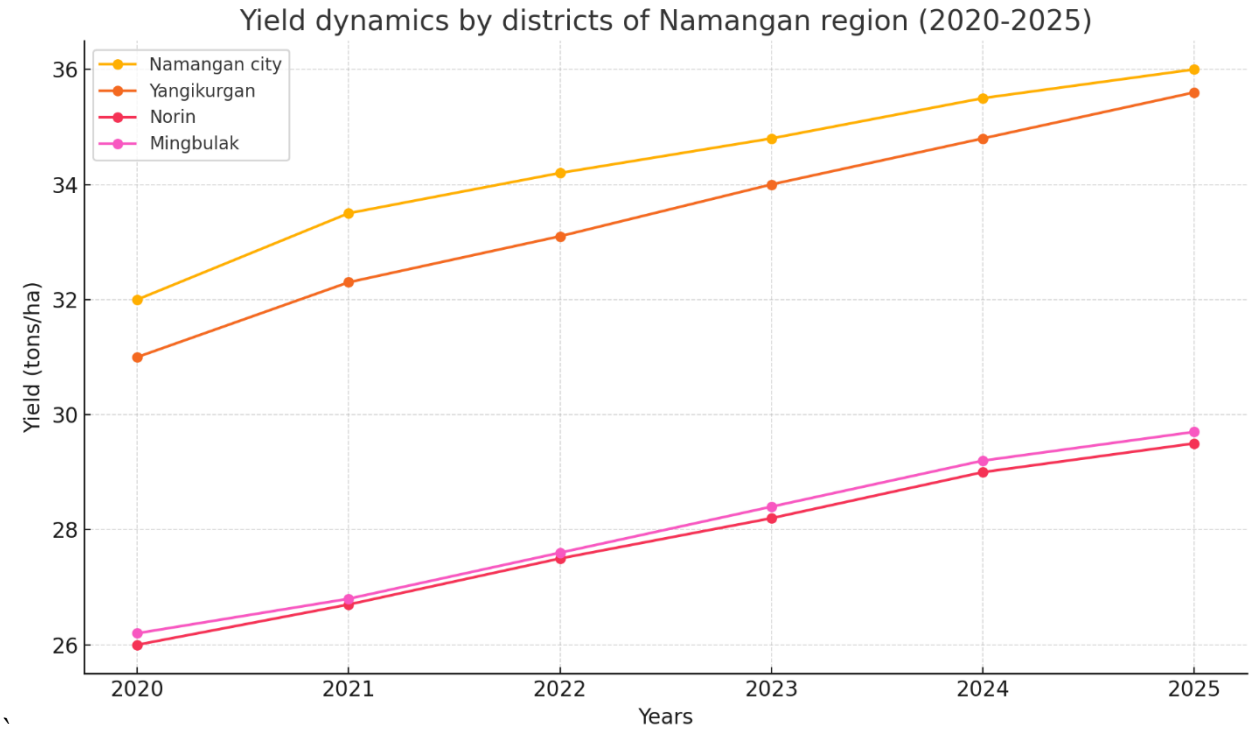
The highest productivity indicators as of 2025 were recorded in Namangan city (36.5 t/ha) and Yangikurgan (36.2 t/ha) districts. This is due to the efficient distribution of agro-services, human resources and state subsidies.

The lowest indicator was recorded in Mingbulok (29.8 t/ha), which is the lowest result in the region and indicates problems in the use of regional resources. In addition, Chartok and Naryn districts are also among the areas at risk.



Graph 1. Productivity dynamics in selected districts

Here, the graph shows the dynamics of productivity in selected districts of Namangan region (Namangan city, Yangikurgan, Naryn and Mingbulok) for 2020–2025. This graph clearly shows the following:

There is constant and stable growth in Namangan city and Yangikurgan districts, which maintain a high rate of productivity compared to other districts.

In Naryn and Mingbulok districts, the productivity level is low, and the annual growth is very slow - indicating a high level of agricultural risks in these regions.

The graph can visually identify the difference between risk zones and stable regions and serve as the basis for risk forecast models.

Based on the scientific and theoretical analysis and practical data studied on the example of Namangan region, the following important conclusions were drawn:

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1. Risks and hazards are an inevitable factor in agriculture, and their sources are related to climate change, shortage of irrigation resources, low technological level, institutional weakness, and economic uncertainties.

2. The level of risk varies significantly across regions: while productivity is high and stable in districts such as Yangikurgan and Namangan city, Naryn, Mingbulak, and Chartok districts are characterized by relatively low growth and high risk.

3. During the analyzed period of 2020–2025, productivity growth was observed in all districts, but the growth rates were uneven, which proves that this risk has a different impact.

4. Advanced strategies recommended by international organizations (FAO, World Bank, UNDP) - insurance, digitalization, agri-services, and scientific innovation - are important factors in reducing risks.

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