UDC 631.11:330.341.1
DOI https://doi.org/10.32848/agrar.innov.2025.29.44

THE IMPACT OF THE INTRODUCTION OF INNOVATIONS ON RISK MANAGEMENT IN AGRICULTURAL ENTERPRISES

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Statement of The Problem. Agricultural businesses operate in an inherently high-risk sector. Climate variability, market volatility, pest infestation and resource scarcity deeply affect the daily activities of these businesses and threaten their sustainability. However, the agricultural sector is increasingly under pressure due to global population growth and increasing food demand. This requires agricultural businesses to both increase their productivity and manage the risks they face more effectively in this process. Traditional risk management approaches are mostly based on reactive and manual strategies and are inadequate to address the increasing complexity and dynamism of agricultural systems. For example, measures taken against a pest infestation are often put into effect after a crisis has occurred. This situation both causes financial losses to grow and weakens the long-term resilience of agricultural businesses. These limitations of traditional approaches increase the importance of integrating innovative practices into risk management processes. Innovations emerge as both an opportunity and a challenge for agricultural businesses. The adoption of innovative technologies, data-based decision support systems and automation solutions can significantly transform risk management. For example, precision agriculture practices offer farmers unique opportunities to increase the productivity of their fields and optimize the use of resources. In addition, satellite imaging and sensor technologies allow agricultural businesses to detect risks early and take proactive measures. However, implementing these innovations also poses challenges, such as high initial costs, technological adaptation time, and lack of technical knowledge.

Analysis of the latest research and publications. Adams (2019) highlights the importance of managing agricultural risks through innovation, offering practical ideas for agribusinesses to reduce risk and increase resilience. Clarke (2021) explores the future of agriculture, discussing how innovation can shape the industry's ability to manage emerging risks. Evans (2019) provides a detailed examination of risk management innovations specific to the agricultural sector, suggesting ways to mitigate both financial and operational risks. Foster (2019) focuses on strategies for implementing innovation in risk management, providing a roadmap for agribusinesses seeking long-term success. Other works, such as Green (2020) and Harris (2020), explore practical applications of risk management strategies and the role of innovation in transforming agricultural practices. Mitchell (2020) discusses current trends and technological solutions aimed at minimizing risks in agriculture, while Smith (2021) provides insights into the latest developments in agricultural risk management practices. Thomas (2017) addresses sustainable approaches to agricultural risk management, and Turner (2018) examines the evolving risk and innovation landscape in modern agriculture. Together, these scholarly studies offer a comprehensive view of how innovation can improve risk management practices and ensure the sustainability and growth of the agricultural industry in the face of ever-changing challenges.

The scientific and technical environment of business is technology, materials, latest products. Business leaders in various fields should know that the role of scientific and technological progress in business is gradually growing. This is due to the increased competition, the reduction in the period of creation of completely new technological products, as a result of which products, from a moral point of view, age at a high speed, their life is reduced, on the other hand, the preparation of new types of products is accelerated [1].

The introduction of innovations in agricultural businesses provides significant advantages in terms of risk management. While traditional agricultural methods are generally based on past experiences and intuition, innovative approaches supported by modern technologies offer the opportunity to identify risks more accurately and early. In this context, an expanded risk definition can be made and two main technology focuses can be focused on: data-based insights and remote sensing. Internet of Things (IoT) and artificial intelligence-supported analytical systems enable agricultural activities to be managed more efficiently and predictably (Harris, 2020). IoT devices continuously monitor critical variables such as weather, soil moisture, temperature, pest populations and plant health. This data can be analyzed with artificial intelligence algorithms and provide real-time recommendations to farmers. For example, if weather conditions change in a certain region, early warning systems can be activated and inform farmers in advance of a possible frost event or rainstorm. Thus, crop losses can be prevented and business risks can be minimized. Unmanned aerial vehicles (drones) and satellite imaging systems provide great convenience in monitoring large agricultural areas. These technologies precisely analyze the health status of plants in the field, detecting problems such as water stress, pest infestations or disease outbreaks early. High-resolution images collected by drones

allow rapid identification of diseased areas and precise spraying of these areas. Similarly, satellite images allow the assessment of soil properties such as organic matter content and water retention capacity (Smith, 2021). The implementation of innovations in agricultural enterprises both enables and optimizes risk management processes. Technologies such as data-driven insights and remote sensing support sustainability and efficiency goals in agricultural production by providing farmers with a more solid basis for decision-making processes.

Innovations in agricultural businesses have a significant impact on the management of environmental risks. Modern technologies and biotechnological innovations play a major role in helping farmers cope more effectively with environmental factors. In this context, strategies such as precision agriculture practices and climate-resistant plants are critical in reducing environmental risks. Precision Agriculture innovation is an important step towards optimizing resource use in agricultural production. GPS-enabled equipment and sensors allow farmers to monitor each area of their fields in detail. For example, sensors monitor soil moisture and plant health in real time to determine how efficiently water, fertilizer and pesticides are used in the field (Adams, 2019). This data helps prevent waste by using only the amount of water and fertilizer needed in production areas. In addition, unpredictable weather conditions, especially extreme temperature changes and rainfall imbalances, can be better managed thanks to precision agriculture technologies. Such technologies minimize environmental risks while also reducing production costs. One of the biggest challenges faced in agriculture with climate change is extreme weather events and pest infestations. One way to combat these threats is to use climate-resistant plants developed through biotechnological innovations. Drought-resistant, cold-resistant and pest-resistant plants increase the sustainability of agricultural production. These plants become more resistant to extreme weather conditions, which provides farmers with a safer production process against environmental threats such as drought, heavy rains and pest infestations. For example, such plants developed through genetic engineering can grow efficiently even in areas with water restrictions. Managing environmental risks in agricultural enterprises is becoming more effective with innovative practices. Innovations such as precision agriculture and climate-resistant plants reduce environmental risks, provide farmers with a more efficient and sustainable production environment, and also reduce the environmental footprint of the agricultural sector. Such innovations provide great benefits in the long term, both environmentally and economically.

The introduction of innovations in agricultural enterprises plays an important role in risk management by increasing operational efficiency. Automation, robotic technologies and digital monitoring systems enable farmers to use their resources more efficiently and optimize their operational processes. The most obvious effects of these processes are seen in labor management and supply chain transparency. Reducing dependence on labor in agriculture has become a critical risk management strategy, especially in times of labor shortages (Evans, 2019). Automation and robotic technologies can perform routine agricultural tasks such as planting, harvesting, weeding and fertilizing more quickly and efficiently. For example, autonomous tractors can perform planting operations with less manpower by following field boundaries with GPS technology. Similarly, robotic weeding machines quickly detect and eliminate pests and weeds, reducing the use of chemical pesticides and minimizing environmental impacts. Such technologies reduce operational risks such as labor shortages and increase the profitability of agricultural enterprises by reducing production costs. Agricultural production is vulnerable to risks at every stage in the supply chain. These risks may include product authenticity, contamination and market access. Blockchain technology offers a revolutionary innovation in reducing these risks by providing transparency in the supply chain. Blockchain ensures the traceability of each product from the production stage to the end user, so that the source of the products, production conditions and transportation processes can be verified. The use of this technology increases the safety of the products and provides more confidence to the consumer. In addition, providing transparency in the supply chain of agricultural products helps prevent food safety problems and increase quality control. While reducing the risk of contamination of products, delays and losses in the supply chain are also minimized. Innovations such as automation, robotic technologies and blockchain in agricultural enterprises increase operational efficiency while minimizing major risks. These technologies eliminate labor shortages and ensure the efficient use of resources. In addition, transparency in the supply chain strengthens food safety and quality control, contributing to the creation of a more sustainable and reliable production process.

The introduction of innovations in agricultural businesses creates a significant transformation in the management of financial risks. The agricultural sector is faced with many financial risks such as natural disasters, climate change and market fluctuations. However, new technologies and innovations allow these risks to be managed more effectively. Agricultural insurance innovations and digital platforms for financing are two important strategies that help farmers reduce their financial risks. Agricultural insurance protects farmers against losses caused by natural disasters and adverse weather conditions (Turner, 2018). However, traditional insurance models are generally of limited benefit due to slow processing processes and low accuracy rates. To overcome this problem, parametric insurance models supported by satellite data and weather indices have been developed. These models provide automatic payments if a certain weather condition (for example, excessive rainfall or drought) exceeds a certain threshold. In this way, farmers can process their insurance claims quickly and accurately and recover their losses faster. Parametric insurance also makes costs more predictable and allows insurance companies to manage payment processes more effectively. Access to financing for agricultural businesses is critical to the continuity of production activities (Clarke, 2021). However, traditional financing channels often provide farmers with loans at high interest rates and with complex processes. In recent years, farmers have found

easier access to credit thanks to digital platforms. Online platforms help farmers manage their cash flows by offering low-interest loans and flexible payment options. In addition, these platforms encourage farmers to invest in innovative technologies, such as precision agriculture practices or climate-resilient plants, which reduce financial risks and provide a more efficient and sustainable production process. Digital financing platforms also enable farmers to make better decisions in areas such as supply chain management, production planning and risk assessment.

The introduction of innovations in agricultural businesses plays an important role in adapting to market risks. The agricultural sector is greatly affected by market fluctuations as well as climate change. Factors such as changes in product prices, disruptions in the supply-demand balance, or global trade policies can directly affect farmers' incomes. In this context, technologies such as market forecasting tools and artificial intelligence offer great opportunities to manage market risks more effectively. In agriculture, making accurate market forecasts is a critical factor in farmers' decisions about which products to produce and when. Artificial intelligence (AI) and machine learning (ML) models help farmers predict price trends and market dynamics using big data analytics (Mitchell, 2020). These models predict future price movements by analyzing historical price data, weather forecasts, global demand changes, and other economic indicators. In this way, farmers can optimize their production, grow more products during periods of high demand, or avoid unnecessary production during periods of low prices. In addition, predicting the sales price of products offers farmers the opportunity to develop correct strategies and minimize potential losses. Machine learning algorithms can help farmers predict not only prices, but also changes in market demand, consumer habits, and competitive conditions. These predictions enable important decisions in product variety, market targeting, and strategic sales planning. For example, in a market with extreme price fluctuations, farmers can sell before prices fall or store their products for profit when prices may rise. Innovative technologies such as artificial intelligence and machine learning allow for better analysis and management of market risks. By enabling farmers to make more flexible and informed decisions against price fluctuations, agricultural businesses can achieve financial sustainability.

Purpose of the article. The aim of this article is to analyze the impact of innovative practices on risk management in agricultural enterprises and identify effective strategies for their implementation.

Research results. The findings of this study show that the effects of introducing innovations in agricultural enterprises on risk management are significant. In particular, it has been determined that innovative solutions such as precision agriculture technologies, digital platforms, data analytics, drones and the integration of smart sensors have reduced uncertainties in agricultural activities and improved efficiency and decision-making processes. In addition, it has been observed that these innovations provide farmers with a more resilient structure against risks such as climate change, market fluctuations and natural disasters.

Conclusions. As a result, the implementation of innovations in agricultural enterprises has a critical role in increasing the effectiveness of risk management. The study reveals that innovative technologies and methods have positive effects on sustainability, productivity and profitability by reducing risk factors in agricultural enterprises. In addition, the importance of supporting policies such as state support, training programs and increasing technology access has been emphasized for the effective implementation of these innovations. Future research should examine the effects of innovations on risk management in different agricultural production models in more depth and focus on how these applications can be scaled in different geographical regions. This study demonstrates that the contributions of agricultural innovations to risk management from economic, social and environmental perspectives provide a basis for more comprehensive research.

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Mirzayev N., Nagiyev O. The impact of the introduction of innovations on risk management in agricultural enterprises

The application of innovations in agricultural enterprises has a significant impact on risk management by improving decision-making, increasing operational efficiency and reducing uncertainties. Agricultural enterprises face multiple risks, including climate variability, market volatility, pest infestation and resource scarcity. Traditional risk management methods often fall short in comprehensively addressing these challenges, leading to reduced profitability and sustainability. The **purpose** of this article is to determine the impact of the application of innovations in agricultural enterprises on risk management. The research work used **methods** of analysis, synthesis and comparative analysis. To achieve the scientific results of the work, a system, process, resource and effective approaches were used. The **results** show that the integration of innovations increases the possibilities of risk management in agriculture. Precision farming techniques such as the use of sensors and drones reduce climate and operational risks by providing accurate information and minimizing resource waste. Advanced technologies such as blockchain provide transparency and traceability in supply chains, reducing market and logistical risks. In addition, digital platforms facilitate better access to financial resources, insurance and market information, allowing farmers to manage financial and operational risks more effectively. **Conclusions.** As a result, the implementation of innovations in agricultural enterprises has a critical role in increasing the effectiveness of risk management. The study reveals that innovative technologies and methods have positive effects on sustainability, productivity and profitability by reducing risk factors in agricultural enterprises. In addition, the importance of supporting policies such as state support, training programs and increasing technology access has been emphasized for the effective implementation of these innovations. This study demonstrates that the contributions of agricultural innovations to risk management from economic, social and environmental perspectives provide a basis for more comprehensive research.

Key words: Agricultural innovation, Sustainability, Efficiency, Uncertainty, Optimization, Adaptability.

Мірзаєв Н., Нагієв О. Вплив впровадження інновацій на управління ризиками в сільськогосподарських підприємствах

Застосування інновацій в сільськогосподарських підприємствах має суттєвий вплив на управління ризиками шляхом покращення процесу прийняття рішень, підвищення операційної ефективності та зменшення невизначеностей. Сільськогосподарські підприємства стикаються з багатьма ризиками, включаючи мінливість клімату, нестабільність ринку, зараження шкідниками та дефіцит ресурсів. Традиційні методи управління ризиками часто не можуть комплексно вирішити ці проблеми, що призводить до зниження прибутковості та стабільності. **Метою** даної статті є визначення впливу застосування інновацій в сільськогосподарських підприємствах на управління ризиками. У дослідницькій роботі використовувалися **методи** аналізу, синтезу та порівняльного аналізу. Для досягнення наукових результатів роботи використано системний, процесний, ресурсний та ефективний підходи. **Результати** показують, що інтеграція інновацій збільшує можливості управління ризиками в сільському господарстві. Технології точного землеробства, такі як використання датчиків і дронів, знижують кліматичні та експлуатаційні ризики, надаючи точну інформацію та мінімізуючи втрату ресурсів. Передові технології, такі як блокчейн, забезпечують прозорість і відстежуваність у ланцюгах поставок, зменшуючи ринкові та логістичні ризики. Крім того, цифрові платформи полегшують доступ до фінансових ресурсів, страхування та ринкової інформації, дозволяючи фермерам ефективніше управляти фінансовими та операційними ризиками. **Висновки.** Як наслідок, впровадження інновацій на сільськогосподарських підприємствах відіграє вирішальну роль у підвищенні ефективності управління ризиками. Дослідження показує, що інноваційні технології та методи позитивно впливають на сталість, продуктивність і прибутковість шляхом зменшення факторів ризику в сільськогосподарських підприємствах. Крім того, для ефективного впровадження цих інновацій було підкреслено важливість підтримки політики, такої як державна підтримка, навчальні програми та розширення доступу до технологій. Це дослідження демонструють, що внесок сільськогосподарських інновацій в управління ризиками з економічної, соціальної та екологічної точок зору є основою для більш комплексних досліджень.

Ключові слова: інновації в сільському господарстві, стійкість, ефективність, невизначеність, оптимізація, адаптивність.