

The impact of digital technologies on agricultural insurance

*Sergey Yekimov*¹, *Makhsetbay Zinatdinovich Aytimbetov*², *Shakhzoda Negmatova*³, *Vadym Ratynskyi*⁴, *Ivan Sokoly*^{5*}, and *Oleksandr Bukovskiy*⁵

¹Czech University of Life Sciences Prague, Department of Trade and Finance, Faculty of Economics and Management, Kamycka 129, 16500, Praha - Suchdol, Czech Republic

²Nukus branch of Uzbek state university of physical education and sport, Street Karakalpakstanskaya, 22, Nukus, Uzbekistan

³Uzbek-Finnish pedagogical institute, Samarqand sh., Spitamen shoh ko'chasi, 166-uy, Samarkand city, Uzbekistan.

⁴Ternopil Ivan Pului National Technical University, Rus'ka St, 56, 46001 Ternopil, Ukraine

⁵Odesa Polytechnic National University, Shevchenka Ave, 1, 65044 Odesa, Ukraine

Abstract. The efficient functioning of agriculture plays an important role in ensuring food security in many countries of the world. Depending on how insurance protection of agricultural producers is carried out, the competitiveness of their financial stability and competitiveness largely depends. Agricultural insurance is one of the most effective ways to combat agricultural risks and at the same time is one of the most difficult for insurance companies. Insurance events related to natural and climatic phenomena can cause significant losses to insurance companies. The use of reinsurance makes it possible to redistribute insurance liability between a large number of insurance companies, which in turn contributes to increasing their financial stability. The active introduction of digital technologies in agriculture allows not only to increase the efficiency of agricultural production, but also helps to reduce the risk of agricultural business. In turn, reducing the riskiness of agricultural business as a result of market competition among insurance companies will reduce the cost of the insurance policy. The state should pay more attention to supporting the use of digital technologies in agricultural production. Traditional subsidizing does not fully encourage agricultural producers to introduce digital technologies at their enterprises. Insurance plays a significant role in stabilizing agricultural production. To a certain extent, it creates conditions for protecting farmers from the onset of adverse weather events. The use of digital technologies in agricultural business contributes to increasing the efficiency of agricultural production and creates prerequisites for reducing the costs of agricultural enterprises for insurance protection.

1 Introduction

* Corresponding author: i.i.sokoly@op.edu.ua

Agriculture is one of the most important branches of the Ukrainian economy, its tasks are to ensure the longitudinal security of the state, as well as to ensure the inflow of foreign currency from the export of agricultural products. In this regard, it is of paramount importance to increase the financial stability of agricultural enterprises.

This can be achieved through the implementation of economic, organizational and social measures that are aimed at eliminating the consequences associated with adverse events.

In the world food market, Ukraine occupies a leading position in the production of sugar, grain, sunflower and meat. Meanwhile, due to the high growth rates of the world's population, the opportunities for expanding the export of food will increase from year to year.

According to [1], the agriculture of Ukraine has recently been experiencing certain difficulties, which are associated with the fighting taking place in the south and east of Ukraine, the low level of professionalism of management structures, the inhibition of reforms of the agro-industrial sector, the technological backwardness of agricultural enterprises.

According to [2], the problems of the development of agriculture in Ukraine are to some extent related to the disturbed balance between the import and export of food, violations of antimonopoly legislation and the presence of unfair competition.

According to [3], the main problems of the development of agriculture in Ukraine are related to: lack of investment, deformation of price inter-sectoral proportions, technological backwardness, high energy intensity, socio-economic problems in rural areas, shortcomings in the process of state regulation of agriculture.

According to [4], the process of introducing new agrotechnical technologies may be associated with certain risks. The use of herbicides and other plant protection products can cause pollution and degradation of arable land.

In the scientific literature [5], the concepts of uncertainty and risk are close concepts. According to [6], uncertainty can be considered in the following aspects (Fig.1):

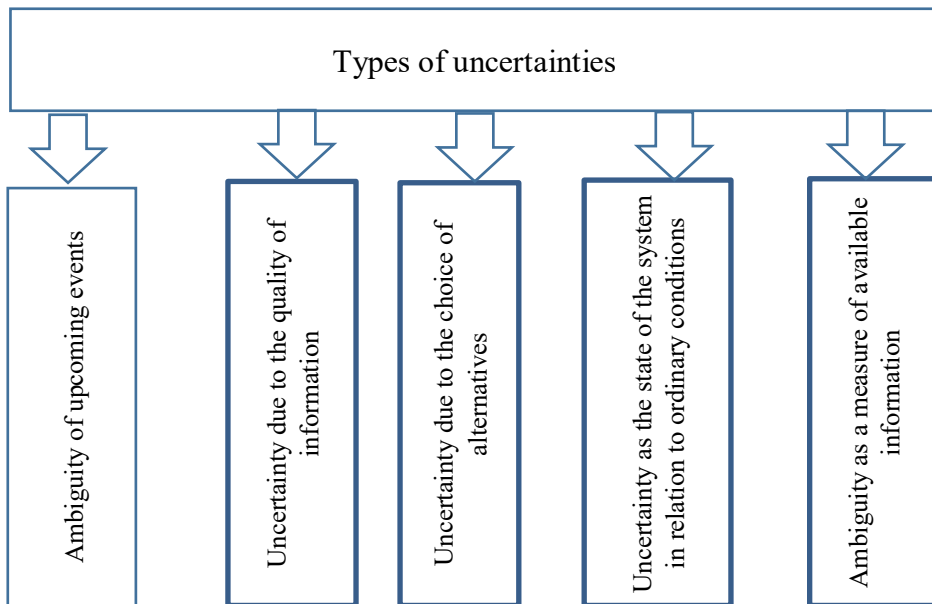


Fig.1. Types of uncertainties

According to [7], agricultural production, as a rule, is associated with an increased level of risk, due to the fact that its productivity largely depends on climatic and natural factors, which, as a rule, cannot be controlled.

The presence of risks associated with agricultural production determines the objective need for insurance protection against these risks. Agricultural insurance is one of the main attributes that contributes to the effective development of agricultural production and allows you to attract additional investments in the agricultural sector.

According to [8] agricultural insurance is a kind of property insurance, the subspecies of which can be called: animal insurance, crop insurance, property insurance and income insurance of agricultural producers.

According to [9] due to the fact that the activity of the agricultural sector of the economy is largely correlated with climatic and natural conditions, fluctuations in prices for finished products, yields, some subspecies of agricultural insurance should be made mandatory.

According to [10], agricultural insurance can be attributed to the most risky and most complex types of insurance and can play a crucial role in reducing the degree of grip of agricultural commodity production.

According to [11], the main task of agricultural insurance can be considered to be overcoming production risks associated with adverse weather events to ensure balanced and stable development of the agricultural sector of the economy.

According to [12], the agricultural insurance system consists of the following elements (Fig. 2):

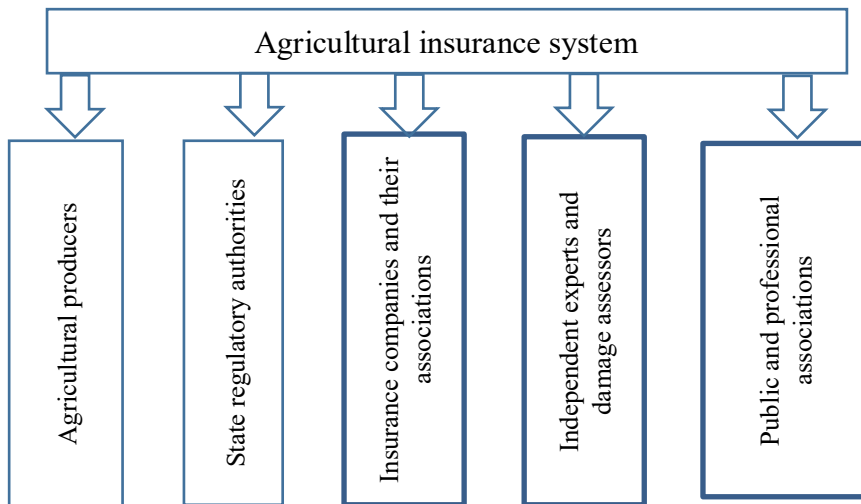


Fig. 2. Agricultural insurance system

According to [13], the main criteria for the functioning of an effective agricultural insurance system are:

- availability of insurance companies' services for agricultural enterprises;
- compliance of insurance companies' services with the requests of agricultural producers;
- absence of abuse by insurers and policyholders;
- profitability of insurance operations for insurance companies;
- an opportunity for agricultural enterprises to choose an insurance company.

According to insurance companies [14], the high cost of insurance services is caused by:

- high loss-making of agricultural plantings insurance
- low technological equipment of agricultural enterprises

- ineffective actions of agricultural producers to prevent possible insurance cases
- the peculiarities of agricultural risks impose additional requirements for the recruitment of specialists to the staff of insurance companies with not only economic, but also agricultural education;
- in order to meet the needs of farmers in the field of agricultural insurance, it may require insurance companies to deploy a network of insurance agents, and this involves additional costs.
- insurance companies may face the problem of investing free cash due to the inefficiency of the stock market.
- as a rule, the occurrence of insured events occurs simultaneously at several agricultural enterprises located in the same region, as a result of which the total amount of insurance payments may be significant for an insurance company.

As noted [15], in turn, agricultural enterprises submit claims to insurance companies regarding:

- high cost of insurance policies;
- delaying the payment of insurance indemnities;
- it is not uncommon for farmers to have to prove the amount of insurance payments in the courts.

According to [16], one of the reasons hindering the development of agricultural insurance is the difficulty for insurers to obtain reliable or complete information about agricultural enterprises subject to insurance. This, in turn, due to additional administrative payments, forces insurers to increase the cost of insurance policies for well-heeled policyholders.

According to [17], for the development of agricultural insurance, the creation of a self-regulating reinsurance insurance company with state support is required, which would reinsure the risks associated with agricultural insurance.

According to [18], in order to support the financial stability of agricultural enterprises, the development and practical implementation of the following measures is proposed:

- creation of a state insurance program for agricultural commodity producers;
- formation of the state agricultural risk reinsurance fund
- linking state support of agricultural enterprises with mandatory insurance of agricultural risks.

2 Methods

During the execution of this scientific work, the authors used an analytical method, which allowed the authors to study the problems considered in the work in their unity and development.

Taking into account the objectives of the task and the conducted research, the authors used a functional-structural method of scientific cognition.

As a result, the authors managed to consider a number of problems related to the impact of digital technologies on agricultural insurance.

3 Results

The use of digital technologies in agriculture can significantly increase the competitiveness of the agricultural sector of the economy.

An example is the creation of digital maps of fields and the use of unmanned aerial vehicles for remote analysis of the state of agricultural crops for contamination with agricultural pests and weed infestation.

Digital technologies can allow farmers to perform rapid analysis of the chemical composition of the soil.

The creation of electronic maps of arable land will allow state regulatory authorities to more effectively predict the yield of agricultural crops, and therefore more accurately determine the necessary amounts of state support for agricultural producers.

The introduction of GPS monitoring makes it possible to locate autonomous metostations on the territory of farming enterprises, which are capable of recording data on air temperature , soil , atmospheric pressure, solar activity on a meteorological server in real time.

Thus, the introduction of digital technologies creates prerequisites for the formation of an effective business environment and reduce the costs of agricultural enterprises.

In turn, the use of digital technologies described above by insurance companies will allow them to more adequately assess insurance risks, and therefore, in conditions of market competition between insurance companies, one can count on a reduction in insurance policies for farms.

At the same time , the rapid and effective deployment of digital technologies requires external investment . In which the state or private capital can act as the main investor on the basis of a public-private partnership.

In our opinion, the measures proposed by us will be economically more effective than passive state subsidization of agricultural enterprises.

The introduction of digital technologies in agriculture makes it possible to reduce business risks, and therefore the need for insurance protection will decrease, and the cost of an insurance policy will decrease.

4 Discussion

The effective functioning of the agricultural sector of the economy is important in ensuring food security for many countries of the world. To a large extent, the competitiveness of their financial stability and competitiveness depends on how insurance protection of agricultural producers is carried out.

Agricultural insurance is one of the most effective ways to combat agricultural risks and at the same time one of the most problematic for insurance companies.

Insurance events related to natural and climatic phenomena can cause significant damage to insurance companies.

The use of the reinsurance mechanism allows you to redistribute insurance liability between a large number of insurance companies, and this in turn increases their financial stability.

The use of digital technologies in agriculture allows not only to increase the efficiency of agricultural production, but also helps to reduce the riskiness of agricultural business.

In turn, reducing the riskiness of agricultural business as a result of market competition among insurance companies will reduce the cost of the insurance policy.

The state should give priority attention to the promotion of the introduction of digital technologies in agricultural production. The usual subsidization of agricultural producers does not fully encourage farmers to introduce digital technologies at their enterprises.

5 Conclusions

Insurance plays an important role in stabilizing agricultural production. It allows farmers to be protected to a certain extent from the onset of adverse weather events .

The introduction of digital technologies in the agricultural business contributes to improving the efficiency of agricultural production and creates prerequisites for reducing the costs of agricultural enterprises for insurance protection.

References

1. G. Radović, Agricultural insurance in the Republic Srpska. Tokovi osiguranja, **38**, 75-95 (2022) doi:10.5937/TokOsig2202075R.
2. R. Neetha, Agricultural risk and insurance: The case of Kerala, India (2022) doi:10.22004/ag.econ.329429.
3. V. Nianko, et al., The role of state regulation of the agricultural sector of the Ukrainian economy for the development of agriculture IOP Conf. Ser.: Earth Environ. Sci., **839**, 022012 (2021) iopscience.iop.org/article/10.1088/1755-1315/839/2/022012
4. S. Chengyu, L. Yanru, J. Wei, Effect of Insurance Subsidies on Agricultural Land-Use. International Journal of Environmental Research and Public Health, **20**, 1493 (2023) doi:10.3390/ijerph20021493.
5. N. Yudiari, P. Luh, B. Made, Effectiveness of Agricultural Insurance Program as a Sustainable Agricultural Development Effort. SEAS (Sustainable Environment Agricultural Science), **6**, 134-143 (2022) doi:10.22225/seas.6.2.5856.134-143
6. T. Caifeng, T. Jianping, Y. Lan, H. Juan, H. Qi, Dynamic Relationship between Agricultural Technology Progress, Agricultural Insurance and Farmers' Income. Agriculture, **12**, 1331 (2022) doi:10.3390/agriculture12091331
7. I. Sazonets, et al., *The problem of risk protection in agriculture of Ukraine*, IOP Conf. Ser.: Earth Environ. Sci., **848**, 012175 (2021) iopscience.iop.org/article/10.1088/1755-1315/848/1/012175
8. I. Kisilova, Y. Krasnoshchok, Problems of Development of the Agricultural Insurance Market in Ukraine (2023) doi:10.54929/2786-5738-2023-9-04-01.
9. O. Nepochatenko, O. Prokopchuk, M. Malyovanyi, Innovative Approaches to the Use of Agricultural Insurance Potential. Collected Works of Uman National University of Horticulture, **2**, 6-20 (2021) doi:10.31395/2415-8240-2021-98-2-6-20.
10. S. Yekimov, A. Poltorak, V. Dereza, I. Buriak, V. Purtov, *The role and importance of financial results in the effective management of an agricultural enterprise*, E3S Web of Conferences, **222**, 06001 (2020) <https://doi.org/10.1051/e3sconf/202022206001>
11. A. Turysbek, Sh. Kantarbayeva, Agricultural insurance system: review of the experience of developed countries, Problems of AgriMarket, 158-166 (2023) doi:10.46666/2023-2.2708-9991.15
12. O. Skydan, O. Vilenchuk, N. Valinkevych, N. Kurovska, N. Reznik, Formation of Stakeholders' Interaction of Agricultural Insurance on the Basis of Corporate Social Responsibility (2023) doi:10.1007/978-3-031-08084-5_45.
13. Yu. Klishina, O. Uglitskikh, Agricultural Insurance Market Analysis: Regional Aspect. Accounting in Agriculture, 628-637 (2022) doi:10.33920/sel-11-2209-05
14. W. Xiao, Loss Aversion Effect: Current Situation and Future Prospect of Agricultural Insurance in China. Highlights in Business, Economics and Management, **11**, 231-235 (2023) doi: 10.54097/hbem.v11i.8103.
15. S. Yekimov, V. Purtov, I. Buriak, D. Kabachenko, A. Poltorak, *Improving the efficiency of corporate management of agricultural enterprises* E3S Web of Conferences, **262**, 03001 (2021) doi.org/10.1051/e3sconf/202126203001

16. A. Rola, Effect of Agricultural Insurance Program on Income Loss Reduction (2023)
17. H. Hudz, V. Erastov, Functional roles of the insurance broker in the agricultural insurance market. *Economics. Finances. Law*, **4**, 77-79 (2023)
doi:10.37634/efp.2023.4.17.
18. V. Nianko, et al., The problem of state support and increasing the investment attractiveness of agriculture *IOP Conf. Ser.: Earth Environ. Sci.*, **839**, 022007 (2021)
iopscience.iop.org/article/10.1088/1755-1315/839/2/022007