УДК: 33. 65: 338.4

YAKUBENKO Yuliia Leonidivna
Ph. D in economic sciences, assistant professor of accounting, auditing and management of financial and economic security, Dnepropetrovsk State Agrarian Economics University, Dnepropetrovsk
e-mail: Yakubenko_alex@mail.ru

KOZECHKO Volodymyr Ivanovych
Ph.D. in Agricultural Sciences, Associate Professor of total agriculture, Dnepropetrovsk State Agrarian Economics University, Dnepropetrovsk

APPLICATION MANAGEMENT ACCOUNTING TOOLS TO ENHANCE YIELD OF WINTER WHEAT

Summary. *The activity of agricultural producers is connected with finding reserves for improving their performance. One of the ways of such improving is using of management accounting's tools. The studying of economic risk influence to the activity results of agricultural enterprises shows a direct connection between climatic conditions and performance indicators of enterprise. Basing on the study's results, it is proposed to use insurance (weather derivatives) for improving the efficiency of winter wheat crop growing. Such insurance approach based on weather indices is the most appropriate for agricultural production in Ukrainian regions, including Dnipropetrovs'k region, where crop losses exist due to drought and frost. The cost of monitoring for weather indices insurance is lower because there is no need to determine losses for individual enterprises. Weather information is available as for the insured as for the insurer.*

Keywords: *tools; management accounting; risk; insurance; insurance product; agricultural insurance; weather derivatives.*

The issue definition and its connection to important scientific and practical tasks. In order to improve the competitiveness of agricultural enterprises in current environment, including the fact that the results of their work are affected by a number of destabilizing factors in the environment, it is necessary to implement a set of adaptive measures. The important aspect of the internal management mechanism can become a system of management accounting.

Analysis of recent research publications and unsolved tasks on the topic of the article. Issues of using of management accounting tools for enhancing activity of agricultural enterprises were examined in the works of F. F. Butynets, S. F. Golov, V. P. Zavgorodniy, L. V. Napadovskaya, V. V. Sopka, M. S. Pushkar, L. K. Suk, M. G. Chumachenko, C. Drury, R. Harrison and others. Noting the works of national and foreign research scientists, and significant achievements of modern accounting science, it is worth to point that debatable problems of application of management accounting remain even today. Such situation makes difficult to identify ways of further development of agricultural enterprises in the market economy.

The purpose of the article. The article devoted to the process of increasing efficiency of winter wheat by applying the tools of management accounting in agricultural enterprises.

The main text of research including substantiation of scientific results. Today tools of management accounting system make it possible to justify measures of neutralizing and minimizing the risks of agricultural activities on the basis of identification of the main species. It is necessary to highlight the risk of production caused by the change of capital goods' status, by interactions of factors of production, by volume production, considered with the results of the production process.

As the biological system of economic and industrial activity agricultural enterprise has several features that are additional sources of risk. Primarily, this is biological nature of resources that effect on climatic conditions and on the final results of production [1, 2].

Personal risk is connected with enterprise's workforce obtaining with relevant qualifications and productivity growth. [3].

Most notable risk of functioning of agricultural commodity is the market (price) risk, which express in the fluctuations in the markets, part of which the company is (material resources markets, markets) in the current conditions [4, 5].

The financial risk associated with the receiving, distribution and using of financial resources. There are such types of this risk as: the risk of debt, characterized by a probability of changes in tax rates; equity risk - the probability of changes in the value of capital; risk of capital structure - structural changes in the ratio of own and borrowed funds.

After identifying the risks of economic activities it is appropriate to make their economic assessment based on which conclusions could be made about the current economic situation. Also it helps to identify measures to minimize and neutralize risks. We made a risk assessment of commercial agricultural enterprises by administrative districts for 16 indicators that characterize the level of economic activity. Obviously, the main factor that determines the aggregate level of economic risk was the level of profitability of agricultural production. Total regional level of this index was taken as the standard, deviation from which characterizes the degree of manifestation of aggregate economic risk.

Table 1

Results agricultural enterprises grouping according to the level of aggregate economic risk

Indexes	Group for risk		
	High	Satisfactory	Low
Number of districts	10	6	6
Average value	0,574	1,239	1,995
The scope of variation	0,726	0,274	1,368
Coefficient of assimilation	1,264	0,221	0,685
Standard deviation, %	38,1	24,6	9,7

Source: *Calculated by authors.*

According to the data in table 1 overall economic performance does not satisfy the majority of agricultural producers: Group 1 (high risk) – low value of calculated numbers indicates unsatisfactory level of economic risk management units in rural areas of the group; Group 2 (satisfactory risk) – dynamic indices indicates a lack of systematic use of measures to neutralize and minimize the risk of manifestation; Group 3 (low risk) – high yield production and economic activity, comparing with other groups, predetermined effective enterprise management system, which ensures economic stability of the entity even in adverse conditions of industrial activity.

Calculated standard deviation performance and the mean value for selected groups of agricultural enterprises show stable trends of cluster formations. After assessing of agricultural enterprises groups we received their allocated characteristics caused by the structure of commodity products, the level of profitability, etc. Given the nature of the research model, available information base, we restrict the study of relationship between the total value of the index of economic risk and the level of profitability of crop production.

Using the methods of correlation analysis it was found that the most significant impact on the rate of total economic risk was made by profitability of crop production (correlation coefficient for Group 1 farm – 0,691, 2nd – 0,648, 3rd – 0,601) that depends on the yield of winter wheat (correlation coefficient of group 1 0, 785, 2nd – .723, 3rd – 0.689).

The survey results indicate, that regardless of belonging to risk agricultural enterprises groups, Dnepropetrovsk region have very narrow specialization that creates additional threats manifestation of climatic and weather risks.

It should be noted that one of the most effective methods, which adapt agricultural enterprise to function successfully under the negative influence of external risk factors is insurance. Threatening number of risk factors inherent to agricultural enterprises requires special conditions of insurance. They are associated with the adoption of certain measures to ensure their own financial security. Therefore it is difficult to imagine modern insurance company that would have identified the risks in the insurance system of agrarian complex with a high level of risk. Due to this, large-scale introduction of credit, insurance and other kinds of support of the agricultural sector should be preceded by state concept of development.

Let's find out the basic conditions of agricultural insurance. First, during obtaining the insurance by agricultural producers crops must be a pledge, according to bank that provides credit insurance; secondly, the implementation of leasing operations to supply machinery producers sowing crops also act as a guarantee of benefits and insure at the request of the lesser. Third, insurance companies practicing insurance of crops belong to agricultural enterprises within the corresponding holding.

The study found that during underwrite year 2014 in Dnipropetrovs'k region there was signed 84 insurance crop contracts on an area of 37 927,34 hectares (2% of the total cultivated area) totaling 123 million UAH.

Taking in attention the risks of growing winter crops in 2013, agricultural producers signed 15 insurance winter crops contracts in 2014 totaling 9,068 thousand UAH. The most popular insurance winter crops program was a program against total loss during winter (8 agreements). This program was implemented since 2009 and didn't franchise. Also there were signed four agreements for the crop insurance program from complete destruction. The next was crop insurance program of partial and complete destruction during the winter, including the risk of spring frosts (3 contracts). As a result of insurance cases insurance companies were made six payments totaling 1,611 thousand UAH and the average insurance losses of winter crops in the Dnipropetrovs'k region amounted to 305%, mainly due to sowing winter rape.

As the practice of local insurance companies shows that insurance rape crops is quite risky, so experts recommend to shape the portfolio that at least 50% of contracts accounted for by winter wheat.

In spring-autumn of 2014 insurance companies signed 69 crop insurance agreements totaling 114,246 thousand UAH in Dnipropetrovs'k. It was insured 30,7 thousand ha or 1.6% of the total cultivated area. For example, Polish agricultural insurance covers 30% of cultivated areas, German – up to 60% [6].

One of the limiting factors of the development of agricultural insurance is low agricultural solvency of insurers. Insurance contracts usually placed just before sowing works, when the producer finally determined the structure of its own production plant production. During this period, agricultural commodity feels the urgent need for financial resources, such as investing heavily in the preparation and conduct of planting. The producer usually buys fuel, equipment and spare parts, seed, fertilizer and crop protection using borrowing capital. In terms of lack of funds, these costs determine the commodity as a priority comparing to the cost of crop insurance. The next factor is the lack of insurable interest in agricultural enterprises. According to the existing pricing mechanism for agricultural products producers are in a better financial situation in the lean years, though, insurance should cover losses related to production shortfalls in lean years.

We believe that in the increasingly uncertain and low activity of economic entities in the insurance market needs to develop a system of agricultural insurance as a tool for

improving the competitiveness of agricultural enterprises. Given the fact that most of them specializing in crop production, it is advisable to introduce a system of insurance based on weather indices. Such insurance would allow promoting a significant number of innovative products in the domestic market agro products. The amount of payments set using an objective parameter that is defined as a combination of a number of weather-related metrics, such as: rainfall, soil moisture and more. Insurance based on weather indices is most appropriate for agricultural production in the regions of Ukraine, including Dnipropetrovs'k region, where crop losses due to drought and frost. The cost of monitoring insurance based on weather indices lower, since there is no need to determine losses for individual farms. Weather information is equally available to the insured and the insurer.

To develop insurance programs based on weather indices must: identify the impact of major weather risks on winter wheat conditions in the Dnipropetrovs'k region; quantitative financial impact of adverse weather conditions in the form of loss of income or additional production costs; structurally formalize insurance contract in which payment shall be made in the event of adverse weather conditions; to perform the contract in optimal shape for reinsurance risk.

An analysis of winter wheat yield in Dnipropetrovs'k region showed that there are significant fluctuations for a long period, describing the impact of agro-climatic risks (Fig. 1).

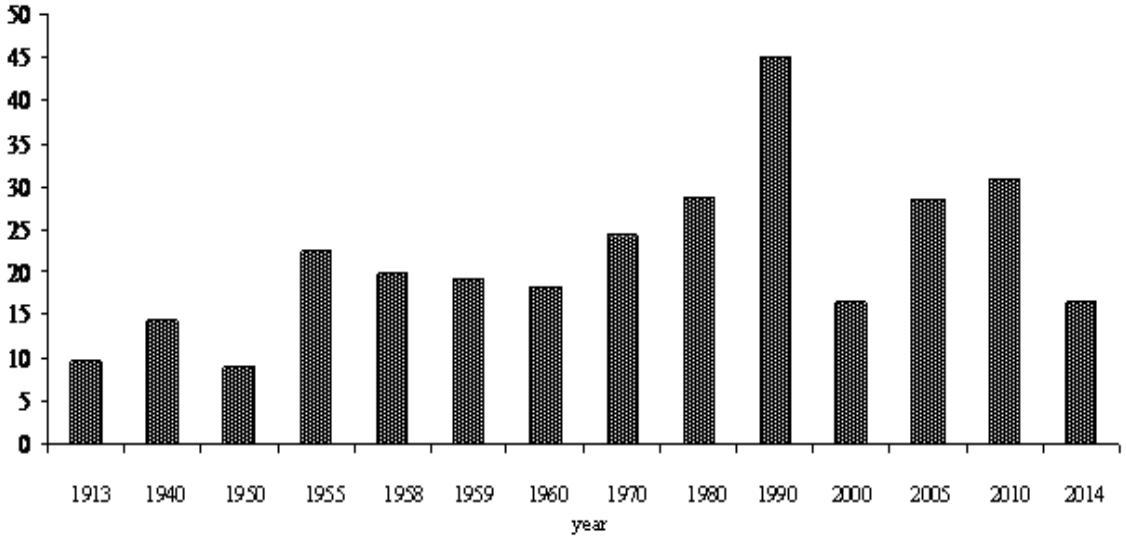

Fig.1. Dynamics of winter wheat yield in all agricultural enterprises categories of Dnepropetrovsk region, c / ha

Source: *compiled and calculated according to the Central Statistical Office in Dnipropetrovs'k region.*

Poll agricultural producers, who grow winter wheat in Dnipropetrovs'k, revealed that the greatest risk is conditioned by drought, followed by (in descending order of importance) freezing, rain or hail, fire. The appearance of pests, most manufacturers believe as manageable risks.

The process of developing the insurance basing on weather indices is in checking the weather index that correlates with productivity, but not same yield. Index is developed after gathering information on weather conditions through: a) see how weather changes affect the yield at the time; b) assessment of the main weather factors experts (agrometeorogists) and producers. Optimal index should take into account the susceptibility of crops to the effects of weather factors at different stages of development, biological and physiological characteristics of the crop and soil properties. If between weather and yield index set a sufficient degree of correlation, producers can insure your production risk through the acquisition of an insurance

contract under which the payments are made in the case of certain weather events. Tools insurance based on weather indices provide financial protection products of uncertain income resulting from fluctuations in yields due to weather conditions.

Results of the survey of producers and workers of metrological service of Dnipropetrovs'k region revealed that growing winter wheat connected with weather risks that reveal influence through the death of culture due to adverse conditions during the winter from December to March; lack of moisture during the vegetative period, from mid-April to June.

Yields of winter wheat during the harvest largely depend on the plants wintered, particularly during winter dormancy. In Dnipropetrovs'k region death of winter wheat usually happened due to consequence of lowering the temperature of the air and therefore the soil below the critical level for one or more days. These critical weather conditions lead to damage and death of plants node. Snow cover significantly improves wintering of winter wheat, since the difference between the air temperature and soil ranges from 0,5 to 1,1C degree per centimeter of snow cover. However, the snow cover on the territory of the research area is usually unstable. According to meteorologist of Ukraine, in some years it did not exist or it rarely reaches a height sufficient to protect crops from frost. Complete loss of winter wheat is possible due to risk of freezing in the steppe zone of Ukraine, because this crop is dying for lack of snow or when it is formed late winter.

Another major factor that hinders obtaining high yields of winter wheat in the Dnipropetrovs'k region is wet. The lack of moisture in the soil and in the air during the period of vegetative development is a major cause of low yield of winter wheat. In particular, all areas of Dnipropetrovs'k exposed to frequent droughts, strong and average probability of drought in the region during the growing season is 15-20% and, respectively, 40-50%. The first critical period, when the formation of winter wheat crop is sensitive to lack of moisture, is a period of up to access the earing stage. According to the climatic conditions in the region this period lasts from 15 April to 25 May. According to meteorologist of Ukraine, the optimum requirement of winter wheat in the moisture in this time, compared to the climatic conditions of this period in the region, is 80%. In the last period was characterized by the presence of sufficient moisture conditions, which are approaching the best and the other half – were insufficient.

The next critical period for winter wheat is a stage from heading to milky stage, the stage of grain formation, which on average lasts from May 22 to June 14, but may end in late June. Lack of moisture in this period is the immediate cause of reducing the number of grains in the ear, and it dries out. According to experts, the need for optimal moisture in winter wheat, compared to the climatic conditions of this period in the study area, is 90%. Consequently, agricultural producers that grow winter wheat for minimizing the impact of weather risks must insure two types of weather risks.

There are two possible levels of insurance protection from the effects of weather conditions that can identify the appropriate limit insurance contract based on weather indices: reimbursement manufacturer on production and inputs; insurance expected income from the sale of the crop at harvest time.

The first level is more acceptable for catastrophic weather risks in the initial phases of growth, such as freezing when the manufacturer has the ability to sift another culture for crop year if sown winter wheat completely lost it. Second is for weather risks, the possible end of the growing season, when there is no possibility sift culture, nevertheless yield may vary significantly from expected levels, for example, due to drought in the period from April to June. Thus, informal survey of manufacturers conducted in the study area, showed that the producers concerned less about risk of frost than about the risk of drought (despite the fact that frost can completely destroy crops), by allowing replanting.

To calculate the insured sum and appreciate index for any contract entered into in order to protect the incomes of slightly more complicated, because of unknown future product prices of upcoming harvest. In addition, product prices often vary due to significant variations in production, so it is difficult to measure quantitatively the correlation between the volume of production (depending on weather conditions) and price. However, you can make an estimate of the price at harvest time, for example, for obtaining the most accurate assessment can be used last year's harvest price or average price in September for the past five years, the local commodity exchanges, or use a minimum price of state support as the lower limit sale price. However, this approach is more suitable for large agricultural enterprises that use under obligations of guaranteed supply at a fixed price or for those who have access to price hedging instruments in the market to minimize the negative impact of the risk, which leads to significant fluctuations in sales prices.

Limit insurance contract set by agreement with the manufacturer, but it should not exceed the maximum probable loss estimates for the manufacturer. In addition, the manufacturer cannot buy insurance on a larger area under winter wheat than it handles.

The upper limit of the amount of risk the client is set on the total area under the crop multiplied by the expected sales price, which, as stated above, is determined by the sale price last year under reporting or the average price for the last five years. The insurer may request a copy of the state statistical report number 29 about the results of agricultural activity, which provide state statistical service, is a must for all farmers. This document is also required for the allocation of state subsidies to producers and can be used as the basis for recognition index contracts in force and sufficient for the regulator in terms of supervision. The manufacturer and the insurer are responsible for the accuracy of the information about the area in hectares under the crop.

Example of insurance on weather indexes is shown in Table 2.

Table 2

Drought insurance index

Insurer:	Dnipropetrovs'k region
Contract provides crop insurance wheat below 2 tons per hectare at a cost of 250 USD /t	
Index:	insufficient precipitation (drought)
Detection Limits:	50 mm
Full payment:	30 mm
The cost step:	500 UAN (20USD) on 5 mm per hectare
The insurance	
Start:	April 15, 2014
End:	June 30, 2014
Weather station:	Behtery (Ukraine)
Culture:	winter wheat
Maximum payment:	1000 UAN/ hectare
Premium:	80 UAN / hectare
Insured area:	5 hectare
Full max. payment:	5000 UAN

Besides the index, information about the buyer and the seller (the name of culture and insured area), the insured amount and interval fluctuation index insurance contract based on weather indices should contain the following information: location of weather station, which measured and recorded weather parameters used for development index; billing period – the period of insurance against the risks specified in the contract; threshold level (strike) – the value of the index at which payments are made under the contract of weather insurance; premium – the cost of insurance for the manufacturer.

Insurance contract premium base on weather is indicted actuarially, i.e. through a careful analysis of historical weather data to understand the statistical properties and distribution of certain weather-index insurance payments.

The use of a standard contract requires the buyer determine the reliability and drawing up individual insurance contract. Moreover, because the insured event is defined at the regional level for the index specified weather option, no need to determine damages in a separate box or in a separate agricultural enterprise. Regardless of individual losses agricultural enterprise, which has entered into an insurance contract receives a standard amount of insurance payment per hectare as defined under the terms of the contract and weather indicators index parameter.

Insurance companies make insurance payments for 30-45 days after the expiration of the contracts. The basis for payments is official information of meteorological services, conducting measurements and records the testimony weather parameters. Of course these services are checked and archived weather data for 30 days, after which the data are entered into a permanent archive without any changes. Insurance companies and manufacturers can get official reports and information, which claims settlement and carried out under the terms of insurance contracts.

Research findings and prospects for further research in this scientific area. It was proved, that in conditions of increased uncertainty and low activity of economic entities in the insurance market of agricultural enterprises, it is needed to develop agricultural insurance system based on the use of tools of management accounting. According the fact that the majority of agricultural enterprises specialize in crop production, it is advisable to introduce a system of insurance based on weather indices.

The introduction of the insurance product that is based on weather indices, appropriate and in the relationships between suppliers of inventory for agricultural production, the use of which depends on climatic conditions and use of weather derivatives in the form of options to protect farms from the additional costs related to the re-use chemicals.

References

1. Andreychuk, V.G. (2002). *Ekonomika ahrarnykh pidpryiemstv* [Economy of agricultural enterprises], 2nd ed, KNEU, Kyiv, Ukraine.
2. Zinchenko, A. I. Salatenko, V. N. Bilonozhko, M. A. (2001). *Roslynnytstvo* [Crop], Agricultural Education, Kyiv, Ukraine.
3. Kondratyuk, O. (2005). Improving the competitiveness of agricultural producer, *Economy APC, 10*, 109-112.
4. Korzh, M.V. (2008). *Marketynh* [Marketing], Center of educational literature, Kyiv, Ukraine.
5. The official site of Dnepropetrovsk Regional State Administration (2012), "Market elevator: grain proved unnecessary". Available at: http://www.adept-group.biz/press/news-industry/454/455/
6. Iwashko, A. (2012). Canopy from the weathe, *Governmental Courier* [Online]. Available at: http://ukurier.gov.ua/uk/articles/tent-vid-negodi/

YAKUBENKO Yuliia Leonidivna
Ph. D in economic sciences, assistant professor
of accounting, auditing and management of financial and economic security,
Dnepropetrovsk State Agrarian Economics University, Dnepropetrovsk
KOZECHKO Volodymyr Ivanovych
Ph.D. in Agricultural Sciences, Associate Professor of total agriculture,
Dnepropetrovsk State Agrarian Economics University, Dnepropetrovsk

APPLICATION OF MANAGEMENT ACCOUNTING'S TOOLS FOR INCREASING WINTER WHEAT'S YIELD.

Abstract. ***Introduction.*** *The activity of agricultural producers is related to finding reserves for improving their performance. One of the ways of such improving is using of management accounting's tools. Basing on the study's results, it is proposed to use insurance (weather derivatives) for improving the efficiency of winter wheat crop growing.*

Purpose. *The article devoted to the process of increasing efficiency of winter wheat by applying the tools of management accounting in agricultural enterprises.*

Results. *Today tools of management accounting system make it possible to justify measures of neutralizing and minimizing the risks of agricultural activities on the basis of identification of the main species.*

It should be noted that one of the most effective methods, which adapt agricultural enterprise to function successfully under the negative influence of external risk factors is insurance. Threatening number of risk factors inherent to agricultural enterprises requires special conditions of insurance. They are associated with the adoption of certain measures to ensure their own financial security. Therefore it is difficult to imagine modern insurance company that would have identified the risks in the insurance system of agrarian complex with a high level of risk. Due to this, large-scale introduction of credit, insurance and other kinds of support of the agricultural sector should be preceded by state concept of development.

Originality. *A use of agricultural crops insurance based on winter weather indices.*

Conclusion. *It was proved, that in conditions of increased uncertainty and low activity of economic entities in the insurance market of agricultural enterprises, it is needed to develop agricultural insurance system based on the use of tools of management accounting. According the fact that the majority of agricultural enterprises specialize in crop production, it is advisable to introduce a system of insurance based on weather indices.*

Одержано редакцією 09.10.2015
Прийнято до публікації 20.10.2015