ORGANISATIONAL AND MANAGEMENT DESIGN OF FINANCIAL AND HUMAN RESOURCE SUPPORT FOR INNOVATIVE AGRIBUSINESS: THE SECURITY ASPECT

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Abstract

The article considers the specifics of the organisational and managerial design of financial and human resource support of innovative agribusiness. It is established that the scientific literature does not sufficiently cover this issue. The tools, methods, principles and models of such design need to be clarified. It is emphasised that the forecasting of the level of security of financial and human resources in the organisation is an important aspect of strategic management, risk diversification and socio-economic development of both a single subject of entrepreneurial activity and the state as a whole. It is proposed to carry out the above forecasting using a combination of quantitative forecasting methods. The results of forecasting the security level of organisational and managerial design of financial and human resources of innovative agribusiness obtained in the article showed almost positive dynamics of the phenomenon under study, but we should not expect stability and permanence of this trend due to significant fluctuations in the external environment.

Keywords: management, human resources finance, modelling, design, forecasting, agribusiness.
JEL Codes: G30, M54, N50.

Introduction

Social and economic development of agricultural production is a multifaceted, complex, difficult to predict process that requires a detailed assessment of the prospects for the functioning of this sector of the economy, taking into account all the factors affecting its functioning. An important aspect of the management and formation of an organisational and managerial design of financial and personnel support of agribusiness is the availability of effective methods and methodologies that can

accelerate the effectiveness of transformations in the agricultural sector.

Literature review

The security aspect of the organisational and managerial design of financial and human resource support of innovative agro-entrepreneurship is not sufficiently considered in scientific sources. Some authors have fragmentally considered the problems of effective development of agribusiness.

As an example, some scholars have emphasised managing the security of the supply of agricultural products (Yadav, V. et al., 2022). Special attention in the study was paid to the state regulation of food security, the search for new tools, methods and ways of forming the design of logistics network, as well as measuring the efficiency of transporting agricultural products.

Of value to our article is the study of synergies between community-supported agriculture and agro-forest melioration (Cechin, A. et al., 2021). The authors assessed in detail the role of Brazilian institutional innovation, the activities of smallholder entrepreneurs, and the need to renew degraded land resources. The scholars conclude that there is a need to intensify financial support, stimulate agrarian reform, and expand marketing research. The study pays special attention to the economic security of Brazilian producers.

Research on clustering, creating zero-waste agricultural production, organising collective innovation to support sustainable agroecosystems through network management and effective climate smart scaling of agricultural innovations is important (Donner, M. et al., 2020; Gryshchenko, I. et al., 2021; Berthet, E. and Hickey, G., 2018; Aranchiy, V. et al., 2022; Makate, C., 2019; Prokopenko, O. et al., 2022; Azadi, H. et al., 2021; Khodakivska, O. et al., 2022).

Important studies in which modeling processes are considered are well-known works

of scientists (Vakulenko, Y., 2021; Kalinichenko, A., 2021; Korchemnyi M. and Fedoreyko V., 2009; Nakonechny, S. et al., Nazarov, A. and Loskutov, A., 2003; Onyshchenko, I., 2016; Stetsenko, D., 2013).

Research on the need for innovative development of agricultural enterprises as a condition for ensuring food security of the agro-sector and sustainable development of agricultural territories (Adenle, A. et al., 2019) is of scientific interest to us. We support the authors' position regarding the need to plan risk-hedging strategies in the process of realising innovation activities in agriculture. Important studies focus on reducing risks and increasing the security of logistics activities by enhancing the management of innovation processes, information sharing and cooperation with partners and service providers (Speier, C. et al., 2011). The results of the study show that the level of safety depends on the active actions of top managers who can make timely management decisions in the process of realising complex operations, risk and unstable external environment.

A highly relevant and important study is a detailed consideration of the problem of enhancing the creation of social and environmental value through sustainable innovations 2.0 (Dyck, B. et al., 2018). Scholars rightly point out that it is possible to solve large-scale social and environmental crises is possible through the implementation of innovations and the departure of enterprises from maximising profits in any way that would contradict the concept of resource conservation. Scholars point out the need to increase innovation among smallholder farmers, in developing countries.

The organisational and managerial design of financial and human resource support for innovative agribusiness in Africa is a topical issue today. Specifically, the article analyses the evolution of the organisational architecture of African agricultural areas (Sumberg, J., 2005). The main conclusion put forward in the article is that the concept of a global agricultural research

system for rural Africa does not take into account the biophysical and socio-economic heterogeneity of African territories.

The methodology, modelling logic and methods that it is advisable to use to improve the process of organisational and management design of financial and human resources for innovative agribusiness are shown in the works of renowned scientists of the present day (Mazur, N. et al., 2021; Solodovnik, O. et al., 2021; Hilorme, T. et al., 2019; Gunderson, M. et al., 2014; Baillette, P. et al., 2018; Chen, J. et al., 2018). The problems of human resources are considered in detail in the works of well-known authors, where the need for their improvement and improvement of management is determined (Iqbal, A., 2019; Jiang, K. et al., 2012). The list of issues raised in the cited research papers is certainly important for our study. However, the turbulence of the external environment and change in the trend of socio-economic and political development of Ukraine require a thorough revision of the process of supporting the security aspect of organisational and management design of financial and human resources for innovative agribusiness.

Methodical approach

Index methods, factor analysis, methods of point (rating) evaluation, least squares method and matrix method are most often used in well-known scientific studies devoted to the effective development of agricultural enterprise. The use of neural networks, game theory, correlation-regression and optimisation models, etc., are also widespread. In the framework of our study, we propose to use a combination of mathematical modelling methods, regression modelling, moving average method, Holt's method and a combination of quantitative forecasting methods.

Results

For research, analysis and forecasting of the level of security of organisational and managerial design of financial and personnel support of innovative agribusiness at the initial stage, we propose to use the method of combining quantitative methods of forecasting. In this case, with the help of a multivariate regression model, we will carry out modelling of forecasting the level of security of organisational and managerial design of financial and personnel support of innovative agribusiness (where profitability is the dependent variable – Y, %). Such a variable depends on the amount of capital investment in agriculture (independent variable – X_1, thousand UAH) and the number of employed workers in agriculture (independent variable-– X_2, person).

At the initial stage of modelling of forecasting the level of security of organisational and managerial design of financial and human resources for innovative agro-entrepreneurship with the help of the built-in function "LINEINE", based on data for the previous 2010-2021 (i.e. 12 years) we build a model of dependence of the level of profitability of agricultural production in enterprises on the amount of capital investment in agriculture and the number of employed workers in agriculture (Table 1).

Table 1. Dynamics of the level of profitability of agricultural production in enterprises, the amount of capital investment in agriculture and the number of employed workers in agriculture, 2010-2021

Years	Capital investment in agriculture (thousand UAH) (independent variable - X_1)	Number of employed workers in agriculture (persons) (independent variable - X_2)	Level of profitability of agricultural production in enterprises (percentage) (dependent variable - Y)
2010	11062,60	811722	21,10
2011	16466,00	750964	27,00
2012	18883,70	751440	20,50
2013	18587,40	726250	11,20
2014	18795,70	733384	25,80
2015	30154,70	642587	24,50
2016	50484,00	658721	23,60
2017	64243,30	635638	20,60
2018	66104,10	626072	19,30
2019	59129,50	610117	20,90
2020	50679,70	575954	22,30
2021	69950,30	576093	21,70

Source: https://www.ukrstat.gov.ua/.

In the course of data processing, the coefficients of the regression model of the level of profitability of agricultural production in enterprises were obtained: a_0=33,28; a_1=-0,000053 and a_2= -0,000014. The regression equation of the level of profitability of agricultural production in enterprises is as follows:

$$\hat{Y} = 33,28 - 0,000053 X_1 - 0,000014 X_2$$

The average error of the regression model is 13.99%, which indicates the average deviation of the actual value of the resultant indicator and its theoretical value during 2010-2021. At the next stage of the research, it is necessary to make a forecast of the security level of organisational and managerial design of financial and human resources support for innovative agro-entrepreneurship for the prospective period, 2024-2026. For this purpose, it is necessary to find the forecast values of the independent variables for this period: the value of capital investment in agriculture (independent variable - X_1) and the number of employed workers in

agriculture (independent variable X_2). We forecast the value of capital investment in agriculture using the 3-point moving average method.

The moving average method takes into account not the whole range of data, but only a few last values, in this case - the three last values of the value of capital investment in agriculture in the total value of this factor. In this case, the forecast value of the independent variable X_1 - the value of capital investments in agriculture for 2024-2026 from 71919,83 thousand UAH to 73351,14 thousand UAH, i.e. that is, this factor is growing. The average value of the absolute error of the forecast of the value of the capital investment in agriculture is 25.82 %.

We use Holt's method to make a forecast of the number of employed workers in agriculture (independent variable - X_2). In this case, the number of employed workers in agriculture for the last 12 years is falling, but it is almost a monotonic process. In this case, the forecast of the number of employed workers in

agriculture for the next 3 years is from 576232 to 576510 persons, that is, compared to the previous year, 2021, the forecast values are slightly higher, while the number of employed workers in agriculture is significantly lower than in 2010. The solution determined $α = 0,43$ and $β = 1,00$ with the minimum value of the mean absolute error of the forecast of the number of employed workers in agriculture is 6.74 %.

At the last stage of modelling of forecasting the level of security level of organisational and managerial design of financial and personnel support of innovative agribusiness by the method of combining quantitative methods, we use regression model. Because of the calculations, we have a forecast of the level of profitability of agricultural production in enterprises for the next 3 years from 21.75 % to 21.79 %, an insignificant growth of the resultant indicator and it is positive. The average value of the absolute error of the forecast of the level of profitability of agricultural production in the enterprises is 16.72 %.

The dynamics of capital investment in agriculture, the number of employed workers in agriculture and the level of profitability of agricultural production in enterprises for the last 12 years and the forecast of these factors and the indicator for the next 3 years are graphically presented (Fig. 1, Fig. 2 and Fig. 3).
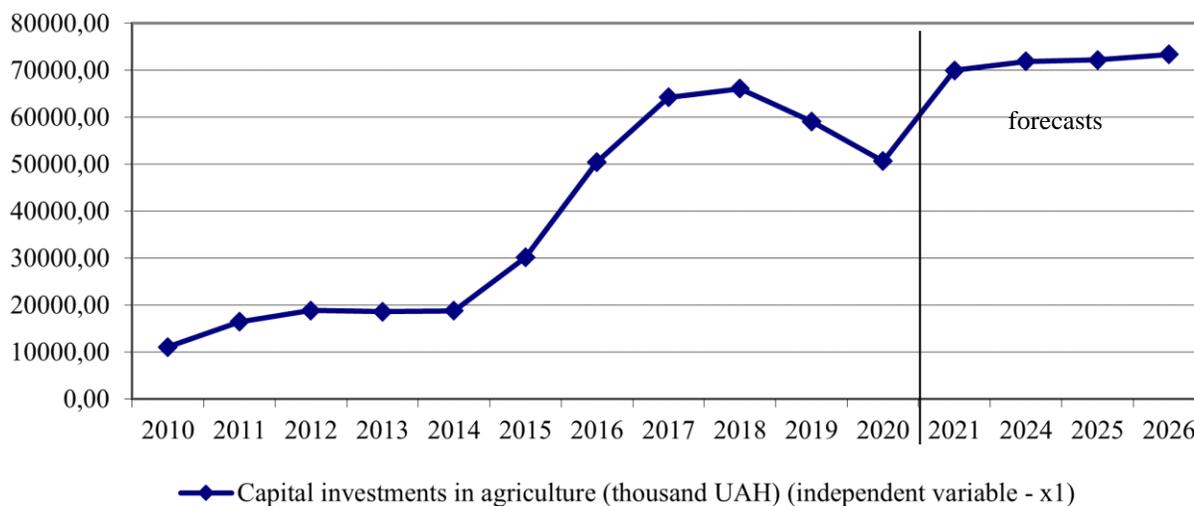

Fig. 1. Dynamics and forecast of capital investments in agriculture, 2010-2021, 2024-2026

Source: forecasts calculated by the authors.

Fig. 2. Dynamics and forecast of the number of employed workers in agriculture, 2010-2021, 2024-2026

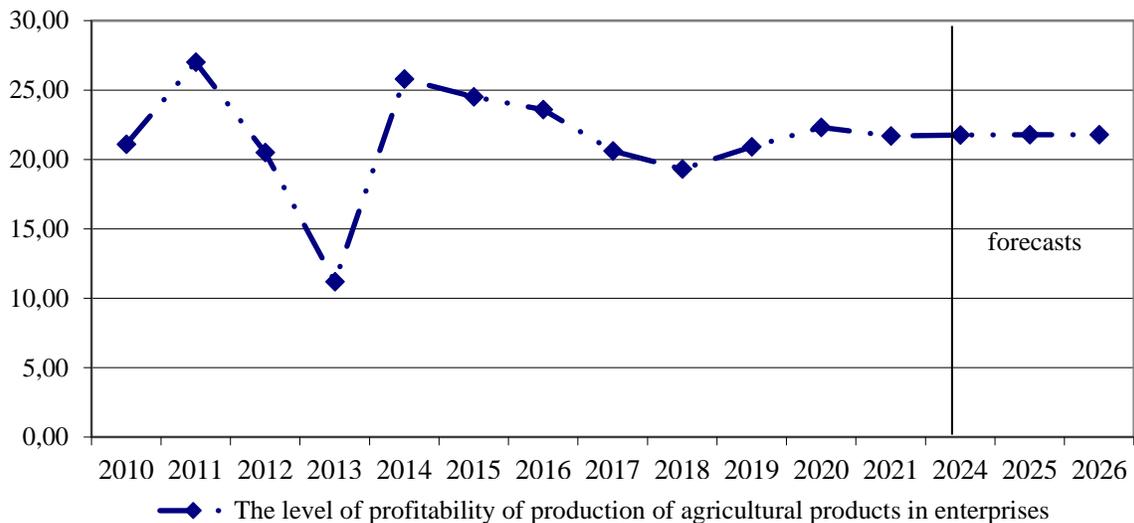*Source: forecasts calculated by the authors.*

Fig. 3. Dynamics and forecast of the level of profitability of agricultural production in enterprises, 2010-2021, 2024-2026

Source: forecasts calculated by the authors.

Thus, the forecasting of the security level of organisational and managerial design of financial and human resources support of innovative agribusiness has shown rather controversial trends. In particular, the dynamics and forecast of capital investment in agriculture for 2024-2026 are positive, which indicates an increase in the financing of the specified sector of the economy in the future. The dynamics and forecast of the number of employed workers in agriculture for 2024-2026 indicate that the staff will decrease or slightly increase. This may indicate two diametrically opposite factors, an increase in unemployment in the agricultural sector or increased automation of production processes. Dynamics and forecast of the level of

profitability of production of agricultural products at the enterprises for 2024-2026 indicate its insignificant increase. Which cannot indicate a positive financial development of the agro-sector. In general, it can be determined that the level of security of organisational and management design of financial and personnel support has witnessed relatively positive dynamics, but we should not expect stability and permanence of the above trend due to significant fluctuations in the external environment.

Conclusions

Forecasting the level of security of financial and human resources in the organisation is an important aspect of strategic management, risk diversification and socio-economic development of a single business entity and the state as a whole. A large number of tools, methods, principles and models are used to forecast this level. Forecasting the level of security of financial and human resources in

the organisation will allow timely monitoring of financial results of the enterprise and profitability management, which is especially important for effective scenario modelling, adaptation of the organisation to the external environment and strategic management of production activity in the conditions of risks. It is important to note that the activity of the enterprise is constantly exposed to the influence of the external environment, which transforms its internal organisation, and therefore, no tool for predicting the level of security of financial and human resources in the organisation can be constant and unchanging. Consequently, there is a need for seamless modelling of the level of financial and human resource support security in the organisation, taking into account current changes. Our next scientific research will be devoted to the assessment of factors that restrain or stimulate the development of human potential, which is capable of producing innovations.

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