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Financial modelling of cash flow management for agribusiness security: Accounting and analytical aspect

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Abstract. The study related to cash flows of agricultural enterprises is relevant, since the agricultural sector is one of the key sectors of the national economy, and food security of Ukraine is becoming a strategic priority in the context of post-war reconstruction and requires effective management approaches to increase investment attractiveness and sustainable development in the field of agricultural activities. The purpose of this study was to analyse, develop, and improve the existing priority approaches to cash flow management for the financial security of agribusiness, considering the accounting and analytical aspect. Among the methods used were the statistical method, forecasting, and financial modelling methods, analytical method, and discounting method. During the study, an analytical assessment and modelling of the prospects for changes in the net cash flow of an agricultural enterprise in the medium term was carried out, the need to use actuarial accounting and reporting to attract the necessary amount of foreign investment in the development of the industry in the context of financial security of farmers was determined. The role of actuarial accounting support in managing the value of agribusiness for its financial security

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was investigated. The study modelled the process of cash flow management at the agricultural enterprise PJSC "Agrofirma "Provesin". The study investigated actuarial information support from the actuarial accounting system for assessing the prospective changes in the property potential of agribusiness. It was noted that cash flow management in agriculture involves the use of innovative accounting and analytical management support, which would help to improve the image of investment attractiveness in foreign markets. The practical significance of this study lies in the development of concrete practical recommendations for the top management of agricultural enterprises to effectively attract the necessary amount of financial resources for sustainable development and post-war recovery of agribusiness

Keywords: monetary assets; investment attractiveness; agriculture; actuarial reporting; food security

INTRODUCTION

Ukraine's agricultural sector has found itself in a rather demanding situation under martial law and needs comprehensive support from both the government and real and potential foreign investors. Ensuring the sustainable development of Ukrainian agricultural enterprises is not only a guarantee of food security, but also the basis for further post-war economic recovery and the restoration of agribusiness. However, effective management of cash flows of agricultural enterprises is an urgent task, as it allows optimising the structure of assets, increasing solvency and liquidity, providing a cost estimate of economic potential, and promoting the investment attractiveness of agriculture. On the other hand, Ukraine's integration into the international community opens new opportunities and requires the country to ensure that the accounting and reporting system of agricultural enterprises is understandable to real and potential foreign investors and other capital providers, i.e., meets European standards. This makes the problem of effective cash flow management in agriculture even more important and justified in terms of the post-war recovery of agribusiness and the iteration of agrarians into the international arena.

According to O.Z. Mykytin (2023), the need for effective management of enterprise cash flows, in the context of martial law in Ukraine, is a crucial and necessary process. One of the main conclusions of the researcher was the considerable impact of the rationality of cash flow management on the efficiency of enterprises, both in the internal and external markets. The researcher emphasises that a comprehensive model of cash flow planning of a business entity should be based on concrete set of methodological tools. At the same time, Mykytin argues that a significant place among the methods of cash flow planning is occupied by financial modelling; the method of optimising financial decisions; calculation-analytical and regulatory methods. According to the researcher, the final managerial decision on the use of certain methods should be made only in the context of the financial strategy. Admittedly, only in consultation with the company's top management and considering the economic value of the business and the present value of net cash flow in the planned and factual periods of evaluation can the capital structure be effectively optimised. However, unlike a few years ago, the current conditions of martial law in Ukraine and the situation in the agricultural sector require additional financial resources in the form of both external and internal investments.

T.E. Kucherenko and G.Yu. Anishchenko (2022) assessed the modern accounting and analytical support for enterprise cash flow management and suggest that it is formed based on a combination of financial and internal accounting systems. The interaction of these systems results in accounting and reporting information that serves as the basis for analytical assessment of cash flows based on express analysis in the context of business development prospects. The researchers' conclusions show that effective cash flow management contributes to financial balance and improves the level of solvency of an enterprise. Reliable accounting and reporting support from the actuarial accounting system forms the quality content for attracting investments.

Yu.O. Kostenko *et al.* (2023) emphasise the significance of effective management of financial resources of an enterprise in the context of implementing a financial management strategy, analysis, and forecasting of cash flows. The increase in the value of an enterprise's assets is determined by investment and financial decisions. The cash flow management strategy aims to achieve the following objectives: maximising net cash flow; optimising cash flow distribution; and reducing the risk of insolvency. The researchers emphasise that investment decisions determine the size and structure of tangible assets required for business activities. Financial decisions relate to obtaining sources of funding for these assets in terms of their structure. Notably, an objective analytical assessment of the prospects for increasing the company's value, based on the information content of actuarial reporting, can help to increase the level of investment attractiveness of an enterprise.

Yu. Nikolchuk and O. Lopatovska (2022) analysed the problems of developing a financial strategy in the financial management system of an enterprise. They identified several key aspects of the financial strategy, considering the prospects for the financial development of the enterprise, which form the financial policy. Important components of the financial policy are the

management of cash flows; investments; assets; capital and financial risks. It is proposed to assess the trends in the financial condition of the enterprise and its own capabilities in the future. Attracting the necessary amount of additional financial resources and their efficient use stays a critical issue under martial law that requires a comprehensive approach. Such a comprehensive approach is important to increase the investment attractiveness of Ukrainian agricultural enterprises and ensure the recovery of the national economy.

Generally, there is a need to improve the efficiency of cash flow management based on actuarial accounting and analytical support to increase the investment attractiveness of agribusiness. Rebuilding the post-war economy requires effective cash flow management and ensuring the recovery of the agricultural sector. The purpose of this study was to develop an algorithm for managing cash flows in agriculture in Ukraine, considering the accounting and analytical aspect and ensuring the recovery of the agricultural sector. To fulfil this purpose, the following tasks were set: to calculate the forecast cash flow of the enterprise; to reflect the discounted value of assets in the actuary's financial statements; to assess the change in the value of an individual agribusiness entity in the context of its investment attractiveness.

MATERIALS AND METHODS

The study was based on official documents and reports of the National Bank of Ukraine (n.d.), Committee on Agrarian and Land Policy (n.d.), as well as materials from the official websites of the European Bank for Reconstruction and Development (2022), Stock market infrastructure development agency of Ukraine (2023) and Thomson Reuters (2023), Decree of the President of Ukraine No. 722/2019 (2019).

The study of the projected cash flow of the Private Joint Stock Company (PJSC) "Agrofirma "Provesin" until 2027 was conducted according to the financial statements for 2018-2023. PrJSC "Agrofirma "Provesin" is a modern agricultural enterprise engaged in the cultivation of various organic vegetables in greenhouse conditions, melons, roots and tubers, and is located in Western Ukraine (registered address: 152 Hlynianskyi Trakt Str., Lviv, 79067). PrJSC "Agrofirma Provesin" provides food to the population through local and all-Ukrainian retail chains, which is strategically important in the context of martial law and food security in Ukraine.

The statistical method was used to investigate the data on the average annual growth rate of income and expenses of an agricultural enterprise. Ex-ante economic analysis made it possible to carry out financial modelling of the management of cash assets of agricultural enterprises based on the calculation of the forecast net cash flow for the last 5 years, by applying the following formula:

$$\overline{G}_{rate} = \sqrt[n-1]{\frac{y_1}{y_0}}, \quad (1)$$

where y_1 – is the value of the indicator in the reporting period; y_0 – is the value of the indicator in the base period; n is the number of periods.

The use of the discounting method made it possible to bring the future value of an agricultural enterprise's cash flows to their value in the current period through the lens of actuarial management reporting. Accordingly, the economic value of an agricultural enterprise is formed from the present value of net cash flow in the planning period and the present value of net cash flow in the final period using the following formulas:

$$NCF_{pl} = \sum_{t=1}^{T} \frac{NCF_t}{(1+cc)^t}, \quad (2)$$

$$NCF_f = \frac{NCF_{T+1}}{cc-g} x \frac{1}{(1+cc)^T}, \quad (3)$$

where NCF_{pl} – is the value of net cash flow in the planning period; NCF_f – is the value of net cash flow in the final period; NCF_t – is the net cash flow in the planning period; cc – is the cost of capital; T – is the duration of the strategic plan for the development of the agricultural enterprise; g – is the percentage change in the volume of activities (sales).

$$PV = \frac{FV}{(1+i)^n}, \quad (4)$$

where FV – is the future value of the enterprise; PV – is the present value of the enterprise; i – is the discount rate (the average annual refinancing rate of the National Bank of Ukraine (NBU)).

The discount rate is an important indicator in the calculation, as its increase will reduce the present value of the agricultural enterprise. Based on the results obtained, concrete recommendations will be developed to improve the image of the investment attractiveness of Ukrainian agricultural enterprises through the practical application of accounting and reporting content of actuarial statements, which will contribute to the post-war recovery of the agricultural sector of Ukraine.

RESULTS

The full-scale losses of Ukraine's agricultural sector as a result of the war are significant. Thus, according to the Ministry of Agrarian Policy and Food of Ukraine, the total amount of losses incurred by the agricultural sector was USD 6.6 billion. Furthermore, the total amount of indirect losses of farmers as a result of the reduction in agricultural production in Ukraine is USD 34.25 billion (Rusan, 2022). The accounting and analytical support of cash flow management of an agricultural enterprise should be considered as a set of information data from the accounting system to model the level of reasonable assessment of the financial security of the business entity and its sustainable development. That is, in the context of rebuilding the post-war economy of Ukraine, accounting should move to a new stage of

development – actuarial. Actuarial accounting is aimed at real and potential investors or other capital providers and can increase the investment attractiveness of Ukrainian agricultural business in the context of not only food but also financial security. To ensure the financial security of Ukrainian farmers under martial law, the actuarial accounting system should be developed in such a way that it creates an image of protection of their activities from the negative effects of military operations and can quickly mitigate various external threats. Financial security is determined by the financial position of the enterprise, the efficiency of *cash flow (asset)* management, the level of security and the prospective (forecast) property potential of business development (Oriekhova *et al.*, 2022). Given the volatile market environment and the overall threats at the macro level, it is worth abandoning short-term forecasts. The optimum forecast period should be no more than 5 years. The calculation of forecast indicators for agricultural enterprises is based on past trends, considering the specifics of trends in the agricultural sector as a whole. Furthermore, the forecast excludes significant large-scale impacts, such as pandemics, wars, etc.

Net cash flow is reflected in the accounting system, specifically in the public financial statements such as the Cash Flow Statement (Form 3), which is modified in the actuarial accounting system into the Actuarial Balance Sheet (Form 3-a). In terms of content, net cash then represents the amount of cash available to investors, which is calculated by deducting investments in working capital and non-current assets from cash flows from operating activities. The total amount of free cash flow should be an identical amount both from the standpoint of the enterprise and from the standpoint of the capital provider (real or potential investor).

Therefore, it is advisable to use the forecasted values of cash inflows and outflows to an agricultural enterprise for a range of periods. The difference between these projections is the net cash flow of the agricultural business entity. Financial modelling of cash flow management is a key stage in the preparation of actuarial reports, specifically, Form 1-a (Actuarial Balance Sheet (Actuarial Statement of Financial Position) and Form 3-a (Actuarial Cash Flow Statement). This factors in the dynamics of the company's cash flows over a range of periods and recalculates their value considering the forecast growth rates of income and expenses. The task of improving the efficiency of cash flow management is addressed in the actuarial accounting and reporting system. To calculate the net cash flow, i.e., the amount of cash available to investors of PJSC "Agrofirma "Provesin", the study used information on the dynamics of expenses and income of the agricultural company for 2018-2023 (Table 1).

***Table 1**. Dynamics of income and expenses of PrJSC "Agrofirma "Provesin" for 2018-2023*

Period	Revenues, (UAH thsd)	Expenses, (UAH thsd)
2018	8,128	7,369
2019	10,318	8,128
2020	10,414	10,261
2021	6,012	8,305
2023	7,246	9,950
$\overline{G}_{rate}$	0.944	1.077

***Source:** compiled by the authors of this study*

An analytical assessment of the dynamics of income and expenses of the agricultural firm over the past 5 years according to the financial statements indicates negative financial results of its operation in the agricultural market and the need to attract additional financial resources. However, conventional financial statements are of no interest to a potential investor, as they do not reflect the present value of future cash flows in the long term, but only state the carrying value of the objects of accounting. Therefore, to create an image of investment attractiveness for Ukrainian agricultural enterprises, it is necessary to have accounting and reporting content that would allow a potential investor to immediately see the additional benefit of investing temporarily free financial resources, i.e., the return on investment.

The average annual rate of decrease (increase) in income and expenses of PJSC "Agrofirma Provesin" for 2018-2023 is -5.6% and +7.7%, respectively, which is a reasonable trend both in the context of the pandemic and martial law in Ukraine. It is worth using the forecasted values of cash inflows and outflows to the enterprise for 2024-2027. The difference between these projections is the net cash flow (Table 2).

***Table 2**. Projected net cash flow of PrJSC "Agrofirma "Provesin" for 2024-2027*

Period	Revenues, (UAH thsd)	Expenses, (UAH thsd)	*Cash flow* (UAH thsd)
$2024_{forecast}$	6,811	10,746	-3,935
$2024_{forecast}$	6,403	11,606	-5,203
$2025_{forecast}$	6,018	12,534	-6,516
$2026_{forecast}$	5,657	13,537	-7,880
$2027_{forecast}$	5,318	14,620	-9,302
Total	**37,453**	**72,992**	**-35,539**

***Source:** compiled by the authors of this study*

Accordingly, the amount of free cash flow should represent the same amount from the standpoint of the agricultural enterprise as well as from the standpoint of a real and potential investor or other capital provider. Determining the discount rate is a rather controversial stage in the preparation of actuarial reports, specifically, Form 1-a "Actuarial Balance Sheet (Actuarial Statement of Financial Position)" and Form 3-a "Actuarial Balance Sheet of Cash Flows". In the current environment, it can be stated that there is no single methodology for calculating the discount rate. Undoubtedly, discounting is an important mechanism that allows providing reliable information about the financial position of an agricultural enterprise, since the present value of future financial flows may differ substantially from the nominal value.

The procedure for selecting the discount rate should be recorded in the accounting department's notes and also prescribed in the accounting policy. Furthermore, it is advisable to use open and widely known sources (the NBU, or information from global rating agencies, such as Thomson Reuters). In addition, the accounting certificate should substantiate the increase in the discount rate if the debt has risks of non-repayment and assess them.

For PrJSC "Agrofirma "Provesin", the discount rate was chosen at the level of the NBU's average annual rate, which as of 01.01.2022 was 9.92% (however, from 16.06.2023 it reached 25.00%). The calculation of the discounted value of assets will be presented on the example of calculating the discounted value of fixed assets, the decoding of which for PJSC Agrofirma Provesin is presented in Table 3.

***Table 3**. Property, plant and equipment of PrJSC "Agrofirm "Provesin" (Lviv) as of 1 January 2022*

Name of the item of property, plant and equipment	Residual cost, UAH thsd	Residual service life, years
Buildings and structures	5,926	12
Machinery and equipment	371	3
Vehicles	7	4
Land plots	0	(no minimum allowable useful lives are set)
Other property, plant and equipment	77	9
Total:	6,381	x

***Source:** compiled by the authors of this study*

The next step is to allocate the cash flow to the company's assets using the discounting method to reflect in the Actuarial Balance Sheet (Actuarial Statement of Financial Position), Form No. 1-a, assets and liabilities with a maturity of more than 12 months. Thus, the distribution of cash flow from operating activities will be carried out only in terms of non-current assets (Table 4). Ukrainian researchers propose to use the residual value of fixed assets as the basis for distribution, which is given in the analytical report on fixed assets. Assets that are expected to be disposed of during the forecast period are excluded from the calculation of the distribution base as they are disposed of (Sergienko *et al.*, 2022; Kyrychenko, 2023).

When calculating the discounted value, information on the residual value of non-current assets at the end of the forecast period is also important (Table 5).

The discounted value of intangible assets for PrJSC "Agrofirma "Provesin" is calculated as follows (Table 6).

***Table 4**. Distribution of cash flows by items of non-current assets PJSC "Agrofirma Provesin" (Lviv)*

Period	2024		2025		2026		2027	
Name of the item of property, plant and equipment	Cash flow allocation basis, %	Cash flow, UAH thsd	Cash flow allocation basis, %	Cash flow, UAH thsd	Cash flow allocation basis, %	Cash flow, UAH thsd	Cash flow allocation basis, %	Cash flow, UAH thsd
Buildings and structures	92.87	2,497.26	92.87	3,211.43	92.87	3,750.07	92.87	5,236.91
Machinery and equipment	5.81	156.34	5.81	201.05	5.81	234.77	5.81	327.86
Vehicles	0.11	2.95	0.11	3.79	0.11	4.43	0.11	6.19
Land plots	-	-	-	-	-	-	-	-
Other property, plant and equipment	1.21	32.45	1.21	41.73	1.21	48.73	1.21	68.05
Total:	**100.0**	**2,689**	**100.0**	**3,458**	**100.0**	**4,038**	**100.0**	**5639**

***Source:** compiled by the authors of this study*

***Table 5**. Estimated residual value of non-current assets of PJSC "Agrofirma "Provesin" (Lviv) as of 31 December 2027*

Indicator	Discount period				Discounted value non-current asset
	31 December 2024	31 December 2025	31 December 2026	Residual value as of 31 December 2027	
1	2	3	4	5	
Rate calculation					
Discount factor	0.7530	0.6850	0.6232	x	
Non-current assets:	Discounted value				
Buildings and structures	2,418.20	2,568.80	3,263.64	1,973.27	13,774.33
Buildings and structures	2,418.20	2,568.80	3,263.64	1,973.27	13,774.33
Machinery and equipment	151.39	160.82	204.32	123.54	862.35
Vehicles	2.86	3.03	3.86	2.33	16.27
Other property, plant and equipment	31.42	33.38	42.41	25.64	178.98
Total:	**2,603.87**	**2,766.03**	**3,514.22**	**2,124.78**	**14,831.93**

***Source:** compiled by the authors of this study*

***Table 6**. Intangible assets of PJSC "Agrofirm "Provesin" (Lviv) as of 1 January 2022*

Operation	Initial cost, UAH thsd	Discount rate	Useful life, years	Note
1	2	3	4	5
Intangible assets	10.0	9.92	2	-
Total:	***10.0***	***X***	***X***	***X***

***Source:** compiled by the authors of this study*

$$PV = 10 \div (1 + 0.0992)^2 = 10 \div \div 1.20824064 = 8.28 \text{ } UAH \text{ } thsd. \quad (5)$$

According to the data presennted in Tables 3-6, in the Actuarial Balance Sheet (Actuarial Statement of Financial Position), Form No. 1-a, the carrying value of fixed assets of "Agrofirma "Provesin" PrJSC is UAH 6,381 thsd, and the discounted value is UAH 14,832 thsd, while intangible assets are UAH 10 thsd and UAH 8 thsd, respectively. Thus, the difference in valuation amounts to UAH 4,899 thsd for fixed assets and UAH 2 thsd for intangible assets, and should be reflected in the equity of the agricultural enterprise in the eponymous Section IV, Form 1-a. Due to this information content of actuarial reports, the investor will immediately see the prospects for changes in the property potential of agribusiness in the future, which will encourage them to invest temporarily free financial resources in its restoration and further progressive development.

Generally, the differences between the book and discounted valuation of not only assets but also liabilities of an enterprise should be recorded in the actuarial accounting system in 3D actuarial accounts, which should be opened as a separate class 10 in the Chart of Accounts. Thus, to account 10 "Fixed assets", it is worth opening an actuarial 3D subaccount of the corresponding procedure 1010 "Fixed assets at discounted value", which will facilitate the procedure for reflecting such an assessment of these objects in the actuary's reports.

DISCUSSION

The diagnostics of the situation of Ukrainian agricultural enterprises under martial law indicates an urgent need not only to preserve but also to strengthen their

position in the international agricultural arena. For this, agricultural enterprises need additional funding and full and comprehensive support from both the state and foreign partners. Due to these circumstances, it is quite reasonable to model the cash flow management of agribusiness in the context of its financial security. Effective financial modelling of cash flow management of an agricultural enterprise requires appropriate information support to assess the prospective change in the property potential of agribusiness, from the actuarial accounting system, which will help to improve the image of its investment attractiveness in foreign markets. Agribusiness value management based on the information content of actuarial accounting and reporting includes modelling net cash flows for the future and assessing the value of its property potential aimed at actual and potential external investors or other capital providers in the financial markets.

The post-war recovery of the national economy requires improvement of the conventional accounting methodology based on the actuarial aspect. That is why actuarial accounting and reporting should become structural elements of the accounting system and the information basis for an objective analytical assessment of the prospects for changes in the economic potential of agribusiness. In other words, the level of investment attractiveness of an agricultural enterprise should be reflected in its actuarial statements. PJSC "Agrofirma "Provesin" does not prepare actuarial reports, as it is not yet regulated by law in Ukraine. The purpose of actuarial reporting is to create an image of investment attractiveness of the business for a potential foreign investor or other capital provider to attract the necessary financial resources, with further improvement of liquidity and solvency in the context of asset security, security of interaction with counterparties and financial security of the enterprise as a whole. In addition, when preparing actuarial reports, under the conditions of martial law in Ukraine, it is necessary to consider such external financial risks as inflation and currency risks. Actuarial accounting support in the n-dimensional format is the information basis for analytical assessment of the dynamics of monetary assets and prospects for changes in the value of an agricultural enterprise. As a result, conventional accounting accounts are transformed into 3D actuarial force accounts that form a spatial interpretation of the prospects for changes in the property and financial potential of a business in a multidimensional format.

S.I. Vasylyshyn *et al*. (2023) demonstrated the need to develop a system of accounting and information support for the potential of agricultural enterprises. Scientists emphasise that Ukraine is a leading exporter of agricultural products under martial law. Agricultural enterprises play a strategic role in the context of global food security. The researchers describe the importance of applying innovative approaches to managing the economic potential of agricultural enterprises based on high-quality accounting and information support to assess it reliably. The meaningful projection of economic potential has a direct impact on the accounting classification of non-current and current assets. This essential and substantive unity determines the need for the accounting service to consider the institutional influence of the external and internal environment on the activities of an agricultural enterprise. It is important to distinguish between accounting, analytical, and control subsystems, which transform incoming financial and non-financial information flows into integrated reporting. Such reporting comprehensively describes the main components of economic potential, such as financial, production, human resources, innovation, science and technology, environmental, information, marketing and management. An objective assessment of the value and economic potential of an agricultural enterprise can be quickly made based on actuarial management accounts prepared within the Conceptual Framework for Financial Reporting and understandable to a foreign investor or other capital provider, as they meet European requirements.

M.V. Leifura (2023) investigated the valuation of companies based on the Firm DCF (Discounted Cash Flow) model and covered the main advantages and disadvantages of applying this model in practice. The researcher found that to estimate the value of a company using modelling, it is necessary to apply a reasonable approach based on a comprehensive analytical assessment of financial and management reports and forecasting trends in income and expenses. Leifura suggests that the most effective method for valuing a company in the context of the income approach is the discounted cash flow (DCF) method. This position is fully supported by the scientist, since it is the discounting procedure that allows for an objective assessment of the present value of future cash flows and provides reliable information about the financial condition of an agricultural entity through the lens of actuarial reporting.

M.I. Diachenko and V.O. Zhmudenko (2023) assessed the current state of the agricultural sector of Ukraine and the areas of restoring economic potential in the context of transformational changes. The researchers stressed that despite the significant potential of Ukrainian agriculture, the war has a significant impact not only on global but also on internal food security. The researchers describe the current model of agribusiness development under martial law. The war against Ukraine threatens food security around the world, as Ukraine is a significant food producer and exporter. Financial support from partners for Ukrainian agriculture is helping to overcome the global food crisis, according to the Committee on Agrarian and Land Policy. The European Bank for Reconstruction and Development (EBRD) and the Netherlands, as a founding member of the EBRD and an important donor to the Bank's activities in Ukraine, will provide a EUR 25 mln financial

guarantee to support private companies, specifically those operating in critical sectors related to agriculture and food processing. The support will focus on food security and will help to leverage further funding from the EBRD in Ukraine.

According to L.O. Boiko and V.O. Boiko (2023), an important priority for the development of the Ukrainian agricultural sector is free access to financial flows of farmers, as well as the availability of credit lines. Authors fully agree with this approach, since the specifics of the functioning of agricultural enterprises are characterised by the seasonality of agricultural production, and, accordingly, certain periods of time require significant amounts of funding to ensure the continuity of production processes. The author strongly emphasises that under martial law, agricultural producers should use all available resources to preserve agribusiness and ensure food security of the state. At the same time, the scientist argues that the key area in the Agricultural Sector Recovery Plan is the Green Deal, i.e., sustainable, clean, and safe environmental management by European countries. According to the researcher, Ukrainian farmers are making significant efforts to ensure the country's food security and hope for financial assistance from the international community. Admittedly, attracting additional funding in the form of foreign direct investment will help modernise all sectors of Ukrainian agriculture, including processing. The actuarial concept of value-based financial management of companies aimed at a foreign capital provider in the medium term can improve the image of the investment attractiveness of domestic farmers.

V. Ilchuk *et al*. (2020) emphasise the importance of the mechanism of value-based financial management of enterprises, which in the context of investment activity involves increasing the investment rating and investment attractiveness. The information subsystem of such a mechanism includes accounting and analytical, regulatory and methodological support. Accordingly, accounting and analytical support is formed by financial and management reports; accounting registers; primary accounting information on business transactions, etc. That is, according to scientists, the initial data for analytical research is formed based on accounting information from the following systems: accounting (which is divided into financial and management), tax, and statistical accounting. Notably, accounting has moved to a new stage of development – the actuarial stage, and therefore the modern accounting and analytical support of the mechanism of value-based financial management of agricultural enterprises should be supplemented by actuarial accounting, which is aimed at increasing the investment attractiveness of agribusiness.

For the first time among Ukrainian scientists, the concept of actuarial accounting in the context of the triple-entry system of accounting and improvement of internal control was covered in a joint study with V. Evdoschak and Y. Manachynska (2015). The innovative approach to improving the accounts by separating actuarial force accounts is based on calculating the prospective development potential of an agribusiness in the context of its sale as an integral property complex (IPC). Considering this, actuarial accounting is designed to factor in the force of changes in both the internal and external environment of an agricultural enterprise.

O.V. Stashchuk (2022) evaluated modern approaches to the concept of value-based financial management and suggests that it requires a comprehensive transformation of financial modelling algorithms for cash flow management in the context of the development of a new paradigm of financial management. The author's conclusions indicate that there is an urgent need to manage not only the finances of an economic entity, but also the overall management of an agricultural enterprise within the financial management system, which is transformed into a value-based approach to financial management of business processes. The interaction of modern digital and information accounting technologies and their active implementation in the company management system results in a comprehensive reorientation of the financial flow management system in business processes to the principles of business valuation in the financial management system as a whole.

O. Fomina et al. (2020) emphasise the importance of managing the valuation of agribusinesses based on the application of a multivariate actuarial model using the adjusted net asset method. The authors focus on the relationship between the accounting information disclosed in the financial statements of agricultural enterprises under international financial reporting standards (IFRS) and actuarial management reporting. The latter, in the context of the Conceptual Framework for Financial Reporting, facilitates the foreign investor's management decision-making on the expediency of investing temporarily free financial resources in the development of the agricultural sector of Ukraine.

L. Shapoval and Ju. Kolotii (2019) analyse the problems of financial modelling of companies' cash flow management. They defined the basis for the OCF model and proposed an algorithm for its construction. It is proposed to use the model for assessing the efficiency of cash flows of companies in practice, which will help to identify the key factors influencing the efficiency of financial and economic activities and will allow calculating the degree of this influence. This integrated approach based on financial modelling and cash flow forecasting is important for improving the financial position and minimising the risk of cash shortages. In the context of the post-war recovery of the national economy, the analytical assessment and modelling of trends in the net cash flow of an agricultural enterprise in the future should be based on actuarial accounting and reporting data. This will not only increase the investment attractiveness of Ukraine's agricultural sector but will

also create a foundation for the food and financial security of domestic farmers.

According to I.I. Pasinovych and V.M. Hutak (2023), financial security of an enterprise is an important component of economic and corporate security. Financial security includes budgetary, banking, insurance, monetary, currency, stock, and investment components. The latter shows the possibility of attracting, investing, and using investment resources in the development of an agricultural enterprise. Scientists identify financial security with a certain level of financial standing and associate it with the ability to develop one's own financial strategy. The term "corporate security" is gradually gaining ground, which, along with economic and financial aspects, focuses on corporate governance mechanisms. Corporate governance itself is formed from the internal systems used to manage and control the agricultural holding. In essence, corporate governance involves the exercise of power in corporate-type agricultural enterprises. In other words, corporate governance forms the legal framework for determining the rights and responsibilities of different parties to an agricultural holding, as "agency conflicts" may arise in the course of business activities between the factual owners of agribusiness (real shareholders), top managers, and creditors. The actuarial concept of accounting, which forms a proper system of financial monitoring of top management activities to overcome "managerial opportunism", can overcome agency contradictions in agricultural holdings. According to the US approach, corporate governance helps to assess the ways in which factual and potential investors or other capital providers ensure a return on investment in agricultural production. The information content of the actuarial financial statements, specifically the Actuarial Cash Flow Balance Sheet (Form No. 3-a), serves as the basis for assessing the economic value of agribusiness and is based on the net present value of future cash flows, which ensures that the "conflict of interest" is levelled in the context of implementing the corporate finance theory.

I.V. Tomashuk and E.A. Borbolyuk (2023) assessed the importance of the agricultural sector of the economy in ensuring food security in Ukraine. The researchers emphasised that strengthening the country's food security requires a comprehensive interaction of all parameters of the development potential of domestic agricultural actors with economic, social, and environmental aspects that guarantee this security. The authors describe the structure of food security in Ukraine, which at the regional level includes the creation of a food fund through budgetary funding and loans. Ensuring food security requires a comprehensive approach and the implementation of modern strategies. Among the priority approaches, scientists identify investments in agriculture to ensure an adequate level of production growth and food reserves in the country. The range of strategic guidelines that ensure food security includes: providing preferential loans to farmers to restore equipment and production facilities damaged or destroyed as a result of hostilities; attracting foreign investment to restore the infrastructure for storing, transporting, and processing agricultural products; and conducting ongoing environmental and economic analysis. The active use of the latter will ensure a comprehensive and comprehensive analytical study of the implementation of the Sustainable Development Goals of Ukraine until 2030 and careful environmental management in the context of achieving food security and promoting inclusive agricultural development.

S.V. Stepanenko (2023) emphasises the importance of investment support for the inclusive and sustainable development of agribusinesses. This is an important aspect that affects the strategic development of the agricultural sector and rural areas to ensure their competitiveness. Investments create a strategic potential for addressing the challenges of sustainable agricultural production and improving the quality of life of the country's population. Notably, the financially secure functioning and protection of agricultural enterprises under martial law requires the introduction of more innovative technologies for making management decisions in the context of multidimensional space (n-D-format of business processes) with an appropriate actuarial accounting and analytical foundation. It is actuarial accounting that allows assessing the prospects for changes in cash flows, which will help increase the investment attractiveness of agribusiness and ensure its financial security. Based on the information from the actuarial accounting system, it is possible to create an image of the investment attractiveness of an agricultural market entity based on actuarial reporting and conventional methods of financial (economic) analysis. The information basis for actuarial reporting and economic analysis tools allow reflecting the potential for agribusiness development, both in the short and long term, which helps to attract investment from foreign capital providers.

Generally, various aspects, such as accounting and analytical support for financial modelling of cash flow management of an agricultural enterprise, affect the investment attractiveness of agribusiness. The researchers define the importance of clarity of accounting and reporting information for analytical assessment of the prospects for changes in the economic potential of agribusiness by real and potential foreign investors, as well as other capital providers. Objective accounting and analytical support for managing the growth of economic potential in the medium term plays a crucial role in attracting the necessary amount of financial investment in the development and post-war recovery of agribusiness.

CONCLUSIONS

This study covered the actuarial information support for the management of financial resources of an agricultural enterprise. Financial modelling of cash flows

based on accounting actuarial and reporting content allows real and potential foreign investors to make an analytical assessment of the prospects for changes in the economic potential of agribusiness. The key stages of the procedure for financial modelling of cash flows in the financial security system, such as determination of the forecast net cash flow, calculation of the discounted value of assets, distribution of cash flows among the assets of the enterprise, reflection of the discounted value of all assets in the actuarial statements, and assessment of the potential for changes in the value of agribusiness are considered. The influence of the discount rate on the assessment of changes in the value of an agricultural enterprise through the lens of such forms of actuarial reporting as the "Actuarial Balance Sheet (Actuarial Statement of Financial Position)" and the "Actuarial Balance Sheet of Cash Flows" was studied. The expediency of documenting the procedure for selecting the discount rate is substantiated, specifically, with mandatory fixation in the accounting certificate and consolidation in the accounting policy. The study analysed the forecast net cash flow of PJSC "Agrofirma "Provesin" for 2024-2027 and determined that the amount of free cash flow should be identical both from the standpoint of an agricultural enterprise and from the standpoint of a real investor. The study emphasised the significant influence of information content of actuarial financial statements according to the valuation of assets at discounted value on the investor's decision to invest temporarily free financial resources. It was highlighted that the difference in the valuation of assets and liabilities of an agricultural enterprise at book and discounted values should be recorded in the system of actuarial accounting and actuarial 3D force accounts. The study proposed the possibility of opening a separate class 10 "Actuarial Accounts" in the Plan of Accounts for Accounting for Assets, Capital, Liabilities and Business Transactions of Enterprises and Organisations. To increase the investment attractiveness of agricultural enterprises and the post-war recovery of the agricultural sector of Ukraine, the procedure for modelling monetary assets in the financial security system based on the data of actuarial accounting and reporting was substantiated.

Further research will focus on investigating and analysing the best digital actuarial accounting technologies in the management of the value of agricultural enterprises and their possible implementation in Ukrainian accounting practice. It is necessary to analyse digital software products for the agricultural sector to improve the efficiency of agricultural enterprises, as well as to analyse the advantages and possibilities of using cloud services to digitise the accounting and analytical support for management in agriculture.

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CONFLICT OF INTEREST

The authors of this study declare no conflict of interest.

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Фінансове моделювання управління грошовими потоками для безпеки агробізнесу: обліково-аналітичний аспект

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Анотація. Дослідження пов'язане з грошовими потоками сільськогосподарських підприємств, є досить актуальним, оскільки аграрний сектор є однією важливих галузей національної економіки, а продовольча безпека України стає стратегічним пріоритетом в контексті повоєнної відбудови та вимагає ефективних управлінських підходів для підвищення інвестиційної привабливості та сталого розвитку у сфері сільськогосподарської діяльності. Мета дослідження полягає в аналізі, розробці та вдосконаленні вже наявних пріоритетних підходів до управління грошовими потоками для фінансової безпеки агробізнесу з урахуванням обліково-аналітичного аспекту. Серед використаних методів було застосовано статистичний метод, методи прогнозування та фінансового моделювання, аналітичний метод та метод дисконтування. В процесі дослідження було проведено аналітичну оцінку і моделювання перспектив зміни чистого грошового потоку аграрного підприємства в середньостроковому періоді, визначено необхідність застосування актуарного обліку та звітності для залучення необхідного обсягу іноземних інвестицій в розвиток галузі в контексті фінансової безпеки аграріїв. Досліджено роль актуарного облікового забезпечення в управлінні вартістю агробізнесу для його фінансової безпеки. Було змодельовано процес управління потоками грошових коштів на сільськогосподарському підприємстві ПрАТ «Агрофірма «Провесінь». Досліджено актуарне інформаційне забезпечення із системи актуарного обліку для здійснення оцінки перспективної зміни майнового потенціалу агробізнесу. У ході дослідження було зазначено, що управління грошовими потоками у сільському господарстві передбачає використання інноваційного обліково-аналітичного забезпечення управління, яке б сприяло підвищенню іміджу інвестиційної привабливості на зовнішніх ринках. Практичне значення дослідження полягає в розробці конкретних практичних рекомендацій для топ-менеджменту аграрних підприємств з метою ефективного залучення необхідного обсягу фінансових ресурсів для сталого розвитку та повоєнного відновлення агробізнесу

Ключові слова: грошові активи; інвестиційна привабливість; сільське господарство; актуарна звітність; продовольча безпека