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Economic and mathematical methods and models of financial development

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Modelling financial results based on "green" budgeting principles

Abstract. Contemporary challenges arising from the global environmental crisis, the transition to a low-carbon economy, economic instability and digital transformation necessitate a rethinking of approaches to financial planning in enterprises.

Problem statement. Modelling the financial results of enterprises based on the principles of "green" budgeting makes it possible to combine economic goals with environmental and social objectives. Such an approach meets the requirements of ESG standards and the challenges of European integration processes.

Unresolved aspects of the problem. Scholarly research focuses on various directions in the development of budgeting: improving enterprise budgeting systems, applying HR- and gender-oriented approaches, integrating instruments of controlling, strategic management, investment project evaluation, crisis management and ensuring financial security.

Purpose of the article is to substantiate and develop a model for forecasting an enterprise's financial results, integrated with the principles of "green" budgeting, which ensures a balanced combination of financial goals and environmental standards, promotes resource optimisation, and enhances business competitiveness.

Presentation of the main material. The object of the study is the system of strategic financial planning of the enterprise, considered from the perspective of integrating environmentally oriented investments, energy efficiency projects, and the implementation of renewable energy sources into financial strategies.

Conclusions. The proposed model provides for the allocation of financial resources with consideration for investments in energy-efficient technologies, decarbonisation projects, the implementation of renewable energy sources, and waste management systems. This contributes to reducing operating costs, optimising resource use, and strengthening the enterprise's environmental reputation. The assessment of financial and economic indicators, taking into account ESG principles, confirmed that "green" budgeting not only improves key financial metrics (profitability, liquidity, asset turnover) but also enhances non-financial indicators related to environmental and social responsibility.

The practical value of the work lies in providing recommendations for integrating "green" budgeting into the strategic management system, which can be used by enterprises across various sectors to improve financial stability, environmental performance, and social responsibility.

The results obtained can serve as a basis for developing sector-specific methodological guidelines and adapting international ESG standards to the realities of the Ukrainian economy.

***Keywords**: modelling, financial results, "green" budgeting, sustainable development, ESG principles, strategic financial planning.*

JEL Classification: M 15, M 20, G 30, O 32

Formulas: 0, Fig.: 4, Table: 4, references: 29.

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Introduction. The current realities of Ukraine's economic development, shaped by military actions, economic instability, and global sustainable development challenges, have significantly complicated the task of ensuring stability and predictability in enterprises' financial outcomes. Traditional methods of financial planning and budgeting no longer guarantee the achievement of planned indicators, as the business environment now requires the integration of environmental, social, and governance (ESG) aspects into operations.

Under martial law and economic turbulence, Ukrainian enterprises face issues such as shrinking sales markets, disruptions to production and logistics chains, fluctuations in resource prices, and rising environmental and social risks. At the same time, the active implementation of "green" budgeting principles creates new opportunities for shaping a positive corporate image, optimising resource use, and enhancing investment attractiveness.

Modelling financial results based on "green" budgeting allows environmental and social priorities to be integrated into an enterprise's financial strategy, ensuring a comprehensive approach to managing profit and expenditure. This approach not only improves the efficiency of financial resource utilisation but also strengthens competitive positions in both domestic and international markets – a factor of particular importance in the context of Ukraine's post-crisis economic recovery.

Literature review. The issue of modelling enterprises' financial results based on the principles of "green" budgeting is actively researched by both Ukrainian and international scholars, as it combines the challenges of effective financial planning, resource management, and the implementation of sustainable development strategies.

Among Ukrainian researchers, significant contributions to the development of theoretical and applied aspects of budgeting have been made by Bailova O. O. [1], Blyzniuk K. O. [2], Bondarchuk O. M., Astafieva K. O., Nikulnikova H. V., Astafiev O. Yu. [3], Vyhovska N. H., Polchanov A. Yu., Dovhaliuk V. V. [4], Hrynchyshyn Ya. M., Pylat M. V. [5], Huzar B. S.,

Ptashnyk S. A., Ulianych Yu. V. [6], Dmytriieva M. M. [7], Zhyber T. V., Tymchenko O. M. [9], Zhovnovach R. I., Kovalov D. H., Burlaka V. V. [10], Iierusalymov V. I. [11], Karpushenko M. Yu., Karpushenko O. O. [12], Kozarezenko L. V. [13], Maiorova T. V., Zhyber T. V. [14], Melikhova T. O., Ptitsyna L. A., Trykoz I. V. [15], Osypenko S. M., Zhelnovach O. O., Pysarevskyi S. V. [16], Rudyk N. V. [17], Sviderska I. M., Yurkevych O. M. [18], Trusova N. V., Chkan I. O. [19].

The works of these authors cover a wide range of budgeting issues – from improving enterprise budgeting systems and introducing HR- and gender-oriented budgeting to integrating the principles of "green" budgeting [13] into companies' financial strategies. Much attention is given to combining budget planning with controlling tools [6], strategic management [5], investment project evaluation [4], crisis management [10], and ensuring financial security [19].

An important research direction concerns the impact of "green" budgeting approaches on resource optimisation and the achievement of sustainable development goals. In particular, Kozarezenko L. V. [13] identifies key determinants for implementing "green" budgeting principles, while Maiorova T. V. and Zhyber T. V. [14] analyse prospects for budgeting expenditure in the education sector in the context of ESG benchmarks.

Among international authors whose works address financial results modelling and the improvement of budgeting processes, notable contributions have been made by Bagatska K. [20], Bagatska K., Blakyta H., Melnychuk O., Pashkuda T., Mishchenko A. [21], Fomina O. [22], Fomina O., Semenova S., Moshkovska O., Lositska T. [23], Harafonova O. I. [24], Herasymovych I. A. [25], Kuznetsova I., Karpenko Y. [26], Shevtsiv L. [27], Simakov K., Chernyshova S. [28].

Their research covers balanced budgeting [22; 23], strategic approaches to budgeting [24; 27], the application of budgeting under conditions of innovative transformation [26], and the improvement of management accounting systems based on strategic budgeting [28].

The analysis of academic sources indicates that combining the principles of "green" budgeting with modern approaches to modelling financial results enables enterprises to increase the efficiency of financial resource utilisation, achieve environmental objectives, and strengthen their competitive positions. At the same time, there remains a need for further development of methodological tools that take into account the specifics of Ukrainian enterprises and integrate best international practices in sustainable development, financial management, and digital transformation.

Purpose, objectives and research methods. The aim of the study is to substantiate and develop a model for forecasting an enterprise's financial results, integrated with the principles of "green" budgeting, which ensures a balanced combination of financial goals and environmental standards, promotes resource optimisation, and enhances business competitiveness.

The object of the study is the system of strategic financial planning of the enterprise, considered from the perspective of integrating environmentally oriented investments, energy efficiency projects, and the implementation of renewable energy sources into financial strategies.

To achieve the stated aim, the following objectives are addressed:

- to reveal the essence and significance of "green" budgeting as a tool for enhancing an enterprise's financial and environmental performance;
- to examine the impact of environmental and social factors on the financial results of the enterprise;
- to assess the enterprise's financial and economic performance indicators, taking into account ESG principles;
- to develop a model for forecasting the financial results of the enterprise that integrates the principles of "green" budgeting into the strategic planning system.

The study employs a set of scientific research methods, namely: analysis and synthesis – to determine the essence and significance of "green" budgeting; comparative analysis – to identify the impact of environmental and social factors on financial results; financial analysis – to evaluate key performance indicators of LLC "KhSMEP" and identify reserves for improving efficiency;

modelling – to construct a forecasting model of financial results, taking into account ESG principles and "green" budgeting.

Research Results. "Green" budgeting is a modern approach to financial planning that integrates economic and environmental priorities into the enterprise's resource allocation process. It involves incorporating the principles of sustainable development and ESG factors into budget formation, enabling financial goals to be achieved without causing harm to the environment.

In practical terms, this approach includes directing investments towards energy-efficient technologies, implementing renewable energy sources, reducing greenhouse gas emissions, optimising resource use, and developing environmentally safe production processes. "Green" budgeting also contributes to enhancing the transparency of financial reporting and improving corporate reputation.

Its significance lies in ensuring a balance between increasing profitability and minimising negative environmental impacts, reducing operating costs through resource savings, and improving competitiveness and the enterprise's long-term financial sustainability. Thus, "green" budgeting serves as a strategic management tool that simultaneously strengthens the financial and environmental performance of the enterprise.

At the present stage, the implementation of "green" budgeting is particularly relevant within the framework of strategic financial planning, which encompasses three interrelated levels:

- long-term (3–5 years) – preparing forecasts of financial statements, cash flows, and the balance sheet;
- current (1 year) – planning income and expenditure by activity type and preparing the balance sheet plan;
- operational (ten-day period, month, quarter) – developing a payment calendar and a cash plan.

Thus, "green" budgeting is integrated across all horizons of financial planning, forming a holistic strategic management system capable of ensuring financial stability, environmental safety, and social responsibility of the enterprise (Table 1).

Table 1. Types of strategic planning of enterprise financial results within the "green" budgeting system

Subsystems of financial results Planning	Types of plans developed	Planning period
Long-term (strategic)	Forecast profit and loss statement including environmental investments; forecast cash flow incorporating costs/savings from energy-efficient technologies; forecast balance sheet integrating "green" assets	3-5 years
Current	Operating income and expenditure plan taking into account the costs of environmentally friendly materials and energy; investment income and expenditure plan for renewable energy sources and decarbonisation projects; cash inflow and outflow plan with a focus on resource efficiency; balance sheet plan with ESG indicators	1 year
Operational	Payment calendar considering "green" procurement; cash plan with monitoring of environmentally oriented expenditures and resource savings	Ten-day period, month, quarter

Source: compiled by the author based on the materials of LLC "Kharkiv Specialised Installation and Maintenance Enterprise", taking into account the principles of green budgeting.

The calculation and analysis method within the "green" budgeting system involves the use of a base index that reflects changes in a financial indicator during the planning period, taking into account environmental and social factors. The forecast value is then determined by integrating data on environmental project costs, resource efficiency, and energy savings. This method is based on expert assessments and allows for the consideration of ESG factors even in the absence of clear technical and economic standards, using an analysis of the dynamics and interrelationships between financial and environmental indicators.

Modelling financial indicators during the planning stage in the context of 'green' budgeting enables the identification of quantitative relationships between financial results and factors of environmental and social efficiency. This approach improves the accuracy of forecasts and allows for the assessment of the impact of investments in renewable energy sources, decarbonisation measures, and waste management projects on the profitability, liquidity, and stability of the enterprise.

Budget planning under the "green" approach includes the preparation of forecast financial statements based on detailed assumptions regarding assets, liabilities, income, and expenditure, including the allocation of resources into traditional and environmentally targeted categories [2].

An important role is played by supplementary budgets, which integrate operating and investment budgets while accounting for the costs of "green" procurement, energy-efficient technologies, and environmental innovations (Fig. 1).

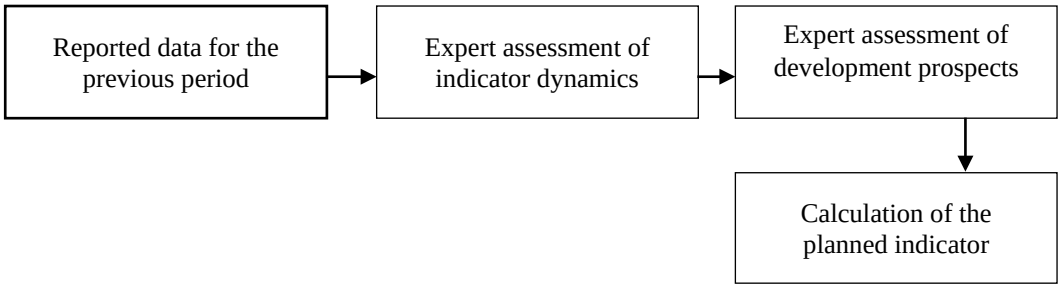

Fig. 1. Diagram of the calculation and analysis method of planning in the "green" budgeting system
Source: compiled by the author based on the materials of LLC "Kharkiv Specialised Installation and Maintenance Enterprise", taking into account the principles of green budgeting

The main outcomes of this process are:

- recording, analysing, and planning the enterprise's and its units' financial and environmental flows, including the carbon footprint and the use of natural resources;
- maintaining records of income, expenditure, profit, and loss, with a separate allocation for "green" budget items;
- ensuring the enterprise's financial stability, solvency, and environmental responsibility;
- planning tax payments, environmental charges, and benefits;
- defining the terms and opportunities for loan repayment, including "green" financial instruments;
- analysing the dynamics of the enterprise's cash flows and environmental investments, both overall and within individual units [3].

The assessment of financial and environmental plans is carried out through responsibility centres [5], where each unit has its share in the overall "green" budget (Fig. 2).

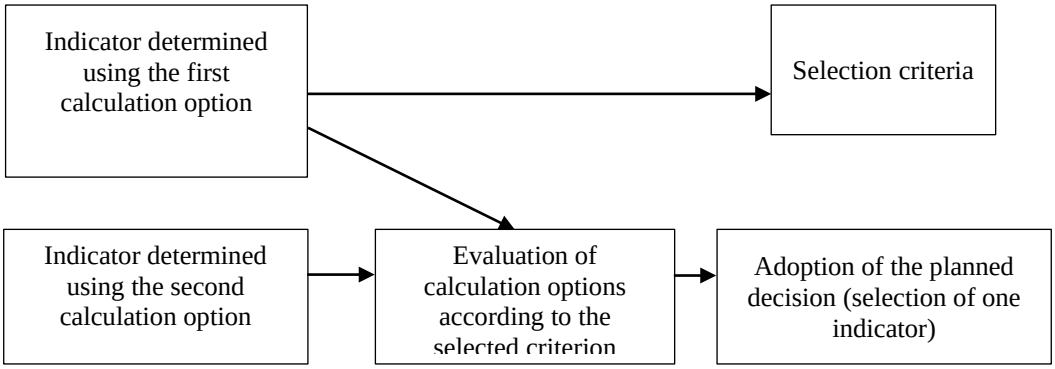

Fig. 2. Application of the method of optimising planned decisions in the "green" budgeting system
Source: compiled by the author based on the materials of LLC "Kharkiv Specialised Installation and Maintenance Enterprise", taking into account the principles of green budgeting

The calculation of debt repayment is based on data from the "green" procurement plan, multiplied by the price adjusted for the environmental factor (for example, energy efficiency or product certification), which determines the cost of goods. Previous period liabilities are also taken into account, in particular accounts payable for goods, works, and services as of 31 December 2024, which amounted to UAH 4,588.8 thousand.

The presence of significant debt may slow down the receipt of profits from the sale of transformers at the enterprise and reduce the capacity to invest in environmental projects and technologies. This underlines the need for careful expenditure planning, particularly in relation to resource-efficient solutions, and for their continuous comparison with revenues, including "green" income and savings from environmental initiatives (Fig. 3 and Fig. 4).

Fig. 3 presents the budgeting process at the enterprise, developed on the basis of data from LLC "Kharkiv Specialised Installation and Maintenance Enterprise" with the integration of environmental parameters into financial planning. It reflects the stages and main processes of "green" budget planning, which include:

- developing a budget that incorporates environmental goals and indicators;
- approving the plan with a priority on financing sustainable solutions;
- monitoring budget execution with oversight of both financial and environmental performance indicators.

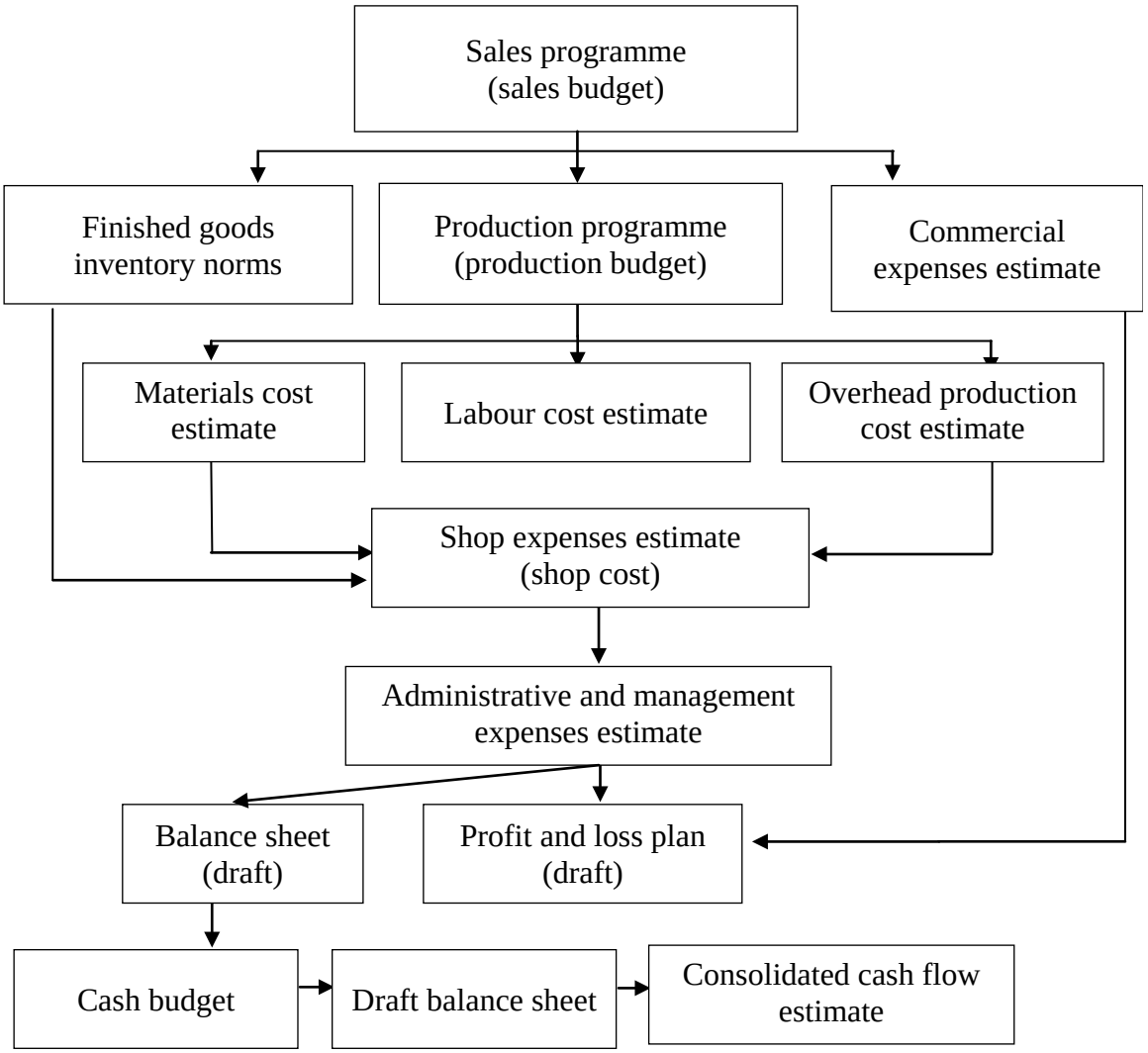

Fig. 3. "Green" budgeting scheme at the enterprise
Source: compiled by the author based on the materials of LLC "Kharkiv Specialised Installation and Maintenance Enterprise", taking into account the principles of green budgeting

Key elements (Fig. 3) cover the formation of planned financial and environmental indicators, forecasting income and expenditure with the allocation of "green" budget items, identifying key areas for environmentally oriented investment, and establishing mechanisms to control the achievement of planned financial and environmental objectives.

The "green" budgeting system supports the effective management of the enterprise's financial and natural resources, enabling the anticipation of possible deviations in expenditure and income, assessing their impact on environmental outcomes, and ensuring timely budget adjustments. In addition, the diagram illustrates the role of governing bodies in allocating funds for environmental initiatives and the responsibility of departments for their implementation and monitoring.

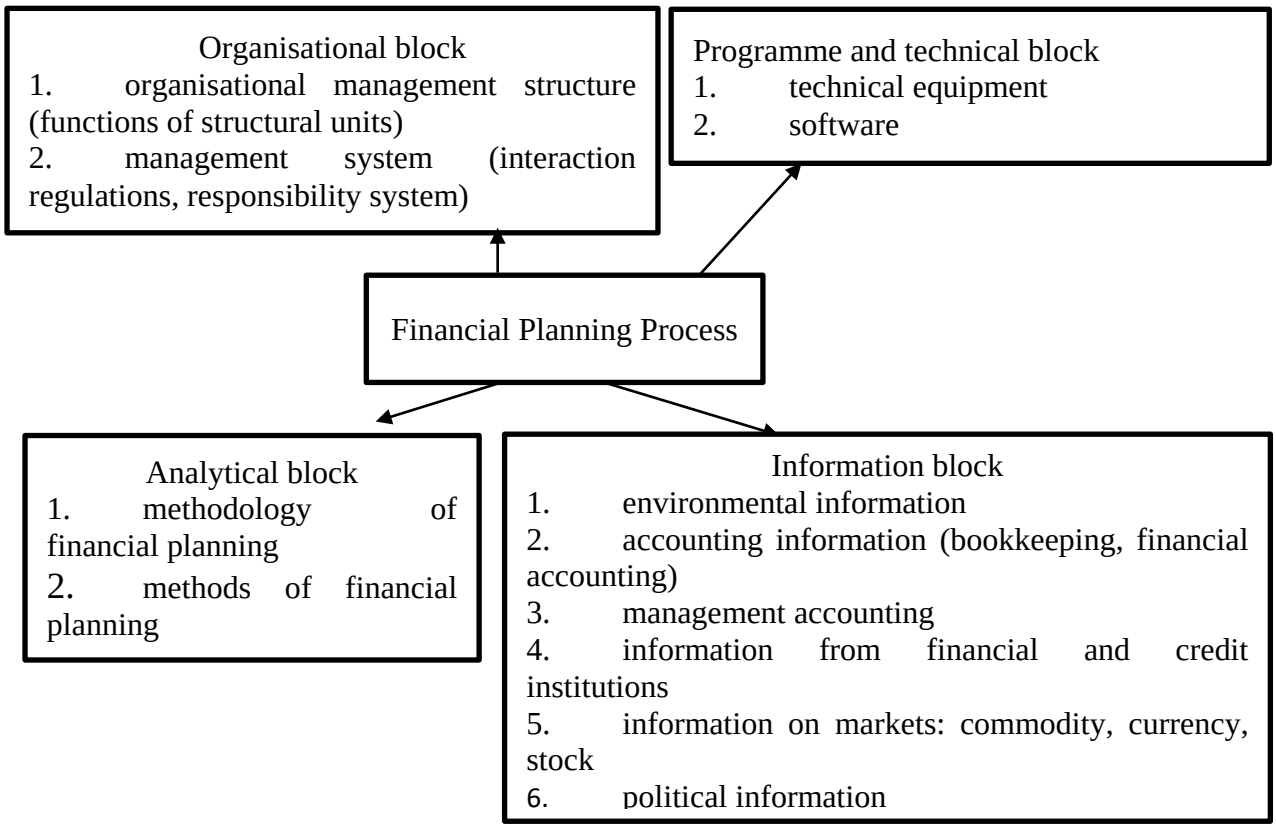

Fig. 4. Structure of the process of strategic planning of the enterprise's financial and environmental performance
Source: compiled by the author based on the materials of LLC "Kharkiv Specialised Installation and Maintenance Enterprise", taking into account the principles of green budgeting

Fig. 4 illustrates the interconnection between the main stages of strategic planning aimed at achieving the enterprise's long-term financial and environmental objectives. The structure includes:

- analysis of the internal and external environment, taking into account the impact on natural resources and the enterprise's carbon footprint;
- definition of the mission and strategic goals, incorporating environmental priorities and ESG indicators;
- formulation of financial and environmental forecasts (for example, reducing energy consumption, cutting waste, and improving resource efficiency);
- development of strategic plans with priority funding for sustainable projects;
- selection of financial instruments (including "green" bonds, eco-loans, and grants) for plan implementation;

- evaluation of results and adjustment of the strategy based on the achieved financial and environmental KPIs.

The management of the enterprise plays a key role in this process, ensuring a balanced allocation of financial and natural resources, maintaining transparency, and fostering accountability at all levels of governance. Such a structure enhances the enterprise's financial stability and competitiveness while simultaneously reducing its environmental impact and adapting operations to the long-term challenges of sustainable development.

To improve the efficiency of planning, the data are transferred to Table 2, which, in addition to traditional financial indicators, takes into account the costs of purchasing new transformers or reactors with enhanced energy efficiency, introducing new product lines that meet environmental standards, as well as investments in "green" technologies and resource-saving solutions [8].

Table 2. Schedule of expected revenues for 2024 to LLC "Kharkiv Specialised Installation and Maintenance Enterprise", taking into account environmentally oriented projects, thousand UAH

Indicator	Quarter				Total for the year	Share of "green" revenues, %	Savings from energy efficiency, thousand UAH	Environmental effect, t CO_2 reduction
Accounts receivable	1	2	3	4				
Realisation in Q1								
60%	600.00				600.00	25	30.00	12.0
40%		400.00			400.00	20	20.00	8.0
Realisation in Q2								
60%		523.74			523.74	28	26.20	10.5
40%			349.16		349.16	22	17.46	7.2
Realisation in Q3								
60%			498.64		498.64	30	24.93	9.9
40%				332.43	332.43	25	16.62	7.8
Realisation in Q4								
60%				893.35	893.35	35	44.67	17.9

Table 2 presents the schedule of expected revenues for 2024 for LLC "Kharkiv Specialised Installation and Maintenance Enterprise", highlighting the share of "green" revenues associated with environmentally oriented projects, energy-efficient technologies, and products that comply with sustainable development standards. The allocation of cash flows by month makes it possible not only to monitor planned financial inflows throughout the year but also to analyse the dynamics of environmental investments and their impact on the enterprise's financial stability.

Each month shows the expected amount of revenue, including the share of "green" funds, enabling management to assess the enterprise's financial and environmental capacity at different periods of the year. This supports more accurate planning of expenditure on the implementation of resource-efficient technologies, ensures the stability of cash flows, and facilitates the timely fulfilment of financial and environmental obligations.

In addition, the schedule helps identify periods of potential growth or decline in revenues, including "green" revenues, allowing timely decisions to be made on optimising the use of financial and natural resources. In our view, Table 2 is an important element of managing the enterprise's financial and environmental strategy, as it serves as a basis for developing measures to adjust the budget, financial plans, and sustainable development programmes in the event of deviations from projected indicators.

Table 3 presents the repayment schedule for the enterprise's trade payables, taking into account the environmental aspects of procurement, which makes it possible to assess the impact of the debt structure on the ability to finance "green" investments.

Table 3. Repayment schedule for trade payables of LLC "Kharkiv Specialised Installation and Maintenance Enterprise" for 2024, thousand UAH, taking into account "green" procurement

Indicator	Quarter				Total for the year
	1	2	3	4	
Accounts payable as at 01 January 2025	4,588.80				4,588.80
Realisation in Q1					
40%	1,601.81				1,601.81
60%		2,402.71			2,402.71
Realisation in Q2					
40%		1,408.09			1,408.09
60%			2,112.13		2,112.13
Realisation in Q3					
40%			1,345.51		1,345.51
60%				2,018.26	2,018.26
Realisation in Q4					
40%				2,445.80	2,445.80

Source: compiled by the author based on the materials of LLC "Kharkiv Specialised Installation and Maintenance Enterprise", taking into account the principles of green budgeting.

The costs of purchasing goods are allocated among different product items in accordance with the debt repayment schedule (Table 4), with a separate allocation for purchases that meet the criteria of "green" procurement – energy-efficient equipment, materials with a low carbon footprint, and products manufactured in compliance with environmental standards.

Transport and procurement costs are calculated as 7% of the cost of goods, in line with the enterprise's logistics standards, and include measures to improve the environmental efficiency of transportation: route optimisation, the use of low-emission vehicles, and the reduction of empty runs.

The total amount of transport and procurement costs, together with purchasing expenses, forms the environmentally adjusted cost of goods, which takes into account not only financial indicators but also environmental aspects. This approach aligns with green budgeting principles and supports the achievement of the enterprise's strategic sustainable development goals.

Social security contributions are calculated as 36.2% of the enterprise's payroll fund and are allocated among product items in proportion to labour costs [9]. Within the green budgeting system, this allocation may also take into account the environmental component of the units' activities – for example, additional incentives for employees involved in the implementation of "green" projects.

Taking into account the above budgets and the planned changes in expenditure by item (which require more detailed planning), the chief accountant prepares the income and expenditure budget, which includes both traditional financial indicators and sustainable development metrics. This enables the comparison of the enterprise's total income with the costs incurred, in particular those related to the implementation of energy-efficient solutions, environmental technologies, and emission reductions.

When planning indirect costs, it is important to analyse past trends and consider the impact of environmental measures on their structure. For example, in 2024 the depreciation rate in turnover was 0.14%, while the rate of other operating expenses was 20.9%. In 2025, it is planned to reduce the latter to 10.9%, partly due to energy-saving technologies and reduced resource costs.

The enterprise's performance in the context of green budgeting is also reflected in profitability indicators that take into account the economic effect of environmental investments. Analysis has shown that the enterprise will continue to operate with positive profitability and gradually increase it, partly by reducing exposure to environmental risks.

Table 4. Budget of commercial expenses of LLC "Kharkiv Specialised Installation and Maintenance Enterprise" for 2024, thousand UAH, taking into account the principles of green budgeting

Indicator	Q1	Q2	Q3	Q4	Total for the year
Sales volume, UAH	5,838,951.7	5,278,526.6	5,034,137.1	9,004,244.0	25,155,859.4
Share of "green" sales, %	18	20	22	25	-
Variable selling expenses, UAH	408,726.6	369,496.9	352,389.6	630,297.1	1,760,910.2
Additional expenses	9,800.0	7,570.0	1,500.0	1,500.0	20,370.0
Purchasing costs of goods	6,190,609.5	3,810,800.2	3,457,635.1	4,464,063.2	17,923,108.1
incl. "green" procurement, %	15	18	20	22	-
Transport and procurement costs	465,959.9	286,834.4	260,252.1	336,004.8	1,349,051.2
incl. environmentally optimised, %	10	12	15	18	-
Cost of works provided	6,656,569.4	4,097,634.7	3,717,887.2	4,800,068.0	19,272,159.3
Material costs	-	10.3	-	-	10.3
Labour costs	76,840.1	77,228.8	77,247.4	84,952.5	316,268.8
Social security contributions	27,816.1	27,956.8	27,963.6	30,752.8	114,489.3
Depreciation	8,174.5	7,389.9	7,047.8	12,605.9	35,218.2
Other operating expenses	636,445.7	575,359.4	548,720.9	981,462.6	2,741,988.7
Total expenses, UAH	7,824,372.5	5,162,646.8	4,732,756.6	6,541,638.9	24,261,414.7

Given the specifics of the sector, it should be noted that the introduction of a budgeting system adapted to green budgeting at LLC "Kharkiv Specialised Installation and Maintenance Enterprise" will allow the enterprise to:

- more accurately justify the calculation of prices for works provided, taking into account the environmental cost of resources;
- plan and optimise expenditure in line with environmental protection requirements;
- improve resource efficiency and reduce both direct and indirect losses.

The overall effect of integrating the "green" budget planning system is estimated at no less than 32-33% of sales volume, with a significant proportion of savings generated through reduced energy consumption, optimised logistics, and the implementation of resource-efficient technologies.

Discussion. The results of the study confirmed the appropriateness of integrating the principles of green budgeting into the financial planning system of enterprises, which is consistent with the findings of Ukrainian and international scholars (L. V. Kozarezenko [13], T. V. Maiorova, T. V. Zhyber [14], K. Bagatska [20], O. Fomina [22]). The proposed model demonstrates that combining financial, environmental and social priorities provides a more comprehensive understanding of an enterprise's financial outcomes and allows for greater forecasting accuracy.

Compared with traditional approaches to budgeting, which focus primarily on financial indicators, the proposed system also incorporates environmental indicators and social effects. This broadens the possibilities for strategic management and aligns with the modern requirements of ESG-oriented business. At the same time, unlike studies that concentrate solely on HR- or gender-oriented budgeting, our research emphasises the interconnection between environmental innovations, financial performance and corporate social responsibility.

It is important to note that the results confirm the economic feasibility of investing in green technologies, as such expenditures contribute not only to reducing costs and optimising resource use, but also to enhancing corporate reputation. This conclusion coincides with the position of international researchers (O. Fomina, S. Semenova, O. Moshkovska, T. Lositska [23]; L. Shevtsiv [27]) on the role of sustainable budgeting in management accounting and the strategic development of companies.

However, the study also revealed a number of limitations. In particular, the model was tested on the example of a single enterprise, which may complicate its universalisation. In addition, reliance on the quality of statistical data and the accuracy of expert assessments creates risks of subjectivity in forecasts. This necessitates testing the model in different sectors of the economy, as well as incorporating international experience.

Conclusions. The study confirmed that modelling an enterprise's financial results with the integration of "green" budgeting principles is an effective tool for ensuring sustainable development and enhancing competitiveness in the context of global challenges and the transition to a low-carbon economy. This approach combines financial and environmental priorities, ensuring a balance between increasing profitability and minimising negative environmental impacts.

The proposed model provides for the allocation of financial resources with consideration for investments in energy-efficient technologies, decarbonisation projects, the implementation of renewable energy sources, and waste management systems. This contributes to reducing operating costs, optimising resource use, and strengthening the enterprise's environmental reputation. The assessment of financial and economic indicators in line with ESG principles confirmed that "green" budgeting not only improves key financial metrics (profitability, liquidity, asset turnover) but also enhances non-financial indicators related to environmental and social responsibility and the quality of corporate governance.

Modelling made it possible to account for the impact of environmental and social factors in forecast calculations, to develop scenarios with varying levels of resource efficiency and environmental impact, thereby increasing the accuracy of strategic planning and enabling the timely adaptation of financial policy to changes in the external environment, regulatory requirements, and stakeholder needs. Thus, the integration of 'green' budgeting principles into financial planning establishes a comprehensive management system capable of ensuring the enterprise's financial stability, environmental safety, and social responsibility in the long term.

Further scientific research should be directed towards deepening the theoretical and applied aspects of integrating "green" budgeting principles into the strategic management system, taking into account financial, environmental, and social priorities. A promising area is the development of advanced economic and mathematical forecasting models that comprehensively assess the impact of environmental innovations and "green" investments on financial results in the short, medium, and long term.

An important task will be the adaptation of the "green" budgeting model to sector-specific characteristics and enterprise scales, the creation of standard methodological guidelines for ESG-oriented financial planning, as well as the analysis of the impact of regulatory initiatives and international sustainable development standards on budgeting processes. Additional attention should be given to examining the economic feasibility of integrating "green" financing instruments into corporate strategies.

The testing of the model across different sectors of Ukraine's economy and beyond will make it possible to identify best practices and develop universal approaches to improving the financial efficiency and environmental performance of enterprises in the context of global challenges, digitalisation, and the transition to a low-carbon economy.

References

1. Bailova O. O. (2023) Improving the budgeting system at an enterprise. Efficient Economy, (7). DOI: http://doi.org/10.32702/2307-2105.2023.7.54 [in Ukrainian]
2. Blyzniuk K. O. (2023) Budgeting of foreign economic expenses as a component of financial planning at an enterprise. Efficient Economy, (8). DOI: http://doi.org/10.32702/2307-2105.2023.8.37 [in Ukrainian]
3. Bondarchuk O. M., Astafieva K. O., Nikulnikova H. V., Astafiev O. Yu. (2023) HR budgeting as a tool for personnel management. International Scientific Journal "Internauka". Series: Economic Sciences, 4(1), pp. 45-51. DOI: http://doi.org/10.25313/2520-2294-2023-4-8800 [in Ukrainian]
4. Vyhovska N. H., Polchanov A. Yu., Dovhaliuk V. V. (2023) Budgeting of expenditures for exploration and evaluation of mineral reserves. Investments: Practice and Experience, (1), pp. 5-10. DOI: https://doi.org/10.32702/2306-6814.2023.1.5 [in Ukrainian]
5. Hrynchyshyn Ya. M., Pylat M. V. (2023) Budgeting as a direction for improving the management system of modern enterprises. Investments: Practice and Experience, (2), pp. 53-59. DOI: http://doi.org/10.32702/2306-6814.2023.2.53 [in Ukrainian]
6. Huzar B. S., Ptashnyk S. A., Ulianych Yu. V. (2023) Budgeting as an effective tool for organising financial controlling at enterprises of Ukraine. Collection of Scientific Works of Uman National University of Horticulture, 102(2), pp. 167-181. DOI: http://doi.org/10.32782/2415-8240-2023-102-2-167-181 [in Ukrainian]
7. Dmytriieva M. M. (2023) Participatory budgeting as a tool for financing general secondary education. Educational Analytics of Ukraine, (5), pp. 31-46. DOI: http://doi.org/10.32987/2617-8532-2023-5-31-46 [in Ukrainian]
8. Dovhopol N. V., Ihumentseva N. V., Peresada O. V., Krasnoshchok V. I. (2023) Investment project management paradigm: budgeting challenges. Finance. Law, (12), pp. 69-72. https://doi.org/10.37634/efp.2023.12.13
9. Zhyber T. V., Tymchenko O. M. (2023) Conceptualisation of budgeting in the paradigm of institutionalism. Finance of Ukraine, (8), pp. 113-128. DOI: https://doi.org/10.33763/finukr2023.08.113 [in Ukrainian]
10. Zhovnovach R. I., Kovalov D. H., Burlaka V. V. (2023) Accounting and analytical support for anti-crisis management of agricultural enterprises based on budgeting. Economic Bulletin of Donbas, (2), pp. 26-33. DOI: https://doi.org/10.12958/1817-3772-2023-2(72)-26-33 [in Ukrainian]
11. Iyerusalimov V. I. (2023) The role of gender budgeting in ensuring socio-economic development of society. Economics and Management, (4), pp. 73-78. DOI: http://doi.org/10.36919/2312-7812.4.2023.73 [in Ukrainian]
12. Karpushenko M. Yu., Karpushenko O. O. (2023) Features of budgeting in IT companies. Business Inform, (12), pp. 271-277. DOI: https://doi.org/10.32983/2222-4459-2023-12-271-277 [in Ukrainian]
13. Kozarezenko L. V. (2023) Determinants of the implementation of the principles of "green" budgeting. Economic Bulletin of the University, (56), pp. 174-182. DOI: https://doi.org/10.31470/2306-546X-2023-56-174-182 [in Ukrainian]
14. Maiorova T. V., Zhyber T. V. (2023) Prospects for budgeting of higher education expenditures in Ukraine in the context of sustainable development. Efficient Economy, (5). DOI: http://doi.org/10.32702/2307-2105.2023.5.18 [in Ukrainian]
15. Melikhova T. O., Ptitsyna L. A., Trykoz I. V. (2023) Improvement of accounting, taxation and salary control for the purposeof business planning and budgeting for accounting and analytical supportof startups and calculation of the economic efficiency of its impact on theresults of the enterprise. Agrosvit, (24), pp. 34-41. https://doi.org/10.32702/2306-6792.2023.24.34 [in Ukrainian]
16. Osypenko S. M., Zhelnovach O. O., Pysarevskyi S. V. (2023) Application of the performance-based budgeting method in the management of a military unit. Honour and Law, (2), pp. 91-96. DOI: https://doi.org/10.33405/2078-7480/2023/2/85/282622 [in Ukrainian]
17. Rudyk N. V. (2023) Programme-targeted budgeting at the level of local budgets for sustainable community development. Investments: Practice and Experience, (11), pp. 44-51. DOI: http://doi.org/10.32702/2306-6814.2023.11.44 [in Ukrainian]
18. Sviderska I. M., Yurkevych O. M. (2023) Financial forecasting and budgeting of corporate enterprises under macroeconomic volatility. Efficient Economy, (8). DOI: http://doi.org/10.32702/2307-2105.2023.8.10 [in Ukrainian]
19. Trusova N. V., Chkan I. O. (2023) Development of gender budgeting in Ukraine: A tool of financial security in the conditions of armed conflict. Business Inform, (11), pp. 266-271. DOI: https://doi.org/10.32983/2222-4459-2023-11-266-271 [in Ukrainian]
20. Bagatska K. (2023) Criteria for the expediency of budget support for municipal-owned enterprises. Scientia Fructuosa, (2), pp. 67-77. DOI: http://doi.org/10.31617/1.2023(148)07 [in Ukranian]
21. Bagatska K., Blakyta H., Melnychuk O., Pashkuda T., Mishchenko A. (2023) The impact of budget financing on the performance of municipal-owned enterprises: case of Kyiv City. Financial and Credit Activity: Problems of Theory and Practice, (3), pp. 116-126. DOI: http://doi.org/10.55643/fcaptp.3.50.2023.4060 [in Ukranian]
22. Fomina O. (2021) Balance budgeting of agribusiness enterprises. Herald of Kyiv National University of Trade and Economics, (6), pp. 112-121. DOI: http://doi.org/10.31617/visnik.knute.2021(140)09
23. Fomina O., Semenova S., Moshkovska O., Lositska T. (2021) Balance sheet budgeting at agricultural enterprises. Financial and Credit Activity: Problems of Theory and Practice, (4), pp. 121-129. Retrieved from: http://nbuv.gov.ua/UJRN/Fkd_2021_4_15 [in Ukranian]
24. Harafonova O. I. (2017) Strategic approach to the mechanism of budgeting in financial planning of agricultural enterprises. Scientific Bulletin of Polissia, 1(2), pp. 122-127. Retrieved from: http://nvp.stu.cn.ua/article/view/102201

25. Herasymovych I. A. (2015) Budgeting of business processes – the basis of financial engineering and operating activities of an enterprise. Independent Auditor, (14), pp. 54-58. Retrieved from: http://nbuv.gov.ua/UJRN/Na_2015_14_9
26. Kuznetsova I., Karpenko Y. (2018) The technology of budgeting enterprises with a divisional structure. Current State of Scientific Research and Technology in Industry, (1), pp. 96-102. DOI: https://doi.org/10.30837/2522-9818.2018.3.096
27. Shevtsiv L. (2017) Investigation of the mechanism of interrelation between accounting and budgeting in the enterprise management system: the strategic aspect. Technology Audit and Production Reserves, 6(4), pp. 39-47. DOI: https://doi.org/10.15587/2312-8372.2017.119845
28. Simakov K., Chernyshova S. (2020) Improving the management accounting system through strategic budgeting in an industrial enterprise. Economic Herald of Donbas, (4), pp. 78-84. DOI: https://doi.org/10.12958/1817-3772-2020-4(62)-78-84 [in Ukranian]
29. (2025) Official website of YouControl. Retrieved from: https://youcontrol.com.ua/ru/catalog/company_details/39425391. [in Ukranian]

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Моделювання фінансових результатів на основі принципів «зеленого» бюджетування

Анотація. Сучасні виклики, зумовлені глобальною екологічною кризою, переходом до низьковуглецевої економіки, економічною нестабільністю та цифровою трансформацією, вимагають переосмислення підходів до фінансового планування підприємств.

Постановка проблеми. Моделювання фінансових результатів підприємств на основі принципів «зеленого» бюджетування дає змогу поєднати економічні цілі з екологічними та соціальними орієнтирами. Такий підхід відповідає вимогам ESG-стандартів і викликам євроінтеграційних процесів.

Нерозв'язані аспекти. Наукові дослідження зосереджуються на різних напрямах розвитку бюджетування: удосконаленні його систем на підприємствах, застосуванні HR- та гендерно-орієнтованого підходів, інтеграції інструментів контролінгу, стратегічного управління, оцінки інвестиційних проєктів, антикризового менеджменту та забезпечення фінансової безпеки.

Мета статті полягає в обґрунтуванні та розробці моделі прогнозування фінансових результатів підприємства, інтегрованої з принципами «зеленого» бюджетування, яка забезпечує збалансоване поєднання фінансових цілей і екологічних стандартів, сприяє оптимізації використання ресурсів та підвищенню конкурентоспроможності бізнесу.

Основний матеріал. Об'єктом дослідження виступає система стратегічного фінансового планування підприємства, що розглядається з позицій інтеграції екологічно орієнтованих інвестицій, проєктів з енергоефективності та впровадження відновлюваних джерел енергії у фінансові стратегії.

Висновки. Проведене дослідження підтвердило, що моделювання фінансових результатів підприємства з інтеграцією принципів «зеленого» бюджетування є дієвим інструментом забезпечення сталого розвитку та підвищення конкурентоспроможності в умовах глобальних викликів і переходу до низьковуглецевої економіки. Такий підхід поєднує фінансові та екологічні пріоритети, забезпечуючи баланс між зростанням прибутковості та мінімізацією негативного впливу на довкілля.

Запропонована модель передбачає розподіл фінансових ресурсів з урахуванням інвестицій в енергоефективні технології, проєкти з декарбонізації, впровадження відновлюваних джерел енергії та системи

управління відходами. Це сприяє зниженню операційних витрат, оптимізації використання ресурсів і зміцненню екологічної репутації підприємства. Оцінка фінансово-економічних показників з урахуванням принципів ESG підтвердила, що «зелене» бюджетування не лише покращує ключові фінансові метрики (рентабельність, ліквідність, оборотність активів), але й підвищує нефінансові індикатори, пов'язані з екологічною та соціальною відповідальністю, а також якістю корпоративного управління.

Практична цінність роботи полягає у наданні рекомендацій щодо інтеграції «зеленого» бюджетування в систему стратегічного управління, що може бути використано підприємствами різних галузей для підвищення фінансової стабільності, екологічної результативності та соціальної відповідальності.

Отримані результати можуть слугувати основою для розробки галузевих методичних рекомендацій та адаптації міжнародних стандартів ESG до умов української економіки.

Ключові слова: *моделювання, фінансові результати, «зелене» бюджетування, сталий розвиток, ESG-принципи, стратегічне фінансове планування.*

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Список літератури

1. Байлова О. О. Вдосконалення системи бюджетування на підприємстві. Ефективна економіка. 2023. № 7. DOI: http://doi.org/10.32702/2307-2105.2023.7.54
2. Близнюк К. О. Бюджетування зовнішньоекономічних витрат як складова фінансового планування на підприємстві. Ефективна економіка. 2023. № 8. DOI: http://doi.org/10.32702/2307-2105.2023.8.37
3. Бондарчук О. М., Астаф'єва К. О., Нікульнікова Г. В., Астаф'єв О. Ю. HR-бюджетування як інструмент управління персоналом. Міжнародний науковий журнал «Інтернаука». Серія: Економічні науки. 2023. Т. 4, № 1. С. 45-51. DOI: http://doi.org/10.25313/2520-2294-2023-4-8800
4. Виговська Н. Г., Полчанов А. Ю., Довгалюк В. В. Бюджетування видатків на розвідку та оцінку запасів корисних копалин. Інвестиції: практика та досвід. 2023. № 1. С. 5-10. DOI: https://doi.org/10.32702/2306-6814.2023.1.5
5. Гринчишин Я. М., Пилат М. В. Бюджетування як напрям удосконалення системи управління діяльністю сучасних підприємств. Інвестиції: практика та досвід. 2023. № 2. С. 53-59. DOI: http://doi.org/10.32702/2306-6814.2023.2.53
6. Гузар Б. С., Пташник С. А., Улянич Ю. В. Бюджетування як ефективний інструмент організації фінансового контролінгу на підприємствах України. Збірник наукових праць Уманського національного університету садівництва. 2023. Т. 102, № 2. С. 167-181. DOI: http://doi.org/10.32782/2415-8240-2023-102-2-167-181
7. Дмитрієва М. М. Партисипативне бюджетування як інструмент фінансування загальної середньої освіти. Освітня аналітика України. 2023. № 5. С. 31-46. DOI: http://doi.org/10.32987/2617-8532-2023-5-31-46
8. Довгопол Н. В., Ігуменцева Н. В., Пересада О. В., Краснощок В. І. Парадигма менеджменту інвестиційного проєкту: виклики бюджетування. Економіка. Фінанси. Право. 2023. № 12. С. 69-72. https://doi.org/10.37634/efp.2023.12.13.
9. Жибер Т. В., Тимченко О. М. Концептуалізація бюджетування в парадигмі інституціоналізму. Фінанси України. 2023. № 8. С. 113-128. DOI: https://doi.org/10.33763/finukr2023.08.113
10. Жовновач Р. І., Ковальов Д. Г., Бурлака В. В. Обліково-аналітичне забезпечення антикризового управління сільськогосподарськими підприємствами на засадах бюджетування. Економічний вісник Донбасу. 2023. № 2. С. 26-33. DOI: https://doi.org/10.12958/1817-3772-2023-2(72)-26-33
11. Ієрусалимов В. І. Роль гендерного бюджетування у забезпеченні соціально-економічного розвитку суспільства. Економіка і управління. 2023. № 4. С. 73-78. DOI: http://doi.org/10.36919/2312-7812.4.2023.73
12. Карпушенко М. Ю., Карпушенко О. О. Особливості бюджетування в IT-компаніях. Бізнес Інформ. 2023. № 12. С. 271-277. DOI: https://doi.org/10.32983/2222-4459-2023-12-271-277
13. Козарезенко Л. В. Детермінанти реалізації принципів «зеленого» бюджетування. Економічний вісник університету. 2023. № 56. С. 174-182. https://doi.org/10.31470/2306-546X-2023-56-174-182
14. Майорова Т. В., Жибер Т. В. Перспективи бюджетування видатків на вищу освіту України у контексті сталого розвитку. Ефективна економіка. 2023. № 5. DOI: http://doi.org/10.32702/2307-2105.2023.5.18 (in Ukrainian)
15. Меліхова Т. О., Птіцина Л. А., Трикоз І. В. Удосконалення обліку, оподаткування та контролю заробітної плати з метою проведення бізнес-планування та бюджетування для обліково-аналітичного забезпечення стартапів та розрахунок економічної ефективності її впливу на результати роботи підприємства. Агросвіт. 2023. № 24. С. 34-41. https://doi.org/10.32702/2306-6792.2023.24.34
16. Осипенко С. М., Желновач О. О., Писаревський С. В. Застосування методу бюджетування, орієнтованого на результат, в управлінні діяльністю військової частини. Честь і закон. 2023. № 2. С. 91-96. DOI: https://doi.org/10.33405/2078-7480/2023/2/85/282622
17. Рудик Н. В. Програмно-цільове бюджетування на рівні місцевих бюджетів для сталого розвитку громад. Інвестиції: практика та досвід. 2023. № 11. С. 44-51. DOI: http://doi.org/10.32702/2306-6814.2023.11.44
18. Свідерська І. М., Юркевич О. М. Фінансове прогнозування і бюджетування корпоративних підприємств за умов макроекономічної волатильності. Ефективна економіка. 2023. № 8. DOI: http://doi.org/10.32702/2307-2105.2023.8.10
19. Трусова Н. В., Чкан І. О. Розвиток гендерного бюджетування в Україні: інструмент фінансової безпеки в умовах збройного конфлікту. Бізнес Інформ. 2023. № 11. С. 266-271. DOI: https://doi.org/10.32983/2222-4459-2023-11-266-271

20. Bagatska K. Criteria for the expediency of municipal-owned enterprises budget support. Scientia Fructuosa. 2023. No. 2. Pp. 67-77. DOI: http://doi.org/10.31617/1.2023(148)07
21. Bagatska K., Blakyta H., Melnychuk O., Pashkuda T., Mishchenko A. The impact of budget financing on the municipal-owned enterprises performance: case of Kyiv City. Financial and Credit Activity: Problems of Theory and Practice. 2023. No. 3. Pp. 116-126. DOI: http://doi.org/10.55643/fcaptp.3.50.2023.4060
22. Fomina O. Balance budgeting of agribusiness enterprises. Herald of Kyiv National University of Trade and Economics. 2021. No. 6. Pp. 112-121. DOI: http://doi.org/10.31617/visnik.knute.2021(140)09
23. Fomina O., Semenova S., Moshkovska O., Lositska T. Balance sheet budgeting at agricultural enterprises. Financial and Credit Activity: Problems of Theory and Practice. 2021. No. 4. Pp. 121-129. URL: http://nbuv.gov.ua/UJRN/Fkd_2021_4_15.
24. Harafonova O. I. Strategic approach to mechanism of budgeting in financial planning of agricultural enterprises. Scientific Bulletin of Polissia. 2017. Vol. 1, No. 2. Pp. 122-127. URL: http://nvp.stu.cn.ua/article/view/102201.
25. Herasymovych I. A. Budgeting of business processes – the basis of financial engineering and operating activities of an enterprise. Independent Auditor. 2015. No. 14. Pp. 54-58. URL: http://nbuv.gov.ua/UJRN/Na_2015_14_9.
26. Kuznetsova I., Karpenko Y. The technology of budgeting enterprises with the divisional structure. Current State of Scientific Research and Technology in Industry. 2018. No. 1. Pp. 96-102. DOI: https://doi.org/10.30837/2522-9818.2018.3.096
27. Shevtsiv L. Investigation of the mechanism of interrelation between accounting and budgeting in the enterprise management system: the strategic aspect. Technology Audit and Production Reserves. 2017. Vol. 6, No. 4. Pp. 39-47. DOI: https://doi.org/10.15587/2312-8372.2017.119845
28. Simakov K., Chernyshova S. Improving the management accounting system through strategic budgeting in an industrial enterprise. Economic Herald of Donbas. 2020. No. 4. Pp. 78-84. DOI: https://doi.org/10.12958/1817-3772-2020-4(62)-78-84
29. Офіційний сайт YouControl. URL https://youcontrol.com.ua/ru/catalog/company_details/39425391

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