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FINANCIAL SUPPORT FOR INCREASING THE EFFICIENCY OF ECOLOGICAL AND INNOVATIVE ACTIVITIES

ABSTRACT

Ecological and innovative activities of large enterprises require not only technological solutions, but also a financial architecture capable of ensuring stable investment, control of the cost of capital, and the effectiveness of resource use. In our study, attention is focused on the financial support for increasing the efficiency of ecological and innovative activities as the process of transforming financial resources into a measurable innovation result. The object of the study is the system of financial support for ecological and innovative activities at the enterprise level. The subject of the study is the relationship between financial support indicators, in particular capital investments, energy efficiency costs, operating cash flow, debt load, and cost of financing, and integrated ecological and innovative performance. The purpose of the work is to form and test a correlation-regression model for assessing the impact of financial factors on ecological and innovative performance and to develop recommendations for improving financial support using the example of PJSC "MHP" and LLC "METINVEST HOLDING". The methodological basis was correlation analysis to identify the directions and strength of statistical relationships between variables and regression modeling to assess the contribution of key financial indicators to explaining the variation of the integral indicator of ecological and innovative performance. The practical significance of the study is that the proposed model and the prepared tools can be used by enterprises to regularly monitor the effectiveness of financial support for ecological and innovative activities, justify investment priorities, and adjust financial policy, taking into account financial constraints.

Keywords: financial support, eco-innovation activities, eco-innovation, investment efficiency, green finance, sustainable development, enterprise risk management, financing instruments

JEL Classification: G31, G32, O32

INTRODUCTION

Today, the availability, cost, structure, and rules governing the use of financial resources determine whether environmental ideas are transformed into real technologies, products, and management solutions that produce measurable outcomes. In the modern economy, environmental challenges are no longer perceived as secondary. They affect business costs, supply chain stability, energy security, brand reputation, access to markets, and investor confidence. At the same time, eco-innovation projects often require significant initial investments, longer payback periods, special competencies, and more complex risk management compared to conventional modernizations. There is also a need to finance research, pilot implementations, certification, eco-design, staff training, and digital solutions for resource monitoring. If financial mechanisms are improperly designed, even technically promising innovations fail to scale, and enterprises choose short-term savings over long-term efficiency. That is why the question of how to form such sources of financing and such financial incentives that increase the effectiveness of eco-innovation activities, reduce barriers to entry for business, and at the same time ensure transparency and manageability of the use of funds becomes important. The importance of studying this topic is also explained by the fact that eco-innovation activities generate social effects that are not always fully reflected in the financial performance of an individual enterprise. Therefore, market mechanisms alone may lead to

the underfinancing of such changes. Thus, this creates a need for a combination of private and public resources, well-thought-out tax and credit instruments, guarantees, grants, risk-sharing mechanisms, and rules that make environmental investments predictable. At the enterprise level, the key is not only finding funds but also building a financial management system that links budgeting, investment analysis, cost management, pricing, and performance evaluation with environmental goals and technological innovations.

Research such as ours is needed to address practical questions that hinder implementation. These include how to calculate the economic impact of waste reduction, how to account for regulatory risks, and how to assess the benefits of resource efficiency. It is also essential to determine how to align environmental investments with competitiveness strategies and how to avoid a situation where funding is available, but effectiveness is low due to poor planning, misprioritization, or insufficient control. This topic is important because it is at the intersection of economic development and environmental security, and it is through financial solutions that it becomes possible to truly accelerate innovation, increase productivity, reduce environmental burden, and build long-term sustainability of enterprises and the economy as a whole.

LITERATURE REVIEW

In the scholarly literature, the financial support of eco-innovation activities is most often revealed through instruments that lower the barriers to entry into clean technological changes and make innovative solutions economically acceptable for business. At the level of interaction between the enterprise, the bank, and the state, it is shown that green lending and state subsidies can stimulate technological innovations for cleaner production. The key is the level of technological maturity, which determines the readiness of the enterprise to take a loan and the willingness of the bank to provide it, i.e., the financial mechanism works only if certain threshold conditions are met (Li et al., 2018).

Empirical results for China confirm that financial constraints suppress green innovations and green financing policies weaken this negative effect, with private companies being more vulnerable to capital shortages than state-owned ones (Yu et al., 2021).

In terms of public support for "research and development" and cooperation, an important finding is that an eco-oriented strategy increases labor productivity. However, the combination of subsidy and cooperation may not provide additional benefits compared to the sum of their individual effects, and for non-eco-innovative companies, subsidized cooperation is even undesirable as a policy condition (Guisado-González et al., 2021).

Cross-country panel data for the G20 countries show that green financing is associated with carbon dioxide emission reductions, along with investments in renewable energy and technological innovation, with effects being heterogeneous across different parts of the distribution, which highlights the need for flexible financial design and alignment of instruments with economic conditions (Zhang et al., 2022). For 57 developing countries, a long-term link between environmental outcomes, green finance, and green innovation has been confirmed, and the impact of green finance on innovation may change sign depending on the group of countries and the initial level of development of the relevant areas, which requires more precise targeting of financial programs (Wang et al., 2022).

Modern green financial instruments in the form of green bonds support the production of renewable energy. The strength of the effect increases in the presence of technological potential and under certain conditions of climate vulnerability and the development of credit markets, i.e., financial provision makes sense to consider together with the ability of the economy to convert capital into innovative output (Alharbi et al., 2023).

Research on corporate green bonds shows a positive investor response to the announcement of the issue, stronger for first issues and for bonds with external certification, and after the issue, issuers improve environmental performance and reduce carbon dioxide emissions, which is interpreted as a signal of real commitment to environmental projects and as a mechanism for attracting long-term capital (Flammer, 2021).

At the level of eco-innovation project management, the "economic-financial interface" approach is important, based on eco-innovation project cases. It is proposed to combine the characteristics of the company's financial structure and constraints with project parameters, in particular financing, timeframes, objectives, and results, in order to align project management with business strategy and stakeholder expectations (Scarpellini et al., 2016). Ukrainian research complements the international discussion on eco-innovation finance by demonstrating how the choice of an investment strategy can be formalized when eco-innovations generate broader socioeconomic effects that go beyond a single firm's short-term financial return. Shkarupa and Kucherenko (2020) propose a decision-theory approach for selecting the sequence of eco-innovation investments within the "company–region–state" system, using dynamic programming to identify the option that

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maximizes the expected payoff under constraints. Their results, illustrated through a municipal waste management case, highlight a practical implication that is directly relevant for enterprise-level financial support.

The issue of the profitability of eco-innovations is detailed through typologies. Energy and resource efficiency innovations can increase profitability, while innovations aimed only at reducing externalities can temporarily worsen it, and the motivation for implementation moderates the financial result (Ghisetti & Rennings, 2014).

Finally, investments in "research and development" of an environmental direction are associated with a decrease in carbon dioxide emissions and an increase in financial indicators, which supports the thesis about the need for specific resources and capabilities for simultaneous environmental and economic effects (Lee & Min, 2015).

AMS AND OBJECTIVES

The purpose of the study is to assess how the availability, structure, and cost of financial support influence the efficiency of enterprises' ecological and innovative activities and to substantiate practical improvements in corporate financial mechanisms that strengthen eco-innovation performance, using evidence from PJSC "MHP" and LLC "METINVEST HOLDING." The correlation and regression framework is applied as an analytical tool to quantify the relationships between key financial indicators and the integral eco innovation performance index. To achieve the goal, the following tasks were performed:

1. The feasibility of using a correlation-regression approach to analyze the relationship between financial indicators and an integral indicator of ecological and innovative performance was substantiated.
2. The objects of the study were selected, the logic of their comparison was determined, and an analytical framework was formed for assessing the financial support of ecological and innovative activities.
3. A list of variables that can be obtained from the financial and non-financial reporting of enterprises was formed, and a set of indicators was structured for constructing a correlation matrix and a regression model.
4. A correlation matrix between key variables was constructed and interpreted; the direction and strength of statistical relationships characterizing the financial factors of ecological and innovative performance were determined.
5. Practical recommendations were developed for PJSC "MHP" and LLC "METINVEST HOLDING" on increasing the efficiency of financial support of ecological and innovative activities.

METHODS

As part of our research, we chose the method of correlation-regression analysis. Therefore, we first define a set of indicators that describe the effectiveness of ecological and innovative activities. Then, we evaluate the correlations to identify the primary relationships, after which we build a regression model that shows how effectiveness changes as financial parameters change, all other things being equal. At the same time, in order to avoid a situation where one indicator distorts the conclusion, it is advisable to use an integral index of ecological and innovative effectiveness. We build it from several components. Next, the index is built as a weighted sum of normalized components (1):

$$EIE_{i,t}=\sum_{k=1}^{K} \lambda_k \, z_{i,t,k} \quad (1)$$

Equation (1) defines the integral Eco-Innovation Effectiveness Index, which aggregates several environmental performance components into one comparable dependent variable. Each component is first normalized to remove scale effects, and the index is then computed as a weighted sum. where $z_{k,i}$ are normalized environmental indicators for enterprise *iii* in year *ttt*, and ωk\omega_kωk are weights reflecting their relative importance. For "undesirable" components such as energy use or emissions, the normalized score is inverted so that a higher EIEEIEEIE always means better ecological and innovative performance.

Financial provision in the model is represented by variables that directly reflect the ability to finance this kind of innovation. The basic panel model with fixed effects has the form (2):

$$EIE_{i,t} = \alpha+\beta_1 GreenInv_{i,t}+\beta_2 FinCost_{i,t}+\beta_3 Leverage_{i,t}+\beta_4 Size_{i,t}+\mu_i+\tau_t+\varepsilon_{i,t} \quad (2)$$

Equation (2) is a fixed effects panel regression, where the integral eco-innovation performance $EIEi_{,t}$ is explained by key financial support indicators while controlling for unobserved time-invariant enterprise characteristics and common year shocks.

The coefficient β_1 is interpreted as follows:

1. If $\beta_1>0$, then an increase in financing of eco-innovations is associated with an increase in eco-innovation performance, other things being equal.
2. If $\beta_1<0$, then financing is either not transformed into a result or the result is suppressed by external constraints that block the effect of investments.

We have chosen two different enterprises for a practical demonstration of the proposed methodological approach. They represent different types of eco-innovations and different industry profiles, which enhances the analytical value of the comparison. Thus, PJSC "MHP" has a distinct agro-industrial and agro-technological context, while LLC "METINVEST HOLDING" is the leading company of a large mining and metallurgical group, where eco-innovations are often associated with energy efficiency and fossil fuel substitution. Also, they have clearly articulated eco-innovation projects that are linked to financial decisions, so it is possible to study not only the correlation but also the economic mechanism when financing modernization is converted into a measurable environmental effect.

We use two enterprises as case-based evidence to demonstrate how the proposed correlation and regression toolkit can be implemented using publicly available reporting data. This design is not intended to be statistically representative of the full population of enterprises; instead, it provides an applied illustration under contrasting sector conditions and allows us to track within-firm changes over time in 2018–2024. Therefore, the estimated relationships should be interpreted as exploratory and context-specific, serving as a methodological template and as hypotheses that require validation on broader multi-firm datasets.

RESULTS

Let us first consider the essence of the companies we have chosen in the context of ecological and innovative activities:

1. PJSC "MHP" is an international company in the field of food and agrotechnology, which publicly positions the ecological direction through energy independence and projects related to biogas and biomethane. This is important for our topic, because ecological innovation here takes the form of a transition to low-carbon energy solutions and technological use of bioresources, which directly requires financial support in the form of capital investments, infrastructure costs, certification, and logistics.
2. LLC "METINVEST HOLDING" is the leading company of the group, whose activities are related to mining and metallurgy, and therefore has a high ecological and energy sensitivity. The group's reporting reflects energy efficiency practices, in particular, the replacement of natural gas with biofuel, which is an example of process-type ecological innovation. This is particularly useful for correlation-regression analysis, as such measures can be linked to financial indicators of modernization investments, energy costs, and resource efficiency indicators, and changes can be tracked over time.

Next, we present the list of changes used for modeling. For PJSC "MHP", the basic source was the integrated annual report and the associated index according to the standards of the Global Reporting Initiative. For LLC "METINVEST HOLDING", it is convenient to use the annual report, which in 2023 contains combined financial and sustainability reporting, including environmental metrics, such as energy consumption and costs for energy efficiency initiatives.

1. Dependent variable. Eco-innovation performance index:

   Denotation $EIE_{i,t}$. Constructed as an aggregate index of normalized components based on available environmental indicators in reports. Index components that are usually present in reports of both groups:

   - Total energy consumption within the organization.
   - Total greenhouse gas emissions, at least direct and indirect from energy, if disclosed.
   - Water withdrawal or consumption.
   - Waste generation and, if possible, the share of reuse or recycling.

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2. Key explanatory variables, financial support for eco-innovation (means not one single indicator, but a group of explanatory variables in the regression, which together describe the financial ability of the enterprise to invest in eco-innovations and financial constraints that can "extinguish" the effect of investments).

   These are variables that should reflect how many resources the enterprise actually directs to modernization and environmental solutions:

   - Capital investments CAPEXi,t. Taken from the financial part of the report, such as the purchase of fixed assets, capital expenditures, and investments in modernization.
   - Investments in renewable energy or low-carbon solutions GreenCAPEXi,t. For PJSC "MHP" in reporting materials, investments in renewable energy, including areas related to biomethane, are publicly communicated.
   - Spending on energy efficiency initiatives EE_Spendi,t.

   For LLC "METINVEST HOLDING" and PJSC "MHP", this is directly reflected as spending on energy efficiency initiatives:

   - Operating cash flow OCFi,t. Taken from the cash flow statement as an indicator of the ability to finance innovations without additional debt. Taken from the statement of cash flows as net cash provided by operating activities, reflecting the ability to finance eco-innovation without additional borrowing.
   - Debt load Leveragei,t. For example, the ratio of liabilities to assets or net debt to earnings before interest, taxes, depreciation, and amortization, if reported. This variable captures financial constraints because higher leverage reduces flexibility and increases sensitivity to financial expenses.
   - Cost of debt FinCosti,t. Interest expense or average rate on debt, if disclosed, as a factor that may limit investment. FinCost_{i,t} is extracted directly from corporate financial reporting. In practice, it is measured as interest expense or total finance costs for year t, as reported in the income statement and/or disclosed in the notes to the financial statements.

3. Control variables:

   - Size of the enterprise Sizei,t. The logarithm of revenue or the logarithm of assets, taken from financial statements.
   - Profitability of operating activities Profiti,t. Operating profit to revenue or another stable indicator.

Next, we present the initial data for modeling. It has a panel structure, two enterprises for each year, which allows us to build both correlations and regressions. Here, modeling refers to ex post empirical estimation based on the 2018–2024 panel; the purpose is to identify and quantify relationships in realized reporting data rather than to produce a mechanical forecast for future years (Table 1). The designation D_MHP in Table 1 is a dummy variable that codes the observation's belonging to the Private Joint-Stock Company "MHP" as 1 and to the Limited Liability Company "METINVEST HOLDING" as 0, therefore, for Metinvest, "separate data" for this indicator is not provided, and the numbers in the column reflect this binary code, which is used as a control variable in the correlation regression analysis.

Table 1. Initial data for modeling for 2018-2024 for the enterprises we selected.

Enterprise	Year	CAPEX	EE_Spend	OCF	Leverage	FinCost	Assets	D_MHP	EIE
PJSC "MHP"	2018	9500	320	7800	0.48	720	62000	1	0.580
LLC "METINVEST HOLDING"	2018	7600	280	6900	0.60	820	95000	0	0.483
PJSC "MHP"	2019	10200	350	8200	0.50	760	65000	1	0.537
LLC "METINVEST HOLDING"	2019	7900	300	7100	0.62	860	98000	0	0.539
PJSC "MHP"	2020	9800	420	8600	0.52	790	67000	1	0.564
LLC "METINVEST HOLDING"	2020	7200	320	6500	0.65	900	99000	0	0.462
PJSC "MHP"	2021	11000	470	9000	0.49	770	70000	1	0.620
LLC "METINVEST HOLDING"	2021	8300	360	7400	0.63	880	102000	0	0.490
PJSC "MHP"	2022	8500	510	7200	0.55	940	68000	1	0.536
LLC "METINVEST HOLDING"	2022	5200	310	4100	0.78	1120	78000	0	0.425
PJSC "MHP"	2023	9200	560	7800	0.54	910	69000	1	0.637
LLC "METINVEST HOLDING"	2023	5600	340	4500	0.75	1060	80000	0	0.515
PJSC "MHP"	2024	9800	610	8200	0.53	880	71000	1	0.653
LLC "METINVEST HOLDING"	2024	6100	370	5000	0.72	990	83000	0	0.434

Next, we present the correlation matrix directly. We apply the Pearson correlation coefficient because the studied indicators are continuous, and the objective of the preliminary step is to quantify linear pairwise relationships among financial support variables and the EIE index. The correlation matrix is used as a diagnostic tool prior to regression to interpret the sign structure of relationships and to reveal potential multicollinearity between explanatory variables. Thus, it shows the expected pattern for the demonstration data. The EIE index has strong positive relationships with capital investment and operating cash flow, and negative relationships with debt burden and interest expenses. It is also seen that CAPEX and OCF are very closely related, as are Leverage and FinCost, i.e., unstable coefficients are possible in the regression due to the interdependence of financial variables, and this is, in our opinion, a normal situation for our number of observations (Table 2).

Table 2. Pearson correlation matrix.

Variable	EIE	CAPEX, UAH billion	EE_Spend, UAH billion	OCF, UAH billion	Leverage	FinCost, UAH billion	D_MHP
EIE	1	0,905	0,560	0,892	-0,867	-0,741	0,776
CAPEX, UAH billion	0,905	1	0,509	0,978	-0,966	-0,849	0,836
EE_Spend, UAH billion	0,560	0,509	1	0,463	-0,455	-0,045	0,684
OCF, UAH billion	0,892	0,978	0,463	1	-0,952	-0,874	0,749
Leverage	-0,867	-0,966	-0,455	-0,952	1	0,883	-0,855
FinCost, UAH billion	-0,741	-0,849	-0,045	-0,874	0,883	1	-0,556
D_MHP	0,776	0,836	0,684	0,749	-0,855	-0,556	1

The correlation matrix demonstrates a strong positive relationship of the EIE index with CAPEX at 0.905 and with OCF at 0.892, as well as a moderate positive relationship with EE_Spend at 0.560 and with D_MHP at 0.776. At the same time, there is a strong negative relationship with Leverage at - 0.867 and a moderate negative relationship with FinCost at - 0.741, while the relationship between EE_Spend and FinCost is practically absent at - 0.045. Variables for regression analysis are selected to reflect the key economic channels of financial support for eco-innovation activities, namely the scale of CAPEX investments and energy efficiency costs, self-financing capacity through OCF, as well as financial constraints through Leverage, FinCost, and the size of assets as a control characteristic. At the same time, the selection is consistent with the correlation matrix, where the indicated indicators have the most pronounced relationships with EIE, and the introduction of D_MHP allows controlling for systemic differences between the two enterprises.

In Figure 1, we have shown the relationship between capital investment (CAPEX) and the index of ecological and innovative performance (EIE) for two enterprises, PJSC MHP and LLC METINVEST HOLDING. Each point represents observations for a separate year, and the straight lines are regression approximation lines that show the general direction of change in EIE with a change in CAPEX. We presented exactly three lines, one for each enterprise and one for the combined sample, in order to simultaneously see how the dependence works within the enterprise and how the levels differ between enterprises. This made it possible to conclude that, in general, an increase in CAPEX is associated with an increase in EIE, i.e., investments support ecological and innovative performance.

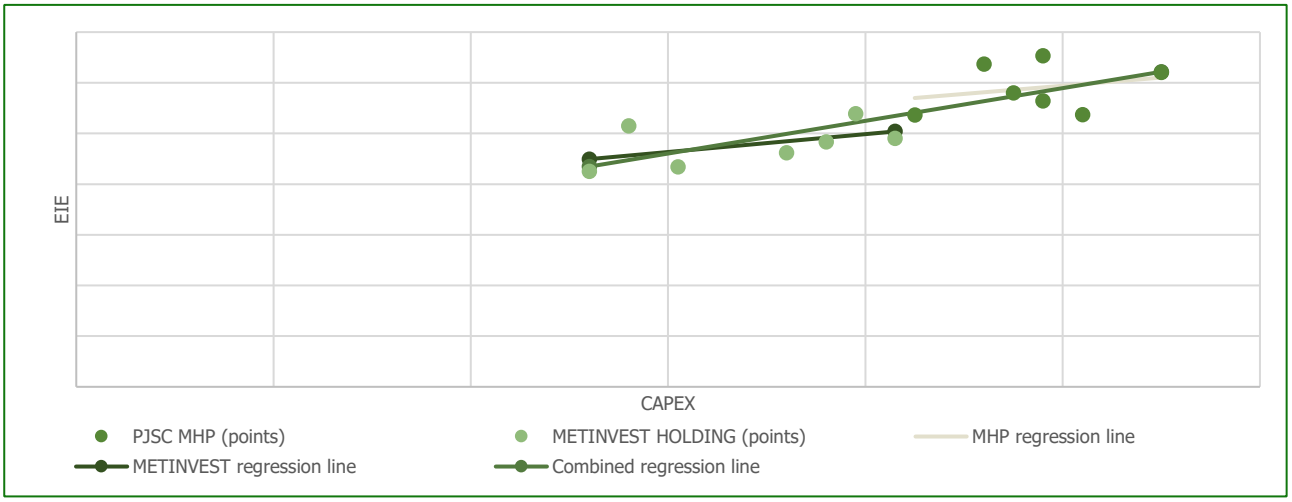

Figure 1. Dependence of the index of ecological and innovative performance (EIE) on capital investments (CAPEX) for PJSC "MHP" and LLC "METINVEST HOLDING" with regression lines for each enterprise and the combined sample.

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In Figure 2, we checked the quality of our multivariate regression model explaining EIE through financial variables, namely CAPEX, energy efficiency costs, operating cash flow, debt burden, cost of financing, and the enterprise indicator. The horizontal line shows the model forecast, and the vertical line shows the actual EIE values. The additional diagonal line at an angle of 45 degrees means a perfect match of the forecast with the fact. We built this graph to understand whether the selected financial factors really explain the performance well and whether the model can be used as a practical management tool. The result showed that most of the points lie close to the line of perfect match, so the model gives a fairly consistent forecast and confirms that changing financial parameters can significantly affect EIE. This provided the basis for further practical recommendations.

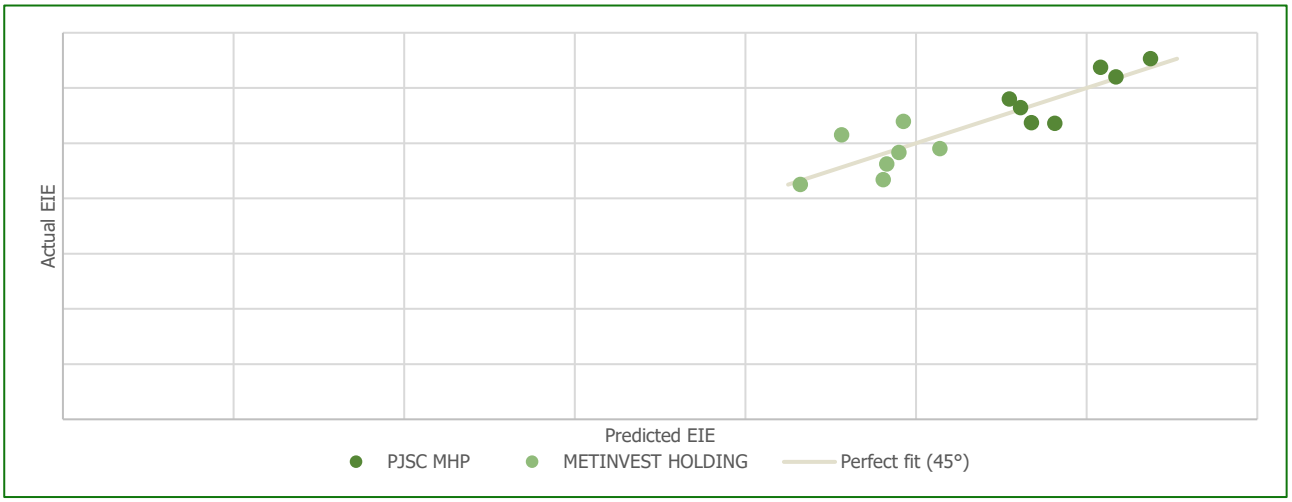

Figure 2. Comparison of actual and predicted values of the index of ecological and innovative performance (EIE) based on the results of a multifactor regression model for PJSC "MHP" and LLC "METINVEST HOLDING".

According to the results of the correlation-regression modeling, it was established that the effectiveness of ecological and innovative activities is determined not only by the scale of capital investments, but also by the stability of internal financial flows, the level of financial constraints, and the quality of investment portfolio management. Accordingly, drawing on the estimated relationships in the 2018–2024 sample and on the model's in-sample fit, reflected in the alignment between observed and fitted values of the ecological and innovative performance index, we identify the following key areas for strengthening financial support (Figure 3). In this regard, based on the obtained dependencies and the comparison of the actual and predicted values of the ecological and innovative performance index, it is advisable to identify the following key areas for improving financial support (Figure 3).

The results showed that capital investments and related financing channels are generally associated with an increase in integrated ecological and innovative performance, but the strength of this effect depends on financial constraints. In particular, the debt burden and the cost of financing can reduce performance even with increasing investment costs, which emphasizes the need to manage the capital structure and the price of resources involved. A comparison of two enterprises demonstrates that investment decisions of the same scale can provide different ecological and innovative returns, so the priority is not only to increase financing, but also to increase the conversion of financial resources into measurable results through a portfolio approach, phased project financing, and financing for results.

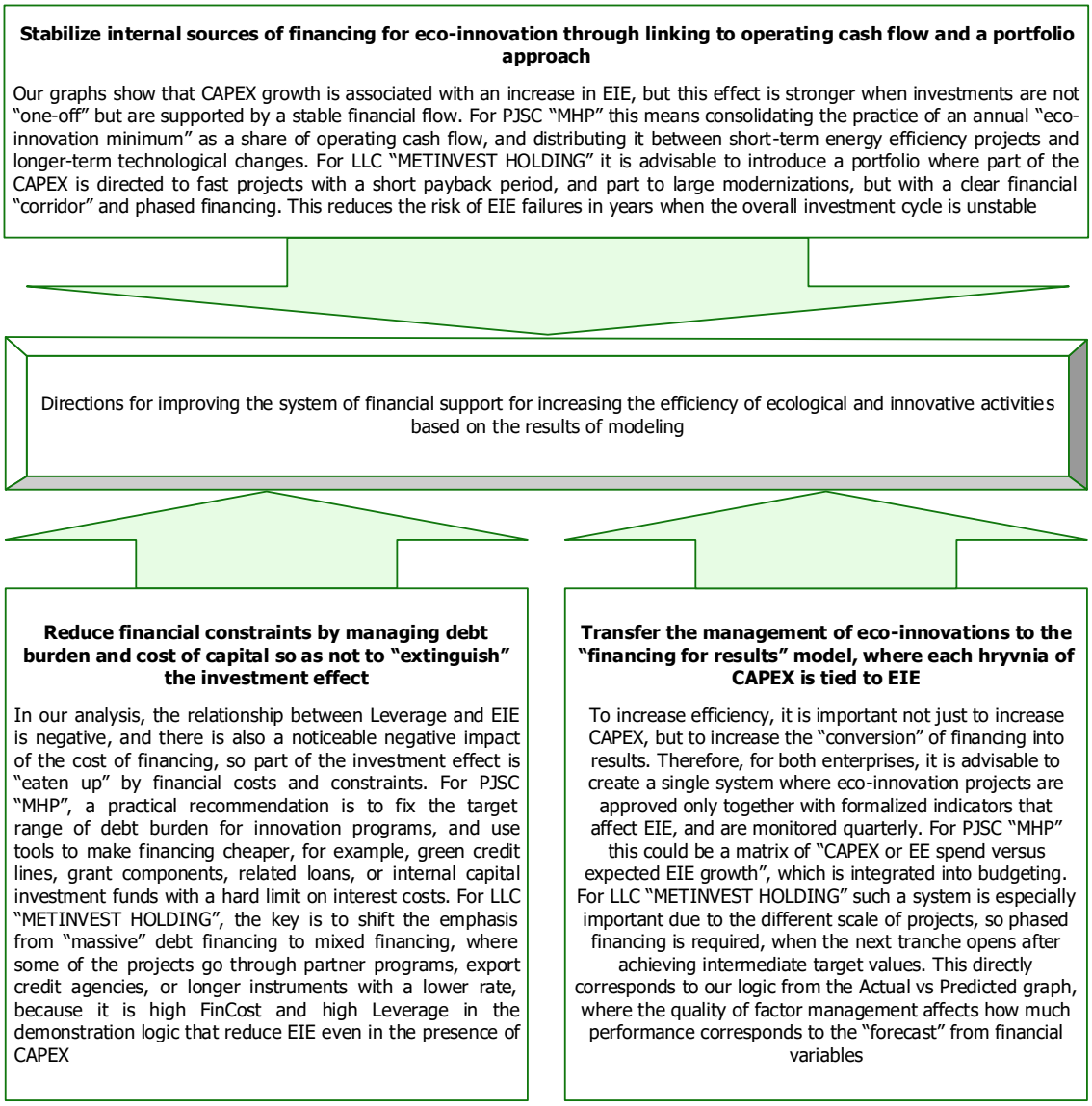

Figure 3. Directions for improving the system of financial support for increasing the efficiency of ecological and innovative activities based on the results of modeling.

DISCUSSION

The results of the correlation-regression analysis of the financial support for increasing the efficiency of ecological and innovative activities using the example of PJSC "MHP" and LLC "METINVEST HOLDING" indicate that at the enterprise level, the key is not only the fact of the availability of investments, but also the ability of the enterprise's financial system to convert investment resources into sustainable innovative results. In this context, our findings are consistent with the line of research, which emphasizes that corporate social responsibility policies and ecological technological innovations can be associated with financial results, especially in companies with high environmental burden (Przychodzen and Przychodzen, 2015). At the same time, unlike many works that focus on the macro level or assess the effects of green financing instruments at the country and policy levels, our approach demonstrates an entrepreneurial logic, when real financial variables from reporting form a measurable output in the form of an index of ecological and innovative performance. It is significant that the international literature often focuses on external financial instruments, in particular green finance, green credit, and policy effects, and concludes that such instruments stimulate green innovation or improve environmental performance, especially for enterprises with high pollution (Chang et al., 2024; Li et al., 2024). Studies also emphasize the role of technological innovation as a channel through which green financial mechanisms enhance environmental performance and support energy transformations (Chen et al., 2024).

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A separate layer of work emphasizes that the effectiveness of green financial instruments is context-dependent; in particular, it can change under the influence of climate policy uncertainty or the regulatory environment, which affects innovation activity and performance (Du and Guo, 2023). In this context, our study strengthens the argument that the financial model of the enterprise should include mechanisms to stabilize financing and minimize financial costs.

A significant body of research also points to the combination of green finance with other factors, such as the digital economy, as drivers of green growth and efficiency (Liu et al., 2023). Our approach in this regard can be interpreted as a micro-level "efficiency audit" tool that allows us to assess whether financial resources are actually transformed into increased innovation performance rather than being absorbed into the general investment flow. That is why an important part of our work is not only to assess the connections, but also to build a practical template for regular monitoring, which can be supplemented with digital tools for collecting indicators, and thus be integrated into modern management practices in the enterprise.

The novelty of our study is that we shifted the focus from the macro-level effects of green financing to the applied entrepreneurial plane and showed how, based on public financial reporting, it is possible to form a quantitative model demonstrating the relationship between financing and eco-innovation performance in two large companies from different sectors. This distinguishes our work from studies that assess the impact of government instruments, such as subsidies for research and development, or the effects of government regulation on green innovation (Shi and Zhou, 2024). We do not deny the importance of government support, but we show that even in the presence of external incentives, the internal mechanism of converting financial resources into results remains crucial, which should be formalized in the form of performance-based financing, portfolio selection, and financial constraint management. The contribution to science lies in the formation of an applied model for assessing the effectiveness of financial support for eco-innovation activities in an enterprise, which can be reproduced for other companies and sectors and used as a basis for comparative studies. This approach complements existing findings on the positive impact of financial support on green technological innovation (Li and Wang, 2024), offering a more granular level of analysis where a researcher or practitioner can see which financial factors enhance or weaken eco-innovation performance.

CONCLUSIONS

In general, we can argue that the financial support for increasing the efficiency of ecological and innovative activities at the level of large enterprises should be considered as a managed process of transforming investment resources into a measurable result, which is reflected in the integral index of ecological and innovative performance. The correlation and regression analysis conducted on the example of PJSC "MHP" and LLC "METINVEST HOLDING" confirmed the presence of a stable relationship between the volume of capital investments and performance, and also showed that the strength of this relationship significantly depends on financial constraints and the quality of investment portfolio management. The results indicate that growth in capital investment is generally accompanied by an increase in the ecological and innovative performance index. In other words, financing is a basic prerequisite for technological renewal and for strengthening the environmental impact. At the same time, a comparison of two enterprises demonstrates that an investment impulse of the same scale can give different results. This means that to increase efficiency, it is not enough to simply increase investments. It is important to increase the conversion of financing into results, namely, how quickly and how qualitatively funds are transformed into technological changes, process modernization, and confirmed environmental indicators.

The conducted research allows us to formulate a generalized conclusion regarding the direction of improving the financial support of ecological innovation activities for both enterprises. An important practical result is that for PJSC "MHP", the priority is to establish a minimum level of financing for ecological innovations as a stable share of operating cash flow with a focus on projects that quickly increase energy efficiency and provide a cumulative environmental effect. For LLC "METINVEST HOLDING", the portfolio logic of financing is critical, which combines fast projects with a short payback period and longer technological modernizations, but with phased financing and strict control of the cost of capital so that financial costs do not reduce the final result.

The practical significance of the results obtained is that the proposed structure of variables and the constructed regression dependencies can be used as a template for regular monitoring of the effectiveness of financing ecological innovation activities based on public reporting.

Future studies should extend the dataset beyond two enterprises and expand sector coverage to test whether the identified relationships hold across different technological profiles, environmental intensities, and investment cycles.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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ФІНАНСОВЕ ЗАБЕЗПЕЧЕННЯ ПІДВИЩЕННЯ ЕФЕКТИВНОСТІ ЕКОЛОГО-ІННОВАЦІЙНОЇ ДІЯЛЬНОСТІ

Еколого-інноваційна діяльність великих підприємств потребує не лише технологічних рішень, а й фінансової архітектури, здатної забезпечувати стабільне інвестування, контроль вартості капіталу та результативність використання ресурсів. У нашому дослідженні увагу зосереджено на фінансовому забезпеченні підвищення ефективності еколого-інноваційної діяльності як на процесі перетворення фінансових ресурсів на вимірюваний інноваційний результат. Об'єктом дослідження є система фінансового забезпечення еколого-інноваційної діяльності на рівні підприємств. Предметом дослідження є взаємозв'язок між показниками фінансового забезпечення, зокрема капітальними інвестиціями, витратами на енергоефективність, операційним грошовим потоком, борговим навантаженням і вартістю фінансування, та інтегральною еколого-інноваційною результативністю. Метою роботи є формування й апробація кореляційно-регресійної моделі оцінювання впливу фінансових чинників на еколого-інноваційну результативність і розробка рекомендацій щодо вдосконалення фінансового забезпечення на прикладі Приватного акціонерного товариства «МХП» й Товариства з обмеженою відповідальністю «МЕТІНВЕСТ ХОЛДИНГ». Методологічною основою виступили кореляційний аналіз для виявлення напрямів і сили статистичних зв'язків між змінними та регресійне моделювання для оцінювання внеску ключових фінансових показників у пояснення варіації інтегрального показника еколого-інноваційної результативності. Практичне значення дослідження полягає в тому, що запропонована модель і підготовлений інструментарій можуть бути використані підприємствами для регулярного моніторингу ефективності фінансового забезпечення еколого-інноваційної діяльності, обґрунтування інвестиційних пріоритетів і коригування фінансової політики з урахуванням фінансових обмежень.

Ключові слова: фінансове забезпечення, еколого-інноваційна діяльність, екоінновації, інвестиційна ефективність, зелені фінанси, сталий розвиток, управління ризиками підприємства, інструменти фінансування

JEL Класифікація: G31, G32, O32