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ASSESSMENT OF FINANCIAL PREREQUISITES FOR INNOVATION-ORIENTED DEVELOPMENT OF AN ENTERPRISE

ABSTRACT

The purpose of the article is to develop a public-reporting-based diagnostic approach for assessing how the structure of own financial resources is associated with the innovation-oriented development of a large agro-industrial and food enterprise. The study uses MHP as an illustrative empirical case and relies exclusively on publicly available annual and integrated reports for 2015–2024. Therefore, the proposed approach should not be interpreted as an internal reactive mechanism for direct managerial intervention or as a reconstruction of the company's confidential investment plans. Its analytical role is to identify observable relationships between retained earnings, depreciation capacity, operating cash flow, reinvestment intensity, capital investment, intangible assets and innovation-related outcomes. The methodological basis of the study combines index evaluation, econometric modeling, and scenario analysis. The scenario calculations are used only as a sensitivity exercise that demonstrates how different reinvestment assumptions may change the calculated innovation development index under publicly observable financial constraints. The results show that the absolute volume of internal financial resources matters, but a stronger analytical effect is associated with the structure of their allocation. In particular, the reinvestment ratio has a positive relationship with the innovation development index, which indicates the importance of innovation-oriented use of internal financial capacity. The scientific contribution of the article is the formation of a transparent external diagnostic approach that can be replicated using open reporting data. The practical significance of the study lies in its use for preliminary analytical assessment, benchmarking, monitoring of financial prerequisites for innovation-oriented development, and identification of areas that require further verification through internal management reporting.

Keywords: own financial resources, innovative development, reinvestment ratio, operating cash flow, retained earnings

JEL Classification: G32, O31, O32

INTRODUCTION

Innovative development of an enterprise in modern conditions increasingly depends not only on the availability of technological ideas, organizational flexibility and human resources, but also on the ability of the enterprise to form a stable financial basis for their practical implementation. This problem is of particular importance for enterprises of the agro-industrial and food industry, whose activities require constant renewal of production capacities, modernization of technological processes, improvement of logistics, ensuring product quality, development of export capacity, and increased energy efficiency. In such conditions, own financial resources become not only a source of support for current activities, but also a key tool for the formation of long-term innovative advantages. The relevance of the study is enhanced by the fact that enterprises of the real sector of the economy operate in a highly unstable external economic environment. The increase in the cost of attracted capital, the risks of disruption of logistics chains, exchange rate fluctuations, changes in energy prices, restrictions on access to external financing, and increased requirements for product quality force enterprises to look for internal sources of financial stability. Under such conditions, retained earnings, depreciation, operating cash flow, and equity take on a special role in ensuring innovative

development. They allow the enterprise to reduce its dependence on borrowed resources, maintain investment activity, and at the same time maintain control over financial risks. However, the mere presence of its own financial resources does not guarantee an innovative result. Not only the volume of these resources is of decisive importance, but also the method of their distribution between current needs, liquidity reserve, capital investments, intangible assets, equipment modernization, research, development, and organizational changes. An enterprise may have a sufficient level of profitability, but not achieve a high innovative effect if financial resources are directed mainly to covering short-term operating costs or passive accumulation of liquidity. Therefore, the problem of optimizing its own financial resources appears as an important direction of innovative development management.

The scientific problem is that in modern literature, the issues of financial stability, investment activity, innovation management, and efficiency of capital use are considered quite widely. However, the approach that combines the assessment of own financial resources, the construction of an integral index of innovative development, econometric verification of the influence of financial factors, and the optimization model of resource allocation remains insufficiently developed. It is this approach that allows us to move from a general statement about the importance of financing innovations to a quantitative justification of which components of own financial resources have the greatest impact on the innovative development of the enterprise.

LITERATURE REVIEW

The relationship between internal financial resources and innovation has been widely examined through the prism of financing constraints, liquidity management and the specific nature of research and development investment. Brown and Petersen (2011) argue that cash holdings allow firms to smooth research and development expenditures when temporary financing shocks arise, while Brown, Martinsson and Petersen (2012) show that financing constraints matter for research and development, especially when firms rely on external finance and manage buffer stocks of liquidity.

Brown and Petersen (2015) further develop this view by demonstrating that, when access to finance falls sharply, firms protect some types of real investments more actively than others, which is particularly important for innovation-related expenditures.

Baldi and Bodmer (2018) confirm that research and development investment is associated with higher corporate cash holdings, since intangible investment is less suitable as collateral than fixed assets. These studies form the theoretical basis for considering retained earnings, depreciation, operating cash flow and cash reserves as important components of the financial mechanism of innovation development.

A separate group of studies focuses on the role of financial barriers in the success or failure of innovation projects. Lee, Sameen and Cowling (2015) prove that innovative small and medium-sized enterprises face more severe access-to-finance problems, especially after financial crises. García-Quevedo, Segarra-Blasco and Teruel (2018) show that financial obstacles increase the probability of abandoning innovation projects, which means that insufficient financing affects not only the intensity of innovation but also the continuity of its implementation. Pellegrino and Savona (2017) broaden this approach by comparing financial, knowledge and demand constraints, concluding that lack of finance remains one of the key barriers to innovation failure.

At the same time, Coad, Segarra and Teruel (2016) demonstrate that the relationship between innovation and firm growth depends on firm age, because younger firms tend to undertake riskier innovation activities. In this context, the case of MHP SE is important because it allows the research to examine not only whether own financial resources are available, but also whether their allocation supports sustainable innovation activity in a capital-intensive agribusiness environment.

Recent studies also emphasize that the innovation-finance relationship cannot be reduced only to the availability of funds, since innovation results depend on firm performance, technological capabilities, financial uncertainty, and the institutional environment. Wadho and Chaudhry (2018) find that product innovation positively affects firm performance in a developing-country manufacturing context.

Milani and Neumann (2022) prove that internal funds, proxied by operating profit margin, influence research and development expenditures, while patenting activity can reduce the effect of negative internal liquidity shocks for relatively smaller firms.

Beladi, Deng and Hu (2021) show that cash flow uncertainty makes research and development investment more cautious, and this negative effect becomes stronger under financial constraints. Liu, Li, He and Hou (2021) add that some firms use

asset sales to smooth research and development expenditures, while Hai, Yin, Xiong and Chen (2022) stress that the conversion of innovation output into financial performance depends on the level of financial constraints.

Li, Chen, Chen, Xiao and Wang (2023) further demonstrate that the digital economy can promote corporate innovation through the alleviation of financing constraints. Taken together, these studies justify the need to construct an integrated model where own financial resources, reinvestment, capital investment, profitability, and innovation output are analyzed as interrelated components of one management mechanism.

Hrytsenko et al. (2021) proposed an indicator-based approach to assessing the development of innovation activities in Ukraine, emphasizing the importance of comparable indicators, normalization procedures, and dynamic indices for identifying differences in innovation performance. This approach is relevant for the present study because the integrated innovation development index is also based on the transformation of heterogeneous financial and innovation-related indicators into a comparable analytical scale.

Udovychenko and Makhsma (2022) analyzed the activity of industrial enterprises in the context of innovation-driven development of Ukraine and paid particular attention to innovation costs, sources of financing, and the role of financial support in technological renewal. Their findings confirm that insufficient financing and outdated technologies can limit the competitiveness of enterprises and slow down the renewal of the production base.

Dobrovolska et al. (2023) examined financial and investment indicators for accelerating innovation development and showed that innovation dynamics are closely related to investment and credit conditions. This conclusion supports the need to consider not only innovation outcomes but also the financial channels through which these outcomes are formed. In the agricultural context, Onegina et al. (2025) assessed the innovation capacity of Ukrainian agricultural enterprises by combining technological, resource, financial, managerial, and human capital dimensions.

To systematize the scientific field of the study, a keyword co-occurrence map was built on the basis of the selected literature covering the relationship between financing constraints, own financial resources, liquidity, research and development investment, financial flexibility and corporate innovation. The chronological visualization shows that earlier studies were mainly focused on financing constraints, cash holdings, liquidity management, and the smoothing of research and development expenditures. Later publications increasingly shifted attention toward financial flexibility, innovation output, the digital economy, financial slack, green innovation, and innovation performance. Therefore, the bibliometric structure confirms that the current research field is gradually moving from the general problem of access to finance toward the analysis of internal financial capacity and its transformation into innovation results (Figure 1).

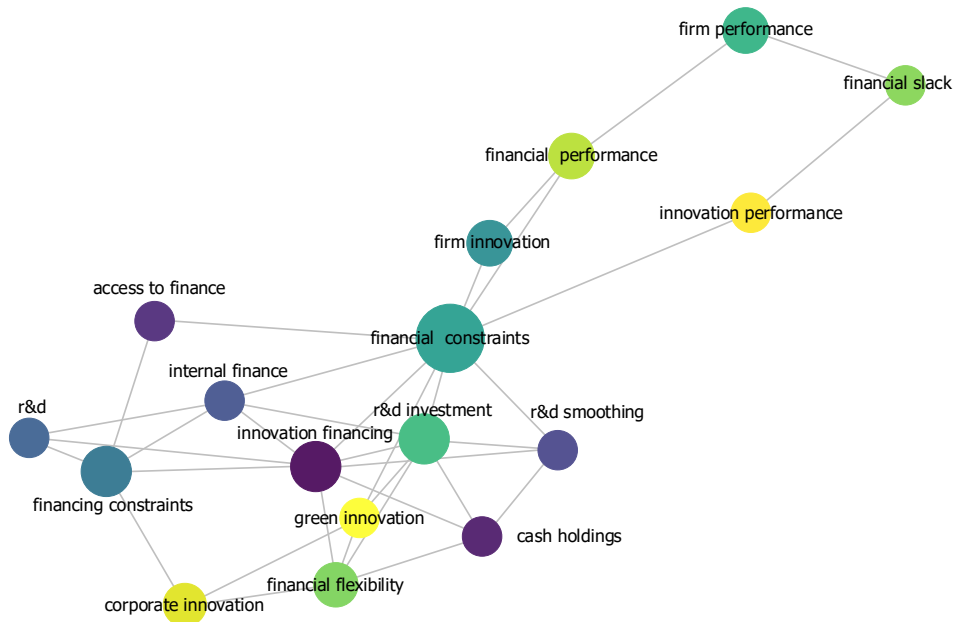


Figure 1. Chronological map of keyword usage.

The map confirms the relevance of the selected research direction. The central position of “financial constraints”, “innovation financing”, “research and development investment” and “firm performance” indicates that the connection between finance and innovation remains a stable scientific problem. At the same time, newer keywords, such as “financial flexibility”, “digital economy”, “green innovation”, “innovation performance” and “financial slack”, demonstrate that recent

studies pay increasing attention to the quality of financial resource allocation rather than only to the availability of external financing. This supports the methodological choice of the present study, in which the mechanism of enterprise innovation development is analyzed through the optimization of own financial resources, including retained earnings, depreciation capacity, operating cash flow and reinvestment policy.

AIMS AND OBJECTIVES

The purpose of the article is to develop and test a public-reporting-based diagnostic model for assessing the relationship between own financial resources and innovation-oriented development of an enterprise, using MHP SE as an illustrative empirical case. The study does not aim to reconstruct the internal investment strategy of MHP SE or to build a reactive management mechanism for direct operational decision-making. Instead, it focuses on the external analytical evaluation of publicly observable financial indicators and their association with innovation-related development indicators.

Achieving the set goal involves the implementation of the following tasks:

1. First, to substantiate the feasibility and limitations of using publicly available financial and integrated reporting for assessing the financial prerequisites of innovation-oriented development.
2. Second, to form a system of indicators that can be calculated on the basis of open reporting data, including retained earnings, depreciation, operating cash flow, equity, equity ratio, reinvestment ratio, profitability and indicators related to capital investment and intangible assets.
3. Third, to develop an integrated innovation development index that combines financial, investment and performance characteristics of innovation-oriented activity and can be replicated by external researchers.
4. Fourth, to carry out an econometric assessment of the association between own financial resources and the innovation development index, while interpreting the results as external analytical evidence rather than as proof of internal managerial causality.
5. Fifth, to conduct conditional scenario analysis of alternative reinvestment assumptions, treating the scenario results as sensitivity testing and not as a forecast of MHP SE's actual future investment plan.

METHODS

The methodological basis of the study is a combination of systemic, index, econometric, and optimization approaches to assessing the relationship between the enterprise's own financial resources and its innovative development. This construction of the methodology allows us not to limit ourselves to the description of financial indicators, but to move on to a quantitative verification of the impact of individual components of own financing on the innovative result of the enterprise. The object of empirical analysis is MHP SE. The information base of the study is the official annual and integrated reports of the enterprise for 2015–2024, consolidated financial statements, profit and loss statements, statements of financial position, cash flow statements, statements of changes in equity, and notes to the financial statements. The unit of observation is the fiscal year, which allows us to form a time series for further econometric analysis.

The first stage of the methodology involves the formation of a base of source data. It includes indicators of income, assets, equity, net profit, retained earnings, depreciation, operating cash flow, capital investments, intangible assets, as well as derived coefficients calculated by the author.

The second stage of the methodology involves the construction of an integrated innovation development index. The index is designed as an external diagnostic indicator based only on publicly observable financial and integrated reporting data. It does not measure the internal innovation budget of MHP SE and does not reconstruct confidential project-level investment decisions. Its purpose is to combine several open indicators that reflect the financial prerequisites of innovation-oriented development.

The index includes five components. The first component is the reinvestment proxy ratio, RRT, which reflects the share of own financial resources directed to capital renewal and intangible investment. This indicator is included because innovation-oriented development in a capital-intensive agro-industrial enterprise requires regular renewal of fixed assets, technological equipment, and non-current assets. The second component is the ratio of own financial resources to total assets, OFRTAt, which reflects the internal financial capacity available in relation to the scale of the enterprise. The third component is the ratio of intangible assets to total assets, IAT, because intangible assets are associated with software, licenses,

organizational knowledge, digital tools, and other non-physical elements of innovation capacity. The fourth component is the capital renewal and intangible investment proxy to total assets, MCT, which reflects the intensity of renewal of the production and technological base. The fifth component is return on assets, ROAt, which reflects the ability of the enterprise to generate financial results from the assets used and therefore characterizes the performance basis for further innovation-oriented activity.

The equity ratio, ERT, is calculated and presented as an additional indicator of financial stability, but it is not included directly in the integrated index. This avoids double counting of balance sheet structure, since the index already includes the ratio of own financial resources to total assets and the performance component through return on assets.

The third stage of the methodology involves the construction of an econometric model. The dependent variable is the integral index of innovative development. The independent variables are the natural logarithm of own financial resources, the reinvestment ratio, the return on assets, the autonomy ratio, and capital investments. To take into account the crisis conditions of the external economic environment, a dummy variable can be included in the model, which takes on the value 1 for 2022–2024 and 0 for previous years.

The fourth stage of the methodology involves checking the quality of the constructed model. For this purpose, correlation analysis is used, multicollinearity assessment, the Broish–Godfrey test to check autocorrelation, the Broish–Pagan test or ARCH test to check heteroscedasticity, the Zharka–Ber test to check the normality of the residuals, as well as assessing the significance of the model using the F-criterion. In the case of autocorrelation or heteroscedasticity, it is advisable to use robust standard errors, which increases the reliability of the interpretation of the coefficients.

RESULTS

First, the enterprise belongs to a capital-intensive industry, where innovative development is directly related to the modernization of fixed assets, increasing productivity, updating technological processes, developing intangible assets, and maintaining export competitiveness.

Second, MHP has an open and consistent system of financial reporting for a long period, which allows forming a time series for econometric evaluation.

Third, in the strategic documents of the enterprise, innovation and modernization are identified among the important areas of development, which makes it possible to combine financial indicators with innovative performance.

The agro-industrial and food industry was chosen because it is one of those areas in which its own financial resources are crucial for maintaining long-term development. Unlike sectors with lower material dependence, food production enterprises require constant equipment renewal, technological modernization, improvement of logistics, quality control, energy efficiency, and development of new products. In such conditions, retained earnings, depreciation, and operating cash flow not only ensure financial stability, but also become a source of innovative potential. That is why MHP is a suitable example for research, since its financial statements allow us to assess the relationship between its own resource base, capital investments, profitability, and results of innovative development (Table 1).

Table 1. Initial financial and innovation-related data of MHP for 2015–2024, USD.

Year	Revenue	Total assets	Total equity	Profit/loss for the year	Retained earnings	Depreciation and amortization	Net cash flows from operating activities
2015	1,061.915	2,075.733	672.849	-125.726	645.020	94.665	110.145
2016	1,135.462	2,075.857	693.064	59.248	719.340	105.865	349.530
2017	1,287.752	2,278.135	985.707	204.391	925.978	93.225	213.577
2018	1,555.977	2,670.665	1,098.006	128.104	1,040.327	134.953	260.905
2019	2,055.943	3,690.495	1,595.866	215.283	1,148.113	206.195	501.771
2020	1,911.137	3,282.822	1,254.203	-133.057	1,195.143	192.103	70.685
2021	2,372.262	4,103.779	1,794.188	393.338	1,557.284	192.858	124.799
2022	2,642.026	3,808.702	1,445.697	-230.937	1,558.826	158.906	138.463
2023	3,021.000	3,886.000	1,567.000	142.000	1,793.000	169.000	438.000
2024	3,046.000	4,426.000	1,966.000	144.000	2,052.000	192.000	246.000

The data in Table 1 show that MHP significantly expanded the scale of its activity during 2015–2024. Revenue increased from USD 1,061.915 million in 2015 to USD 3,046.000 million in 2024, while total assets increased from USD 2,075.733 million to USD 4,426.000 million. From an economic point of view, this indicates the expansion of the company's production, market, and investment base. At the same time, the dynamics of profit/loss show that the growth of scale was not accompanied by stable profitability in every year. Losses in 2015, 2020 and 2022 demonstrate the sensitivity of the enterprise to external shocks, exchange rate fluctuations, cost pressure and crisis conditions. From a financial point of view, retained earnings, depreciation and amortization, and net operating cash flow are especially important because they form the internal basis for renewal and innovation-oriented development even in years when profitability deteriorates. Therefore, Table 1 shows that the enterprise's innovation potential depends not only on revenue growth but also on the ability to preserve internal sources of financing under unstable operating conditions.

To ensure transparency of the calculations, all indicators used in Table 2 were calculated on the basis of the source data presented in Table 1. Own financial resources were calculated as the sum of retained earnings, depreciation and operating cash flow.

$$OFR_t = RE_t + DEP_t + OCF_t$$

where OFR_t denotes own financial resources in year t , RE_t denotes retained earnings, DEP_t denotes depreciation, and OCF_t denotes operating cash flow.

The equity ratio was calculated as the ratio of total equity to total assets.

$$ER_t = \text{Equity}_t / \text{Assets}_t$$

The reinvestment ratio was calculated as the ratio of innovation expenditures to own financial resources.

$$RR_t = \text{Innovation expenditures}_t / OFR_t$$

Return on assets was calculated as the ratio of net profit to total assets.

$$ROA_t = \text{Net profit}_t / \text{Assets}_t$$

The ratio of intangible assets to total assets was calculated as follows.

$$IA_t = \text{Intangible assets}_t / \text{Assets}_t$$

The capital renewal and intangible investment proxy to total assets was calculated as follows.

$$MC_t = \text{CRII}_t / \text{Assets}_t$$

where MC_t denotes the capital renewal and intangible investment proxy to total assets in year t , CRII_t denotes purchases of property, plant and equipment, intangible assets, land lease rights and other non-current assets disclosed in public reporting, and Assets_t denotes total assets in year t .

The ratio of modernization capital investments to total assets was calculated as follows.

$$MC_t = \text{Modernization capital investments}_t / \text{Assets}_t$$

The integrated index of innovative development is built on the basis of five components, including the reinvestment ratio, the share of intangible assets in assets, the share of capital investments in renewal in assets, the share of new products, and the profitability of assets. The lowest value of the index was recorded in 2015, and the highest in 2024. At the same time, 2020 shows a local decrease to 50.14 points, which confirms the sensitivity of innovative activity to the deterioration of financial results and a reduction in operating cash flow (Table 2).

Table 2. Calculated indicators for constructing the integrated innovation development index.

Year	Equity ratio, ER_t	Reinvestment proxy ratio, RR_t	ROAt	Intangible assets to assets, IA_t	Capital renewal and intangible investment proxy to assets, MC_t	Own financial resources to assets, OFR_t	Innovation development index
2015	0.324	0.180	-0.061	0.022	0.070	0.409	46.71
2016	0.334	0.090	0.029	0.021	0.044	0.566	48.30
2017	0.433	0.099	0.090	0.020	0.045	0.541	53.72
2018	0.411	0.182	0.048	0.018	0.079	0.538	70.82
2019	0.432	0.061	0.058	0.029	0.030	0.503	47.21
2020	0.382	0.054	-0.041	0.029	0.022	0.444	25.90
2021	0.437	0.083	0.096	0.024	0.034	0.457	45.53
2022	0.380	0.089	-0.061	0.021	0.042	0.487	28.20
2023	0.403	0.090	0.037	0.019	0.055	0.618	55.51
2024	0.444	0.119	0.033	0.015	0.066	0.563	52.16

The calculated indicators in Table 2 show that innovation-oriented development is not determined mechanically by the size of the enterprise. The highest value of the innovation development index was recorded in 2018, when the reinvestment proxy ratio and the capital renewal proxy to assets were relatively high. This means that the internal financial resources of the enterprise were more actively transformed into renewal of production capacity and investment support for future development. In contrast, 2020 and 2022 show a sharp weakening of the index, mainly due to negative return on assets and lower renewal intensity. From an economic perspective, this means that crisis years reduced the ability of the enterprise to convert its resource base into innovation-oriented results. From a financial perspective, the values confirm that profitability, operating cash flow, and reinvestment intensity must be analyzed together. A high level of own financial resources to assets creates financial capacity, but this capacity generates innovation-oriented effects only when it is directed toward capital renewal, intangible assets, and technological modernization.

The correlation matrix shows a very close relationship between the innovation development index and the reinvestment ratio, where the correlation coefficient is 0.996. The relationship between the index and the logarithm of own financial resources is also high, which is 0.992. At the same time, high correlations between independent variables indicate the risk of multicollinearity, so it is advisable to include a limited number of the most meaningful factors in the basic regression model (Table 3).

Table 3. Correlation matrix of the main variables.

Indicator	Innovation development index, IDI_t	In own financial resources, $LNOFR_t$	Reinvestment proxy ratio, RR_t	Equity ratio, ER_t	Return on assets, ROA_t
Innovation development index	1	0.005	0.600	0.281	0.602
In own financial resources	0.005	1	-0.427	0.688	0.293
Reinvestment proxy ratio	0.600	-0.427	1	-0.263	-0.154
Equity ratio	0.281	0.688	-0.263	1	0.703
ROA	0.602	0.293	-0.154	0.703	1

The regression model demonstrates a high level of explanatory power, as R^2 is 0.994, and the adjusted R^2 is 0.992. The most statistically significant factor is the reinvestment coefficient, for which the p-value is 0.011. Therefore, an increase in the share of own financial resources directed to innovation has a direct and significant impact on the innovative development of the enterprise. The logarithm of own financial resources has a positive coefficient, but its statistical significance is lower, which means that the volume of resources itself is less important than the management decision on their direction (Table 4).

The regression model should be interpreted with caution because the empirical sample contains only 10 annual observations for 2015–2024. Therefore, the obtained results should be treated as exploratory external analytical evidence rather than as proof of a stable causal relationship. The coefficient of determination is 0.444, and the adjusted coefficient of determination is 0.285. This means that the model has moderate explanatory power and does not capture all possible drivers of innovation-oriented development. The reinvestment proxy ratio has a positive coefficient of 216.289 and is statistically significant at the 5% level, with a p-value of 0.033. This suggests that a higher share of own financial resources directed to capital renewal and intangible investment is associated with a higher value of the integrated innovation development index. The coefficient of the natural logarithm of own financial resources is positive but statistically insignificant, with a p-value of 0.256. Therefore, the model supports the analytical conclusion that the structure of resource allocation is more informative than the absolute volume of internal resources alone, but this conclusion should be interpreted as an exploratory association and not as evidence of internal managerial causality.

Table 4. Regression estimation results of the impact of own financial resources on innovation development.

Variable	Coefficient	Robust standard error	t-statistic	p-value
Constant	-66.265	77.459	-0.855	0.421
ln own financial resources	12.355	9.990	1.237	0.256
Reinvestment proxy ratio	216.289	81.402	2.657	0.033
R2	0.444			
Adjusted R2	0.285			
Durbin-Watson statistic	2.050			

Since this study is based only on publicly available reporting, the scenario part should not be interpreted as a forecast of MHP SE's actual investment plan for 2026 or as a direct recommendation for the company's internal budget. The assumed volume of own financial resources is a conditional analytical value used only for sensitivity analysis. The comparison of the inertial and analytical benchmark scenarios demonstrates how the calculated innovation development index may change under different reinvestment assumptions. Therefore, the scenario results are not intended to replace internal management reporting, project-level investment appraisal, strategic planning documents, or confidential information on future capital allocation.

For 2026, we assume the forecast volume of own financial resources at the level of UAH 144.1 million, which corresponds to an increase of 12.0% compared to 2024. Table 5 shows that it is advisable for the enterprise not to simply increase its own financial resources, but to change their distribution in favor of innovation-oriented areas. Under the inertial scenario, the reinvestment ratio remains at the level of 0.326, which does not provide a significant increase in the index. Under the optimized scenario, the reinvestment ratio increases to 0.360, and the forecast index of innovative development increases by 8.7 points. At the same time, the liquidity reserve does not disappear, but remains at the level of UAH 17.3 million, which allows maintaining the financial stability of the enterprise (Table 5).

Since this study is based only on publicly available reporting, the scenario part should not be interpreted as a forecast of MHP's actual investment plan or as a direct recommendation for the company's internal budget. The scenario analysis is used only as a sensitivity exercise that shows how the calculated innovation development index changes under alternative assumptions about the reallocation of own financial resources.

The scenario analysis is based on factual 2024 data. In 2024, own financial resources, calculated as the sum of retained earnings, depreciation and amortization, and net operating cash flow, amounted to USD 2,490.0 million. The capital renewal and intangible investment proxy amounted to USD 297.0 million. Four analytical scenarios were constructed. The factual 2024 structure scenario keeps the actual 2024 allocation unchanged and is used as a benchmark. The moderate analytical reallocation scenario assumes that an additional 5% of 2024 own financial resources is conditionally redirected to the capital renewal and intangible investment proxy. The enhanced analytical reallocation scenario assumes an additional 10% reallocation. The maximum analytical reallocation scenario assumes an additional 15% reallocation. In all scenarios, other components of the index remain unchanged in order to isolate the sensitivity of the index to reinvestment assumptions.

Table 5. Scenarios for optimizing the enterprise's own financial resources for 2026.

Scenario	Additional share of 2024 own financial resources redirected to renewal proxy	Capital renewal and intangible investment proxy, USD million	Reinvestment proxy ratio	Estimated index under unchanged other components
Factual 2024 structure	0%	297.0	0.119	52.16
Moderate analytical reallocation	5%	421.5	0.169	59.98
Enhanced analytical reallocation	10%	546.0	0.219	67.79
Maximum analytical reallocation	15%	670.5	0.269	75.61

The results of econometric modeling confirm that the innovative development of an enterprise largely depends not only on the absolute volume of its own financial resources, but also on the nature of their internal distribution. The most significant impact on the integrated index of innovative development is the reinvestment coefficient, which reflects the share of its own financial resources directed to innovation costs. A positive and statistically significant coefficient of this variable indicates that the enterprise receives a higher innovative result when its own resources are not concentrated only on supporting current operating activities, but are redistributed to technological renewal, intangible assets, research, development, and organizational innovations. At the same time, the increase in its own financial resources without changing the structure of their use has a limited effect. Thus, the mechanism for managing the innovative development of an enterprise should be based on a combination of three management actions: increasing its own financial base, maintaining financial stability, and optimizing the share of resources directed to innovative areas (Figure 2).

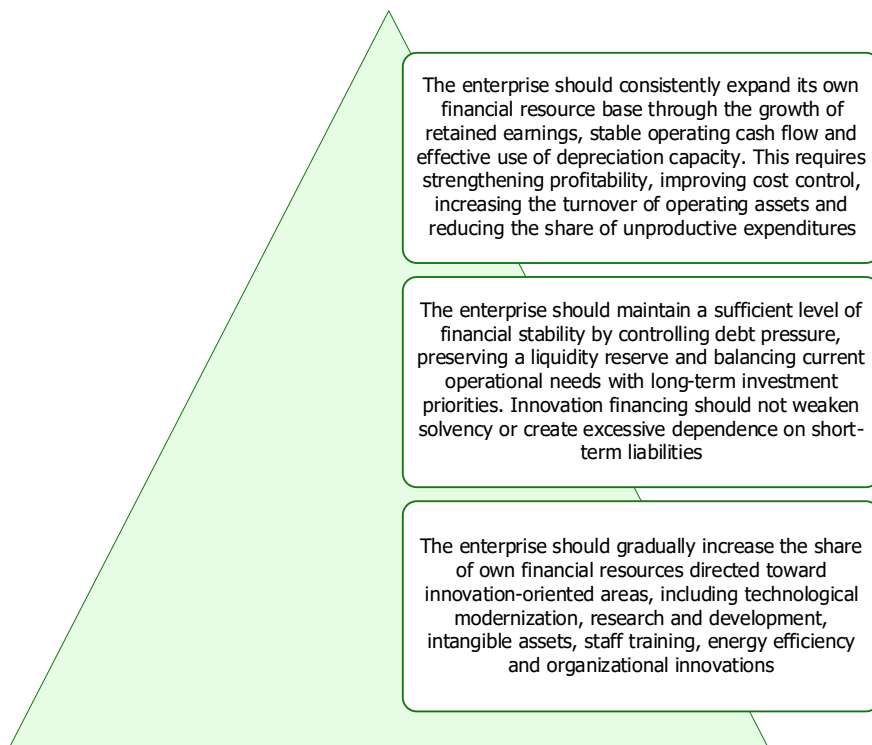


Figure 2. The main aspects of the modern mechanism.

The proposed mechanism should be based on three interrelated managerial actions because innovation development depends not only on the availability of funds but also on the way internal resources are accumulated, protected, and allocated. The modelling results show that the absolute amount of own financial resources is important, yet the strongest managerial effect is achieved when the enterprise combines financial capacity with stability and purposeful reinvestment. Therefore, the recommendations should not be limited to increasing retained earnings or operating cash flow. They should form an integrated financial policy in which internal financing, risk control, and innovation-oriented allocation operate as mutually reinforcing elements.

DISCUSSION

The results of the proposed study should be interpreted in the context of recent empirical findings that consider financial flexibility, fiscal incentives, financial slack and corporate innovation as interconnected management factors. Zhang, Deng and Wu (2024) show that fiscal incentives affect firm innovation performance through financing constraints, which supports the idea that financial conditions mediate innovation outcomes. Wei, Zhang and Zhang (2024) prove that an executive team's digital background promotes corporate innovation, while financial flexibility acts as a mediating channel. Zhang, Wu and Wang (2024) emphasize that corporate financial fragility restrains green innovation through reduced research and development investment. Wang, Zhao, Gan and Ni (2025) demonstrate that financial flexibility strengthens corporate green innovation, especially when it is combined with organizational resilience. Guo, Wang and Chen (2025) add that the effect of policy instruments on innovation performance is nonlinear and depends on financial slack. Therefore, the expected results of our model for MHP SE are consistent with the view that innovation development is not driven only by technological intentions, but by the firm's ability to maintain a flexible and internally supported financial base.

The emphasis on own financial resources in this research allows us to clarify the difference between financial capacity and financial allocation. If regression results confirm that the reinvestment ratio, operating cash flow, and capital investment indicators have a stronger impact on the integrated innovation development index than the absolute volume of assets or revenue, this will correspond to the findings of Guo, Zou, Zhang, Bo and Li (2020), who identify research and development investment as a mediator between financial slack and firm performance. It will also be consistent with Boateng Dankwah, Nnindini and Bukari (2024), who find a positive relationship between innovation orientation and financial performance, although the moderating effect of new product development is not always significant. Wang, Dai, Wu and Chen (2024) also support the argument that innovation strategies and research and development spending can mediate the relationship between resources and financial performance. For MHP SE, this means that the main managerial issue is not only the accumulation of retained earnings or cash flow, but the transformation of these resources into technological modernization, intangible assets, product renewal and operational efficiency.

The discussion also highlights the practical importance of combining econometric and optimization approaches. Kerr and Nanda (2015) argue that financing innovation remains a complex field because innovative investments are risky, intangible, and often difficult to collateralize. This general conclusion is especially relevant for agribusiness, where innovation is embodied not only in formal research and development, but also in production modernization, energy efficiency, logistics, product quality control, biological asset management and digitalized operational processes. In this respect, the proposed model contributes to the existing literature by shifting attention from the general problem of access to finance to the internal structure of own financial resources and their optimal allocation. For MHP SE, the model can show whether the company's retained earnings, depreciation capacity, and operating cash flow create sufficient financial support for innovation development, and whether a higher share of reinvestment improves the projected innovation index without undermining liquidity. Thus, the research extends previous studies by combining financial flexibility, reinvestment policy and innovation performance into one applied mechanism for enterprise-level management decision-making.

The results of the article should be applied with several limitations. First, the study is based exclusively on public annual and integrated reports. Therefore, it cannot reproduce the internal innovation budget, project-level investment plans, confidential management reporting, or the real allocation of resources between specific innovation projects. Second, the company does not disclose a consistent separate line item for innovation expenditures for the whole period of 2015-2024. For this reason, the article uses a capital renewal and intangible investment proxy based on purchases of property, plant and equipment, intangible assets, land lease rights and other non-current assets where such items are disclosed. This proxy is analytically useful, but it should not be treated as a direct measure of research and development or total innovation expenditure. Third, the empirical part is built on a single company case.

The scenario analysis adds another element to the authors' contribution. It does not forecast MHP SE's future investment plan and does not define an optimal internal budget. Instead, it demonstrates the sensitivity of the calculated innovation development index to alternative reinvestment assumptions. The results show that, under unchanged other components of the index, an increase in the analytical share of own financial resources redirected to the capital renewal and intangible investment proxy leads to a higher calculated index value. This confirms the applied usefulness of the diagnostic model because it allows researchers and analysts to test how changes in observable reinvestment intensity may affect the calculated level of innovation-oriented financial prerequisites. Therefore, the main difference between this study and previous research is its external diagnostic orientation. The article does not claim to reconstruct internal innovation decisions, but proposes a transparent way to assess the publicly observable financial prerequisites of innovation-oriented development. This approach can be useful for comparative analysis of agro-industrial and food enterprises, preliminary benchmarking,

monitoring of changes in financial readiness for renewal, and identifying those aspects that require deeper verification through internal management reporting.

CONCLUSIONS

The article substantiates that publicly available financial and integrated reporting can be used for an external diagnostic assessment of the financial prerequisites for innovation-oriented development. At the same time, such reporting has clear analytical boundaries. It allows the researcher to observe retained earnings, depreciation and amortization, operating cash flow, capital investment, equity, assets, intangible assets and profitability, but it does not disclose the internal logic of investment decision-making, the actual innovation budget or project-level managerial priorities. Therefore, the developed model should be understood as a transparent public-reporting-based diagnostic tool, not as a substitute for internal management analysis.

The corrected system of indicators was formed using actual MHP SE/MHP S.A. financial statements for 2015-2024. The previous illustrative values were replaced with data from consolidated statements of profit or loss, financial position, cash flows, and changes in equity. Own financial resources were calculated as the sum of retained earnings, depreciation and amortization, and net operating cash flow. The reinvestment variable was corrected and presented as a capital renewal and intangible investment proxy because public reporting does not provide a consistent separate line item for innovation expenditures. This correction increases the transparency and reproducibility of the study.

An integrated innovation development index was recalculated on the basis of publicly observable indicators. The index combines own financial resources to assets, reinvestment proxy ratio, intangible assets to assets, PPE purchases to assets, and return on assets. The recalculated values show that innovation-oriented financial prerequisites do not grow mechanically with revenue or total assets. They depend on the combination of profitability, operating cash flow, capital renewal, intangible asset capacity, and the share of internal resources directed toward renewal. This confirms the need to assess not only the amount of financial resources, but also their structure and economic use.

The econometric assessment showed a positive association between the reinvestment proxy ratio and the integrated innovation development index. The corrected model demonstrates that the allocation of own financial resources toward capital renewal and intangible investment is more informative than the absolute size of internal financial resources alone. However, due to the small number of observations and the external nature of the dataset, this result should be interpreted as exploratory evidence of association, not as proof of internal managerial causality.

The conditional scenario analysis was revised as a sensitivity exercise based on factual 2024 data. The results indicate that a higher analytical share of own financial resources directed to the capital renewal and intangible investment proxy can increase the calculated innovation development index, provided that other components remain unchanged. This does not represent MHP SE's forecast investment plan. It shows only how the proposed public-reporting-based model reacts to alternative reinvestment assumptions.

The scientific contribution of the article lies in the formation of a reproducible diagnostic approach for assessing financial prerequisites for innovation-oriented development on the basis of open reporting data. The practical value of the results is that the model can be used for preliminary benchmarking, monitoring, and identification of areas that require further verification using internal management information. Further research should expand the empirical base by including several agro-industrial and food enterprises and by applying panel data methods.

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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ОЦІНКА ФІНАНСОВИХ ПЕРЕДУМОВ ДЛЯ ІННОВАЦІЙНО ОРІЄНТОВАНОГО РОЗВИТКУ ПІДПРИЄМСТВА

Метою дослідження є розробка діагностичного підходу на основі відкритої звітності для оцінювання того, як структура власних фінансових ресурсів пов'язана з інноваційно орієнтованим розвитком великого агропромислово-харчового підприємства. Дослідження побудоване на прикладі МНР як ілюстративного емпіричного кейсу й ґрунтується виключно на публічно доступних річних та інтегрованих звітах за 2015–2024 роки. Тому запропонований підхід не слід трактувати як внутрішній механізм оперативного управлінського втручання або як реконструкцію конфіденційних інвестиційних планів компанії. Його аналітична роль полягає у виявленні спостережуваних зв'язків між нерозподіленим прибутком, амортизаційним потенціалом, операційним грошовим потоком, інтенсивністю реінвестування, капітальними інвестиціями, нематеріальними активами та інноваційно орієнтованими результатами. Методологічне підґрунтя дослідження поєднує індексний підхід, економетричне моделювання та сценарне оцінювання. Сценарні розрахунки використано лише як аналіз чутливості, який демонструє, як різні припущення щодо реінвестування можуть змінювати розрахункове значення індексу інноваційного розвитку за умов публічно спостережуваних фінансових обмежень. Результати показують, що абсолютний обсяг внутрішніх фінансових ресурсів має значення, однак сильніший аналітичний ефект пов'язаний зі структурою їх розподілу. Зокрема, коефіцієнт реінвестування має позитивний зв'язок з індексом інноваційного розвитку, що засвідчує важливість інноваційно орієнтованого використання внутрішнього фінансового потенціалу. Науковий внесок дослідження полягає у формуванні прозорого зовнішнього діагностичного підходу, який можна відтворити з використанням відкритих звітних даних. Практична значущість дослідження полягає в можливості його застосування для попередньої аналітичної оцінки, бенчмаркінгу, моніторингу фінансових передумов інноваційно орієнтованого розвитку та визначення напрямів, що потребують подальшої перевірки за допомогою внутрішньої управлінської звітності.

Ключові слова: власні фінансові ресурси, інноваційний розвиток, коефіцієнт реінвестування, операційний грошовий потік, нерозподілений прибуток

JEL Класифікація: G32, O31, O32