

DOI: [10.55643/fcaptop.4.45.2022.3801](https://doi.org/10.55643/fcaptop.4.45.2022.3801)
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Received: 02/07/2022

Accepted: 28/07/2022

Published: 31/08/2022

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# FINANCING THE FIXED ASSETS REPRODUCTION OF WOODWORKING ENTERPRISES: INNOVATION AND INVESTMENT ASPECT

## ABSTRACT

The current market economy implies that the search for effective sources of financing the fixed assets reproduction is one of the key tasks in managing the fixed capital of the economic entity. In the changing external environment, modernized equipment of enterprises provides an opportunity to carry out innovative activities, as well as to implement investment projects. The aim of the research was to outline a modern approach to financing the reproduction of fixed assets based on the identification of the relationship between investments and innovations in this process. The research involved the following methods: analysis and synthesis to determine trends in the dynamics of capital investment in Ukraine and the Republic of Poland; regression analysis to forecast the capital investment volume in Ukraine and the Republic of Poland; the internal rate of return to evaluate the effectiveness of the innovation and investment project of a woodworking enterprise. Capital investment volumes in Ukraine and Poland are determined. The 2025 capital investment volume is projected at \$8.02 billion in Ukraine (provided a stable rate of further economic decline), and at \$110.2 billion in the Republic of Poland. The strategic priorities for the development of woodworking enterprises are outlined: the production of innovative products; implementation of effective solutions for products and markets provided full implementation of innovation and investment strategy; focus on current market needs; ensuring a minimum degree of risk with maximum control of the innovation and investment project; achieving a short-term return on investment with maximum liquidity of the project and the implementation of innovation and investment strategy. An innovation and investment project were developed for the production re-equipment to create an innovative model of interior doors, and its economic justification was carried out.

**Keywords:** fixed capital, depreciation, equipment, innovation and investment potential

**JEL Classification:** D92, G31

## INTRODUCTION

The use of fixed assets, including their active part — machines tools and equipment — is one of the enterprise efficiencies factors. The production potential of enterprises has an impact on the place of the industry in the economy, its competitiveness, and social role in the division of labour. Reproduction financing implies that fixed assets gradually transfer their value to the products. It is necessary to modernize equipment while operating it, but this is not enough. The investment is required for the purchase of machine tools and equipment for the production or introduction of new technologies [1].

In this case, it is impossible to simply distinguish some aspects and quantification of investment, as well as to improve the efficiency of fixed assets. Investment and innovation are becoming increasingly important in economic processes, as they are associated with the opportunity of increasing the effects — economic efficiency, as well as improving ergonomics, and reducing environmental damage.

The aim of the study is to identify aspects of financing the reproduction of active fixed assets in the woodworking industry in terms of using the investment and innovation potential of enterprises. The main objectives were to identify the features of financing

the reproduction of fixed assets based on the innovation-investment aspect, study the innovation and investment strategy and analyse the effectiveness of the innovation and investment project on the example of the woodworking enterprises. Building an effective innovation and investment strategy is important for achieving the aim and fulfilling the objectives of the research. It should be based on input and output elements, as well as strategic priorities, objects and strategic alternatives.

## LITERATURE REVIEW

There are two approaches to defining the concept of the economic life of fixed assets — regulatory and optimization. These concepts determine the term for the use of the fixed asset, upon which the fixed asset should be replaced with a new or upgraded one. The fact that technically the fixed asset could still be used is not taken into account [2; 3].

The fixed assets turnover is carried out through depreciation deductions, where the depreciation policy is one of the methods of managing its reproduction. In theoretical terms, depreciation is a source of simple reproduction, while in practice it can be a source of expanded reproduction due to the shift in the establishment of the depreciation reserve and replacement of fixed assets in time [4].

From the perspective of the managerial approach to the reproduction of simply fixed assets, reproduction means the restoration of their utility (productivity, cost of production) to the original level at the time of purchase. Therefore, the emphasis on fixed assets productivity determines the importance of the reproduction of their active part — machinery and equipment [5].

It is necessary to analyse the dynamics and structure of fixed capital investment because the mass renewal of fixed assets of production is primarily the result of an investment. In turn, this result becomes a major factor in modernization and economic development [6].

The intensive expanded reproduction of fixed assets is characterized by increasing the production volume, improving the technological potential of the organization through investment and innovation, as well as product quality. As a rule, this type of reproduction allows the organization to reduce the unit cost of production while increasing productivity [7].

At the same time, financing the fixed assets reproduction is to reveal the relationship not only between innovation and investment for the implementation of relevant projects. The main feature is to make relevant decisions on liquidation, replacement, modernization or repair of active fixed assets (machine tools and equipment) carrying the greatest production load. Besides, standard service periods for this type of fixed assets cannot be set once because of the changing operating conditions of the equipment, modernization, innovations, and the introduction of new types of materials [8].

There is also the problem of the diversion of investment intended for fixed assets reproduction, which in fact covers the lack of working capital. This negatively affects the company's financial performance, including the amount of profit. In developed countries, investment in reconstruction is an effective financial tool to increase the company's production capacity [9].

The introduction of innovations in the production process in the form of new models of machines and equipment with the optimal operation period based on the rationalization of their use has a significant impact [10]. This is the relationship between innovation and investment. Investment restores fixed assets and creates innovation opportunities.

Most of the innovations provided by the innovation policy in the woodworking industry relate to the production range policy, raw materials, accessories and the use of tools. Possible innovation processes also include new production technologies and production management techniques. The main obstacle to innovation in the woodworking industry is a lack of investment, mainly because of the high risk and long payback period of the investment [11].

In recent years, the growing importance of foreign investment has been associated with accelerated globalization and socio-economic integration, which involves increased openness of domestic markets and their transformation into global markets. Foreign investment is important, most of all, for countries with savings lower than potential investment demand [12].

The globalization processes are characterized by capital flows to be attracted to the places providing certain benefits. Therefore, the investment recipient country largely determines the input elements for building an effective innovation and investment strategy. The greater the budget deficit of the recipient country, the lower the technological level of production,

the lower the R&D level, and the more difficult the conditions for creating innovation [13]. For this reason, foreign investment as a development opportunity for the donor country should be used for the development of science, reinvestment of profits, and fixed assets reproduction by the existing enterprises.

At the same time, it is worth noting that the sectoral aspects of financing fixed assets remain insufficiently studied, in particular in the woodworking industry.

The papers reviewed prove the topicality of the study of innovation and investment aspects of fixed assets reproduction. At the same time, it is appropriate to study the industry specifics of financing the fixed assets reproduction, the woodworking industry in particular.

## METHODS

Conducting the research and implementing the relevant innovation and investment strategy requires the analysis of the factors of the external and internal environment of the enterprise, as well as the investment climate of the region at the first stage. It is necessary in order to take into account the relevance of the implementation of a particular innovation and investment project. The dynamics of capital investment in Ukraine and Poland by a source of funding should be considered for this purpose. This provides for the use of the statistical method and the regression analysis.

The identification of the factors of external and internal environments, the investment climate of the region is followed by the consideration of strategic priorities of the enterprise development in order to build the innovation and investment development strategy. Effective innovation and investment development strategy is a set of inputs and outputs, in particular development priorities, strategic objects and strategic alternatives are its main aspects. For example, the sample for this study will be a list of strategic alternatives. The re-equipment of the production unit to create an innovative model of interior doors Evelin - 1 was selected among them (Table 2). However, the enterprise's management chooses the number of innovation and investment projects at its discretion, taking into account the following parameters depending on the financial strength of the enterprise:

- implementation time;
- project costs;
- use of human resources in monetary units;
- available benefits (for example, extending the life cycle of fixed assets through modernization).

The internal rate of return is used to evaluate the effectiveness of the innovation and investment project. This is an indicator used in the evaluation of investment projects, which is closely related to the net present value. It is also determined as the discount rate that makes net present value equal to zero for a given investment project. The internal rate of return (*IRR*) provides a relative profitability measure. This means that it is expressed as a percentage and provides information about the expected growth rates that the company or organization will achieve after the project completion. A high *IRR* indicates that the project has a potentially positive impact on growth, while a negative one indicates slow or weak growth. Net present value (*NPV*) is the project profit discounted to the present value (*PV*):

$$NPV = PV - I, \quad (1)$$

where *NPV* is the project's net present value; *PV* is the true value of cash flow over the life of the investment project; *I* is the amount of investment in the project.

The discount factor (*DF*) shows how much money we will receive, taking into account the time factor and the risks:

$$DF = 1/(1 + DR)^t \quad (2)$$

where *DF* is a discount factor; *DR* is a discount rate; *t* – the number of periods (years).

The profitability index (*PI*) indicates the efficiency of the enterprise. This indicator is often used in strategic planning, as it provides the advantage of feedback between the expected effect and investment:

$$PI = PV / I, \quad (3)$$

where  $PI$  is a profitability index;  $PV$  — cash flows in the present value;  $I$  — the amount of investment in the project (with different investment periods shall also be discounted to the present value).

To determine the payback period, the average annual amount of cash flow in present value is set. This is why the average value is calculated for 4 years in our case:

$$PP = I / PVt, \quad (4)$$

where  $PP$  is a payback period;  $I$  — the amount of investment in the project;  $PV$  — the present value of cash flow in the period  $t$ .

The method of internal rate of return:

$$IRR = \left( \frac{NPV}{I} \right) * 100 \quad (5)$$

where  $IRR$  is an internal rate of return;  $NPV$  is a net present value;  $I$  — the amount of investment in the project.

The investment management and management of the enterprise make appropriate strategic decisions on a further operation based on the data obtained for the innovation and investment project at the final stage of strategy implementation.

## RESULTS

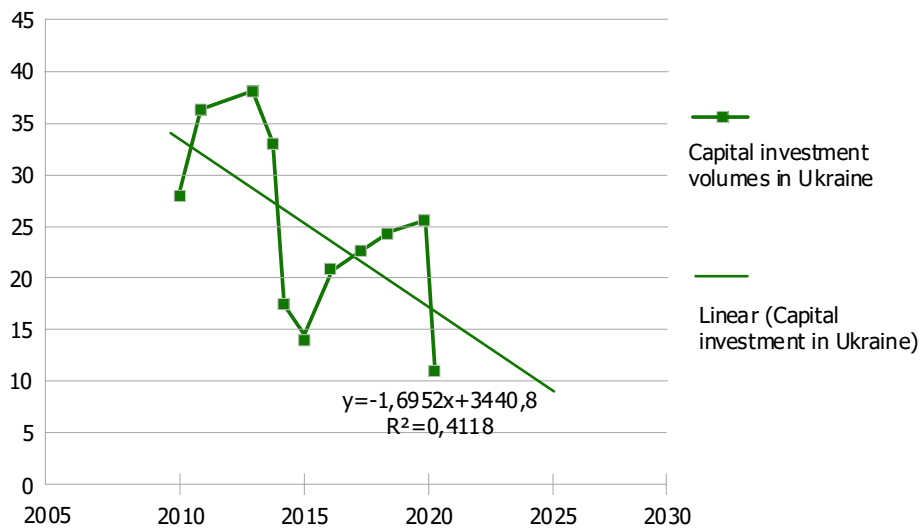
We consider the dynamics of capital investment in Ukraine and Poland in 2010-2019 (Table 1) in order to review the general situation with investment in fixed assets reproduction.

**Table 1. Dynamics of capital investment in Ukraine and the Republic of Poland for 2010 - 2020, USD billion.** (Source: prepared by the author based on [3; 21])

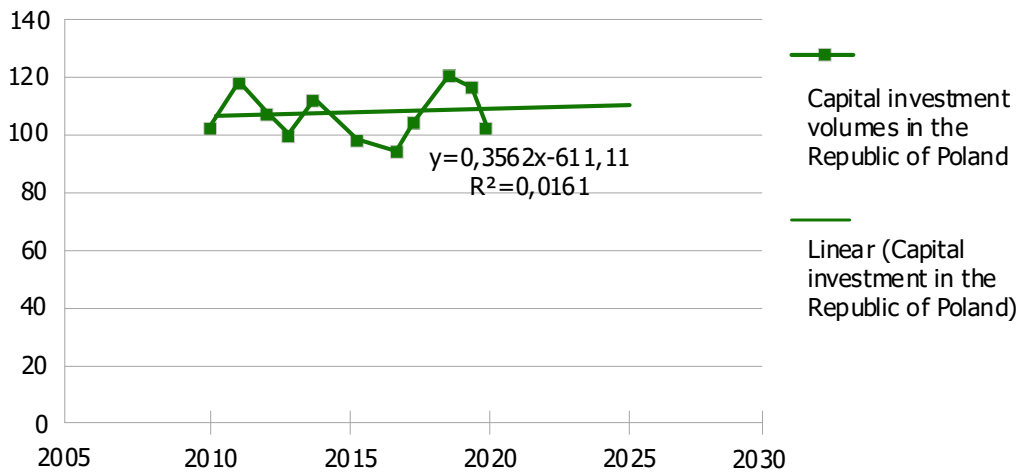
Indicators	Capital investment in Ukraine		Capital investment in the Republic of Poland	
	Billion USD	% to GDP	Billion USD	% to GDP
2010	28.39	20.87	102.16	21.31
2011	36.61	22.44	118.67	22.44
2012	38.17	21.72	105.03	20.99
2013	33.89	18.49	99.51	18.98
2014	17.88	33.40	111.03	20.36
2015	14.50	15.93	97.71	20.46
2016	20.28	21.72	92.46	19.59
2017	22.38	19.95	104.32	19.82
2018	24.56	18.77	121.00	20.77
2019	26.23	18.05	117.80	19.73
2020	11.69	7.52	102.90	17.25

As we see, the capital investment volume in Poland significantly exceeds that in Ukraine in monetary terms. But in terms of the percentage of GDP, the level of investment in fixed assets of Ukrainian and Polish enterprises is almost the same and ranges around 18-20% of GDP. The exception was 2020 when investment in fixed assets declined in both countries because of the crisis in the economy caused by the COVID-19 pandemic.

We also forecast further volumes of capital investment of Ukrainian and Polish enterprises through the regression analysis in MS Excel (Figure 1, Figure 2).



**Figure 1. The trend line parameters of capital investment in Ukraine, USD billion.** (Source: built by the author based on [3; 21])



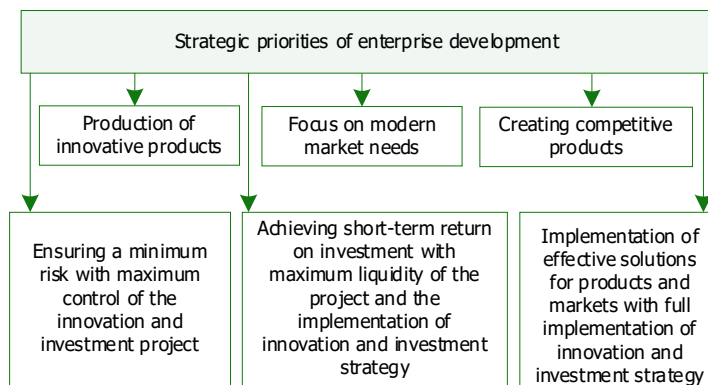
**Figure 2. The trend line parameters of capital investment in the Republic of Poland, USD billion.** (Source: built by the author based on [3; 21])

Given the parameters of the regression equations, we can forecast that the capital investment volume of Ukrainian enterprises in 2025 will decline to \$ 8.02 billion (provided the stable rate of further economic decline), while it is expected to increase to \$110.2 billion in the Republic of Poland. This is why the study of the specifics and improvement of investment and innovation of fixed assets reproduction is required.

The ability of investment management to attract a variety of financial resources from different sources of funding, for the fixed assets reproduction among other things, opens up significant prospects for the rapid economic development of the enterprise. Most of the innovation and investment projects of the enterprise are financed from its own funds, less often — by attracting investors' funds. The next step is to determine the development priorities, that is outlining the main directions of further expansion of the enterprise or reduction of certain areas.

The practice of woodworking enterprises (WoodWay, Kronospan, Sokme, Brosko), including those with joint Ukrainian-Polish capital (Gerbor (BRW Ukraine)), indicates their medium investment activity.

Relevant strategic alternatives should be taken into account when selecting appropriate strategic objects (innovation and investment projects) (see Figure 3).



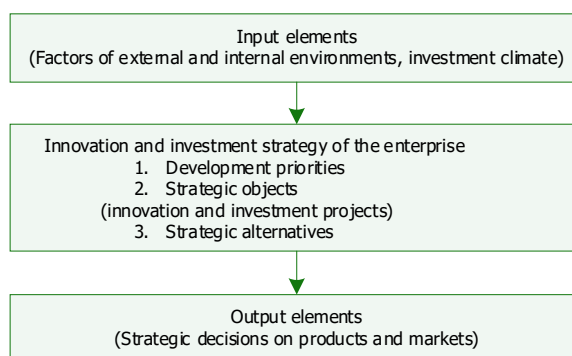
**Figure 3. Strategic priorities for the development of woodworking enterprises.**

The woodworking enterprise can have the following strategic alternatives: expansion of production areas, equipment of new workplaces, and reconstruction of buildings. Table 2 presents a list of potential strategic alternatives for the wood-working enterprise.

**Table 2. Potential strategic alternatives for woodworking enterprises.**

The name of the strategic alternative for the enterprise	Implementation period, years	Availability of innovations	Project costs, UAH million	Wages, UAH million	Benefits
Modernization of existing equipment	2	No	3	0.5	Extension of the life cycle of fixed assets through modernization
Opening of a branch in Lviv	3	No	4	1.5	Enterprise expansion
Re-equipment of the production unit to create an innovative model of interior doors Evelin – 1	4	Production of a new model of interior doors	3.8	1	Availability of innovations
Production of kitchen furniture	4	No	5	2	Expanding the product range
Production of furniture for bedrooms and living rooms	5	No	6	2.5	Expanding the product range

We choose one innovation and investment project — the creation an innovative model of interior doors Evelin – 1, as the real estate market is growing rapidly. An effective innovation and investment strategy are a relationship of inputs and outputs based on development priorities, relevant innovation and investment projects and selected strategic alternatives. Figure 4 illustrates the development of innovation and investment strategy.



**Figure 4. The outline of the development of an effective innovation and investment strategy.** (Source: prepared by the author based on [3;21])

One of the main dysfunctions in the strategy implementation is the inadequate integration into the strategic planning process and further control over the initial elements, that is further decisions after the implementation of the chosen strategy. It should be emphasized that the main problem is the imperfection of management and selection of strategic alternatives, as well as the separation of the strategy-building process from its implementation.

These enterprises effectively implement the innovation and investment strategy through the use of their own funds and through the attraction of the investors' funds, applying a systems approach. Capital investments are aimed at improving

the condition of fixed assets, expanding the scope of services through the implementation of innovation and investment project "Re-equipment of the production unit to create an innovative model of interior doors Evelin — 1". The innovation and investment project consider the prospect of expanding the product range by creating a new door model that is more ergonomic and has high sound insulation, which is for multi-storey buildings. Table 3 shows the data of the innovation and investment project "Re-equipment of the production unit to create an innovative model of interior doors Evelin — 1" with a 4-year implementation period.

**Table 3. Characteristics of the innovation and investment project "Re-equipment of the production unit to create an innovative model of interior doors Evelin — 1", mln UAH.** (Source: the data are provided on the basis of the financial statements of the enterprise)

Indicators	mln UAH
Investment	3.8
Cash flow (project income)	6.5
2020	2
2021	1.5
2022	2
2023	1
Discount rate, %	12

The cost of this innovation and investment project is UAH 3.8 million, the total project income is UAH 6.5 million. A discount rate of 12% was chosen for the calculations, as this rate shows the average return expected by the owners (investors) of the enterprise, investing in it. As we can see from the above indicators, the cash flows of the investment project are mostly uniform during the first three years of implementation (2, 1.5, 1 million UAH), and decrease by the fourth year of project implementation (1 million UAH). We will further analyse the state of implementation of the innovation and investment project "Re-equipment of the production unit to create an innovative model of interior doors Evelin — 1". For this purpose, we will use a system of indicators of investment projects: by calculating the net present value (NPV); profitability index; payback period; internal rate of return (IRR) of the project. Table 4 shows the calculation of the true cost of the project, which is adjusted for the discount rate.

**Table 4. Calculation of the present value of the innovation and investment project "Re-equipment of the production unit to create an innovative model of interior doors Evelin — 1, mln UAH.** (Source: the data are provided on the basis of the financial statements of the enterprise)

Years	Future cash flows	Discount factor at a rate of 12%	Present value
2020	2.5	0.893	2.799
2021	2.3	0.797	2.8858
2022	1	0.712	1.4044
2023	1	0.636	1.5723
Total	6.8	-	8.6615

In our case,  $PI = 2.27$ , which means that the PI is greater than 1, so this project should be considered to improve the state of the enterprise. In case the value of the profitability index is less than or equal to 1, is not reasonable to implement such a project. Now, it is necessary to find the size of the discount, at which the true value of cash flow is UAH 8.6615 million. Table 5 summarizes calculations for the investment project.

**Table 5. Consolidated calculations for the investment project.** (Source: the data are provided on the basis of the financial statements of the enterprise)

Indicators	Value
Profitability index (PI)	2.27
Payback period (PP), years	1.75
Internal rate of return (IRR), %	127.93

Performance indicators evidence the feasibility of the project implementation. The profitability index is greater than 1, and the payback period of the project is 1.75 years, the internal rate of return is 127.93%, the net current value of the project is UAH 4.8615 million. However, the internal rate of return may be too optimistic, so some investors refer to the modified internal rate of return. The internal rate of return is often used to determine the profitability of a project.

## DISCUSSION

The current economic conditions dictate that further innovative development of industrial enterprises is impossible without the introduction and effective use of new technologies in the production of knowledge-intensive products — without the implementation of fixed assets reproduction [14].

At the same time, in order to successfully compete in the market, companies need to make investments for the modernization of their assets, among other areas. The investment is aimed at ensuring the development of the economic entity, as well as at increasing productivity and economic performance [15].

The results of the study confirm the views of researchers [16]. They believe that the improvement of fixed assets is possible only through the renewal and implementation of technical and technological innovation modernization, as this determines the production growth rates and the future efficient operation of the enterprise as a whole.

Moreover, we agree with the opinion of authors [17] on the search for strategic prospects for fixed assets reproduction by industrial enterprises, which takes place in harsh conditions, as their financial condition does not allow for proper reproduction while attracting external resources is risky and nonoptimal.

At the same time, the author [18] notes that the priority of development may be, for example, achieving the socio-economic effect, modernization of fixed assets, and increasing profits. The same results were obtained in our study. The strategy is, in fact, a set of measures and methods aimed at achieving the selected priorities through the implementation of selected projects, taking into account the impact of external and internal factors.

In discussing the results of the study, it should be taken into account that inadequate growth investment in fixed assets is an obstacle to the effective reproduction of industrial fixed assets in the region. This seriously impedes the neo-industrial transformation of the economy [6; 19]. The results of our research prove the possibility of neutralizing such obstacles.

Own funds are the main part of the sources of financing the fixed assets reproduction of enterprises. Their growth requires active state support of enterprises, aimed both at improving financial performance and the development of optimal depreciation policy [20; 21].

At the same time, the author's [4] opinion on the appropriateness of indexing depreciation, which is attractive for business entities, is correct. We should also take this opinion into account in further research. The state can use an additional tool of economic regulation within this source of funding for fixed assets reproduction: obliging companies that choose this method to use the depreciation reserve for its intended purpose [25; 26]. This method is a tool of state support, which does not apply to measures that directly affect production's growth and restrictions on trade, and has no obstacles to its use in accordance with the rules of the World Trade Organization [22].

Scholars also suggest the use of monetary "pools" to finance fixed assets reproduction. Cash pools accumulate funds in the form of retained earnings and depreciation, which are not always used for their intended purpose. So, managers need to focus on their accumulation and rational use [9].

Financial leasing is also a source to finance the active fixed assets reproduction. As world experience shows, financial leasing is an effective tool for the renovation of the fixed assets of enterprises, but its share is too small in the total investment in the active fixed assets [23]. There is a need to develop new mechanisms that would ensure the synchronization of the main cycles of development of business entities and promote the development of leasing technologies [24].

## CONCLUSIONS

The fixed assets reproduction, including the active assets in the form of machine tools and equipment, is one of the key factors in ensuring the competitiveness of the woodworking enterprise in the furniture market, as well as a component of investment and innovation activity of the economic entity. As it was found, the modernized equipment provides an opportunity to produce innovative products, while expanding the product range, as well as reduce the cost of manufacturing wood products. Financing the reproduction of fixed assets of woodworking enterprises from the point of view of innovation and investment aspect involves the selection of rational sources of financing for the reproduction of fixed assets, the development of investment projects for the production of innovative products from wood (for example, the production of an innovative door model in our study), as well as determining the effectiveness of such financing in modern economic conditions. At the same time, the company's own funds or financial leasing are rational sources of financing the fixed assets reproduction. Retained earnings are the recommended source of financing in terms of using the own funds of a woodworking enterprise. Financial leasing has the most significant advantage, which is the ability to use machine tools



and equipment without the funds to cover the cost available at the enterprise. The modernization of equipment for the manufacture of innovative products should play an important role in the development of investment projects for wood-working enterprises. Prospects for further research include determining the rational grounds for the use of financial leasing of equipment as an effective tool for fixed assets reproduction by woodworking enterprises.

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## ФІНАНСУВАННЯ ВІДТВОРЕННЯ ОСНОВНИХ ФОНДІВ ДЕРЕВООБРОБНИХ ПІДПРИЄМСТВ: ІННОВАЦІЙНО-ІНВЕСТИЦІЙНИЙ АСПЕКТ

Сучасна ринкова економіка передбачає, що пошук ефективних джерел фінансування відтворення основних фондів є одним із ключових завдань в управлінні основним капіталом суб'єкта господарювання. У мінливому зовнішньому середовищі модернізоване обладнання підприємств дає можливість здійснювати інноваційну діяльність, а також реалізовувати інвестиційні проекти. Метою дослідження було виявити зв'язок між інвестиціями та інноваціями, а також окреслити сучасний підхід до фінансування відтворення основних фондів. У дослідженні були використані такі методи: аналіз та синтез для визначення тенденцій динаміки капітальних інвестицій в Україні та Республіці Польща; регресійний аналіз для прогнозування обсягу капітальних інвестицій в Україні та Республіці Польща; внутрішня норма прибутку для оцінки ефективності інноваційно-інвестиційного проекту деревообробного підприємства. Визначено обсяги капітальних вкладень в Україні та Польщі. Обсяг капітальних інвестицій в Україні на 2025 рік прогнозується на рівні 8,02 млрд доларів США (за умови стабільних темпів подальшого економічного спаду), а в Республіці Польща – 110,2 млрд доларів. Окреслено стратегічні пріоритети розвитку деревообробних підприємств: виробництво інноваційної продукції; упровадження ефективних рішень для продуктів і ринків за умови повної реалізації інноваційно-інвестиційної стратегії; орієнтація на поточні потреби ринку; забезпечення мінімального ступеня ризику при максимальному контролі інноваційно-інвестиційного проекту; досягнення короткострокової окупності інвестицій при максимальній ліквідності проекту та реалізації інноваційно-інвестиційної стратегії. Інноваційно-інвестиційним проектом було розроблено переоснащення виробництва для створення інноваційної моделі міжкімнатних дверей і здійснено його економічне обґрунтування.

**Ключові слова:** основний капітал, амортизація, обладнання, інноваційно-інвестиційний потенціал

**JEL Класифікація:** D92, G31