

# Transformation of national Accounting Depreciation Methodology in Accordance with the Questions of the digital innovational Economy

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## Abstract

Substantiation of the necessity to improve the national method of depreciation accounting in accordance with the challenges of the innovative digital economy. Critical assessment of the national's components depreciation accounting methodology. Construction of the basic mathematical model life cycle asset, taking into account the economic efficiency of this equipment's use, the cost of innovation replacement equipment and the price at which existing equipment can be realized. Exemption of the depreciation's branch component, which is reinforced by the development of the digital economy and scientific and technological progress. Methods. In the study of foreign experience in the regulation of depreciation's allocation deductions, the method of system generalization was used. The method of sociological analysis is used to study the opinion of specialists on the practical implementation of the accounting and information component of the formation of depreciation policy in the framework of national and international accounting and reporting standards. Simulation is used in constructing a dynamic function of determining the life cycle of an asset and the effect of this indicator on the method of accounting for depreciation. Results. The constructed model of the life cycle of an asset provides an opportunity to develop a accounting methodology based on the requirements of innovative directional production, which allows considering depreciation deductions in the perspective of their investment and innovative use, which is embodied in the formation of a depreciation fund in the sum of promising investments, rather than retrospective costs. The simulation of the life cycle of the asset revealed discrepancies with the normative values in accordance with the Tax Code of Ukraine, which confirms the need for a differentiated sectoral approach to asset amortization. Conclusions. The formation of the depreciation policy of the state should be based on the technological expediency and economic ability of enterprises to independently update non-current assets. The method of accounting for depreciation should provide information and form data arrays in areas such as statistics on the economic efficiency of current and capital repairs, the dependence of economic indicators on the stage of the asset life cycle, professional judgment of technical workers on the prospects of attraction and use of technologies, cost and cost-effectiveness of innovation. The practice of statistical observation of the circular circulation of non-current assets in Ukraine does not allow for the calculation of such indicators. In order to model the results of the change in the methodology of depreciation accounting, a survey was conducted on 132 enterprises, in which experts from the economic and technical fields participated. The obtained data allowed substantiating the economically expedient life cycle of the asset, taking into account the field of use. The obtained data allowed substantiating the economically expedient life cycle of the asset, taking into account the field of use, which is especially relevant for the enterprises of the agro-industrial complex, which revealed significant differences. In addition, the questionnaire survey confirmed the expediency of attracting professional judgment of technical staff in order to predict the life cycle of the asset (the difference between the estimated data and the survey results was 8.23%).

**Key words** depreciation policy, information support, accounting, innovation policy, investment policy

**JEL Codes:** M41, M48

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### **Introduction. Literature review**

The peculiarities of socio-economic development of Ukraine at the present stage and a definite course towards European integration determine the need for innovation in the restructuring of the economy and the search for economic mechanisms to stimulate investment and innovation activity. An assessment of the state of the innovation and scientific and technical sphere of Ukraine according to the indicators of the European Innovation Scoreboard testifies to the need to develop and implement a targeted science and technology and innovation policy. Bringing it into line with regulatory regulation of entrepreneurial activity, real steps to implement the necessary structural changes in the economy, and science, as well as technological modernization of production.

Comprehensive construction of the information space, continuous statistical surveys, a flexible system of interaction between the state and business entities, transparent programs of support for depreciation policies made it possible to reduce the level of wear and tear of non-current assets to 38% in Canada and 26% in Japan (Suga and Nomura, 2018), according to the World Bank index the level of investment-innovation activity in these countries is about 44% (PricewaterhouseCoopers, n.d.).

A key element in the growth of innovation activity was the introduction of a depreciation policy aimed at the timely formation of its own investment resource at the expense of amortization deductions. Comprehensive policies in these countries have led to an increase in the depreciation share in gross investment from an average of 43% to 54.5% (European Commission, 2008). To achieve such results in the process of amortization policy allowed high-quality accounting and information support. The accumulation of extended databases, exchange, analytical procedures and reporting information is impossible without a radical transformation of the accrual methodology and accounting and accounting depreciation.

#### **1. Literature review**

Analysis of scientific publications allowed substantiating the theoretical basis for the formation of depreciation policy. This testifies to the presence of significant domestic gains from depreciation accounting, the development of an investment and innovation component of accounting. However, it does not lose relevance to the study of the essence of the category "depreciation", the definition of its subject and object, the theoretical basis of accounting and accounting synchronization of innovation and depreciation policy of the state and enterprises. Insufficient attention was paid to the impact of institutions on depreciation policy, its system of regulation and infrastructure provision. Need to study the factors of influence on depreciation policy. At the time, there is an actual assessment of expediency of implementation of certain elements of foreign methods of accrual and use of depreciation. Few researchers are innovative directions for improving the methodology of depreciation and the theoretical basis for the formation of centers of responsibility for depreciation policy.

All this, in aggregate, leads to the recognition of the need to formulate the concept of accounting and information provision of amortization policy with the definition of the list, content and frequency of reporting and the organization of a single accounting and information space.

The discrepancy of the theory and methodology of amortization policy formation with the conditions of the institutional economy, the aggravation of the problem of innovation renewal of assets, the issue of stimulating the accumulation and use of depreciation resources in accordance with the requirements of scientific and technological progress, determined the research direction, the topic of the dissertation, its content, purpose, task, scientific and methodological and practical significance.

#### **2. Research methodology and data**

In the analysis of the effectiveness of accounting techniques and accrual of depreciation for 2015-2018, used official data from the State Statistics Service of Ukraine, the Ministry of Economic Development and Trade of Ukraine, the Office for Financial and Economic Analysis in the Verkhovna Rada of Ukraine, the World Bank, the Organization for Economic Cooperation and Development, The Statistical Service of Canada, an information communique of international organizations on innovation and investment activities, specialized professional Internet resources, materials of the public unions of Ukraine (Federation of Auditors, Accountants and Financiers of the Agroindustrial Complex of Ukraine, NGO «Agrarian Union of Ukraine», GO «Innovations and Social Economic Initiatives»), data of financial, statistical, management reporting, internal regulations of enterprises, results of enterprise's questionnaires.

In the study of foreign experience in the regulation of the allocation of depreciation deductions, the method of system generalization was used.

The method of sociological analysis is used to study the opinion of specialists on the practical implementation of the accounting and information component of the formation of depreciation policy in the framework of national and international accounting and reporting standards. Simulation is used in constructing a dynamic function of determining the life cycle of an asset and the effect of this indicator on the method of accounting for depreciation. The information base of the research served as scientific developments of domestic and foreign scientists, devoted to questions of theory, methodology and organization of accounting and information support for the formation of depreciation policy, institutional accounting theory; Accounting Standards (Standards) and International Financial Reporting Standards; official data of the State Statistics Service of Ukraine, the Ministry of Economic Development and Trade of Ukraine, the Office for Financial and Economic Analysis in the Verkhovna Rada of Ukraine, the World Bank, the Organization for Economic Cooperation and Development, the Statistical Service of Canada; Informational communiqué of international organizations on innovation and investment activities; specialized professional Internet resources; materials of the unions of Ukraine (Federation of Auditors, Accountants and Financiers of the AIC of Ukraine, NGO "Agrarian Union of Ukraine", NGO "Innovations and Socio-Economic Initiatives"); data of financial, statistical, managerial reporting, internal regulations of enterprises, results of questionnaires, etc.

### 3. Results and discussions

The research of the current state of amortization policy formation in Ukraine revealed its direct dependence on general economic factors, such as the size of an enterprise, the degree of freedom of action, the level of taxation, etc. (Zherdev, n.d.). According to statistics, in 2018 about 82% of enterprises belong to the category of "micro enterprises", and accordingly, to the formation of amortization policy are formally, and 81% of the total number of economic entities - these are individuals who in the vast majority do not are engaged in the calculation of depreciation (Eurostat, 2015).

This is due to the ignorance of the importance of the depreciation component in the accounting strategy of the enterprise development and the lack of human and technical resources for analytical work, the organization of the exchange and use of information.

The analysis of the dynamics and structure of investments in non-current assets for 2015-2018 showed the priority of financing in the direction of "replacement of worn machinery or equipment."

Among all investments, the share of this trend is from 33 to 42% of statistical observations (Sala-I-M. et al., 2017). The modeling of further investment decisions by the determined directions of statistics revealed a tendency to reduce investments in the rationalization of production (17% of the total number of enterprises in 2021) and a significant increase in the share of investments in replacing worn out machinery and equipment (over 80% in 2021).

Such modeling results confirm the need for revision at the state level and, accordingly, in the accounting policies of enterprises for depreciation methods, an important element of which is to determine the useful life of the asset. This is confirmed by the experience of the G7 countries, where much attention is paid to a rational, balanced depreciation policy based on a system of time limits for useful use, the optimal value of which is called the life cycle of the asset.

In accordance with such information requests of the present day, accounting requires a methodology for calculating indicators that reflect the level of innovative asset renewal or its necessary criteria. The accuracy of the fixed capital valuations obtained by identifying the innovation index depends to a significant extent on the duration of the service, that is, the duration of the time during which the assets are held in equity, either in the composition of the original buyer or in the stocks of the producers who purchase them, as secondary assets. The researchers pointed out that the life-cycle of assets is recognized as an economic category rather than a physical or engineering category (Hunya, 2000).

This is important because it means that the life cycle of assets can change over time simply because of economic events, even if the asset remains physically unchanged. In fact, asset life cycle is one of the ways in which aging is detected and a liquidation decision is taken if there is a prospect or a substitute for a new, possibly more productive and / or cheaper asset, which makes the existing model outdated.

Moreover, the average or short term of service should differ from the maximum life of the asset group, since the life of the same assets in the group is usually described by the same liquidation function.

In most countries, tax authorities determine the number of years for which depreciation of different assets types can be deducted from profit before deducting tax liabilities.

For example, Australia and Germany use them both to estimate the life of assets for which there is no other source, and to ensure a joint validation of lifetime estimates obtained by other methods. In the study of directions of transformation of the depreciation's accounting method interest in the first place, which sources are used to assess the tax life cycle. It can be assumed that the defined tax cycle in most cases is based on sources of different reliability, including experts' opinions, special reviews of individual assets in specific sectors economy's and analytical data of organizations.

In general, the accuracy of tax definitions depends on how much they are actually applied in tax calculations. Some governments use accelerated depreciation systems to stimulate investment, resulting in life cycle times becoming irrelevant for the calculation of tax liabilities, and for taxpayers, there is no incentive to make sure that life cycle indicators are accurate and supported in accordance with requirements. That is why, with a shortage of budget funds for Ukraine, it would be expedient to use life cycle indicators based on periodic and statistical data, since measures of state protection in the form of a tax bonus or compensation of a share of the value of investments are not applicable and are not foreseeable in the near future.

To verify the scientific hypothesis of the transformation of the method of accounting for depreciation using FAAF ACU, a survey was conducted of 132 enterprises, in which experts of economic and technical directions took part. Next, an asset is used in three industries and has the same technical characteristics for a clear demonstration of the industry specific use.

The task was to prepare a schedule for replacing equipment, which ensures the economic efficiency of the use of this equipment, taking into account the cost of the necessary replacement of equipment and the price at which the equipment used can be implemented.

On the basis of the obtained data, the life cycle modeling of the determined asset was performed. In determining the life cycle of an asset, a dynamic programming method was used with the use of the Weibull function in calculations.

Dynamic programming is an optimization method adapted to operations in which the decision-making process can be divided into separate stages (steps) (Balogh et al., eds., 2000). This method is based on the use of the optimality's principle and makes it possible to compare the extreme values of the objective function in such problems, for which the typical length of the studied processes is typical. At the same time, the decisions taken at each step affect the results obtained at other stages.

The essence of solving the problems of dynamic programming is as follows:

- optimization is carried out by the method of successive approximations (iterations) in two circles; first from the last degree of surgery to the first, and then, on the contrary - from the first to the last degree;
- in the first circle, going from the next steps to the previous ones, there is the so-called conditional optimal control; The conditional optimal control is chosen so that all previous stages provide the maximum efficiency of the next degree. In other words, at each step there is such a control, which ensures the optimal continuation of the operation. This continues until the first step, but since the first step does not have the preceding one, then the conditional optimal control obtained for it loses its conditional character and becomes simply optimal control;
- the second round of optimization begins with the first step for which optimal management is known.

To validate the model, calculations were made to determine the life cycle of a truck. The results of calculations of the life cycle of the asset accounted for 10 years for agriculture, for trade - 6, transport enterprises - 7 and industry - 8 years, with an average value for the enterprises under study 15 years.

Changing the depreciation methodology will take into account the peculiarities of the innovative restoration of non-current assets in the sectoral view, taking into account the pace and peculiarities of scientific and technological progress in it. It should be noted that for the construction of the model, not the retrospective value of the replacement of the relevant non-current asset, and its present value, which would form an appropriate reserve for its own investments, was used.

Simultaneously with the study of economic indicators of the efficiency of the use of non-current assets, a questionnaire was compiled from the professional assessment of the possible timing of the use of the asset and the effectiveness of the application of the adopted depreciation method, taking into account the speed of change in the modern production technology. Survey results are given in Table 1.

**Table 1. Useful life, years**

Activity	Truck	
	professional judgment of enterprises technical workers	forecast indicator (based on modeling results)
Agriculture	10	10
Motor transport	4	7
Trade	7	6
Industry	8	8
Actual enterprises	15	

Source: systematized by the author on the basis of questionnaires of commodity producers and modeling

The conducted questionnaire confirms the effectiveness of professional judgment, and the possibility (or need) to apply such indicators in the reporting. The application of the improvement methodology clearly illustrates the consideration of the industry specifics of the enterprise, since at almost the same level of innovation in the transport enterprise, the lorry is the main means of production, and in agriculture, it is auxiliary, hence the various life cycle terms of the asset. The improvement of methodology and the possibility of its annual revision should be fixed in the order on the accounting policy of the enterprise, which will allow formation of the investment resource necessary for innovative reproduction in the form of a depreciation fund of the enterprise.

### Conclusions

As a result, of the study of the methodology of accounting policy and amortization policy of domestic and foreign enterprises, it has been found that in developed countries, depreciation policy is one of the main ways of managing an enterprise. In particular, the management of operational capital of an enterprise is part of the general policy. Formation of own investment resources, as well as an integral part of the general asset management policy. It determines the effectiveness of the process of recovering resources spent by the enterprise on the acquisition of assets, and is a tool to manage the current cost of these assets. The critical assessment of individual elements of the depreciation methodology and the experience of their practical application made it possible to determine the useful life of the asset as a key component, which should be transformed into the life cycle of an asset, which is formed depending on the demands of innovation-oriented production development.

Theoretical and practical researches in the direction of identifying innovatively favorable terms of useful use require the formation of a certain information basis, which consists of statistical data and data of sample observations and professional judgment of technical and accounting services. Such a transformation can become an alternative to state protectionism, provided that an array of statistical data is created using the capabilities and tools of accounting and reporting.

Thus, the state amortization policy has a real opportunity to overcome the existing imbalance of budgetary interests and investment needs of enterprises. Recovering depreciation, as a reliable source of investment, it is necessary to provide for its regulation, limiting the use of the created resources to the current needs of the enterprise.

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