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DEVELOPMENT OF AN ALGORITHM FOR ASSESSING THE FAIR VALUE OF NON-CURRENT ASSETS FOR HIGHER EDUCATION INSTITUTIONS

The object of research is the algorithm for assessing the fair value of non-current assets for higher education institutions.

The research problem, which is solved in the course of the work, is the lack of a clear algorithm for assessing the fair value of non-current assets of higher education institutions. There is also no methodological support for assessing the fair value of non-current assets taking into account the industry specifics of higher education institutions.

The work has developed an algorithm for assessing the fair value of non-current assets of higher education institutions, which includes two directions: assessing the fair value of non-current assets independently for higher education institutions; assessment with the help of an assessment entity. The algorithm for assessing the fair value of non-current assets independently by higher education institutions is identified as the main direction, which involves the implementation of the following actions:

- creation of an assessment commission;
- approval of the head's order for the assessment;
- the presence of an active market;
- the possibility of identifying the object;
- the presence of methodological support for calculating fair value.

The methods of assessing the fair value of non-current assets were investigated, among which: market, cost and income. The market method of assessing the fair value of non-current assets, which is the easiest to apply, was determined as the recommended one for higher education institutions. Its advantages and disadvantages were summarized, among the advantages the market factor of supply and demand for similar objects was highlighted. The structure of the Methodological Provisions for assessing the fair value of non-current assets (NA) was developed according to the following points:

- general provisions;
- criteria for allocating groups of NA subject to assessment;
- criteria for identifying NA;
- the presence of active market conditions;
- methods of assessing fair value;
- requirements for drawing up an Act on the valuation of non-current assets.

Keywords: *valuation of non-current assets, valuation algorithm, fair value, initial recognition, revaluation, higher education institutions.*

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1. Introduction

Non-current assets (hereinafter referred to as NA) of state higher education institutions (hereinafter referred to as HEIs) play an important role in determining the direction of development of the educational sector. More and more attention in the educational process of HEIs is paid to the latest technologies, the introduction of new modern equipment, the use of innovative platforms in order to improve

the quality of educational services. Non-current assets are considered one of the most important objects of accounting and reporting, which characterize the property status and economic potential of HEIs. An important role in the system of movement of non-current assets is played by their valuation, which should guarantee reliable data in financial reporting. Valuation of non-current assets as a component of the accounting method ensures transparency, clarity, and accessibility of accounting data formed in financial reporting.

Using the National Provisions (Standards) of Accounting in the Public Sector (hereinafter referred to as the NP(S)APS), the valuation of non-current assets has undergone significant changes, its functions have significantly expanded, and the types and methods of calculation have diversified. One of the most problematic issues in the process of valuing non-current assets is determining the fair value upon initial recognition and subsequent revaluation.

Various scientists have dealt with the problems of valuing non-current assets, among whose works it is possible to highlight research in the following areas:

- valuation of non-current assets based on the concept of fair value [1];
 - application of the principles of conservatism as opposed to the application of the concept of fair value of assets [2];
 - modern methods of valuing intangible assets [3].
- Among the scientists who have dealt with the issues of valuing non-current assets of public sector entities, the following studies can be highlighted:
- valuation of assets in the accounting system [4, 5];
 - modern approaches and innovations in the valuation of budgetary institutions [6];
 - valuation and classification of non-financial assets in the public sector [7].

The problems of asset valuation in the public sector have been studied, however, the problems of valuation of non-current assets of higher education institutions during initial recognition and their subsequent revaluation remain unresolved.

The aim of research is to build an algorithm for assessing the fair value of non-current assets for higher education institutions. To achieve the set aim of the research, the following scientific objectives have been defined:

- determine the volume of state funding directed to education;
- determine possible periods for assessing the fair value of non-current assets;
- develop an algorithm for assessing the fair value of non-current assets of higher education institutions;
- investigate methods for assessing the fair value of non-current assets;
- develop the structure of the Methodological Provisions for assessing the fair value of NA.

2. Materials and Methods

During the work, general scientific and special research methods were applied:

- methods of analysis and synthesis (analysis of regulatory and legal support for accounting for non-current assets for HEI);
- methods of analogies and comparison (comparison of norms of the NP(S)APS and other regulatory documents);
- system method (standardization of determining the fair value of non-performing assets);
- generalization method (development of a conceptual model for assessing non-current assets of higher education institutions).

3. Results and Discussion

Non-current assets in the activities of HEIs affect the quality of educational services provided. Depending on the condition of non-current assets, the material and technical base of HEIs is in such a condition. Therefore, it is important to constantly update and improve the condition of non-current assets, improve the quality of educational services, student living conditions, and increase income. The bulk of HEI financing is carried out through the state budget of Ukraine. In accordance with the Law of Ukraine "On the State Budget of Ukraine for 2023" [8], state budget expenditures are distributed in various areas in accordance with the budget classification. Fig. 1 shows the distribution of expenditures by functional classification as of 01.01.2023.

Thus, education accounts for 1.5 % of the state budget expenditures of Ukraine, which is 1104.6 million USD, a significant share of which falls on non-current assets.

In the context of reforming the accounting system in the public sector, the essence of assessment is being rethought, its role and significance are changing due to the expansion of its functions, the diversity of types in accordance with the NP(S)APS and International Accounting Standards for the Public Sector (hereinafter referred to as IPSAS).

Updated approaches to the assessment of non-current assets have entered the practice of HEIs through the NP(S) APS implementation [9, 10], implemented on the IPSAS basis [11]. Additionally, information on the features of the assessment of non-current assets is disclosed in the Methodological Recommendations for Accounting for the Public Sector (Methodological Recommendations) [12]. The Methodological Recommendations cover in more detail the issues of assessing fixed assets and intangible assets as the main elements of non-current assets for HEIs.

Valuation of non-current assets as an element of the accounting system is included in the process of forming accounting and analytical information at all stages of the accounting process [4]. Starting from the initial recognition, subsequent recognition and disposal of non-current assets:

- at initial recognition, the valuation affects the initial cost of non-current assets;
- at subsequent recognition, the valuation affects the revaluation of non-current assets;
- at disposal, the valuation affects the sale value of non-current assets.

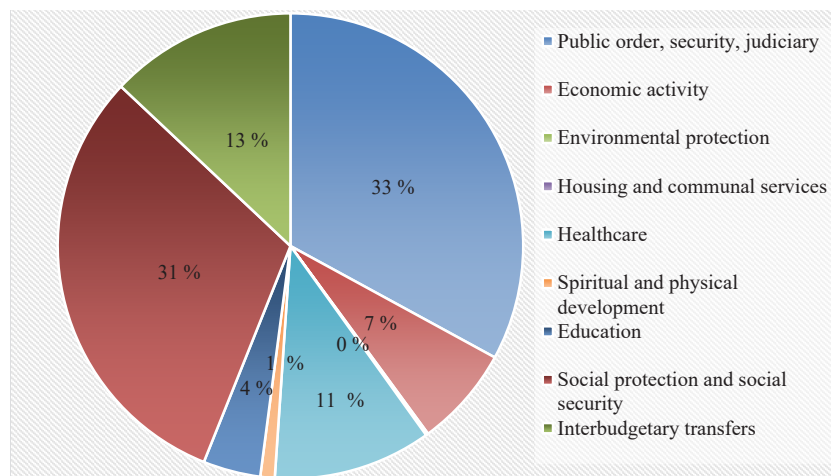


Fig. 1. Distribution of expenditures by functional classification as of 01.01.2023, % (summarized by the author based on [8])

The choice of valuation methodology depends on the date of the valuation, in particular on the date of the transaction:

- the date of initial recognition of non-current assets in the balance sheet;
- the date of inventory of non-current assets and preparation of annual financial statements;
- the date of valuation of non-current assets (revaluation, write-down, theft, shortage, etc.);
- the date of disposal of non-current assets.

The changes also provide for the possibility of revising accounting estimates in the event of a change in circumstances, in particular a change in: economic benefits, potential usefulness of non-current assets, on which the accounting estimate was based [9, 10].

Depending on the date of the transaction, the approaches to the estimate and the type of their value change. In particular, upon initial recognition, non-current assets are estimated at their original cost, depending on the method of obtaining the non-current asset. Upon initial recognition of non-current assets, the following types of estimates arise, which are summarized in Table 1.

Table 1

Types of estimates upon initial recognition of non-current assets for HEI

| Method of obtaining NA upon initial recognition | Type of valuation of non-current asset |
|---|--|
| Acquisition of NA for a fee | Acquisition cost |
| Independent production (creation) of NA | Production cost |
| Receipt of NA without payment from individuals and legal entities (except public sector entities) | Fair value |
| Receipt of NA without payment from public sector entities | Original (revalued) value |
| Receipt of NA as a result of exchange for another asset in accordance with the legislation | Fair value |

Note: generalized by the author based on [9–11]

It is worth noting that the acquisition cost and cost of NA consists of expenses determined by NP(S)APS 121 "Fixed assets", 122 "Intangible assets", namely:

- amounts paid to suppliers of assets and contractors for the performance of construction and installation works (excluding indirect taxes);
- registration fees, state duties and similar payments made in connection with the acquisition (obtaining) of rights to the NA object;
- amounts of import duties;
- amounts of indirect taxes in connection with the acquisition (creation) of NA (if they are not reimbursed to the public sector entity);
- expenses for insurance of NA delivery risks;
- expenses for transportation, installation, assembly, adjustment of NA;
- other expenses directly related to bringing NA to a state in which they are suitable for use for the intended purpose [9, 10].

Fair value is established both upon initial recognition and upon subsequent revaluation in the following cases:

- NA received free of charge from individuals and legal entities (except for public sector entities), for which there is no reliable information in the primary documents regarding their value;

- NA received as a result of an exchange for another asset;
- NA revaluation;
- NA sale.

Establishing fair value is a mandatory condition for valuing NA, provided that information about NA is not indicated in the primary documents. According to the Law of Ukraine "On the Valuation of Property, Property Rights and Professional Valuation Activities in Ukraine" dated 12.07.2001 No. 2658-III, the NA fair value is determined by the subject of valuation activities (hereinafter referred to as the Law of Ukraine dated 12.07.2001 No. 2658-III) [13], by types:

- buildings and structures, objects of unfinished construction, real estate, machinery, equipment, vehicles, etc.; shares, securities; intangible assets, integral property complexes;
- property rights (right of possession, disposal, use), etc.

Fair value is the most objective assessment of NA, since it is the value at which an asset can be sold or a liability paid under normal conditions on a certain date for the assessment of future cash flows compared to costs [9, 10].

In view of the above, other NA objects that are not defined by law can be assessed by the HEI independently, but under certain conditions:

- by creating a commission, by order of the head;
- an order of the head to determine the fair value of NA;
- the presence of an active market;
- the possibility of identifying the object;
- the presence of methodological support for calculating the fair value.

The algorithm for assessing the fair value of non-current assets for HEI is summarized in Fig. 2.

Therefore, HEI can determine the fair value of non-current assets only for objects that are not defined by the Law of Ukraine dated 12.07.2001 No. 2658-III for the following objects:

- when receiving non-current assets free of charge, provided that there is no value in the primary documents;
- when identified as a result of an inventory;
- when received as a result of an exchange of non-current assets (notional value).

To determine the fair value of non-current assets, HEI must approve the composition of a commission, by order of the head, which will carry out the assessment. This may be a permanent or temporary commission. The composition of the commission for determining the fair value of non-current assets is not legally defined, therefore, one can focus on the Regulations on the Inventory of Assets and Liabilities, approved by the order of the Ministry of Finance of Ukraine dated 02.09.2014 No. 879 [14].

Therefore, the composition of the commission for determining the fair value of non-current assets is given below:

- Chairman of the commission: manager or his/her deputy;
- Members of the commission: representatives of the management staff, accounting department (representatives of centralized accounting), experienced employees (engineers, technologists, mechanics, work performers, commodity experts, economists, accountants).

To calculate the fair value of non-current assets, it is necessary to determine the subject of assessment and the methodology for calculating the fair value of non-current assets. The subject of assessment can be either a separate non-current asset or a group, including a cash-generating unit, etc.

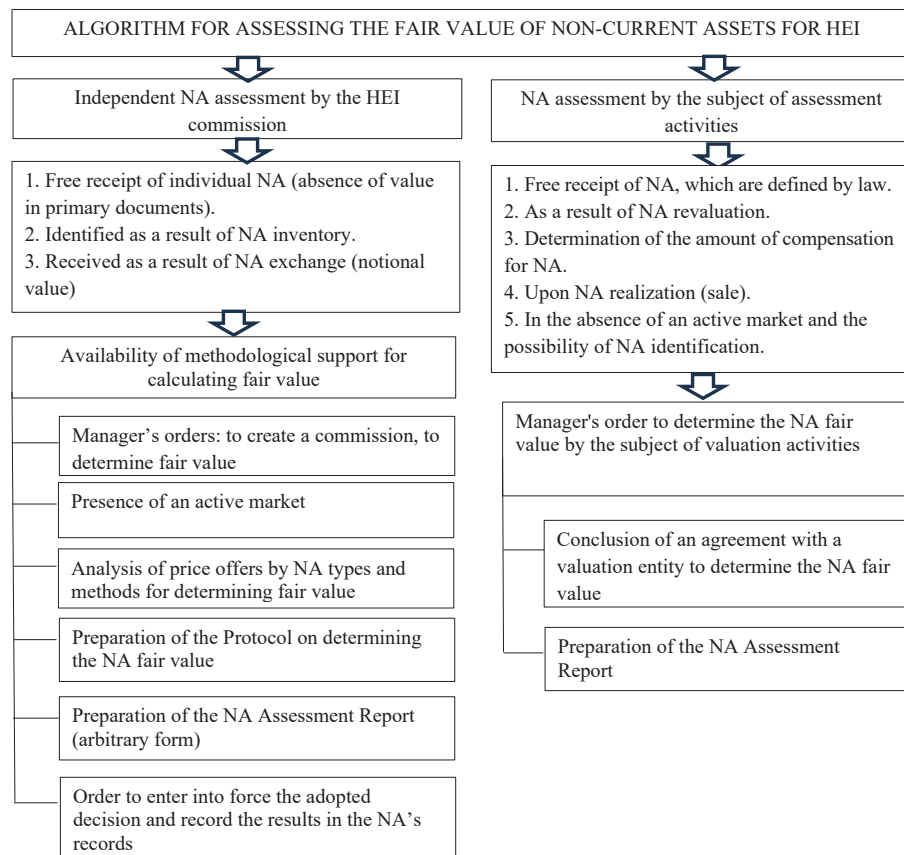


Fig. 2. Algorithm for assessing the fair value of non-current assets for HEI (summarized by the author based on [9, 10, 12])

The calculation methodology is defined in IPSAS 17 "Property, Plant and Equipment", which provides methods for assessing the fair value of property, plant and equipment based on such approaches as: market, cost, income. The HEI itself must choose the most convenient valuation method, while different methodologies can be used simultaneously, but for different groups of property, plant and equipment.

Characteristics of methods for assessing the fair value of property, plant and equipment for HEI are given in Table 2.

Table 2
Characteristics of methods for assessing the fair value of NA for HEIs

| Methodology name | General characteristics | Calculation methodology |
|------------------|--|--|
| Market approach | Prices and other similar information in the market for identical or comparable assets are used | Market indicators, matrix pricing |
| Cost approach | The amount of costs at which the NA could be purchased on the date of the transaction is reflected | Comparison with acquisition cost (construction) of comparable utility NA adjusted for obsolescence |
| Revenue approach | The amount of income at which the NA could be sold on the date of the transaction is reflected | Methodologies based on present value, excess income, option pricing models |

Note: grouped according to [11]

Each of the above methods has its advantages and disadvantages. The recommended method for HEIs is to use the market method of assessing the NA fair value, which is the easiest to apply. The advantages of the market approach

are that when assessing NA, market factors, supply and demand for similar objects are taken into account, the disadvantages are that price volatility is observed in the market.

The advantages and disadvantages of methods for assessing the NA fair value for HEIs are summarized in Table 3.

It is worth noting that in some cases it is advisable to use several methods simultaneously in order to increase the efficiency of the NA valuation process. At the same time, one valuation method is applied to one group of NA.

Given the need to develop and approve methodological support for the fair value assessment of NA, taking into account the specifics of the activities of HEIs. Methodological support can be in the form of Methodological Provisions for the Fair Value Assessment of NA, intended for the activities of HEIs, with the following structure:

- 1) general provisions;
- 2) criteria for the allocation of NA groups to be assessed;
- 3) criteria for identifying NA;
- 4) the presence of active market conditions;
- 5) methods for assessing fair value;
- 6) requirements for drawing up an Act on the valuation of non-current assets.

Table 3

Advantages and disadvantages of methods for assessing the NA fair value for HEIs

| Valuation approach | Advantages | Disadvantages |
|--------------------|--|--|
| Market approach | Takes into account market factors, supply and demand for similar objects | Dependence on market activity, price volatility, unsuitability for unique NA |
| Cost approach | Adjusts for depreciation and impairment of the NA object, applies to real objects, possible for use by the HEI in bankruptcy | Non-contribution to current and expected income of the HEI being assessed, does not take into account the efficiency of NA use and the dynamics of changes in asset values |
| Income approach | Takes into account future expectations, market factors, calculation flexibility | Labor-intensive, dependence on discounting and the real amount of future cash flows |

Note: grouped according to [11]

The structure and characteristics of the sections of the Methodological Provisions for the Fair Value Assessment of NA for HEIs are summarized in Fig. 3.

The proposed structure of the Methodological Provisions on the Fair Value of Non-Current Assets will help HEIs develop their own methodological support, taking into account their industry specifics, improve the quality of the assessment of non-current assets and ensure the reliability of data in financial reporting.

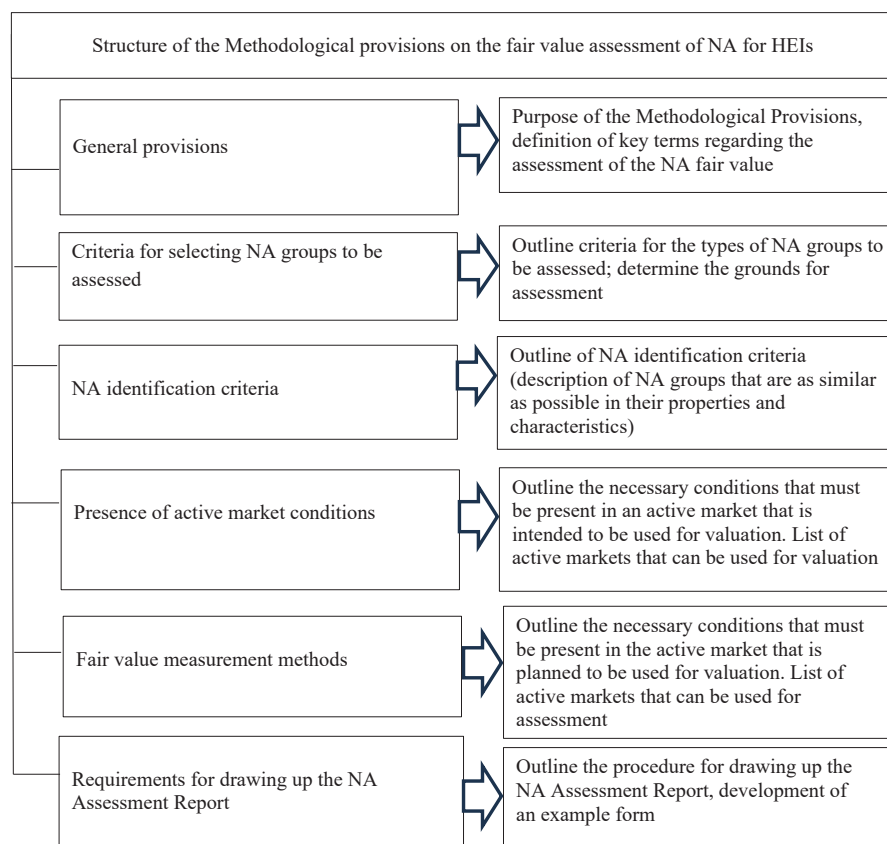


Fig. 3. Structure and characteristics of sections of the Methodological Provisions on the Fair Value of Non-Current Assets for HEIs

Among the main limitations in the process of assessing the fair value of non-current assets for HEIs, the following can be distinguished:

- lack of methodological support for assessing the fair value of non-current assets for HEIs;
- lack of qualified employees of the accounting service of HEIs in the field of fair value assessment;
- difficulty in applying assessment methods due to limited data on individual non-current assets;
- insufficient financial and technical resources of HEIs of state ownership.

The conditions of martial law in Ukraine significantly affected the possibility of assessing non-current assets for HEIs, among the main factors can be identified:

- destruction or damage to property, where many buildings and equipment have suffered physical damage or complete destruction;
- inability to physically access non-current assets or they are under occupation, which makes the assessment impossible;
- lack of up-to-date information on the registration and accounting of non-current assets, which leads to data distortion;
- fluctuations in the value of non-current assets due to inflation, currency exchange rate changes and market instability, which makes it difficult to determine a fair market price;
- limitations in logistics and technical support, which makes the assessment less effective.

The prospects for assessing the fair value of non-current assets for HEIs depend on several factors that will determine its effectiveness and feasibility in the future. With the

stabilization of the military situation, comprehensive inventories and assessments of the condition of assets are expected. Damaged assets will require an assessment of their fair value, but the territories will remain dangerous after de-occupation. Therefore, it is necessary to involve the latest technologies, such as drones, satellite data, 3D scanning to collect information and the ability to assess non-current assets. The introduction of digital platforms for asset management can simplify valuation processes, ensure transparency and reliability of data on the real value of non-current assets for HEIs.

4. Conclusions

The volumes of state funding according to the structure of expenditure distribution by functional classification were determined. It was highlighted that education accounts for 1.5 % of the volume of expenditures of the state budget of Ukraine, which is 1104.6 million USD, where a significant share of these funds falls on non-current assets.

Possible periods for assessing the fair value of non-current assets were determined, namely:

- upon initial recognition of non-current assets in the balance sheet, provided that there is no value in the primary documents;
- upon inventorying non-current assets and drawing up annual financial statements;
- upon revaluation, theft, shortage of non-current assets;
- upon disposal (sale) of non-current assets.

An algorithm for assessing the fair value of non-current assets for HEIs was developed. The algorithm provides for two directions: assessment of the fair value of non-current assets by the higher education institution itself; assessment with the help of an assessment entity. The algorithm for assessing the fair value of non-current assets independently by the higher education institution provides for the following actions:

- creation of an appraisal commission;
- approval of the manager's order for the appraisal;
- the presence of an active market;
- the possibility of identifying the object;
- the presence of methodological support for calculating the fair value.

The methods for assessing the fair value of non-current assets have been studied, among which: market, cost and income. The market method for assessing the fair value of non-current assets, which is the easiest to apply, has been identified as the recommended method for higher education institutions. Its advantages and disadvantages have been summarized, among the advantages of which the market factor of supply and demand for similar objects has been highlighted.

The structure of the Methodological Provisions for the Fair Value Assessment of NA has been developed according to the following points:

- general provisions;
- criteria for allocating NA groups subject to assessment;
- criteria for identifying NA;
- the presence of active market conditions;
- methods for assessing fair value;
- requirements for drawing up an Act on the valuation of non-current assets.

Conflict of interest

The author declares that she has no conflict of interest regarding this study, including financial, personal, authorship or other nature, which could affect the study and its results presented in this article.

Financing

The study was conducted without financial support.

Data availability

The manuscript has no related data.

Use of artificial intelligence

The author confirms that she did not use artificial intelligence technologies when creating the presented work.

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