ACCOUNTING ASPECTS OF UNMANNED AERIAL SYSTEMS USE IN THE ENTERPRISE

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Abstract: The use of Unmanned Aircraft Systems (UAS) in modern economic conditions (better known as drones), with their capabilities to provide new services, has created significant challenges for accounting professionals in enterprises. The application of UAS is expanding into sectors such as logistics, agriculture, aerial surveillance, emergency services, and advanced air mobility. There are gaps in existing accounting legislation regarding their recognition, classification, measurement, and reporting as new high-tech assets. The aim of this article is to investigate the accounting aspects regarding the use of UAS in enterprise activities. The methodological approaches are based on accounting interpretation and analysis of the current treatment of these assets in accordance with the accounting basis used for preparing financial statements and compliance with the requirements of applicable accounting standards (International Accounting Standard 16 (IAS 16) Property, Plant and Equipment, IAS 38 Intangible Assets, National Accounting Standards NAS 38 Intangible Assets, NAS 16 Tangible Fixed Assets, and NAS 4 Accounting for Depreciation). The research focuses on the practical application and accounting treatment of these new assets, as well as analyzing gaps in the existing accounting legislative framework, particularly regarding indivisible components such as specialized sensors, communication systems, and software that alter the characteristics of the reporting object. The expected result is the creation of a theoretical model for the accounting interpretation of reporting these assets and their depreciation, in accordance with the technical conditions for their application in the enterprise, while taking into account the maintenance and updates of the distinct reporting objects. The study analyzes usage-based depreciation methods versus the straight-line approach, examining which better reflects the consumption of economic benefits. The article proposes finding theoretical and practical approaches to solve specific accounting aspects when using UAS, while recognizing UAS as a separate class of long-term non-current assets with specific operational characteristics. The proposed theoretical frameworks provide practical guidelines for accountants and financial managers, ensuring consistent application of accounting policies and specific accounting decisions for the use of UAS, to increase the transparency and reliability of information in enterprise financial statements. The results contribute to the harmonization of accounting practice in an increasingly automated business environment and support the development of comprehensive standards adapted to the characteristics of unmanned systems.
Keywords: Unmanned Aircraft Systems (UAS), Drone, Applicable Accounting Standards, High-tech assets, Depreciation.

1. INTRODUCTION

The introduction of unmanned aerial systems (UAS) into the economic life of modern societies is fundamentally changing the way businesses conduct their business activities. This new economic reality creates not only operational benefits, but also the need to rethink management and reporting processes. Sectors such as agriculture, logistics and monitoring of key infrastructure are already steadily relying on UAV capabilities as their main production factor. The commercial application of these systems is growing exponentially, with some studies (Cohn et al., 2017) noting that drones are moving from an experimental phase to mass integration into corporate processes. This rapid advancement aligns with the broader trend of digital transformation, which, as Iliev (2025) notes, is redefining the functions of accounting and auditing, forcing professionals to recalibrate their roles in the new digital era.

Despite the benefits of applying new technological advances, the accounting profession faces the challenge of adapting to existing regulatory frameworks to reflect a new reality. As Guthrie & Parker (2016) points out, the future of accounting depends on its ability to adequately reflect new forms of capital and technological assets. In Bulgaria, as well as internationally, there is no specialized standard for BMA reporting, which requires the application of the general principles of IAS/NCSR, often leading to the application of contradictory practice in the preparation of the financial statements of enterprises.

The purpose of this report is to propose a theoretical and practical model for the accounting treatment of UAS, analyzing them through the prism of the component approach and the specifics of high-tech assets, such as drones.

2. CLASSIFICATION AND RECOGNITION OF THE ASSET

Terminological clarifications and recognition criteria

The first problem for accountants is the correct identification of the reporting object. In his analysis of the UAS classification, Mitev (2024) emphasizes that the term "drone" is colloquial, while in a professional context (according to ICAO) the correct concept is Remotely Piloted Aircraft Systems (RPAS). The author classifies systems based on physical parameters and application (civilian and military), which is key to determining their economic essence (Mitev, 2024a).

According to IAS 16 Property, Plant and Equipment (IASB, 2023a), an asset is recognised if it is likely that the entity is likely to receive future economic benefits and its price can be reliably measured. The applicable Bulgarian Accounting Standard 16 Fixed Tangible Assets (AS 16) also requires a materiality threshold to be disclosed in accounting policy (MFRB, 2005) for the recognition of a Fixed Tangible Asset (FTA). For example, in a sector such as agribusiness, where drones are intensively used for various activities (spraying, fertilizing, filming, etc.). It is a challenge to distinguish when a drone is a monitoring tool (cost) and when it is a major asset generating output, hence economic benefits for the enterprise.

Component Approach

Unmanned aircraft do not consist of a single component to be treated as an asset. Most often they consist of a hull, an engine, a control system, with navigation and payload elements included (cameras, sensors, vessel receptacles, etc.). In its IAS 16 guidelines, KPMG (2021) explicitly states that where material parts of an asset have different useful lives, they must be reported as separate components. Applying the component approach to a custom-configured UAS often mirrors the accounting complexity found in acquiring fixed assets through construction. As Nachkova (2022) emphasizes regarding complex assets, correct cost accumulation for each stage and distinct element is essential for reliable financial reporting.

An analysis of the technical characteristics of the inertial navigation systems and components of drones reveals (Mitev, 2024b) that determining their location requires complex and expensive modules (accelerometers, gyroscopes) that function independently of the hull. Therefore, through the accounting policy of the enterprise, management can determine the navigation module and expensive sensors (e.g. LiDAR) as separate inventory objects when they are subject to faster technological obsolescence or replacement compared to the useful life of the drone.

In order to bridge the gap between technical characteristics and accounting requirements, this study proposes an accounting model for classification (Table 1). It uses two leading criteria:

– Materiality Threshold: Determined in accordance with the accounting policy of the enterprise and tax laws (e.g. BGN 700 for Bulgaria according to the Corporate Income Tax Act (CITA)). This distinguishes assets that are subject to depreciation from those that are current expenses.

– Flight Hours/Usage: An operational indicator that determines the degree of physical wear. In high-intensity operation (e.g. in agriculture), flight time is an accurate measure of consumption of economic benefit relative to calendar time.

Table 1: Accounting model for classification of UAS by value and operational load

UAV class (According to technical parameters)	**Materiality value threshold**	**Intensity of use (Flight time / Cycles)**	**Accounting recognition (Asset category)**	**Recommended depreciation method**	**Justification**
Class 1: Micro/ Nano Drones *(Consumer/Hobby)*	**Under Prague** *(e.g. < 700 BGN)*	**Low / Irregular** *(Casual use)*	**Running Cost (Materials)** *(IAS 2/AS 2)*	**Not charged** *(Writes off immediately)*	The low value and the rapid obsolescence do not justify the administrative burden of maintaining FTA.
Class 2: Light commercial UAS *(For example, for filming)*	**Over Prague** *(Standard asset)*	**Temperate** *(e.g. < 100 hours/year.)*	**Fixed Tangible Asset (FTA)** *(MSS 16)*	**Linear method** *(Term: 2-3 years)*	Wear and tear is mostly moral (technological), not physical. The linear method is the most rational.
Class 3: Industrial UAS	**High value** *(Investment*	**High / Intense**	**FTA - Component approach**	**Functional method**	Physical wear and tear outstrips

UAV class (According to technical parameters)	**Materiality value threshold**	**Intensity of use (Flight time / Cycles)**	**Accounting recognition (Asset category)**	**Recommended depreciation method**	**Justification**
(Heavy payload - Agro/Cargo)	*asset)*	*(Daily Missions, Heavy Conditions)*	*(Separately: Housing/Motors/Sensors)*	*(Based on flight hours or cycles)*	moral wear. The asset loses value with each mission.
Class 4: Specialised systems *(Swarm / High-end Security)*	**Due diligence** *(Hardware + Software)*	**Ranging** *(Autonomous missions)*	**Hybrid approach** *(FTA + Intangible asset for the software)*	**Combined** *(Linear for NDA / Functional for FTA)*	Software (swarm intelligence) retains value longer than hardware media and must be depreciated separately.

Source: Authors' research

Regulatory framework for drone activities (Regulatory Approach)
It is important to clarify that a terminological distinction should be made between the two key concepts of UAV and unmanned aerial systems (UAS). UAV means the aircraft itself, while UAS includes the aircraft with its remote control equipment included. Therefore, the importance of regulation at European Union level has been examined by comparing the terms used in the regulatory framework (Table 2), with an analysis to help refine the concepts – from the general "unmanned aircraft" to the complex "unmanned aerial system", as well as a distinction according to risk and certification.

Table 2: Comparative meaning of the terms used in EU regulations

Regulation/Objective	Main term used	Focus of the term	Key sub-terms
2018/1139 - Basic	UA (Unmanned aircraft)	The physical object that flies.	• Remote control equipment • Autonomous operation
2019/945 - Products	UAS (Unmanned aerial system)	The product as a kit (drone + remote).	• Classes (C0-C6) • Privately built. • Remote identification attachment
2019/947 - Operational	UAS operation	The action (fields) and the responsible persons.	• UAS operator • Remote pilot • Autonomous operation (other than automatic)
2021/664 - U-space	UAS in U-space	The drone as an airspace user.	• Dynamic airspace reconfiguration • e-ID (electronic identification)
2024/1107 - Airworthiness	Certified UAS	Technical reliability and support.	• UAS component • Maintaining airworthiness • Project approval

Source: Authors' research

The summary of this comparison is that there has been an evolution in the use of the term 'Vehicle' to the term 'System', which is consistent with the understanding that a ground station is just as important to UAS safety as a flying UAV.

3. SOFTWARE AND AI REPORTING

The conduct of automated flights by UA is carried out using specialized software. According to IAS 38 "Intangible Assets" (IASBb, 2023), software is recognized as an asset if it is separable from the hardware or derives from contractual rights. If the UAV cannot fly without the help of the software, it is considered basic and is an integral part of the FTA - a drone. In advanced systems, as Mitev (2024c) considers them, the algorithms for "swarm intelligence" (Swarm Intelligence) have the character of an intangible asset, since the control of a group of drones

depends on complex, often separately acquired or developed software, for which license fees are due. This high-tech software is most often intellectual property of high value, which generates a competitive advantage and finds a place in the balance sheet of the enterprise separately from fixed assets – physical carriers.

4. PECULIARITIES IN THE DEPRECIATION OF THE UAS

Due to the nature of some of the important components of UAS for which the use of a linear depreciation method is not applicable (e.g. batteries and rotors – their life is measured in cycles or flight hours, technological obsolescence), a functional method for extracting economic benefits should be applied. The functional method is associated with accruing depreciation on fixed assets, for which the useful life is not expressed in time, but in productivity, in our case with flown time. This method most accurately takes into account the physical depreciation when using the UAS, with a feasible forecast of performance over the entire useful life of the asset. In practice, it is possible to combine it with the linear method due to the following comparative characteristic between the two depreciation methods, presented in Table 3.

Table 3. Comparative analysis of linear and functional depreciation method

Criterion	Linear method	Functional method
Terms of Use	Suitable for assets that are subject to the same constant factors (e.g. time).	Suitable for assets where the useful life is translated into productivity/output.
Advantages	Easy to use.	It most accurately takes into account the physical depreciation of the asset. Accounting depreciation is close to the actual depreciation. Particularly applicable in the transport industry.
Disadvantages	Uniform depreciation does not always correspond to actual change/depreciation. It does not take into account moral obsolescence.	It must be combined with a linear method (if there is no production). It requires more complex monitoring of indicators.
Accounting policy	It leads to a commitment to tax policy. The company's accounting policy becomes "tax-oriented".	The depreciation policy is linked to the company policy through labor productivity and efficiency.

Source: Authors' research and analysis

The choice between the two methods, according to the information presented in the table, can be reduced to determining one of the two priorities of the management of the enterprise, which are firmly related to a specific depreciation method:

– Priority "Administrative ease" is related to the linear method, as it is predictable, easy to budget, compliant with the tax legislation (CITA) and does not require constant monitoring of flight time or flight cycles.

– The priority "Real Cost and Efficiency" is related to the functional method, which is mandatory for manufacturing enterprises with loaded assets, where the distortion of the cost price would lead to wrong management decisions.

5. DISCUSSION – using a model for determining the accounting policy in relation to the UAS

Based on the comparative analysis of the depreciation methods and the component approach, the need for practical application of a four-step model to assist accountants in the initial recognition of the UAS as an asset is deduced. The model is based on four consecutive control questions that point to the correct accounting approach discussed in this paper. The steps are presented in Table 3.

Table 3. Model for determining the accounting policy in relation to the UAS

Step	Control question / Criterion	Condition / Analysis	Accounting solution
1. Recognition	**Materiality question:** Does the asset exceed the materiality threshold (e.g. BGN	**NO** (Value below the threshold or short-term use) **YES** (Value above the threshold and long-term	**Current expense -** Written off immediately as a tangible asset under IAS 2/AS 2. No depreciation is accrued.

Step	Control question / Criterion	Condition / Analysis	Accounting solution
	700) and will it be profitable for more than 1 year?	use)	**Fixed tangible asset (FTA)** It is recognized in the balance sheet.
2. Classification	**A question of complexity:** Does the system have expensive, detachable parts with different useful life (e.g. sensors, cameras, batteries)?	**NE** (Uniform Asset) **YES** (Complex configuration)	**Single Inventory Item** The drone is kept as one whole reporting unit. **Component approach** Division into: 1. *Underlying Asset* (Enclosure/Platform) 2. *Replaceable components* (Camera, LiDAR, Batteries) – depreciated separately.
2a. Classification for individual software	**Software dependency question:** Can a drone fly without the specific software?	**NO** (Basic Software) **YES** (Swarm Intelligence Licenses/Specialized Missions)	Part of the value of FTA (hardware). **Intangible asset (IA)** Reported separately under IAS 38.
3. Depreciation	**Intensity question:** What is the nature of operation and wear?	**Uniform / Administrative** (Security, surveillance, constant readiness) **Intensive / Production** (Agribusiness, supplies, seasonal peaks)	**Linear method** Preferred for administrative ease and when obsolescence is leading. **Functional method** Depreciation based on flight hours or cycles. Reflects real wear and tear.

Source: Authors' research

As a result of the proposed discussion, the need to apply a new model for determining the accounting policy in relation to the UAS can be justified in order to minimize the risk of distortion of the financial result. The discussion analysis shows that for enterprises in the agricultural sector (class 3 of Table 1), the neglect of step 3 (Depreciation) of Table 3 and the use of the linear method leads to an underestimation of the cost price in the active season and its overestimation in the passive season.

6. CONCLUSION

BMA accounting requires a specific approach to taking into account the specifics arising from the rapid technological progress in their development, the available regulatory restrictions and the possibilities for correct reflection of the costs for their operation in the financial statements of enterprises. An opportunity is opened for the preparation of national guidelines or methodological guidelines (national methodology for UAS reporting). There is a need to update the accounting policies of enterprises that use UAS in their activities, as well as to refine the regulatory framework in the field of depreciation of high-tech assets, in order to create opportunities for applying a comprehensive approach, including precise classification according to the technical standards for their operation, the application of a component structure to distinguish between wear parts (batteries, batteries, navigation) or technologically obsolete (such as sensors for collecting heterogeneous information, data management system, satellite communication system, etc.), separately positioned by the UAV body (drone). The proposed approach will ensure a true and fair presentation of the financial situation of enterprises in the current economic conditions. Ultimately, the precise valuation of these high-tech assets is not merely an accounting formality but a critical factor for the enterprise's financial stability. Misclassification can distort the capital analysis, a risk that underscores the importance of strict adherence to regulatory frameworks in financial reporting (Nachkova, 2024).

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