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**MANAGEMENT OF CRYPTOCURRENCY  
TRANSACTIONS FROM ACCOUNTING ASPECTS**

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**Introduction.** An analysis of approaches to accounting for transactions with cryptocurrency states that the development of digital technologies and virtual markets has revealed a lack of readiness for the accounting display of such assets because there is no single approach to accounting for cryptocurrency transactions. Various regulatory documents have proposed considering cryptocurrency as an object that can be stocks, financial investments, monetary means, or intangible assets. Therefore, there is a need to determine exactly what cryptocurrency should be considered and which financial accounts should be displayed in the future.

**Aim and tasks.** The purpose of the study is to identify the main characteristics of cryptocurrencies, which will help identify them as accounting objects. Based on this, it is necessary to study the main approaches to the display of such assets on financial accounts and to determine in which operations cryptocurrency can be used, and how to identify it.

**Results.** It is established that the generation of cryptocurrency is affected by the approach of the miner, as he can generate new cryptocurrency, and all incurred costs are included in the cost price and form the initial value of the mined coin. However, if a miner can mine cryptocurrency using already existing technology, then the initial value must be capitalized on account 154 “Purchase (creation) of intangible assets” to form the initial value (cost). The identification criteria are as follows: receiving economic benefits, the sale operation will be completed, according to which cryptocurrency can be considered as reserves. The content of the operations (increase or decrease in exchange rate, formation of reports, etc.) for which cryptocurrency should be revalued on the relevant balance sheet date is given.

**Conclusions.** Cryptocurrency can be considered a stock or an intangible asset. Modern blockchain technology affects accounting science by using triple rather than double recordings. This adds a level of entry, a cryptographic stamp with all transactions, and proves, however, that the interested parties (accountant, client, tax authorities, and auditor) will have an identical copy of the “ledger”. After achieving cryptocurrency price stability, such an asset can be used during international transactions, as it is more often used for speculative gains.

**Keywords:** mining, cryptoassets, income, expenses, accounting of cryptocurrencies.

## 1. Introduction.

Due to the lack of a unified approach to accounting for digital assets, accountants, guided by their professional judgment, have classified them as assets, stocks, investments, and digital tools. This has led to misunderstandings and distortions in accounting. The main development of the cryptocurrency industry is based on the use of modern blockchain digital technology. The development of digital technologies and virtual markets revealed the unpreparedness of accounting science and practice for the challenges of the cryptocurrency industry; therefore, to date, there is no single approach to accounting for transactions with cryptocurrency.

In Ukraine, national provisions (standards) of accounting do not regulate the accounting of cryptocurrencies as cryptocurrencies are not recognized in the legal field as a whole, which officially does not allow legal entities to legalize these transactions. At the international level, the issue of accounting for operations with crypto assets was considered on the agenda of the Interpretation Committee of the IFRS Council "Maintenance of Cryptocurrencies - June 2019" (Verkhovna Rada of Ukraine, 1999), at which it was decided that cryptocurrency can meet the definition of an intangible asset. That is, it is necessary to use IAS 38 "Intangible assets" for accounting. However, if the primary purpose of using cryptocurrencies is solely for sale, IAS 2 inventories should be applied. Currently, cryptocurrencies are not reflected in accounting as part of money and financial assets. In March 2022, the IFRS Board adopted cryptocurrencies and related transaction projects (André et al. 2018).

The terms of using cryptocurrencies and their main transactions remain insufficiently substantiated. Thus, cryptocurrencies can act as payment instruments, financial investments, stocks, and financial assets.

## 2. Literature review

Aras (2021) addressed forecasting the level of cryptocurrency volatility and its use in trading operations on cryptocurrency exchanges.

The problems of introducing blockchain technology into business processes and the use of cryptocurrencies in fast exchange operations were reflected in the work of Aysalkyn et al. (2022). Accounting for cryptocurrency depends on how it was obtained and the purpose of its further use. In most cases, when mining a cryptocurrency, it is received in exchange for other assets or as a contribution to authorized capital (although this aspect still requires legal regulation). Kostiuchenko et al. (2018) propose to display cryptocurrency as part of intangible assets.

In the case of the purchase of cryptocurrency, opinions differ the most: it is proposed to display cryptocurrency as part of intangible assets, as part of financial investments, or as other means. It is proposed that cryptocurrency be displayed as part of reserves (Shabelnikov et al., 2021; Zayed et al., 2022) in the event of a decision to sell it (also as part of intangible assets).

Initial Coin Offerings (ICOs) and initial exchange offers for such assets are blockchain-based token offerings. After numerous scams involving decentralized and unregulated ICOs, IEOs have emerged as a new way to rely on centralized cryptocurrency exchange platforms that act as intermediaries. However, how this change affects fundraising processes in a traditionally decentralized environment remains unresolved (Gryshchenko et al., 2020).

In shaping the Internet of Money, the use of blockchain and distributed ledger technologies (DLT) in the financial sector has raised concerns among regulators. Notably, while user anonymity enabled in this area can guarantee privacy and data protection, the lack of identification hinders accountability and challenges the fight against money laundering, terrorist financing, and the proliferation of weapons of mass destruction (Bashynska, 2020). Account-based blockchain platforms have seen a rapid increase in the number of financial scams and hacks owing to the rapid development of decentralized apps and the anonymity and high cost of using those (Binda et al., 2020; Gryshchenko et al., 2020).

### 3. Aim and tasks.

The purpose of the study is to find out the main characteristics of cryptocurrencies, which will help identify them as accounting objects. Based on this, it is necessary to study the main approaches to the display of such assets in financial accounts and to determine in which transactions cryptocurrency can be used, and how to identify it. Within the framework of this study, it is proposed to conduct an analysis of situations and operations in which cryptocurrencies can be used to distinguish the recognition of such assets depending on the type of operation, as this further affects the accounting process – reflection on the financial accounts and financial statements of the business entity.

### 4. Methodology.

The analysis was based on a study of the approach to recognizing cryptocurrency as an accounting object. An analysis of the literature and the approaches of scientists to the regulation of such assets made it possible to conclude the identification of cryptocurrency as a certain accounting object. The synthesis method made it possible to determine the main operations in which cryptocurrencies can be used, which, depending on the operation, have significant peculiarities of recognition, such as stocks or intangible assets.

This research is based on an experimental method, which allowed us to imagine and substantiate two accounting situations that a business entity may face. This subsequently made it possible to propose a typical correspondence of accounts for displaying transactions in accounting and to single out certain conditions under which cryptocurrency should be included in the inventory.

The hypothetical method made it possible to reveal the accounting consequences of transactions with cryptocurrencies if it is recognized as an official means of payment because there is currently no legislation or method of recording transactions with cryptocurrencies approved at the regulatory level.

### 5. Results.

To display cryptocurrency mining operations, it is advisable to consider the conditions in which it is used and the main operations with it. Two cases are proposed in accounting for the determination of the main problems of the accounting display of such assets on financial accounts.

**Case 1.** Miners are working on mining a new type of cryptocurrency that has not yet existed. In this case, the miner's costs should be considered research costs. In particular, IAS 38 "Intangible assets" includes "original and planned research carried out to obtain and understand new scientific or technical knowledge". Similarly, in terms of content, this concept is defined by Regulations (standards) of accounting 8 "Intangible assets": "Research - research planned by enterprises, which are conducted by them for the first time in order to obtain and understand new scientific and technical knowledge". In accordance with the same standards, research costs are subject to display as part of the costs of the reporting period in which they are incurred. In the Chart of Accounts for Accounting of Assets, Capital, Liabilities, and Business Operations of Enterprises and Organizations, subaccount 941 is provided for accounting of expenses related to research and development carried out by the enterprise, if such research and development corresponds to Regulations (standards) of accounting 8 "Expenses for research and development", which at the end of each reporting period is written off to the account of financial results, reducing (PwC, 2019).

After the miner receives the first real result, which will correspond to the 3rd characteristics, according to which the object can be included on the balance sheet as an intangible asset according to Regulations (standards) of accounting "8," namely, the enterprise has:

- 1) the intention, technical ability, and resources to bring intangible assets to a state in which the assets are suitable for sale or use.
- 2) the possibility of receiving future economic benefits from the sale or use of an intangible asset;

3) information for a reliable determination of the costs associated with the development of an intangible asset), the miner's expenses for the extraction of cryptocurrency can be capitalized on account 154 "Purchase (creation) of intangible assets" according to the option described in Case 2.

**Case 2.** A miner creates crypto-assets according to existing technology. In such a case, the costs must be capitalized on account 154 "Purchase (creation) of intangible assets" to form the initial cost (cost price) (Maeng et al., 2022). After the smallest unit of cryptocurrency is created (for BTC it is a satoshi, which is 10-8 BTC (0.00000001 BTC), the costs should be calculated and reflected in account 12 "Intangible assets". However, for effective management of mined cryptocurrency units, was offered the following:

1) the unit of account for a given group of intangible assets shall be the smallest unit of measurement of this type of cryptocurrency

(e.g., for BTC, it is a satoshi, which is 10-8 BTC (0.00000001 BTC);

2) calculate the cost of the mined cryptocurrency in the permanent accounting system and include it in the composition of intangible assets after mining the smallest unit of measurement of this type of cryptocurrency;

3) the document that reflects the original value of the mined cryptocurrency should not be a formal note, as is customary for other intangible assets, but a calculation card (for example, a calculation card for mining 1 satoshi);

4) since the cryptocurrency is proposed to be accounted for in account 12 "Intangible assets", which belongs to the class of non-current assets, it was suggested that the miner's income be accounted for in account 74 "Other income", setting aside a separate sub-account, for example, 747 "Miner's reward".

Table 1 presents a typical account correspondence for displaying cryptocurrency mining operations.

**Table 1. Typical account correspondence for displaying cryptocurrency mining operations.**

№	Content of the operation	Correspondence of accounts			
		Case 1		Case 2	
		Debit	Credit	Debit	Credit
1	Costs for payment of services for electricity consumed in the mining process are displayed	941	631	154	631
2	The VAT tax credit included in the electricity bill is displayed	641	631	641	631
3	The costs of paying for Internet services are displayed	941	631	154	631
4	The VAT tax credit included in the bill for internet services is displayed	641	631	641	631
5	Wages have been charged to workers involved in mining	941	661	154	66
6	A single contribution to the wage fund has been calculated	941	651	154	66
7	Depreciation is accrued on the equipment used in the mining process	941	131	154	131
8	Depreciation has been charged for programs used in the mining process	941	133	154	133
9	Rent has been charged for the premises in which mining is carried out (if the premises are owned, depreciation must be charged)	941	685	154	685
10	The VAT tax credit included in the rent is displayed	641	685	641	685
11	Intangible assets include the smallest unit of measurement of this type of cryptocurrency	-	-	128	154
12	The miner's reward for successful mining is displayed	-	-	311*	747**
13	Revenues and expenses are reflected in the financial results of the reporting period	79	941	747	79

\*Miners receive income in the system mainly in foreign currency. However, according to the current legislation, funds that are not documented, in particular, concluded contracts or invoices that have the force of a contract, cannot be credited to a current account in foreign currency. Therefore, this transaction in Ukraine is valued in the equivalent of the national currency

\*\* Even after selling the cryptocurrency, miners receive a commission from further transactions with the coins, confirming them. The commission to miners for confirming information in blocks during a transaction in the blockchain network has three priority options: low, medium and high, which differ in the confirmation time and the size of the commission. In addition, there is a "user" option that can choose a minimum amount of satoshi (tax amount per byte of transaction data), but the confirmation time increases significantly.

Further accounting of the mined cryptocurrency depends on the actions the miner plans to take with it (Malyarets, 2021), which can be considered in two main options.

**Option 1.** Saving cryptocurrency on one's balance to save. In this case, taking into account the high volatility of the cryptocurrency market, the miner needs to revalue the cryptocurrency on each balance sheet date, reflecting the corresponding differences not as part of the total income,

but as part of the financial results from changes in the value of financial instruments (740 "Income from changes in the value of financial instruments" and 970 "Costs from changes in the value of financial instruments") (Table 2). It is worth noting that the cost of each unit of mined cryptocurrency differs immediately after mining because the mining process uses different amounts of resources and different periods.

**Table 2. Typical correspondence of accounts to display operations on the revaluation of mined cryptocurrency as of the balance sheet date.**

№	Content of the operation	Correspondence of accounts	
		Debit	Credit
1	The value of cryptocurrency is increased when the exchange rate on the cryptocurrency market increases	128	740
2	The value of cryptocurrency is decreased when the exchange rate on the cryptocurrency market increased	970	128

After the first such revaluation, the value of each cryptocurrency unit (revaluation value) becomes the same for each unit.

**Option 2.** If the miner decides to sell cryptocurrency, it is recommended to be guided by the provisions of Regulations (standards) of

accounting 27 "Non-current assets held for sale and discontinued operations" (Martinez-Zarzoso et al., 2020). On the basis of the criteria for recognizing an asset held for sale, it is worth conducting an analysis according to the sample given in Table 3.

**Table 3. Criteria, subject to the fulfillment of which cryptocurrency is included in the inventory.**

№	Criteria for recognizing an asset held for sale	Yes	No
1	Economic benefits are expected from the sale of cryptocurrency, not from holding it	+	
2	Cryptocurrency is ready for sale in its current state	+	
3	The cryptocurrency sale operation will be completed this year	+	
4	The main conditions of sale that are put forward for cryptocurrencies will be similar to the sale of similar assets	+	
5	The management of the company prepared a plan for the sale of crypto-assets, which indicated the stages and number of coins, as well as the desired conditions for the sale of such assets on the domestic market	+	

If a positive answer is given to each item in Table 3, the cryptocurrency should be transferred from account 128 "Digital assets" to account 286 "Non-current assets and disposal groups held for sale", to a separate analytical account 286.1 "Cryptocurrency intended for use during the reporting period" (until cryptocurrency is recognized as an official means of payment) (Prokopenko, 2021).

When cryptocurrency is recognized as an official means of payment, entering sub account 336 "Digital wallet" is recommended together with reflecting the transfer of cryptocurrency from account 128 "Digital assets" to account 336 "Digital wallet" with an indication at the level of analytical accounting of the type of digital wallet.

When using digital currency, which can be represented as a string of bits of certain information in the calculations of enterprises, participants must be registered in the electronic payment system, which is an intermediary. The main task of such a system is control, which ensures that a set of bits cannot be repeated. Corresponding changes in legislation are also taking place in our country, especially during the adoption of the law “On Virtual Assets” (Verkhovna Rada of Ukraine, 2002). However, there are still many unresolved accounting issues regarding cryptocurrencies. Moreover, there are no established accounting methods for the use of cryptocurrency as a means of payment methods for such operations (Prokopenko, 2020).

However, the calculations were carried out both inside Ukraine and outside its borders. Accountants are faced with the question of displaying such transactions in the accounting and taxation systems because cryptocurrency differs significantly from other types of assets and between types of cryptocurrencies, which also affects the management and display of cryptocurrency transactions in accounting (Prokopyshyn, 2020). There are ongoing disputes regarding the recognition of cryptocurrencies, their status, and the legalization of such means of payment. Based on this, accountants should know not only the possible options for displaying transactions with cryptocurrency in accounting but also the technologies behind cryptocurrencies to be able to perform accounting correctly. In addition, special attention should be paid to professional judgment if a certain issue related to accounting is not regulated by relevant legislation and regulations.

At the same time, it should be taken into account that the professional judgment used in the formation of accounting policies in terms of cryptocurrency transactions can be used as a means of manipulation, which will affect the indicators of financial reporting, which can have negative consequences both for users of reporting and for a decrease in confidence in financial markets in general (Pyroh, 2021; Ingram et al., 2022). Owing to the anonymity of cryptocurrency and the lack of identification of business entities by the state and certain government structures, most crimes are committed in such a system.

The money is laundered, assets are sold, and taxes are not paid. In 2018, 54% of all transactions in the Bitcoin transaction system were related to illegal activities (Saiedi et al., 2021). It is also worth noting that individuals and legal entities that use cryptocurrencies in their calculations must explain the legality of their receipt to state authorities. Therefore, it is important to control cryptocurrency transactions in accounting and taxation (Hashemi Joo et al., 2016). Cash accounting is carried out by identifying the means of payment and the parties to an agreement. Such a process can be represented as follows: “seller-buyer” (agreement) according to the principle of “money – products”. This approach makes it possible to carry out the transaction immediately, provided the counterparties are located at the same location. Currently, various systems use data and information to increase the risk of fraud (Molchanova et al., 2014).

Calculations in the blockchain system do not involve third parties; therefore, they can be considered safe. However, both settlement entities must be registered in such a system (Malyarets, 2021). The peculiarity of the use of digital currency in the payment market lies in the blind signature technology, which is aimed at solving problems related to payment anonymity. Electronic cash is centralized, but it is quite difficult to identify and track an electronic payment scheme that is displayed in the customer's bank and controlled by the country's central bank. Decentralization of cryptocurrencies based on blockchain technology has significantly affected some aspects of financial markets and the open economy. This impact on retail payments makes the movement of peer-to-peer payments easier and cheaper, which should further simplify e-commerce and settlement in cross-border transactions.

In order to recognize cryptocurrency as an official means of payment, the digital currency market must be restrained from the appearance of private crypto assets. Otherwise, the payment network will be uncontrolled (as the high volatility of decentralized currencies and the impossibility of control pose a risk of their potential use in financing terrorism, the occurrence of uncontrolled inflation, and the lack of state influence on the stabilization of the

financial market), and therefore it will be impossible to officially use, account and tax them. Currently, the number of private tokens (crypto-assets) is less than 1% of the total monetary funds of developed countries.

Understanding the advantages of cryptocurrency as a means of payment and the risk of an uncontrolled increase in the volume of payments by them, the Central Banks of many countries are studying the issue of putting CBDC (Central Bank Digital Currency) into circulation, the exchange rate of which will be tied to the main currency of the country, but will have all advantages of cryptocurrency - ease of use, speed of transaction settlement, safety (repayment and settlement are guaranteed by the Central Bank), quick acquisition of user status, a significant reduction in the cost of settlements, especially in cross-border transfers (according to the World Bank, in the traditional system, the average percentage of the commission for cross-border money transactions remittances as of Q 4 2020 was approximately 6.51%, and for transactions initiated through banks - an average of 11%, and the average time for making an international payment is 2-3 business days. In contrast, the duration of a cryptocurrency transaction is 5-7 seconds, and there is absolutely no payment fee.)

According to PwC, more than 60 central banks around the world are studying the possibility of issuing digital currencies and options for their use. At the same time, CBDC may differ in each central bank: with the use of blockchain technology (like Bitcoin) or without its use. Anonymity or openness of settlements; with the maintenance of wallets directly by the Central Bank or with the delegation of these powers to entities authorized by them. In addition, the Central Banks of different countries have different goals for the introduction of CBDC: for example, the Central Banks of Canada, Singapore, and England aim to create a digital currency for settlements exclusively in the network of banks and other financial intermediaries; while the Central Banks of China, Sweden, Ecuador, and Uruguay, as well as the National Bank of Ukraine aim to introduce CBDC as a full-fledged cash substitute that does not have a territorial attachment.

The National Bank of Ukraine pilot project lasted from September to December 2018, during which 5,443 e-hryvnias were issued. The results of the testing resulted in the conclusion that technically the issue of the e-hryvnia is fully prepared, but additional research is needed to study the impact of its introduction on macroeconomic stability. For the implementation of CBDC, the National Bank of Ukraine is considering the possibility of using distributed ledger technology (DLT) or classic databases.

The beginning of the use of e-hryvnia in the payment market of Ukraine is possible according to one of two alternative models of participant interaction: centralized or decentralized. In the case of using a centralized CBDC introduction model, a negative impact on the country's banking system is likely, which is manifested in the fact that:

1) Central Bank receives operational risks that are associated with the operations of "donor" clients and "recipient" clients;

2) there are certain inconveniences in verifying persons using the identity verification identifier and documentation; the time to verify identifiers increases due to the lack of functioning of the CBDC blockchain system;

3) settlement and cash service cease to be a key source of income for commercial banks as it moves to the CBDC blockchain, which reduces the solvency of the Central Bank; 4) it becomes difficult to carry out the active operations of commercial banks regarding attracting deposits and issuance of loans.

Despite the lack of regulations on the use of cryptocurrency in domestic legislation, in Ukraine, some hotels, restaurants, online stores, and hosting companies are ready to accept cryptocurrency from buyers.

In Ukraine, there is a network of exchangers that make it possible to exchange any currency for cryptocurrency (there is no comprehensive list of exchangers, but one can find at least 38 sites offering to exchange hryvnias for cryptocurrency), an internet banking system is functioning (the most popular is exchange using the banking p2p payment service), and exchanges that trade in the hryvnia-bitcoin pair (KUNA, EXMO.COM, BTC TRADE UA).

At the same time, KUNA and BTC trade UA exchange cryptocurrencies for only one fiat currency, the hryvnia, while Exmo also offers exchanges for US dollars, euros, and zlotys (Malyarets, 2019).

All of these operations require accounting reflection, which is currently not defined at the level of accounting standards. Therefore, it is based on accountants' professional judgment. When considering the use of cryptocurrency in the calculations of enterprises in Ukraine, it is necessary to consider two situations, depending on whether the cryptocurrency is recognized as an official means of payment.

**Case 1.** Cryptocurrency is not recognized as an official means of payment.

This situation currently prevails in Ukraine's cryptocurrency market. In such a case, this transaction is considered to be carried out under an exchange (barter) agreement, which is regulated by Article 715 of the Civil Code of Ukraine and Art. 293 of the Economic Code of Ukraine. According to this agreement, each party undertakes to transfer ownership of one product (in this case, a specific product, work, or service) to the other party in exchange for another (in this case, cryptocurrency). Each party to the contract is both a seller and a buyer.

Accounting should reflect such operations as an exchange of dissimilar assets. However, as evidenced by the experience of leading countries in the cryptocurrency market, the payment or receipt of cryptocurrency in this case is not subject to VAT.

In addition, since cryptocurrency is recorded on the balance sheet at an attributive value that correlates with the current fair value through regular revaluation of the cryptocurrency, we consider it inappropriate to reflect the income from the sale of the cryptocurrency and the cost of the realized cryptocurrency, as they will be identical.

At the seller, the traded cryptocurrency is displayed either as part of intangible assets on account 128.1 (if the buyer intends to accumulate it further) or as part of stocks on account 286.1.

**Case 2** (currently prohibited by law). Cryptocurrency is recognized as an official means of payment. In this case, it is suggested

that both the buyer and seller use the second-order synthetic account 336 "Digital Wallet" to account for cryptocurrencies stored in crypto-wallets, such as Coinomi. In this case, the accounting of settlements will also change somewhat, as the transactions will be carried out according to the purchase and sale agreement according to the exchange agreement.

## 6. Conclusions.

For accountants, blockchain technology and its integration into an accounting system can change the idea of "double entry". In the future, accountants will have to master the triple-entry accounting model. The triple entry adds a level of entry and a cryptographic signature to all transactions. However, this shows that the interested parties (the accountant, the client, the tax authorities, and the auditor) will have an identical copy of the "accounting book". To change the information in the register, it was necessary to obtain the consent of all participants. Because all records in the blockchain are distributed and cryptographically encrypted, it is virtually impossible to destroy or manipulate information. Accounting will become more operational: information from accounting registers will be suitable for automatic reporting at any time, and interested parties will always have complete, relevant, and up-to-date information about business performance results in real-time.

Rapid development of the cryptocurrency environment has led to an increase in the generation capacity of new coins. In the future, this can decrease the value of such an asset or lead to the collapse of an entire industry. All this will affect elements of accounting such as accounts, double entry (triple entry methods are already being considered), balance sheets, and reporting, which is a necessary source of information for all interested parties. However, this requires further research to introduce blockchain technology into accounting processes using modern financial assets in practice, as the status of cryptocurrencies in most countries of the world remains unregulated and unclear in terms of the operations in which such assets are involved.



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