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Display of cryptocurrency in accounting

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Abstract. *The purpose of the research* to determine the main features of the use of cryptocurrency and its identification as an object in the account. A comparative description of cryptocurrencies, electronic money and paper money is given. It has been established that there are no grounds to classify various types of cryptocurrencies in the accounting system as ordinary currencies or assets in a given period of time because they: are not regulated by any jurisdictions; it is not possible to identify the issuer or the specific organization responsible for its issuance; cryptocurrency exists only in the virtual Internet environment. *Methods.* General scientific methods and approaches, systematic approach, general research methods (analysis, synthesis, generalization, comparison), statistical methods. *Results.* The list of stages for reflection of activity of the business entity with use of cryptocurrency is offered and considered. The mining process is analysed and the list of cost items for the extraction of new digital coins is highlighted. The variant on reflection in the account of operations with cryptocurrency on accounts of accounting is offered. There are options for reflection in the accounting of cryptocurrency depending on its recognition: virtual goods, intangible assets, financial investments, digital money. To calculate the cost of cryptocurrency obtained by self-extraction, it is necessary to consider the main costs that need to be identified and reflected in the account. In addition to cryptocurrency, you can extract altcoins, light-coins or convert cryptocurrencies into stablecoins, which cannot be extracted, but can only be purchased. The article presents the main aspects of calculating the cost, which include: the cost of electricity for individuals and legal entities in the country; the cost of the necessary equipment, its depreciation and maintenance, depreciation; residual value at which you can sell old mining equipment; hash – the speed of solving mathematical problems with one or another equipment; network load and production complexity; monetary value or exchange rate of a particular cryptocurrency or digital assets. *Practical meaning.* Despite all the scientific developments, the issue of accounting for cryptocurrency from the point of view of IFRS is quite debatable. On the one hand, most propose to account for it as a specific intangible asset. Virtual currency is a huge amount of computing power and digital assets. At this stage of technological development of mankind, cryptocurrency is gaining a stable position in the international market. *Prospects for further research.* Rapid development is causing further capacity growth and interest, but may eventually lead to collapse. However, if the price stability of the cryptocurrency is achieved, it can be used in international transactions, not just for speculative gain. However, this issue will be directly related to the legalization of the new currency and its recognition by central banks as a means of exchange or storage of money. There is a need for further research to understand the basic conditions for the use of digital currency in the payments market.

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Відображення криптовалюти в бухгалтерському обліку

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Анотація. Метою роботи є визначення основних особливостей з використання криптовалюти та її ідентифікації як об'єкта в обліку. Надано порівняльну характеристику криптовалютам, електронним грошовим коштам та паперовим грошам. Встановлено, що віднести криптовалюту різних видів у обліковій системі до звичайних валют чи активів в даний проміжок часу не існує підстав через те, що вони: не врегульованні ніякими юрисдикціями; не можливо встановити емітента чи конкретну організація, яка відповідає за її випуск; криптовалюта існує лише в віртуальному інтернет – середовищі. **Методи.** В ході дослідження використано загальнонаукові методи та підходи, системний підхід, загальнологічні методи дослідження (аналіз, синтез, узагальнення, порівняння), статистичні метод. **Результати.** Запропоновано та розглянуто перелік етапів для відображення діяльності суб'єкта господарювання з використанням криптовалюти. Проаналізовано процес майнінгу та виокремлено перелік статей витрат для видобування нових монет цифрових коштів. Запропоновано варіант з відображення в обліку операцій з криптовалютою на рахунках бухгалтерського обліку. Наведено варіанти відображення в обліку криптовалюти в залежності від її визнання: віртуальним товаром, нематеріальним активом, фінансовою інвестицією, цифровими грошима. Для розрахунку собівартості отриманої криптовалюти шляхом самостійного видобутку необхідно розглянути основні витрати, які необхідно ідентифікувати та відобразити в обліку. Крім криптовалюти, можна видобувати альткоїни, лайткоїни або переводити криптовалюту у стейблкоїни, які не можливо видобути, а можна тільки придбати. У статті наведено основні аспекти розрахунку собівартості до яких належать: вартість електроенергії для фізичних та юридичних осіб в країні; вартість необхідного обладнання, його амортизація та обслуговування, моральний знос; залишкова вартість за якою можна реалізувати старе обладнання для майнінгу; хеш – швидкість вирішення математичних завдань тим чи іншим обладнанням; навантаження мережі та складність видобутку; грошова цінність або курс конкретної криптовалюти або цифрових активів. **Практичне значення.** Попри всі наукові доробки достатньо дискусійним є питання ведення обліку криптовалюти з токи зору МСФЗ. З одного боку більшість пропонує обліковувати її як специфічний нематеріальний актив. Віртуальна валюта – це величезна кількість обчислювальних потужностей та цифрових активів. На даному етапі технологічного розвитку людства криптовалюта здобуває стійкі позиції на міжнародному ринку. **Перспективи подальших досліджень.** Стрімкий розвиток визиває подальший приріст потужностей та зацікавленість, але в кінцевому підсумку може призвести до краху. Втім, якщо цінова стабільність криптовалюти буде досягнута, то її можна буде використовувати у міжнародних транзакціях, а не лише для спекулятивної вигоди. Однак, це питання вже буде напряму пов'язано з легалізацією нової валюти та її визнанням центральними банками як засобу обміну, або зберігання вартості грошей. Існує потреба в подальших дослідженнях з метою розуміння основних умов використання цифрової валюти на ринку платежів.

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Ключові слова: криптовалютий облік, об'єкт обліку, гроші, нематеріальні активи, віртуальні товари, інформаційні технології.

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1. Introduction.

The information technology development results in the origin of new types of cryptocurrency. Main advantages of the cryptocurrency use are decentralization and freedom of transactions. Cryptocurrency acts worldwide as the inexpensive technological means of payment as well as special form of investment.

Nowadays, there is no shared idea as for the interpretation of the “cryptocurrency” concept. On the one hand, it is considered as the “virtual currency” and called both a special payment network and a new type of monetary means. On the other hand, it is called a “digital asset”, which can be exchanged for other assets. Cryptocurrency is characterized by a free market rate formed on the demand-supply basis.

Accounting of the traditional monetary means is performed in terms of the identification of a payment instrument and participants of the agreement. Such a process may be represented as follows: “seller – buyer” (agreement) on the “money-goods” principle. That is the approach which helps conduct short-term transactions in terms of similar location of the counterparties. While using cryptocurrency, which may be represented as a series of bytes of certain information, it is necessary to have electronic payment system acting as an intermediary. Main task of such system is the accounting control providing non-admittance of repeated set of bytes. Nowadays, there are several similar systems, which increase the risk of data and information fraud. Bitcoin (cryptocurrency) does not mean the involvement of the third parties to conduct monetary operations; thus, a blockchain system can be considered rather safe.

During the recording of cryptocurrency and operations with it, the accounting has certain legal limitations as the legal status of such assets is different worldwide. It is within the

range from virtual currency, monetary surrogate, virtual goods, and digital asset to the intangible asset. Basing on that, there are no legal grounds to recognize cryptocurrency as a payment instrument in Ukraine. Along with that, it is not prohibited to convert cryptocurrency into the national currency and vice versa as such operations are not prohibited at the legislative level; thus, there is no violation of the national legislation. Bitcoin-ATMs already function in the developed countries worldwide but the no availability of the regulatory system does not allow the operation of electronic payment system PayPal (cryptocurrency) in Ukraine (*Rysin, Rysin and Fedyuk, 2018, p. 12*).

Legalization of the cryptocurrency operations requires a complex process of the determination of cryptocurrency status, a mechanism of its accounting, and the development of a system for taxation and control of such operations. There is the necessity to legalize cryptocurrency and cryptocurrency operations in order to legalize and impose taxes on the cryptocurrency operations and mining process. Basing on the fiscal law, legal entities that buy the equipment for virtual currency mining should enter it in the books and put it into operation.

If a physical party (a sole proprietor) buy such equipment, he/she does not enter it in the books, only in case if the latter is in the 3rd group of a simplified taxation system, it should be kept in mind that the income is limited by USD 178,000 (as of 01.06.2020) and costs for its purchase should be confirmed within the limits of the obtained income (*Virtual Currency Schemes, 2012*).

2. Literature review.

R. Brukhansky and I. Spilnyk (*2019b, p. 145–156*) try to identify and substantiate the perspectives of solving the problem of digital assets integration in the accounting system and

financial data reporting. The authors focus on the necessity of identification and giving certain legal status for cryptocurrencies in terms of certain legal environment. The research states that the acceptance of cryptoassets by accounting is rather a methodologically complicated but innovative and perspective problem requiring complex solution. In his research, T. Yatsyk (2019, p. 28) represents a comparative characteristic of such main users of the cryptocurrency market as miners, cryptocurrency emitters, online-exchangers, cryptocurrency exchange markets etc. Moreover, the paper analyses stages of the activities of economic agents in the cryptocurrency market to single out the cryptocurrency-related operations. It should be also noted that in the near future such standard assets as bonds will become digital, which will make it possible to develop new decentralized business-models based on a blockchain model. A. Stovpova (2018) studies key features of tokens as cryptoassets, which differ from cryptocurrencies. She also considers the problems of recognition of bitcoin and other cryptocurrencies in accounting. The author substantiates impossibility of using a universal approach to the accounting of cryptocurrency due to its variety and functional difference. In their analysis, T. Tarasova et al. (2020) use stochastic models to forecast a cryptocurrency exchange rate. The authors emphasize the necessity of representation of certain operations in cryptocurrency-related accounting; they propose to recognize digital currency as digital assets. M. Pashkevych et al. (2020) substantiate the necessity of the implementation of a blockchain technology in accounting. They also specify certain risks of the cryptocurrency use and consider the possibility for accounting to record digital assets in financial accounting and financial data reporting. A. Jumde and B. Cho (2020) study if cryptocurrency can draw ahead of fiat money with the help of analytical hierarchy process (AHP) for elaborating a scale of pair comparisons. The results have shown that fiat money still prefer cryptocurrency due to numerous reasons. In his

research, S. Ammous (2018) analyses monetary characteristics for five cryptocurrencies to estimate whether they could act as money. He makes a conclusion that only bitcoin has the potential to act as the value storage owing to the facts that it is stick to low supply growth; in addition, it is supported reliably by the distributed network protocol and significant demonstration of nonavailability of any authority. R. Brukhanskyi and I. Spilnyk (2019a) consider the essence of cryptocurrency for the accounting purposes: money, their equivalent, currency, goods, shares, financial investments or intangible assets. They conclude that it is required to apply a universal approach to the recording of cryptoassets in accounting. O. Fomina et al. (2019) discuss different aspects of cryptocurrency recognition in Ukraine. They identify the necessity to clarify and harmonize the available national accounting standards for the determination and reporting during the cryptocurrency operations. Along with the development of information technology, there are certain changes not only in the technology dealing with the payment transactions; attitude of people to those operations changes as well (Ievdokymov et al., 2020). Different generations replace each other; we observe transformation of modern society. D. Procházka (2018) proposes the scenarios, in terms of which cryptocurrency should be considered as the (foreign) currency though the financial system regulators do not consider cryptocurrencies as money (fiat currency). In their work, P. Katsiampa et al. (2019) study the interaction between the the information demand measured by the Google search index, price return, and volumes of trades for five basic cryptocurrencies. S. Pastrana and G. Suarez-Tangil (2019) prove the illegal conduct of some cryptocurrency operations. They also substantiate the possibility of their evening-out. G. Hong et al. (2018) state that cryptocurrency and its mining is gaining more and more popularity. W. Yiy-ing and Z. Yeze (2019) stress that cryptocurrency is growing in its importance in the reformation of a financial system due to its increasing popularity and loyalty. However, A. Baur

et al. (2015) proves that cryptocurrency is a destructing instrument of payment. Nevertheless, H. Nabilou and A. Prüm (2019) are sure that soon cryptocurrencies will have considerable effect on the banking, financial, and monetary systems.

Despite the considerable interest of scientists in digital assets, a problem of cryptocurrency determination as the accounting object is rather debating as it is not clear what it should be recognized as and where should it belong to. Consequently, there arises the necessity of studying the parameters of cryptocurrency as the accounting object.

3. Methodology.

General scientific methods and approaches, systematic approach, general research methods (analysis, synthesis, generalization), statistical methods.

4. Research objectives.

The purpose is to specify basic parameters for the identification of cryptocurrency as the accounting object with its further recording in accounting and financial data reporting.

5. Results and discussions.

From the accounting viewpoint, a problem of considering cryptocurrency as a payment instrument has not been analysed to the full extent. Currently, there are no grounds for qualifying different-type cryptocurrencies in the accounting as standard currencies or assets due to the following: they are not regulated by any jurisdictions; it is impossible to identify an emitter or a specific organization responsible for their emission; cryptocurrency exists only in the virtual internet-medium.

Basic features peculiar for cryptocurrencies and electronic monetary means are given in Table 1.

Table 1. Comparison of monetary means, electronic money, and cryptocurrencies

Parameter	Monetary means	Electronic money	Cryptocurrency
Format	Paper	Digital	Digital
Payment unit	National currency	Fiat money (USD, UAN, EUR, BYN, ARS)	About 1000 cryptocurrencies
Identification of clients	Passport data	To identify clients, the standards developed by the Financial Action Task Force on Money-laundering (FATF) are used though the standards admit the simplified measures for low-risk financial instruments	Anonymity
Methods of emission	State institution	Emission in the electronic form in exchange for fiat money emitted by the central regulatory body	Mining – equipment and mathematical methods
Emitter	National banks	Based on the legal grounds, electronic money emitter (which may be represented by a financial institution)	Private individual, miners
Book-keeping operations in terms of the accounts (Ukraine)	301, 311	335	127, 301, 335, 35,

Source: Formed by the authors on the basis of (Jumde and Cho, 2020; Ammous, 2018).

There is a problematic aspect at the initial stage; that is misunderstanding of the algorithm of accounting representation of such operations as well as a mechanism of its taxation. From the technical viewpoint, Ukrainian companies may conduct the operations of cryptocurrency buy and sell, exchange, and payment using free exchange rate on the Internet-sites

or electronic resources of currency conversion (a peculiar kind of exchange market).

Thus, anonymity and diversification are the main cryptocurrency distinctions comparing to electronic money. The emission method means mining, owing to which new information blocks are created and main rewards for mathematical calculations of certain

cryptocurrencies are generated. Bitcoin has the greatest market capitalization and, correspondingly, the greatest market share. Bitcoin is a peer-to-peer electronic payment system used in terms of the same-name exchange unit. Maximum number of bitcoins, which can be mined, is limited by 12 million units.

Classification of such assets and their further estimation has significant aftereffects not only for the reporting economic entity but also for the state economy in general (*Procházka, 2018*).

According to the preliminary calculations, the last Bitcoin may be mined in 2040. Since the Bitcoin cryptocurrency emission is limited, becoming more and more resource-intensive with the course of time, it is quite common to consider Bitcoin as “digital gold”, i.e. as a certain standard for other cryptocurrencies. Leading role of Bitcoin is confirmed by statistic data concerning the cryptocurrency market functioning (*Brukhanskyi and Spilnyk, 2019a*).

At the beginning of 2018, market capitalization of cryptocurrencies reached its peak. Cryptocurrencies cannot be neglected in terms of their involvement in a share of wealth of both a state and certain parties. Differences in the approaches to cryptocurrency interpretations are the main practical problem; later, those differences affect the accounting methods, which influence considerably the financial markets. Asymmetry of the information between the authorities and the interested parties experience certain intensification with further effect on the income control in terms of the lack of proper accounting regulation.

To understand better the creation of such an accounting object as cryptocurrency, it is expedient to analyse a mining process with the singling out of certain calculation stages of costs and consideration of main stages, which form the activity of economic entities in the cryptocurrency market.

Thus, stage one of the cryptocurrency creation, i.e. its emission, is the accrual of the ownership rights. There are several ways to get cryptocurrency. The first way requires use of specific equipment for cryptocurrency mining,

Internet speed, powerful facilities, and electric power. Certain method (ASIC or mining farm) should select one correct hashCode among the millions of combinations, which will form the block heading in the blockchain. As soon as the required number is generated, a block with all the transactions is closed, and miners move on to search for the next one. Miners are rewarded for the correct hashCode; the reward is 12.5 bitcoins (*Fomina et al., 2019*). The rental of premises, heat elimination, and temperature control in the premises are the additional conditions of the successful equipment performance.

The second way is much simpler. That is cryptocurrency purchase in the exchange market for real monetary means. The third way relates to the Thash equipment rent – virtual ASICs on the Internet for certain sum of compensation for the costs described in the first way. The fourth way is a mine, i.e. a barter operation – exchange for some similar asset.

All that should be singled out for further accounting of the costs, formation of the cryptocurrency prime cost, and cryptocurrency representation in both financial and fiscal reports.

Stage two involves cryptocurrency keeping in terms of certain media or virtual wallet. Two variants are possible here – with and without the private key transfer; the key is formed of 30 words in a virtual wallet or of 20 symbols on an information-carrying medium. In this case, form of control and a period, during which an enterprise or sole proprietor can control such asset, is of great importance.

Stage three means the cryptocurrency use in everyday life of enterprises and organizations (*Cherchata and Andrusiv, 2018*). Two objectives are possible here: the first one is to use cryptocurrency for buying goods and services; the second one is the investment (*Andrusiv et al., 2020*). There are also other variants of cryptocurrency use, e.g. exchange for monetary means, but the mentioned ones are basic. Moreover, while investing, all the possible risks should be considered. One cannot identify all the risks and protect oneself against them.

For instance, prohibition of cryptocurrency use in any country of the world may influence negatively its exchange, resulting in its further fluctuation; besides, electricity may become more expensive, making the mining inexpedient. Miners start switching off the equipment; load of mining complexity will decrease due to the lower number of network participants; and cryptocurrency will either increase or reduce its cost.

The accounting objects represented by cryptocurrency are accompanied by the subjects of the cryptocurrency market. Traditionally, they include salespeople, buyers, and those who deal with mining of new coins.

The wallet owners specify cold and warm cryptocurrency keeping. Warm keeping includes such wallets as exchange market wallets, mobile applications, and software applications. Cold wallets involves paper ones where a private key is represented by the following: a printable QR code; hardware keeping as a variety of USB flash disc; a computer, but in case of system crash one can lose the wallet access for ever; a coin – developers create real coins, which code a private key for digital money. To calculate the prime cost of the cryptocurrency obtained by independent mining, it is necessary to consider main costs that

need to be identified and represented in accounting. Apart from bitcoins, one can mine altcoins and litecoins or transfer cryptocurrency into stablecoins, which are impossible to mine – they can be only bought. Thus, to calculate the cryptocurrency profitability, following aspects should be taken into consideration (Kneysler et al., 2020): cost of electric over for a physical party and legal entity in the country; cost of the required equipment, its amortization, maintenance, and functional depreciation; residual value in terms of which one can sell the outdated mining equipment; hash – a speed of the solution of mathematical problems by certain equipment; network loading and mining complexity; monetary value or exchange rate of a specific cryptocurrency or digital assets.

Thus, cloud mining is profitable for those, who has just started the cryptocurrency operations. For those, who have no possibility to invest money either in the equipment purchase or in the cloud service renting, there are services, which give certain Internet-sites that pay cryptocurrency for watching the advertisements. Relying on that, accounting may record the operations of the parties, which have decided to start “cryptocurrency mining” (Table 2).

Table 2. Accounting of the cryptocurrency operations

No.	Content of the operation	Debit	Credit	Total sum, USD
1	ASIC installation (power source and processor) or ASIC purchase	152	209	279
		152	631	279
2	Debiting of tax credit with VAT	644	631	46
3	ASIC putting into operation	104	152	325
4	Purchase of the software for ASIC	154	631	107
5	Debiting of tax credit with VAT	644	154	17.8
6	Putting into operation of the software (“firmware upgrade” – software)	127	154	90
Calculations for the services (mining – acc. 977)				
7	Electric power	92 (977)	631	61
8	Premises lending Rent payment is recalculated, in advance	01		428
		371	311	36
9	Payment for the Internet	92 (977)	631	3.6
10	Remuneration settlements (for ASIC maintenance)	92 (977)	661	286
11	National social insurance settlements	92 (977)	651	62.8

Source: Generalized by the author.

Correct legal interpretation and recognition are the basic problems for the cryptocurrency recording in accounting. Due to that, in case of cryptocurrency recognition as a digital currency, it is proposed to use synthetic account 336 "Other means of digital currency" (virtual wallet); in case of cryptocurrency recognition as a variety of electronic money, it is proposed to use synthetic sub-ledger account 335.1 "Variety of electronic money"; if cryptocurrency is recognized as virtual goods, then one should use synthetic sub-ledger account 287 "Virtual goods"; if cryptocurrency is recognized as a financial investment, then one should use synthetic sub-ledger account 352 "Other current financial investments"; if one recognizes cryptocurrency as an intangible asset, then it is recommended to use synthetic sub-ledger account 127 "Other intangible assets".

6. Conclusions.

Given the above, we can conclude that given the economic derivative of cryptocurrency, it can affect the economic and social components of any country. The European Union's sustainable development strategy aims to develop the information component. Cryptocurrency is a hub that influences the development of telecommunications, digital economy, e-business and commerce. It can motivate countries around the world to develop all areas of activity for the control of such a specific asset.

At the economic level, cryptocurrency affects the way certain transactions are carried out. In the future, if it can be recognized internationally and locally, it will displace paper money and electronic money, as it is completely protected from counterfeiting. Under coronavirus, most bacteria exist on the surface of paper money, so people use an electronic payment format or cryptocurrency. You can pay with cryptocurrency using a QR code in

your digital wallet. The amount of cryptocurrency affects the calculation of monetary aggregates in a country. Such a specific activity as mining allows the state to receive additional revenues from the taxation of such activities.

At the social level, humanity is constantly striving for self-development. Cryptocurrency is a future form of cash that can be easily and safely used in everyday life. It does not depend on the bank or a country, you can not worry, however, that will not be a country – will not be such money that if the bank goes bankrupt, it will remain guilty of deposits to certain individuals. The main thing here is that countries develop a mechanism for recognizing and controlling such assets. For example, most of the US population trusts cryptocurrency, because after President Donald Trump's order to pay a certain amount of \$ 1,200 per person to support a pandemic, many individuals were registered on the Coinbase cryptocurrency exchange people who started buying cryptocurrency in the amount equivalent to \$ 1,000. That is, people try to keep their assets in such a digital format.

Thus, a virtual currency is a huge amount of computing power and digital assets. At this stage of technological development of mankind, cryptocurrency is gaining a stable position in the international market. Rapid development is causing further capacity growth and interest but may eventually lead to collapse. However, if the price stability of the cryptocurrency is achieved, it can be used in international transactions, not just for speculative gain. However, this issue will be directly related to the legalization of the new currency and its recognition by central banks as a means of exchange or storage of money. There is a need for further research to understand the basic conditions for the use of digital currency in the payments market.

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