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# ACCOUNTING AND CONTROL OF FOREIGN ECONOMIC ELECTRONIC TRANSACTIONS USING CRYPTOCURRENCIES

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***Introduction.*** *Digitization of socio-economic processes and the active development of information and communication technologies have led to the emergence of a new phenomenon - "cryptocurrency", which requires the improvement of accounting and control of electronic transactions. The use of cryptocurrencies in electronic transactions is associated with six stages of their evolution from the accounting and control theory: 1) intangible assets, 2) stocks, 3) investment property, 4) financial instruments, 5) cash equivalents, 6) cash. Today, in international regulations, accounting and control policies, cryptocurrencies are at the initial stage of formation and are positioned as intangible assets. However, the realities of their foreign economic use are ahead of legal and accounting and control regulations. There was a need to transform the methodology and organization of accounting and control of foreign economic electronic transactions using cryptocurrencies.*

***The purpose of the article*** *is to improve the accounting and control of cryptocurrencies in the context of their use in foreign economic electronic monetary transactions.*

***Methods.*** *In the process of the article purpose realization the system, innovative, institutional approaches and methods of economic and mathematical modeling, bibliographic and comparative analysis are used.*

***Results.*** *The need for progressive evolution of the accounting and control understanding of cryptoassets as stocks, investment property, financial instruments and, at the final stage, money is substantiated. The ability of cryptocurrencies to perform the functions of money has been studied: a measure of value, a means of circulation, a means of accumulation, a means of payment, world money. It was determined that cryptographic monetary units can be considered money only in the case of the ability to be a means of international exchange. It has been proven that the final stage of the formation of the concept of "cryptocurrencies" is their recognition as monetary units for international monetary exchange as a component of foreign economic activity. The expressed author's vision regarding the use of cryptocurrencies in foreign economic electronic transactions, which requires reducing the speculative nature of the cryptocurrency market, avoiding their improper and illegal use, and increasing the level of international control of monetary transactions. It is necessary to establish parity in the control of electronic transactions using cryptocurrencies and confidentiality, which can be implemented with the involvement of international independent audit institutions. An information scheme of an innovative information environment of foreign economic electronic transactions using cryptocurrencies has been developed, in which multi-level integration processes take place with the formation of: An integrated system of electronic communications based on the combination of "Client-bank", "Internet-bank" and block-chain structuring of account data; Integrated system of information synchronization of banking and accounting and control software; An integrated system of business communications, which connects all participants of international monetary settlements; Integrated accounting and control system.*

***Prospects.*** *The practical implementation of the developed information scheme of the innovative information environment of foreign economic electronic transactions is the*

*basis for the formation of virtual meta-environments in which all financial and economic processes take place exclusively in an electronic format, which requires further research in this direction.*

***Keywords:*** *accounting, control, cryptocurrencies, electronic transactions, foreign economic activity.*

**Formulas: 0; fig .: 3; tab .: 1; bibl .: 22.**

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**Introduction.** Together with the formation of the digital economy, non-bank financial institutions began to appear, which provide intermediary services for foreign currency exchange and virtual money transfer. These financial institutions, not having the authority to issue government banknotes, began to create electronic equivalents of money, which were called electronic money. Electronic money in most cases does not have a gold-currency security of any country, but is freely exchanged by intermediary institutions for any foreign currencies. Accordingly, the accounting of electronic money is carried out similarly to the accounting display of currency transactions. Accounting information on electronic account settlements is freely transferred between foreign payers and recipients of funds with automatic formation of electronic supporting primary documents. Electronic documents received from a financial institution are already the basis for the accounting display of monetary transactions.

However, the development of blockchain technology has made drastic changes in the implementation of foreign economic electronic monetary transactions. There are no intermediary financial institutions in foreign economic electronic transactions with the use of cryptocurrencies. After the emission of crypto assets, information exchange, including international information exchange, can take place directly between participants in monetary transactions. Information about electronic transactions immediately has an accounting and control value, which indicates the merger of the electronic payment platform and automated accounting and control systems. The use of a highly integrated information system of electronic transactions introduces fundamental changes in the organization and methodology of accounting and control.

**Analysis of research and problem statement.** The following works are devoted to the peculiarities of accounting and control of electronic transactions using cryptocurrencies: Rasa Subačienė and Natalija Kurauskienė – variable methods of valuing cryptocurrencies in accounting [1], Yukun Liu, Aleh Tsyvinski and Xi Wu – reliable determination of the value of cryptocurrencies [2]; Juan Delva Benavides, Francisco Amaya – the relationship between the legal recognition of cryptocurrencies and their accounting and taxation [3]; Feras Shehada, Mohanad Shehada – problematic accounting of cryptocurrencies according to international reporting standards [4]; Vanessa Jiménez-Serranía, Javier Domínguez, Fernando De La Prieta and Juan Corchado – accounting mechanism for the impact of cryptocurrencies on financial markets [5]; Kim Kyoung-Won, Lee Su-Min, Kim Seo-Yeong, Jung Da-Woon, Jee Eun-Sang – limitations and imperfections of all current methods of accounting for cryptocurrency transactions [6]. All the cited scientists associate the problematic accounting and control display of transactions with cryptocurrencies with the ambiguous interpretation of cryptocurrencies in accounting.


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In particular, A.S.Stovpova set the goal and indicated the complexity of the multifaceted characteristics of cryptocurrency as an accounting object [7]. R.Brukhanskyi and I.Spilnyk investigated the institutional mechanism of functioning of electronic payment systems using cryptocurrencies. Scientists have proposed an understanding of crypto assets in social and economic processes from the standpoint of accounting and taxation as important social institutions [8]. The ontology of the origin of cryptocurrencies in accounting as a new stage in the development of electronic money was explained by I. A. Derun and I. P. Sklyaruk [9]. The most problematic, as A. A. Makurin proves, is the accounting display of transactions with cryptocurrencies in financial accounting [10]. In particular, A. V. Ozeran, R. S. Korshikova point out the need for a dual display of cryptocurrencies in financial statements as assets and expenses [11]. The direct relationship between crypto assets and intangible assets was substantiated by S. V. Labunska, T. M. Serikova, and M. V. Sobakar [12]. T.O. Tarasova, A.A.Makurin also explained the difference in the accounting display of cryptocurrencies as monetary means and fiat money resulting from the regulatory and legal regulation of accounting and taxation [13]. The legal uncertainty of cryptocurrencies as important accounting objects was also pointed out by L.V. Shevchenko. [14].

Scientists debate concerning the correctness of legal regulations and the order of display of cryptographic funds in accounting. Even in international regulatory and legal documents, as well as in accounting and control regulations, there is no unified positioning of terminology in the field of cryptographic assets. The active use of the term virtual currency is interesting, which is explained by the virtual intangible origin of crypto assets. Also, the member states of the European Union are recommended to apply this definition in accordance with the Decision of the European Court of Justice in the C-264/14 case to prevent the use of the financial system for the purpose of money laundering and terrorist financing [15]. The virtual understanding of cryptocurrencies complicates their accounting and control recognition. In addition, other terms are present in the regulatory and legal provision of accounting and control of some countries, such as: digital currency (Argentina, Thailand and Australia), crypto-token (Germany), token payment (Switzerland), cyber currency (Italy and Lebanon), electronic currency (Colombia and Lebanon) and virtual asset (Honduras and Mexico) [16].

Such phasing of the development of the phenomenon of cryptocurrencies is associated with the variability of methods of recognition and valuation of cryptographic assets in accordance with international accounting standards. Each of the financial and economic transactions using cryptocurrencies is differently evaluated and identified by accounting and control systems [19].

Normative legal regulation and the state of development of accounting and control systems is in its infancy and is not able to realize all the infrastructural and functional advantages of cryptocurrencies (especially in international exchange). There was a need to identify a new accounting object, which is a circulating intangible asset. Today, crypto assets meet the definition of current intangible assets as much as possible in accordance with IAS 2 “Inventories” [20]. For example, some crypto assets can completely transfer the value to the finished product in the reporting period, cryptocurrencies can be held for a short period of time for further sale. And therefore there was a real need to review the legal and accounting and control policy of states regarding the international circulation

of cryptographic means of payment, which would correspond to the current state and prospective trends in the development of the information society and digital economy. The next stage is the recognition of cryptocurrencies in accounting and control as an investment property and a financial instrument.

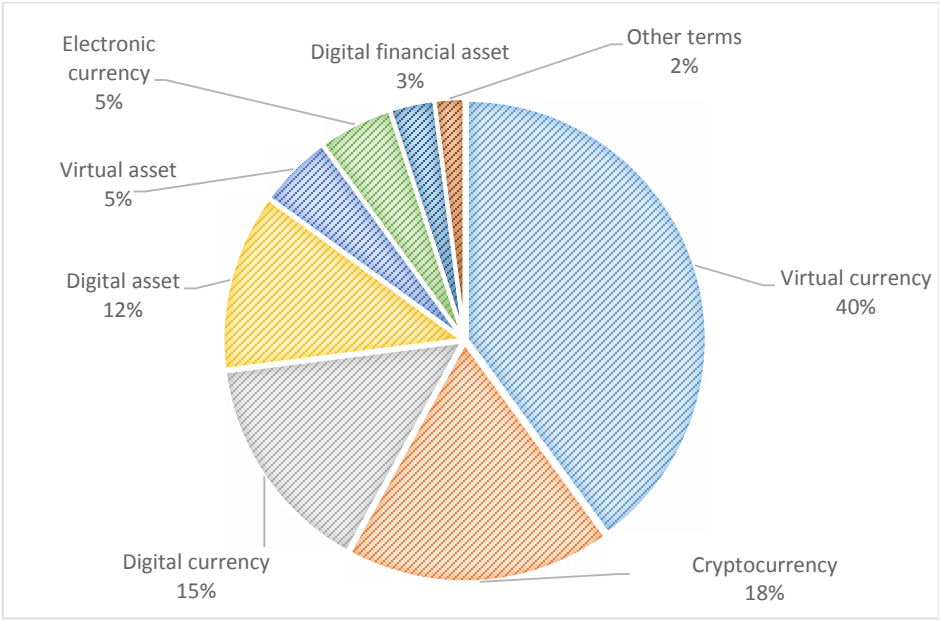


Fig. 1. The most popular terms for identifying cryptocurrencies in the main international regulatory documents [17].

The lack of a unified understanding of cryptocurrencies by scientists and international legal documents in the context of accounting and control of electronic transactions using cryptographic monetary units determines the purpose of the article.

**The purpose of the article** is to improve the accounting and control of cryptocurrencies in the context of their use in foreign economic electronic monetary transactions.

**Research results.** The essential formation of cryptocurrencies occurs progressively as the social and economic realities of their use develop. At the present moment, regulatory and legal legalization of cryptocurrencies is in its infancy. Despite more than ten years of experience in using cryptographic funds in electronic transactions, there is no unified understanding of them in the accounting and control space. Similarly, international regulatory documents lack a comprehensive understanding of crypto assets as accounting objects. Transactions with cryptocurrencies fall under the regulatory field of IAS 38 “Intangible assets” only. The recognition of the economic essence of cryptocurrency as an intangible asset according to IAS 38 “Intangible assets” meets the following criteria: it can be separated from the holder and be realized or transferred individually; does not give the holder the right to receive a fixed or defined number of monetary units [18]. The positioning of cryptocurrencies as intangible assets, which occurs in most countries, significantly narrows the scope of their application. The intangible origin of crypto assets corresponds to the first initial stage of the development of electronic transaction platforms (Fig. 2).


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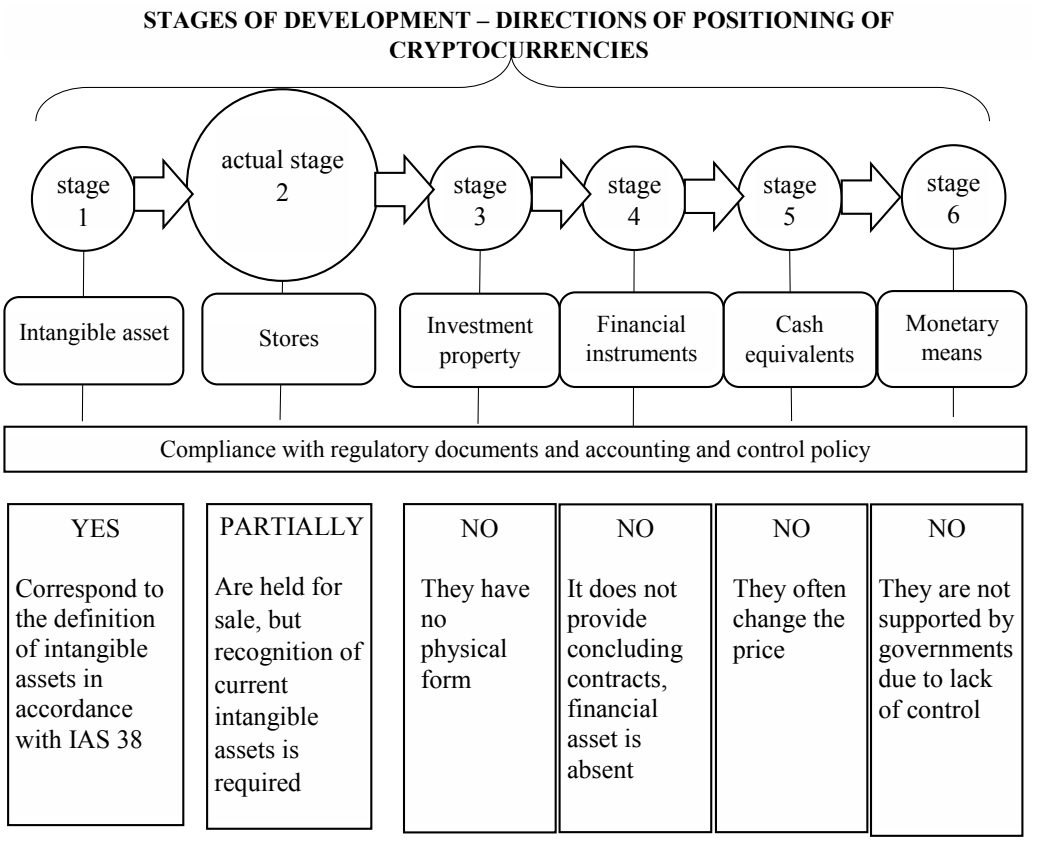


Fig. 2. Evolutionary stages of cryptocurrency development from the standpoint of accounting and control.

Source: created by the authors.

After minimizing the speculative components of international trade in crypto assets, stabilization of crypto markets will take place. The excessive volatility and riskiness of cryptocurrency transactions will eventually reduce the number of speculators in the market in favor of the traditional investment positioning of cryptographic monetary means. Cryptocurrencies are already divided into assets that have an investment interest and act as a means of monetary circulation. In the near future, this classification will become more and more clear, which will allow choosing cryptocurrencies according to individual needs and expected results. That is, the final stage of the development of cryptocurrencies will be their use as equivalents of money that do not have a material form. But the performance of the functions of money by cryptographic monetary units remains problematic (Table 1).

*Table 1*

**Cryptocurrencies as money: modernity and prospects**

| No. | Function of money | The ability of cryptocurrencies to perform the functions of money | Further prospects |
|---|---|---|---|
| 1. | Measure of value | Cryptocurrencies are freely traded on active markets, which makes it possible to determine their value and exchange rate. The price of most cryptocurrencies, which are positioned as speculative investment objects, is quite volatile, which makes it difficult to predict their value. | Further development of cryptocurrencies leads to their use for payment operations with value tied to fiat money or stock assets. |
| 2. | Means of circulation | Cryptocurrencies are already used as a means of payment when purchasing goods (works, services). More and more trading platforms are accepting cryptocurrencies, and countries are officially recognizing them as a means of payment. However, other countries prohibit the use of cryptocurrencies. | Over time, the number of countries in which cryptocurrencies will be legalized will increase. In countries with a regulated economy, it will be possible to create their own cryptocurrencies, or to ensure controllability of electronic transactions. |
| 3. | Means of accumulation | Unpredicted emission and significant exchange rate fluctuations make it difficult to accumulate cryptocurrencies for a long time. | Investors, having received the expected investment profit, try to sell high-risk crypto assets. As the level of control over electronic transactions increases, the emission of cryptocurrencies and their value will stabilize. Active attraction of cryptocurrency deposits and loans will stimulate their long-term accumulation. |
| 4. | Means of payment | In connection with significant price fluctuations, cryptocurrencies are considered by counterparties as an undesirable means of payment in conditions of large time lags between the conclusion of contracts and their payment. | Active implementation of the practice of smart contracts, which automatically monitor the fulfillment of contractual terms and their payment, the use of cryptocurrencies is acceptable. With the stabilization of the value of cryptocurrencies, their use for commercial purposes is possible. |
| 5. | World Money | As electronic transactions using cryptocurrencies are confidential, most countries restrict their use to combat illegal activities. Some national governments and large international companies are already accepting cryptocurrencies in international export-import transactions | Ensuring international control or independent auditing of electronic transactions will ensure credibility of cryptocurrencies as international means of payment. |

Source: created by the authors.


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The impossibility of identifying crypto assets by monetary means from the standpoint of accounting and control is justified by the difficulty of recognizing them as a measure of value, as well as by means of circulation, accumulation, payment, and international exchange. According to Ya. Krupka and V. Okrenets, "international standards and domestic analogues even more were developed even before the active spread of cryptocurrencies", and therefore do not take into account their economic nature. As scientists prove, "taking into account different approaches to regulatory regulation of the legal status of crypto assets in the world and, in general, the practice of their use", cryptocurrencies are able to partially perform certain functions of money [21, c. 244]

Thus, for the recognition of cryptocurrencies as monetary means, which eventually perform the function of international monetary exchange, there is a major obstacle connected with international non-recognition as a result of confidentiality and uncontrollability. The positive influence on fluctuations of the value of crypto assets makes it impossible to use them for legalization of illegally obtained funds or avoiding taxation. For this purpose, it is necessary to increase the level of international control of electronic transactions using cryptocurrencies.

Ensuring proper international control over the circulation of cryptographic monetary units solves the obstacle to their recognition as monetary means. Accordingly, for the state and international legalization of cryptocurrencies, it is necessary to partially abandon the confidentiality of electronic transactions in favor of increasing the level of control. Such control for compensation of the loss of the main advantages of the use of cryptocurrencies must be external. Only international audit control of electronic transactions using cryptocurrencies can ensure the necessary level of confidentiality and non-riskiness. In case of arising of suspicions about the illegal use of crypto assets, information about electronic transactions may be disclosed by auditing firms at the request of regulatory institutions or judicial institutions. In other cases, auditors act as guarantors of electronic transactions. So, a balance is ensured between maintaining the confidentiality and adequacy of electronic transactions and ensuring international control, which minimizes barriers to the legalization of cryptocurrencies.

As a result, in the near future the prerequisites will be formed for the recognition of cryptocurrencies as a new type of assets, equated to monetary means for conducting foreign economic electronic transactions. In the scientific work, it was proposed to use a separate accounting account for recording electronic transactions using cryptocurrencies [22]. In the Ukrainian scheme of accounting accounts, you can use free account number 32 with the name "Electronic money and cryptocurrencies", which determines the ownership of electronic money and cryptocurrencies. The next step is the regulation of the method of displaying financial and economic transactions on accounting accounts, including as part of the foreign economic activity of enterprises, with the use of cryptographic monetary means.

The use of cryptocurrencies as international monetary means foresees the integration of their support into modern electronic payment services. Electronic money settlement platforms are already effectively integrated into the information systems of foreign economic electronic transactions. Participants of electronic transactions are able to pay with electronic monetary units in the process of trading operations, and banking institutions provide free instant conversion of electronic and international fiat money. According to a

similar scheme, it is advisable to informationally integrate cryptocurrency services into the information environment of international electronic payments.

Traditionally, banking institutions use two types of communication channels for customer relations: “Client-bank” and “Internet-bank”. Electronic communications of the “Client-Bank” type require the installation of specialized software for the exchange of information messages and the management of funds in bank accounts. Such software products can be informationally integrated into the accounting and control information system of the enterprise. But, at the same time, due to the limited support of various software platforms and operating systems, “Client-Bank” communications are not sufficiently mobile, which is important in the conditions of remote work of employees during pandemic and wartime circumstances, as well as personnel staying abroad.

Instead, electronic communications with banking institutions of the “Internet Bank” type through Internet browsers allow staff responsible for monetary settlements to work remotely even from mobile smartphones. But this option of information exchange with banking institutions complicates direct synchronization with specialized software for automating accounting and control functions. Therefore, information integration of electronic communications “Client-Bank” and “Internet-Bank” with cryptocurrency platforms in the contour of the information system of the enterprise is necessary. Such integration is already possible on the basis of experience and developments of banking electronic platforms for customer service through ATMs, terminals and Internet platforms and the SWIFT international payment system.

The implementation of cryptocurrency services in the information systems of commercial banks will contribute to the growth of reliability and cyber security of banking services for end customers. Thanks to the use of blockchain technology, on which cryptocurrency services are built, distributed storage of information about the functioning of the banking system is ensured. Every foreign user of banking services who uses specialized software becomes the holder of a part of the database, all elements of which are united by blockchain technology. This blockchain structuring of data ensures the reliability of their storage and use, respectively, the integrity and stability of the functioning of the banking system.

With the use of blockchain technology, it is advisable to integrate accounting databases into banking and cryptocurrency information systems of money circulation. It is necessary to provide free information synchronization of the software for automating accounting functions with banking and cryptocurrency exchange information services. Thus, the multi-level integration of electronic communication channels such as “Client-bank” and “Internet-bank”, banking and cryptocurrency portals, money exchange and accounting and control functions ensures the formation of an innovative information environment of foreign economic electronic transactions, in which cryptocurrencies are monetary means of circulation (Fig. 3).


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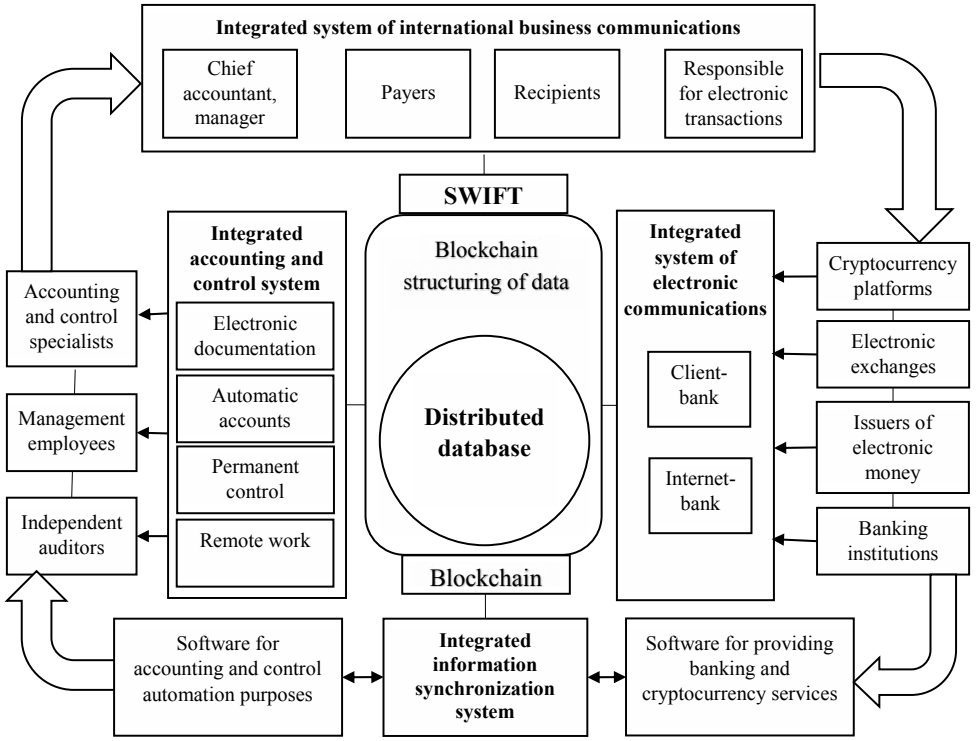


Fig. 3. Innovative information environment of foreign economic electronic transactions using cryptocurrencies and implementation of accounting and control functions.

Source: created by the authors.

The information environment of foreign economic electronic transactions is the basis of functioning of virtual metauniverses, which are formed from the Integrated system of electronic communications based on the combination of “Client-bank”, “Internet-bank” and blockchain structuring of accounting data; integrated system of information synchronization of banking and accounting and control software; an integrated system of business communications, which informationally connects all participants in monetary payments; integrated accounting and control system.

In the conditions of free information exchange, accounting and control specialists are able to carry out monetary transactions promptly 24 hours a day. From personal telecommunications devices or smartphones, full-time personnel can perform actions that are prescribed by job duties, being outside the boundaries of the enterprise and the country, which is important in the conditions of pandemic and wartime circumstances. Regardless of the territorial location, requests for approval or rejection of an electronic transaction, including international payments using cryptocurrencies, may be sent to persons responsible for monetary transactions. In addition, all electronic transactions are under the permanent control of responsible persons. At any time, when suspicious monetary and currency transactions are detected, especially those that are part of foreign

economic activity, automatic restrictions may be imposed. And only after a personal check by the controller, the electronic transaction can be implemented.

Based on information about electronic transactions from the innovative information environment, it is possible to automatically form appropriate accounts. After confirmation of receipt or withdrawal of funds from electronic accounts, it is advisable to form initial documents and accounting transactions. It is recommended that primary documents on the movement of funds, including cryptocurrencies, be automatically generated and sent to responsible persons exclusively in electronic format, similar to bank statements. That is, the single electronic communication channels "Client-bank" and "Internet-bank" can be used for sending information about electronic transactions and account data about them. Thus, the promising direction of improving accounting and control processes in the conditions of the formation of an innovative information environment of foreign economic electronic transactions using cryptocurrencies as monetary means is: generation of primary documents in electronic format, automatic creation of accounts, permanent accounting and control of electronic transactions, remote functioning of the company's personnel etc.

**Conclusions.** The formation of the "cryptocurrency" phenomenon is at an initial stage, when international processes of speculative investment income, insufficient control and regulation in international regulatory documents prevail. The development of the concept of "cryptocurrency" goes through six successive stages, which include each of the previous stages of recognition of cryptographic monetary units as: intangible assets, reserves, investment property, financial instruments, monetary equivalents, monetary means. Today, there is a dissonance between the international practical use of cryptocurrencies as investment objects and financial instruments and their recognition only as intangible assets from the standpoint of accounting and control. The actual stage of the evolution of electronic transactions using cryptocurrencies foresees their identification in the accounting and control system as circulating intangible assets that can be consumed in a short-term period of time and they fully transfer the value to newly created products (works, services).

The final perspective of the use of cryptocurrencies is their recognition as monetary units for international monetary exchange as a component of foreign economic activity, which requires reducing the speculative nature of the cryptocurrency market, avoiding their improper and illegal use, and increasing the level of international control over monetary transactions. It is necessary to establish parity in the control of electronic transactions using cryptocurrencies and confidentiality, which can be possibly implemented with the involvement of international independent auditing institutions.

The use of cryptocurrencies as monetary units for international exchange ensures the formation of a unique information environment of foreign economic electronic transactions, in which multi-level integration processes take place with the formation of: integrated system of electronic communications based on the combination of "Client-bank", "Internet-bank" and blockchain structuring of accounting data; integrated system of information synchronization of banking and accounting and control software; an integrated system of business communications, which informationally connects all participants of international monetary payments; integrated accounting and control system.


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# ОБЛІК І КОНТРОЛЬ ЗОВНІШНЬОЕКОНОМІЧНИХ ЕЛЕКТРОННИХ ТРАНСАКЦІЙ З ВИКОРИСТАННЯМ КРИПТОВАЛЮТ

***Вступ.*** *Цифровізація соціально-економічних процесів та активний розвиток інформаційно-комунікаційних технологій зумовили виникнення нового феномена – «криптовалюти», що потребує удосконалення обліку та контролю електронних трансакцій. Застосування криптовалют в електронних трансакціях пов'язано з шістьма етапами їхньої еволюції з позиції бухгалтерського обліку та контролю: 1) нематеріальні активи, 2) запаси, 3) інвестиційна власність, 4) фінансові інструменти, 5) грошові еквіваленти, 6) грошові засоби. На сьогодні криптовалюти в міжнародних регламентах та обліково-контрольних політиках перебувають на початковому етапі становлення і позиціонуються як нематеріальні активи. Проте реалії їхнього зовнішньоекономічного використання випереджають юридичну та обліково-контрольну регламентацію. Виникла необхідність трансформації*

*методики та організації обліку й контролю зовнішньоекономічних електронних трансакцій з використанням криптовалют.*

***Мета статті** полягає в удосконаленні бухгалтерського обліку й контролю криптовалют у контексті їхнього використання у зовнішньоекономічних електронних грошових трансакціях.*

***Методи.** У процесі реалізації сформованої мети наукового дослідження використано системний, інноваційний, інституційний підходи та методи економіко-математичного моделювання, бібліографічного та компаративного аналізу.*

***Результати.** Обґрунтовано необхідність поступальної еволюції обліково-контрольного розуміння криптоактивів як запасів, інвестиційної власності, фінансових інструментів та (на кінцевому етапі) грошей. Досліджено здатність криптовалют виконувати функції грошей: міри вартості, засобу обігу, засобу накопичення, засобу платежу, світових грошей. Визначено, що криптографічні грошові одиниці можна вважати грошима тільки у випадку здатності бути засобом міжнародного обміну. Доведено, що фінальним етапом становлення поняття «криптовалюти» є їхнє визнання грошовими одиницями для міжнародного грошового обміну як складової зовнішньоекономічної діяльності. Висловлено авторське бачення щодо використання криптовалют у зовнішньоекономічних електронних трансакціях, що потребує зменшення спекулятивності криптовалютного ринку, уникнення неправомірного і незаконного їхнього застосування та зростання рівня міжнародної контрольованості грошових операцій. Необхідне становлення паритетності в контролі за електронними трансакціями з використанням криптовалют та конфіденційності, що можливо реалізувати із залученням міжнародних незалежних аудиторських інституцій. Розроблено інформаційну схему інноваційного інформаційного середовища зовнішньоекономічних електронних трансакцій з використанням криптовалют у якому відбуваються багаторівневі інтеграційні процеси з формуванням: Інтегрованої система електронних комунікацій на основі поєднання «Клієнт-банк», «Інтернет-банк» та блоково-ланцюгового структурування облікових даних; Інтегрованої системи інформаційної синхронізації банківського та обліково-контрольного програмного забезпечення; Інтегрованої системи бізнес-комунікацій, яка інформаційно поєднує усіх учасників міжнародних грошових розрахунків; Інтегрованої системи обліку і контролю.*

***Перспективи.** Практичне втілення розробленої інформаційної схеми інноваційного інформаційного середовища зовнішньоекономічних електронних трансакцій є підґрунтям формування віртуальних метасередовищ, у яких усі фінансово-господарські процеси відбуваються винятково в електронному форматі, що потребує подальших досліджень у цьому напрямку.*

***Ключові слова:** облік, контроль, криптовалюти, електронні трансакції, зовнішньоекономічна діяльність.*

**Формули: 0, рис.: 3, табл.: 1, бібл.: 22.**

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