УДК 334: 658.114

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DIGITAL ASSETS AS PAYMENT INSTRUMENTS: ESSENCE AND PRACTICE OF IMPLEMENTING

Various digital assets have become an integral part of global, and especially individual national economic systems. The creation and introduction into circulation of national digital currencies, the development of blockchain technologies is an element of the innovative strategy of digitization of the financial system. The main goal of the article is to study practical cases of the use of digital assets (bitcoin in El Salvador, eNaira in Nigeria, eCNY in China). Such practical cases allow us to identify the positive and negative effects of the implementation of this strategy. And predict risks, such as the legalization of cryptocurrencies for mutual settlements of external debt obligations, the lack of coverage of these assets, the creation of a "soap bubble" effect, which may lead to another global financial crisis. The study showed that there are several potential advantages - with the help of cryptocurrency and blockchain mining, various projects in the business, social and state spheres can be implemented, the sales market should potentially increase, the level of corruption should decrease due to the transparency of operations, and the cost of resources should be rationalized. However, negative effects and additional risks are also present, although it is much more difficult to assess them due to the too short period of practical implementation of these assets in the form of means of payment and the limited geography of such cases.

Key words: *virtual assets, digital commerce, global space, digital financial services, blockchain.*

DOI 10.34079/2226-2822-2023-13-25-167-173

In the information space, there are many concepts that would mean monetary entities implemented on electronic platforms in the network. Digital assets in the sense of the US Internal Revenue Service are “any digital representation (equivalent) of value that is recorded on a cryptographically protected distributed ledger or a similar technological base” (IRS, 2023). The US Department of Commerce's National Institute of Standards and Technology defines digital assets as: “Any asset that is purely digital or the digital equivalent of a physical asset” (NIST, 2023). What does Ukrainian legislation in the field of digital assets contain? In the Law of Ukraine “On Virtual Assets” (2022) there is no concept of “digital asset”. Instead, there is the concept of a virtual asset – an intangible good that is the object of civil rights, has a value and is expressed by a set of data in electronic form. According to the definition of the FATF, virtual assets (or crypto assets) are any digital equivalent of value that can be traded, transferred, and used as a means of payment in a digital dimension” (FATF, 2023). According to it virtual assets are not digital equivalents of fiat currencies.

There is also the concept of crypto assets. The European Central Bank defines crypto assets as “any asset that exists in digital form that does not represent a financial obligation to any natural or legal person, and that does not embody any property rights in relation to a business entity”. The European Banking Association has given the following definition to crypto assets: “a crypto asset is” an asset that: a) relies primarily on cryptography and DLT or similar technology as part of its value; b) is not issued or guaranteed by a central bank or government, and c) can be used as a medium of exchange and/or for investment purposes and/or to access a good or service”. According to the definition of European Securities and Markets

Authority crypto assets are: "a type of private asset that relies on cryptography and distributed ledger technology DLT or similar technologies as part of its inherent value". ESMA distinguishes between the following types of crypto assets: (1) virtual currencies and (2) digital tokens. ESMA characterizes a crypto asset as an asset that is not issued by a central bank and is any digital representation of an interest that may have value, exist in the form of the right to receive a certain benefit, or perform certain functions, or may not have a specific purpose of use. The International Securities Commission defines a crypto asset as "a type of private asset that primarily depends on cryptography and distributed ledger technology (DLT) or similar technology as part of their inherent value, and may have the functions of money, commodity or security, or be a derivative instrument". The Financial Stability Board, in turn, defines crypto assets as "a type of private asset that relies on cryptography and distributed ledger technology or similar technology as part of their intrinsic value". FATF defines crypto assets as "a digital representation of value that can be digitally exchanged or used for payments or investments. They include both convertible and non-convertible types, as well as centralized and decentralized forms, as well as assets obtained through ICOs".

Based on this understanding of the issues of digital assets, an actual **task** arises to assess the possibilities, expediency, and effectiveness of the introduction of digital assets in the modern financial environment, having studied the practical cases of individual countries.

Digital assets are a general term for several monetary entities in digital form. PricewaterhouseCoopers distinguishes the following types of digital assets: stablecoins; non-fungible tokens (NFT); digital currencies of central banks; security tokens; payment tokens; utility token; cryptocurrencies.

Each digital asset is a certain technological product on a platform developed for it. From a technical point of view, a digital asset is a set of symbols in an electronic system, a special record. The origin of records (digital assets) can be either minting or mining. The minting nature of the creation of a digital asset requires the presence of a minting center, or a certain type of monetary body that issues digital assets. Mining is the activity of participants in the electronic system of circulation of digital assets, which involves the performance of certain actions necessary for the creation of a digital asset (mostly cryptocurrency). First, this is the solution of tasks set by the algorithm, which require a lot of computing power. That is why activities related to cryptocurrencies are so energy-consuming: several powerful system units, coolers, high-speed Internet – all this and not only crypto miners need.

Since the participants in the system of circulation of digital assets do not know each other and most of these assets are not recognized means of payment, the requirements for the technology and functionality of platforms and algorithms are as follows: transparency, speed, cheapness, the presence of a "trustless" trust mechanism, decentralization. Currently, the technology that generally meets these requirements is Distributed Ledger Technology (DLT). To understand its essence, let's consider the name. The name contains the concept of "distributed registry". All transactions are stored in ledgers, regardless of where they are located: in a bank, on paper or in cloud storage. But the problem with centralized record keeping is that other participants become dependent on whoever keeps the transaction records, and therefore can change them, write new ones, or delete old ones. This is how our financial system works: people must trust their data and resources to other people who promise to fulfill their responsibilities honestly and unwaveringly. But some enthusiasts thought about the threats of centralized systems and developed DLT. The content of the technology is the availability of an updated transaction register for each system participant. For a transaction to take place (for a new entry to be made in the register), it is necessary to confirm it on the part of most participants. When the transaction is validated, the register is updated for all participants.

The best example of DLT is blockchain. Blockchain is a technology based on the idea of representing transactions in the form of block records that make up register chains. Each block

of transactions is validated according to a defined algorithm by other participants. If most participants agree, a new block is added to the chain. The chain is automatically updated for each participant on their device. In this way, transparency and availability of information is ensured for all participants of the blockchain.

Let's use the Bitcoin cryptocurrency as an example for considering the main elements of this system. First, each participant in the system has his own Bitcoin address. It is necessary to send and transfer cryptocurrency. Access to it is provided by the private key of the owner of the address, and there is also a public key. Second, a transaction is a set of digital data that initiates the sending of bitcoins from one address to another. The structure of each transaction is as follows: origin of funds, confirmation of ownership, destination address, transfer amount. Thirdly, transactions are carried out from digital wallets, which are in the form of an application, physical medium and centralized. The difference between them is where the keys are stored. In applications, they are stored by the owner on a sheet or in notes, the physical medium already contains these keys, and centralized wallets place the keys on servers.

Bitcoin has many undeniable advantages, such as anonymity of transactions, security, and transparency of the entire chain of blocks, an honest reward mechanism (when a miner solves a mathematical problem and mines bitcoin, he is given a certain commission as a reward for his work) (Кравченко, Скрябін та Дубініна, 2019).

Despite the controversy, some countries have already taken the risk and started implementing digital assets as a means of payment. Advantages and disadvantages, as well as unforeseen additional effects of such practice can be determined by considering several cases from the experience of individual countries of the world.

For example, the experience of introducing Bitcoin in El Salvador is interesting. Legislatively, this step was formalized by a law known as the "Bitcoin Law". According to the provisions of this law, bitcoin becomes a means of payment and is accepted for payments by all economic agents. Bitcoin can also be used to pay taxes; prices can be expressed in Bitcoin. The exchange rate between the US dollar (El Salvador's first official currency) and Bitcoin (El Salvador's second official currency) is set by market forces. All obligations that previously existed in dollars can be paid in bitcoins (Roy, 2021).

This case will be considered by the authors from the following statistical and economic positions: the growth of financial inclusion, financial efficiency of the system, and transparency and accountability.

Before the introduction of bitcoin as a means of payment, the share of people who had a bank account was 30 %. Such a figure was a consequence of underdeveloped banking infrastructure and low state financing of the network of financial institutions. In addition, more than 50 % of people in the country make transactions exclusively with cash. To compensate for the physical infrastructure with a digital one, the state crypto wallet “Chivo” was developed and implemented. According to a study conducted by the National Bureau of Economic Research, crypto wallet downloads have reached only 20 % of the adult population since its introduction to date. Despite the government's encouragement to join the national blockchain ecosystem, citizens do not trust cryptocurrency (or the government). At the beginning of this process, the government introduced thirty-dollar gift wallet deposits. But after using the deposit, people usually closed their wallets or simply did not use them (Alvarez, Argente and Patten, 2023). Such non-acceptance of cryptocurrency among the population can be explained by several reasons. The main reasons are the low financial literacy of the population, the historical context of the region's development, which is characterized by corruption, military dictatorships, and household poverty. These factors affect the level of trust in financial innovations and government actions.

In addition, it is advisable to evaluate the effectiveness of implementation by indirect indicators. Let's start by constructing the following hypothesis: the introduction of

cryptocurrency affects the amount of assets of the banks behind the crypto infrastructure. After all, replenishment of the crypto wallet takes place both in physical terminals and with the help of exchange in the application. Exchange in the application requires the interaction of (1) a government processing center that manages the Chivo application and forwards requests to the banking information system; (2) front-office banking information services (interaction with the client and the external environment) and back-office (interaction within the bank) and (3) an automated banking accounting system.

When a citizen makes a request in the wallet for, for example, a top-up, the government allows him to choose a payment method - transfer from a bank card. The client enters the card data, these data are transferred through the government servers to the bank servers, which changes the user's balance: debits fiat funds from his account and credits tokens, that is, cryptocurrency. The circulation according to this scheme allows to ensure the steady growth of the assets of the banks of El Salvador. After all, funds credited to bank accounts from users and the government in the form of fiat money and bitcoin affect the bank's total assets.

The analysis of statistical data allows us to draw a conclusion about the neutral dynamics of the growth of assets of banks in El Salvador. This is explained by the low activity of the population in opening bank accounts and distrust of the population in the banking system.

Additional analytical parameters are indicators of the percentage ratio of expenses to income and the percentage ratio of non-interest income to total income. The first indicator indirectly reflects the profitability of the banking business, and the second shows the structural share of non-interest income (commissions to a greater extent) in the bank's income. The profitability of the banking business and its commission-transaction component of income indicate the economic activity of the population. Theoretically, according to forecasts, this indicator should have increased after the introduction of bitcoin as a legal means of payment. However, according to the data of the report of the National Bureau of Economic Research (Alvarez at al, 2023), the opposite trend is observed: 1) the profitability of the banking sector is falling, which is logically explained by the fact that the banking infrastructure in El Salvador is underdeveloped, and the population carries little money in banks; 2) non-interest income increased in 2020–2022, which can be attributed to commission income from cryptocurrency exchange transactions.

In general, this case is a negative experience of introducing digital assets in the form of means of payment. The main reason for the collapse of the project in El Salvador is the insufficient level of trust and digital literacy of the country's population, as well as the lack of a properly developed crypto infrastructure.

The next case of cryptocurrency implementation took place in the Central African Republic. On April 22, 2022, a law was passed on the introduction of bitcoin as a legal means of payment on the territory of the country. According to the provisions of Law No. 22.004, bitcoin became a means of payment for use by all individuals and legal entities and the official currency of the country (RCC, 2022). In this context, it is worth noting that the Central African Republic is included in the zone of the Central African franc, which is the currency of the other five Central African states. The law provides definitions of cryptocurrency, bitcoin, blockchain technology, mining, and volatility. The basic provision of this law is the marketability of pricing between cryptocurrencies and the Central African franc. Taxes can be paid in cryptocurrency, and cryptocurrency exchanges are tax-free. Profits from cryptocurrency trading are subject to taxation in accordance with the provisions of the Tax Code of the country. According to the law, the National Agency for the Regulation of Electronic Transactions was established.

The real effects of the implementation of this project are still difficult to assess, although the forecasts of the country's financial institutions are quite optimistic, and the government is actively developing the relevant infrastructure to intensify the implementation of this digital asset as a means of payment.

In addition to bitcoin, other digital assets are being introduced as means of payment. Examples of such projects include digital currencies of central banks, such as the Nigerian eNaira and the Chinese eCNY.

Work towards the implementation of eNaira began in 2017 with consultation sessions, presentations, and discussions among various stakeholders. 2021 has become the most active year for the implementation of this project: the process has moved to the stage of Assessments and Handshakes; eNaira was developed, and from the end of 2021, its experimental implementation began, accompanied by an educational process for the population and awareness.

In implementing eNaira, the Central Bank of Nigeria adopted a two-tier model in which the central bank acts as the issuer, developer, and holder of eNaira. The main bank distributes the digital currency to financial institutions and international money transfer operators. They act as commercial agents for the distribution of eNaira among the population (eNaira, 2023).

The beginning of work on eCNY (digital yuan) began in 2014, when a special research group was created within the People's Bank of China. In 2017, a separate research institute was established. The digital yuan was first demonstrated at the Beijing Olympics, where athletes and tourists could pay for goods and services with their digital wallets, payment cards and wristbands (Jones, 2022). Backed 100 % by the reserves of the People's Bank of China, the digital yuan is implemented on the Binance Smart Chain blockchain. Binance Smart Blockchain is an innovative solution for Beacon Chain programming and compatibility. BNB Smart Chain relies on a system of 50 validators with a Proof of Staked Authority (PoSA) consensus mechanism that can support short block times and lower fees. The most connected staking candidate validators will become validators and create blocks. Double sign detection and other slicing logic ensure chain security, stability, and completeness. In addition to the 29 active validators, BSC will introduce more validators, about 20 more inactive validators to the validator pool as backups, which will be called “Candidates” (BNB, 2023).

The digital yuan implementation model is chosen as a three-level model. At the top of the pyramid is the issuer and controller – The Central Bank of the People's Republic of China. At the second level in the eCNY system, there are commercial banks that will distribute the digital currency among intermediary custodial companies (storage and circulation companies), which will already interact directly with end consumers – individuals (eCNY, 2021).

The introduction of its own digital currency allowed China to increase the sales market, reduce the level of corruption due to the transparency of operations, ensure logistics chains, rationalize the expenditure of resources and even monitor people more effectively.

Blockchain and other digital assets are a relevant innovative tool for improving national financial systems, diversifying assets, and obtaining new sources of budget replenishment. According to a study by consulting company PricewaterhouseCoopers, the world economy will receive an additional $ 1,76 trillion by 2030 due to the use of blockchain, which is 1,4 % of global GDP, and the largest benefit from the technology. China will receive the most – $ 440 billion. Along with India and Japan, it will become the driver of blockchain development in Asia.

Conclusions. The analysis of the essence of digital assets and the study of practical cases of their implementation in the world made it possible to come to the following conclusions. First, the implementation of Bitcoin is not advisable due to its monetary uncontrollability and volatility. Similar features of this digital asset are clearly manifested in the process of its functioning, are difficult to predict and are not amenable to sustainable hedging. Secondly, national digital currencies are a rather promising payment instrument, although the experience of their use is quite limited, the risk assessment is not comprehensive, and the whole list of advantages is not fully predicted. In any case, such an initiative requires the presence of an extensive financial and technical ecosystem, which would allow realizing all the advantages of this instrument and predicting all possible risks and threats that exist in the conditions of the real financial environment. Thirdly, for the introduction of digital assets, it is necessary to develop a map of both use cases and possible activities and application options. This will make

it possible to work out various scenarios and highlight several relevant functions and roles that digital assets should perform in the modern global financial and payment system. In general, the introduction of digital assets will significantly affect the configuration of the financial and payment systems of the countries of the world. The predicted consequences will be the acceleration and security of transactions, transparency and transactional efficiency, cheapness. In addition, digital assets will promote financial inclusion, effectively displacing fake money.

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Стаття надійшла до редакції 15.05.2023 р.

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ЦИФРОВІ АКТИВИ ЯК ПЛАТІЖНІ ІНСТРУМЕНТИ: СУТНІСТЬ ТА ПРАКТИКА ВПРОВАДЖЕННЯ

Різноманітні цифрові активи стали невід'ємною частиною як глобальних, так і окремих національних економічних систем. Створення та введення в обіг національних цифрових валют, розвиток технологій блокчейн є елементом інноваційної стратегії цифровізації фінансової системи. Основною метою статті є дослідження практичних кейсів використання цифрових активів (біткойн в Сальвадорі, eNaira в Нігерії, eCNY в Китаї). Подібні практичні кейси дозволяють виявити позитивні та негативні наслідки реалізації даної стратегії. А також – спрогнозувати ризики, такі як легалізація криптовалют для взаєморозрахунків за зовнішніми борговими зобов'язаннями, відсутність покриття цих активів, створення ефекту «мильної бульбашки», що може призвести до чергової глобальної фінансової кризи. Проведене дослідження показало, що є кілька потенційних переваг – за допомогою майнінгу криптовалют та блокчейну можна реалізовувати різноманітні проекти в бізнесі, соціальній та державній сферах, потенційно має зрости ринок збуту, знизитися рівень корупції завдяки прозорості операцій, а вартість ресурсів має бути раціоналізована. Проте негативні ефекти та додаткові ризики також присутні, хоча оцінити їх значно складніше через надто короткий термін практичної реалізації цих активів у формі платіжних засобів та обмежену географію таких випадків.

Ключові слова: *віртуальні активи, цифрова торгівля, глобальний простір, цифрові фінансові послуги, блокчейн.*