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THE EVOLUTIONARY DEVELOPMENT OF MONEY: FROM MINTED COINS TO CRYPTOCURRENCIES

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Lukianchuk D. Yu. The Evolutionary Development of Money: From Minted Coins to Cryptocurrencies

The article is aimed at studying the evolution of money. The article examines the history of the emergence and evolutionary development of money and cryptocurrencies. Blockchain technology is analyzed, as well as the technological difference between Bitcoin, Ethereum, Solana cryptocurrencies is considered. The issues of the operation of the Ethereum blockchain and smart contracts are covered. An analysis of blockchain technology and the use of cryptocurrencies as a means of payment is carried out. The type of cryptocurrency such as a stablecoin is revealed in its variety. Comparisons of native blockchain coins and stablecoins as a means of payment, further of USDC and USDT stablecoins, are made. An analysis of differences between the centralized and decentralized stablecoins is carried out. It is specified what the stablecoins USDC, USDT, DAI are backed by. It is analyzed what share of the market is occupied by USDT, USDC, and DAI. The advantages and disadvantages of stablecoins are identified. A characterization of activity of the Central Bank Digital Currency (CBDC) with its connection to central banks is presented. It is determined that stablecoins are an attempt to objectively eliminate the high volatility of traditional cryptocurrencies such as Bitcoin or Ethereum by tying the value of a stablecoin to one or more other assets, such as fiat currency. Blockchain technology along with stablecoins can increase the efficiency of cross-border payments. With the growing demand for use, a stablecoin can become one of the important elements of the payment infrastructure. As result of the study, a comparison between cryptocurrencies and the companies Visa, Paypal in terms of processing speed and the amount of payment commissions is made. It is determined that blockchain and cryptocurrency technologies are a new evolutionary stage in the development of money. It is substantiated that the effect of using blockchain technology allows to cheaper and faster money transfers. It is noted that blockchain technology is young, but cooperation between traditional financial companies and cryptocurrencies is already visible.

Keywords: money, cryptocurrency, Blockchain, Bitcoin, Ethereum, Solana, Visa.

Tabl.: 2. **Bibl.:** 9.

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Лук'янчук Д. Ю. Еволюційний розвиток грошей: від карбованих монет до програмованих криптовалют

Метою статті є дослідження еволюції грошей. У статті розглянуто історію виникнення та еволюційний розвиток грошей і криптовалют. Проаналізовано технологію блокчейн, а також технологічну відмінність між криптовалютами Bitcoin, Ethereum, Solana. Розкривається питання роботи блокчейну Ethereum і смарт-контрактів. Проведено аналіз технології блокчейну та використання криптовалют саме як засобу платежу. Розкрито вид криптовалюту як стейблкоїнів у різних видах. Порівняно нативні монети блокчейну та стейблкоїни як засіб платежу. Проведено порівняння стейблкоїнів USDC і USDT. Проаналізовано різницю між централізованими та децентралізованими стейблкоїнами. З'ясовано, чим забезпечені стейблкоїни USDC, USDT, DAI та яку частку ринку займають USDT, USDC, DAI. Охарактеризовано переваги та недоліки стейблкоїнів. Проаналізовано діяльність Центрального банку цифрової валюти (CBDC) і що це дає центральним банкам. Визначається, що стейблкоїни – це спроба об'єктивно ліквідувати високу волатильність таких традиційних криптовалют, як Bitcoin або Ethereum шляхом прив'язки вартості стабільної монети до одиниці або кількох інших активів, наприклад фіатної валюти. Зроблено висновок, що технологія блокчейн, а також стейблкоїни здатні підвищити ефективність транскордонних платежів. При зростаючому попиті на використання стейблкоїнів може стати одним із важливих елементів платіжної інфраструктури. У результаті дослідження відбулося порівняння між криптовалютами та компаніями Visa, Paypal у швидкості обробки та сумою комісійних за платежі. Визначено, що технологія блокчейн і криптовалюта є новим еволюційним етапом розвитком грошей. Обґрунтовано, що ефект від використання технології блокчейн дозволять здешевити, а також пришвидшити грошові перекази. Зазначається, що технологія блокчейн є молодю, але вже простежується співпраця між традиційними фінансовими компаніями та криптовалютними.

Ключові слова: гроші, криптовалюта, блокчейн, Bitcoin, Ethereum, Solana, Visa.

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The article examines the history of the emergence and evolutionary development of money and cryptocurrencies. The stages and features of the development and technology of money are analyzed.

The purpose of the article is to explore the evolution of monetary forms.

Introduction

A study or an analysis of blockchain technology and cryptocurrencies is not a widespread occurrence, as in most scientific works the attention is focused on Bitcoin. When relating to both the domestic and the foreign scientists engaged in research on cryptocurrency and

blockchain technology, one can mention B. Bernanke, A. Grinspan, T. Kovalchuk.

Statement of the problem and its connection with important scientific and practical tasks. Money is an integral attribute of society. Concerning the life of the entire society, money is one of the oldest, incomprehensible phenomena that did and does play an important role in the socioeconomic development. The evolution of mankind can as well be viewed through the prism of the evolution of money and its forms.

According to the opinion of L. Harris, the traditional approach considers the generally accepted properties of money to be the following: medium of exchange, a unit of account, and a store of value [1].

In the author's own opinion, the means of payment should be added to the above parameters, because money in modern context may include cryptocurrency which, though not a monetary instrument, can be used in most countries as an additional option at the level of national currencies. It should be noted, that when paying with cryptocurrency, the latter is converted into the currency of the central bank, which represents the main means of payment.

The evolution of modern money begins with precious metals. Even if the counterparty does not recognize the issuer of a coin, it will still be willing to value the precious metal contained in the coin. The next stage is paper money. It was believed that the first paper notes introduced in ancient China could be exchanged at a fixed exchange rate for gold, silver or silk. But in practice, there was never any such conversion. Thus, the first paper money may also have been the first fiat currency. A fiat currency is a currency that has no intrinsic value but is only valuable because the parties to the exchange agree to its value, or because a third party uses its own power to maintain the declared value. In the absence of covert third-party support, payment notes would mostly be useless pieces of paper. Nowadays, most financial operations are carried out with the mediation of banks. But banking business is a relatively recent invention in the monetary history. Although money changers, moneylenders, and depositories have ancient roots, the first modern banks were established in Renaissance Italy, run by merchant families like the Medici. At that time, bank bankruptcy was common event, and most banks did not last long.

Paper money appeared in Europe in 1661 in the form of Swedish banknotes. Before centralized banking, all suchlike services were private. Each bank issued its own banknotes, which were usually exchanged for gold that was stored in the bank's reserves. By the XX century in the United States, most of the money circulating in the economy was private payment notes issued by various commercial banks – at some point there were more than 5000 different types of banknotes in circulation. This can be reminiscent of the present-day cryptocurrency market. The next stage was the establishment in 1913 of the

Federal Reserve, which had become the Central Bank of the United States and had received the right to print the US dollar. In 1971–1978, the Bretton Woods system was replaced by the Jamaican currency system, based on free currency trading (free currency conversion). Since then, all major world currencies have also become fiat currencies, centrally managed by the respective central banks.

The value of fiat currency is determined by the following factors:

- ✦ The government and the respective central bank will take reasonable measures that will be transformed into maintaining stable purchasing power in the market;
- ✦ Payment of taxes will be accepted in the national currency, which causes demand.

Since the advent of money, many technologies have made it easier to pay money: paper bills, checks, and letters of credit have ancient origin. But modern payment technology took off with the invention of the credit card. The idea of a credit card as a universal payment scheme did not appear until the 1950s. The next stage in the evolution of payment technology was launched on the Internet, which began to gain popularity among consumers in the late 1990s. The factor influencing the introduction of the use of credit cards was the Internet, whose users preferred to pay with credit or debit cards, rather than cash. Payment in 2022 takes place with the help of banking applications located on mobile phones. Adding a plastic bank card to a mobile wallet for payment using Apple pay or Google pay technologies becomes the next stage in the evolution of money, which is characterized as "Cashless".

The presentation of the conception of the first cryptocurrency dates back to 2008, and the Bitcoin blockchain itself was launched in 2009. Blockchain is a decentralized ledger or database that contains information about all transactions. Blockchain is divided into centralized and decentralized system. Decentralized means that everyone can connect to the registry, while centralized blockchain is several computers that ensure control over the related network. The more decentralized, the more credible is the blockchain, because it will be much more difficult to cause influence upon it. Centralized blockchains are created for private or public projects, while decentralized systems are intended for all interested parties. Bitcoin is considered the most decentralized cryptocurrency because the founder has long since retired from business, and the development is carried out by a community to the further advance. Cryptography is used as a means to program the blockchain. Cryptography has been used since ancient times to encrypt data during transmission. Bitcoin is the first cryptocurrency that was created in 2009, the founder of which used many previous inventions, such as cryptography, blockchain, other theoretical knowledge. As result, a currency was created, applying so-called "peer to peer" transfer which does not require a third party. Al-

Table 1

Forms and types of money evolution

Form	Type
Metal money	It is believed that the first use of metals as money began around 1000 BC, at the beginning of the Iron Age
Paper money	In the X–XIII centuries AD, it was believed that the paper notes of the Song Dynasty could be exchanged at a fixed rate for gold, silver or silk. Paper money finally arrived in Europe in 1661 in the form of Swedish banknotes. Before centralized banking, all banking services were private. Each bank issued its own banknotes, which were usually exchanged for gold held in the bank's reserves
Paper – fiat money	After World War II, the United States became the world's financial superpower and a leading force behind the international monetary system known as Bretton Woods. Under the Bretton Woods system, all major world powers set their own currencies' exchange rates against the US dollar (with about 1% leeway), and the US dollar itself was pegged to gold. This stabilized exchange rates between major world currencies. In 1971–1978, the Bretton Woods system was replaced by the Jamaican currency system, based on free currency trade (free currency conversion). Since then, all major world currencies have also become fiat currencies, centrally managed by their respective central banks
Credit or debit cards	Since the advent of money, many technologies have made it easier to pay money: paper bills, checks, and letters of credit have ancient origin. But modern payment technology took off with the invention of the credit card. The idea of a credit card as a universal payment scheme did not appear until the 1950s. In 1958, Bank of America launched the BankAmericard in Fresno, California, which became the first successful recognizable modern credit card. By the 1980s, credit cards had become ubiquitous in American society. They quickly spread across Europe and beyond, and have since revolutionized cashless payments
Electronic money	Most of the payments on the Internet were made using credit cards. This is because credit card payment technology was convenient. PayPal became the first widely successful online payment company in 2002. Today, consumers make online payments in different ways. In most countries, consumers prefer credit or debit cards. Other common methods include Paypal, electronic wallets such as AliPay or Skrill, and in some countries cash on delivery. With the advent of cryptocurrencies, this landscape has evolved even further
Cryptocurrency	In 2008, there was a financial crisis that threatened to destroy the world banking system. In response to the cascading bankruptcies, central banks around the world bailed out financial institutions, printed huge amounts of money and engaged in massive asset-purchase operations, a practice known as quantitative easing. It was at this time that a programmer or a group of programmers created the first cryptocurrency called Bitcoin. In 2015, the Ethereum cryptocurrency was created, on the blockchain of which one can create decentralized applications based on a smart contract

Source: compiled on the data of [2].

though some other cryptocurrencies were invented over the years, they did not differ significantly from Bitcoin. In 2015, the creation of the Ethereum became the next stage in the evolution of blockchain technology. The novelty of the Ethereum blockchain lies in the possibility not only to make transactions using Ethereum coins, similar to Bitcoins, but also to create decentralized applications on top of this blockchain using smart contracts. A smart contract is a programmable contract that allows two counterparties to set the terms of a transaction without delegating any third party to execute it. Ethereum is a global platform with open source code for decentralized applications, being the so-called world computer that can be turned off when the electric power on planet Earth vanishes completely. Using the Ethereum blockchain, software developers can write smart contracts that control digital values according to a given algorithm and are accessible from anywhere in the world [3]. Ethereum can be sent to another person as an exchange for goods and services at its current market value. The Ethereum blockchain records this transaction and guarantees the seller that it will not

be reversed after receiving the goods. When executing a smart contract or sending a transaction, a fee is paid in the native coin of the blockchain in which it takes place, in this instance, Ethereum. The next development that deserves attention is the Solana blockchain, an open-source project that implements a new high-performance and high-speed blockchain technology [4]. It is similar to the Ethereum blockchain, based on which decentralized applications can be built and the native coin is used to pay for transactions.

As can be seen from *Tbl. 2*, in terms of speed at the present time only Solana can theoretically compete with Visa, but it should be noted that this blockchain is capable to process more and developers are working on it. As a means of payment, Bitcoin loses significantly in speed to its cryptocurrency competitors.

The advantage of blockchain technology is that transaction costs when sending, for example, the equivalent of 10 US Dollars and more in Bitcoin, will not affect the amount of commissions, unlike Visa and Paypal.

Table 2**Comparison of transaction speed between financial products**

Financial products	Transaction per second	Avg Fee for transaction
Bitcoin	10	1–3 USD
Ethereum	20	5–100 USD
Solana	65 000	0.0015 USD
Paypal	193	1–3% of total value
Visa	65 000	1–3% of total value

Source: compiled on the data of [5].

When considering money to pay for a good or service, most people prefer fiat currencies to cryptocurrencies like Bitcoin, Ethereum, and Solana, which are volatile. To solve problems with volatility and take advantage of all the benefits of blockchain technology, stablecoins were created.

A stablecoin is a cryptocurrency pegged to a stable currency, such as the USD. One of the first centralized stablecoins is USDT issued by Tether. Each USDT must be backed by \$1 in its issuer's bank account. One of the main disadvantages of centralized stablecoins is that users must have trust in the issuer. Users must believe that the centralized stablecoins are fully secured and the corresponding dollar reserves are held unaltered in the proper place.

The decentralized stablecoins are designed to solve this problem of trust. These stablecoins are issued decentralized by the method of overcollateralization, function in decentralized registers, are managed by decentralized autonomous organizations and their reserves can be publicly verified by anyone. The most common stablecoin is DAI, but it is 50% backed by the USDC stablecoin, which is in turn issued by Circle and is centralized. Stablecoins are a product on top of the blockchain, therefore most stablecoins are on the Ethereum and Solana blockchains, it should be noted that decentralized applications and stablecoins cannot be built on top of Bitcoin. The advantage of stablecoins on the Ethereum blockchain over Solana is greater liquidity, the blockchain itself works more efficiently due to its age, the disadvantages are lower speed and transaction fees.

As mentioned above, if we compare fiat currency to cryptocurrency as a means of payment, it would be more appropriate to compare fiat currency to stablecoins; if we talk about centralized stablecoins like USDT and USDC, they keep their parity to fiat currency, for example to USD, and the volatility that comes with cryptocurrencies is not allowed, but is the common case with cryptocurrencies such as Bitcoin and Ethereum. The main risk of stablecoins is the loss of parity with fiat currency, and that is why trust in the issuer should be preserved.

Today, stablecoins occupy a significant proportion of the cryptocurrency market, the total capitalization of stablecoins is 142.02 billion USD [6], while the total capitalization of the entire cryptocurrency market amounts to 885 billion USD [7].

As of December 6, 2022, from the total amount of the stablecoin market, Tether's USDT stablecoin occupies 47.34% of the market share, the next USDC from the Circle company occupies 31.1% of the market share, followed by the BUSD stablecoin issued by the Binance cryptocurrency exchange, which has a share of 15.95%, the stablecoins mentioned above are centralized ones, i. e., there is a certain issuer to control the respective cryptocurrency, the largest decentralized stablecoin is DAI, which makes 3.74%. If we analyze the above figures, we can come to the conclusion that despite all the risks, most participants of the cryptocurrency market prefer centralized stablecoins and only only a small number of participants prefer decentralized ones [8].

The main competitor to stablecoins is CBDC. Central Bank Digital Currency (CBDC) is a new form of money that exists in digital form only. Instead of printing money, a central bank issues widely accessible digital coins so that digital transactions and transfers become simple [9].

Numerous central banks around the world aim to use blockchain technology. Most world countries are testing their own CBDCs, but partial use is currently present in China only. When using CBDC, central banks will be able to speed up and make money transfers cheaper thanks to blockchain technology and will also be able to identify and trace the entire chain of transactions, which is not possible when using traditional technologies.

CONCLUSIONS

Human history has seen many evolutions in the forms and incentives surrounding money. Forms and types of money have undergone a great stage of evolution in the recent time, which can be attributed to the present financial system. From coins minted out of precious metals and the gold-backed paper coins such as the US dollar to electronic ones that can be sent from a banking application on your phone. The new stage of evolution is digitalization.

Implementation of blockchain technology enables transactions from one end of the world to the other within minutes with a minimum number of transactions. Fiat money as a means of payment should be compared with stablecoins whose task is to keep parity with fiat currencies, and not with native coins such as Bitcoin, Ethereum, Solana and others that are volatile.

The total capitalization of stablecoins amounts to 142.02 billion USD, while the total market capitalization of the cryptocurrency market amounts to 885 billion USD. The market dominance of stablecoins is as follows: USDT occupies 47.34%, USDC – 31.1%, BUSD – 15.95%, DAI – 3.74. The trust of participants of the cryptocur-

rency market occurs precisely in centralized cryptocurrencies.

The main competitor of today's stablecoins is CBDC, a digital currency from central banks, the introduction of which in most countries of the world represents a slow process or is being postponed for the coming years, although work in this direction is taking place.

As mentioned in the article, the main advantages of blockchain technology are currently the cheapness of the commission, the disadvantage is the lower speed compared with the Visa payment system.

The cryptocurrency market is 13 years old, and most blockchains are even younger, but it is already beginning to impose competition on traditional finance, at least, the electronic payment companies. ■

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