

TRENDS IN THE DEVELOPMENT OF DIGITAL CURRENCIES IN FOREIGN COUNTRIES

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ABSTRACT. The relevance of the study is driven by the significant impact of digital currencies on modern financial systems and the economy. The purpose of the study is to analyze trends in the development of digital currencies abroad, including cryptocurrencies and central bank digital currencies (CBDC). The study aims to identify the main drivers of digital currency adoption, examine their influence on the global financial system, and determine the key directions and prospects for their integration into the global economy and financial markets. To achieve this goal, methods of analysis and synthesis of theoretical and empirical data were employed. The study is based on an examination of international experiences in the development of digital currencies. Publications in scientific journals, reports from international organizations, legislative initiatives in various countries, and case studies on the implementation of cryptocurrencies and CBDCs were analyzed. Special attention was given to a comparative analysis of digital currency regulations and an exploration of their technological foundations, including the use of blockchain and distributed ledgers. The study's findings indicate that the development of digital currencies abroad is influenced by several key factors: technological innovations, efforts to improve financial inclusion, optimization of cash flows, and enhancement of financial system security. An analysis of the experiences of various countries has shown that central bank digital currencies serve as a strategic tool for stabilizing monetary systems and improving monetary policy. At the same time, cryptocurrencies, despite their high volatility and lack of regulation, remain a vital area for the advancement of financial technologies. The main challenges include regulatory issues, risk management, and ensuring data protection. The study also revealed prospects for the integration of digital currencies into the global economy, including their use in international transactions and their impact on global financial flows.

KEYWORDS: blockchain, digital currency, virtual currency, cryptocurrency, Bitcoin.

ШЕТ ЕЛДЕРДЕГІ ЦИФРЛЫҚ ВАЛЮТАЛАРДЫҢ ДАМУ ТЕНДЕНЦИЯЛАРЫ

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АҢДАТПА. Зерттеудің өзектілігі цифрлық валюталардың замануи қаржы жүйелері мен экономикаға айтарлықтай ықпал етуімен негізделген. Зерттеудің мақсаты – шетелдегі цифрлық валюталардың, соның ішінде криптовалюталар мен орталық банктердің цифрлық валюталарының (CBDC) даму тенденцияларын талдау. Зерттеу цифрлық валюталардың таралуының негізгі драйверлерін анықтауға, олардың жаһандық қаржы жүйесіне әсерін зерттеуге, сондай-ақ әлемдік экономика мен қаржы нарықтарына интеграциялау бағыттары мен перспективаларын белгілеуге бағытталған. Қойылған мақсатқа қол жеткізу үшін теориялық және эмпирикалық деректерді талдау мен синтез әдістері қолданылды. Зерттеудің негізінде цифрлық валюталарды дамыту саласындағы шетелдік тәжірибені зерделеу жатыр. Ғылыми журналдардағы жарияланымдар, халықаралық ұйымдардың есептері, әртүрлі елдердің заңнамалық бастамалары және криптовалюталар мен CBDC енгізу мысалдары талданды. Цифрлық валюталарды реттеудің салыстырмалы талдауы мен олардың технологиялық негіздерін, соның ішінде блокчейн және таратылған реестрлерді қолдануды зерттеуге ерекше назар аударылды. Зерттеу нәтижелері көрсеткендей, шетелдегі цифрлық валюталардың дамуы бірнеше негізгі факторлардың ықпалымен жүруде: технологиялық инновациялар, қаржылық қолжетімділікті жақсарту, ақша ағындарын оңтайландыру және қаржы жүйелерінің қауіпсіздігін арттыру. Әртүрлі елдердің тәжірибесін талдау орталық банктердің циф-

рлық валюталары валюта жүйелерін тұрақтандыру және ақша-несие саясатын жетілдіру үшін стратегиялық құрал екенін көрсетті. Сонымен қатар, криптовалюталар жоғары құбылмалылық пен реттеу кемшіліктеріне қарамастан, қаржы технологияларын дамытуда маңызды бағыт болып қала бермек. Негізгі сын-қатерлер ретінде реттеу мәселелері, тәуекелдерді басқару және деректерді қорғауды қамтамасыз ету қарастырылуда. Зерттеу цифрлық валюталардың әлемдік экономикаға интеграциялану перспективаларын, оның ішінде халықаралық есеп айырысуда қолданылуын және жаһандық қаржы ағындарына әсерін айқындады.

ТҮЙІН СӨЗДЕР: блокчейн, цифрлық валюта, виртуалды валюта, криптовалюта, биткоин.

ТЕНДЕНЦИИ РАЗВИТИЯ ЦИФРОВЫХ ВАЛЮТ В ЗАРУБЕЖНЫХ СТРАНАХ

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АННОТАЦИЯ. Актуальность исследования обусловлена значительным влиянием цифровых валют на современные финансовые системы и экономику. Целью исследования является анализ тенденций развития цифровых валют за рубежом, включая криптовалюты и цифровые валюты центральных банков (CBDC). Исследование направлено на выявление основных драйверов распространения цифровых валют, изучение их влияния на глобальную финансовую систему, а также определение ключевых направлений и перспектив их интеграции в мировую экономику и финансовые рынки. Для достижения поставленной цели использовались методы анализа и синтеза теоретических и эмпирических данных. В основу исследования легло изучение зарубежного опыта в области развития цифровых валют. Были проанализированы публикации в научных журналах, отчеты международных организаций, законодательные инициативы различных стран и примеры внедрения криптовалют и CBDC. Особое внимание уделялось сравнительному анализу регулирования цифровых валют, а также изучению их технологической основы, включая использование блокчейна и распределенных реестров. Результаты исследования показывают, что развитие цифровых валют за рубежом движется под влиянием нескольких ключевых факторов: технологических инноваций, стремления к улучшению финансовой инклюзии, оптимизации денежных потоков и повышения безопасности финансовых систем. Анализ опыта различных стран продемонстрировал, что цифровые валюты центральных банков являются стратегическим инструментом для стабилизации валютных систем и совершенствования денежно-кредитной политики. В то же время, криптовалюты, несмотря на их высокую волатильность и недостаток регулирования, остаются важным направлением для развития финансовых технологий. Основными вызовами остаются вопросы регулирования, управление рисками и обеспечение защиты данных. Исследование также выявило перспективы интеграции цифровых валют в мировую экономику, включая их использование в международных расчетах и влияние на глобальные финансовые потоки.

КЛЮЧЕВЫЕ СЛОВА: блокчейн, цифровая валюта, виртуальная валюта, криптовалюта, биткоин, альткоин, стейблкоин.

INTRODUCTION. In recent decades, the world has witnessed the rapid development of digital technologies that inevitably affected the financial sector. One of the most significant and discussed phenomena in this area is the emergence and development of digital currencies. It is a new class of financial instruments that includes both cryptocurrencies such as Bitcoin and Ethereum, and central bank digital currencies (CBDC). Development of these instruments in the international arena profoundly affects global financial systems and creates new opportunities and challenges for government agencies, the business community, and general users.

Over the past decades, people have been actively

using digital technologies under various applications. Among other things, this trend has resulted in digital currencies also referred to in international economic literature as "cryptocurrencies," "virtual currencies," "crypto assets," etc. In the early years of their development, digital currencies were mostly attractive to retail investors because of decentralized and pseudonymous structure of issuance and circulation, as well as their resistance to background economic shocks, which is why they would often be referred to as "digital gold." During that period, both national and supranational financial authorities would take a wait-and-see attitude towards digital currencies and assess possible risks as insignificant for the global economy.

However, when demand for digital currencies started to grow, their value also took off, new technologies for their issuance and circulation started to develop and existing ones started to improve. In addition to retail investors, institutional investors also began to pay attention to digital currencies, large international companies began to use them in transactions partly replacing fiat money. These factors have led to a growing magnitude of digital currency circulation and wider integration into people's lives. [1]

Relevance of this study lies in the fact that in parallel with the dynamic development of digital technologies in the global economy, the importance of digital currencies is growing as well, and Kazakhstan citizens are making active use of them. With this trend in the background, a growing number of financial regulators prioritize the task of thoroughly studying this digital product and identifying possible scenarios for managing its circulation. Given the current economic situation, effective regulation of digital currencies can create new opportunities and prospects for the development of individual industries and the national economy altogether.

Many countries have already begun to actively research and implement various forms of digital currencies, which raises interest in how such trends are developing abroad. Issues of regulation, security, and introduction of innovative technologies are becoming the most important aspects for the further development of digital currencies. This paper explores the key trends that determine the development of digital currencies in the international arena and assesses the prospects for their integration into the global financial system.

MATERIALS AND METHODS OF RESEARCH.

Methods for studying trends in the development of digital currencies abroad can include various approaches of analyzing both theoretical and practical aspects. One of the main methods is monitoring legislative and regulatory changes related to digital currencies across borders. This allows us to assess how governments and financial institutions are adapting their approaches to both cryptocurrencies and central bank digital currencies (CBDCs).

Another important method is the analysis of market data, such as exchange rates, transaction volumes, and user interest. This helps to understand the dynamics of supply and demand in cryptocurrency markets and to identify trends, such as growing interest from institutional investors or emergence of new technologies affecting evolution of cryptocurrencies.

The study may also include expert interviews and surveys involving market participants, government agencies, and academics operating in economics and finance. This helps to collect expert opinions and create a more complete picture of current trends and possible development directions.

In addition, comparative analysis methods can

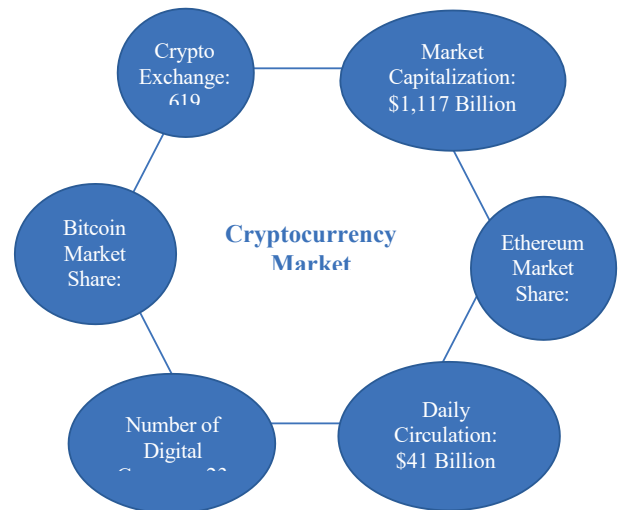


Figure 1 - Key Digital Currency Indicators as of May 2023

Source: Compiled by the author based on CoinMarketCap data

be used to study the specifics of various countries' approaches to digital currencies, including taxation, regulatory mechanisms, and implementation of innovative financial technologies. Monitoring of scientific publications and studies that consider the theoretical and practical aspects of digital currencies and their impact on the global financial system might also prove to be important.

The quality of research in this area also depends on analysis of forecasts and trends presented in global reports and forecasts from major financial institutions and research organizations.

RESULTS AND THEIR DISCUSSION. Despite the inherent volatility of their value, while developing, digital currencies also improve technology, attract new investors, both private and institutional. In May 2023, the total capitalization of digital currencies has reached \$1.1 trillion (Figure 1). [2]

For years on end, Bitcoin, the first cryptocurrency, has been dominating the market. It accounts for 46.8% of capitalization of all digital currencies in the amount of \$553 billion. In February 2021, it was 60% of total cryptocurrency capitalization. However, with the emergence of new digital currencies, the development of the Ethereum ecosystem, and the strengthening of its native currency ETH, which has become the main altcoin, as well as the rapid growth in the popularity of stablecoins, Bitcoin's share has decreased by about one and a half times in two years. In such circumstances, developers are expending significant efforts on optimizing and developing Bitcoin's functionality and network to maintain their competitiveness. One of the promising projects that can optimize the efficiency of the Bitcoin network is Lightning Network (LN), an add-on to the current Bitcoin blockchain, which is a

Table 1 - Ten Major Digital Currencies by Market Capitalization

Names	Cryptocurrency Types	Daily Circulation, USD	Capitalization, USD
Bitcoin (BTC)	UC*	26 401 968 674	446 201 727 194
Ethereum (ETH)	UC	8 353 353 528	204 535 978 204
Tether (USDT)	Stablecoin	40 066 657 609	68 190 013 917
BNB (BNB)	UC	516 983 051	52 237 803 976
USD Coin (USDC)	Stablecoin	3 814 674 608	41 528 569 431
XRP (XRP)	UC	951 567 619	20 370 807 312
Binance USD (BUSD)	Stablecoin	10 188 434 172	16 183 648 997
Cardano (ADA)	UC	396 956 957	13 765 189 298
Dogecoin (DOGE)	UC	510 260 417	12 195 688 489
Polygon (MATIC)	UC	714 117 824	11 381 945 692

network of payment channels between users (Table 1). [3]

Bitcoin’s speed of transactions (bandwidth) lags far behind that of centralized payment systems such as Visa, as well as more modern blockchain platforms such as Ethereum. Accordingly, Lightning Network (LN), the second-level solution, is designed to scale the Bitcoin blockchain and perform transactions with the first cryptocurrency faster and cheaper, making it a compromise step to preserve the idea of decentralization and security at the main level of the network with the parallel development of a faster and cheaper second level. Lightning Network’s structure is payment channels with special wallets where a certain Bitcoin amount is stored. These channels can be opened with a regular transaction with Bitcoin. Transaction details are added and saved in blockchain while the corresponding amount of Bitcoin for the transaction gets frozen to organize the LN channel. The maximum amount of funds used within the created LN channel cannot exceed the amount of frozen Bitcoin. Otherwise speaking, the LN channel can be compared to a safe storing a certain amount of money accessible by a number of people. [4]

The developers also see the prospect of further network development in creating interchain bridges (links between blockchains with different work structures). These could help exchange data and coins between the Bitcoin blockchain and other blockchains. The developers’ main task in further development of cross chain bridges is to improve their level of security because they are highly vulnerable to hacker attacks.

For a long period of time, Ethereum has been remaining the second cryptocurrency on the market. In September 2022, a change in the cryptocurrency network algorithm has been arranged, as part of which the Proof-of-Work consensus algorithm was replaced with the Proof-of-Stake algorithm. From there, validators began to add new blocks to the network instead of miners. Ethereum blockchain validators are required to stake a minimum of 32 Ethereum to be able to participate in confirming new blocks.

Following the transition to the Proof of Stake (PoS)

algorithm, Ethereum prices decreased. Ethereum forks (see Glossary) that remained with the Proof of Work (PoW) algorithm also became cheaper. Even before the change in the consensus algorithm in the network, a multitude of ETH miners started switching to Ethereum Classic (ETC) considered to be the most promising ETH fork that did not change algorithm. They believed the cost of ETC would grow to be the second cryptocurrency after Bitcoin with the PoW consensus algorithm after the network update. However, this did not happen, and ETC cost decreased in parallel with ETH. As a result, the consensus algorithm change has negatively affected the activities of ETH miners because they could not find an equivalent alternative. Prior to the change in the consensus algorithm, ETH was the most profitable cryptocurrency for mining ahead of Bitcoin since mining the first cryptocurrency requires special, more expensive equipment.

After switching to the new algorithm, the annual electricity consumption plummeted from 80 TWh to 0.01 TWh. However, it is also worth noting that the level of centralization and censorship in the network has increased. The main reason for this is the fact that the largest validators in the network are enterprises subordinate to US financial regulators, mainly the Office of Foreign Assets Control (OFAC). [5]

Despite a number of negative consequences, according to the management of the Ethereum ecosystem, the algorithm change was successful. Ethereum is the most popular platform in the crypto industry, especially in the DeFi segment. This is the name for digital economy projects with a decentralized structure (decentralized finance). Transitioning to a “green” format of activity has further strengthened the ecosystem’s popularity and positive reputation. By implementing new technologies in processes and optimizing its activities, Ethereum is expected to continue to strengthen its position as the largest altcoin.

The stablecoin Tether (USDT) closes the top three cryptocurrencies by capitalization. It is also the first stablecoin on the market. Since its release in 2014, Tether has maintained its position as the largest stable

Table 2 - Composition of Tether Holdings Limited's Assets as of 30.06.2022

Asset Categories	Amount, USD
U.S. treasury bills	28,856,434,491
Commercial papers and certificates of deposit	6,810,253,431
Money market funds	6,810,253,431
Cash in accounts	5,418,232,067
Repo	2,992,015,954
Other treasury bills	397,150,678
Corporate bonds, funds, and precious metals	3,486,896,735
Other investments	5,551,836,303
Secured loans	4,494,373,260
Total	66,409,619,424

digital currency by market capitalization to this day. Tether has also been the leader in terms of transaction volume on crypto exchanges for a long time. This is due to the fact that USDT, as well as other stablecoins, are actively used for cross-border transfers. Some exchanges use USDT as an intermediate instrument for transactions without the need to have a USD account.

USDT is issued when funds from Tether Limited clients are transferred. Having received US dollars from those wishing to purchase the stablecoin, the company issues USDT coins in the corresponding volume, and when holders demand redemption, the company pays them the required volume of US dollars and removes USDT coins from circulation in the same volume. [6]

Throughout Tether's existence, a multitude of regulators have had questions about the availability or sufficiency of USDT collateral. They would file multiple complaints against Tether Limited Holding, accusing it of market manipulation. Since the launch of the coin, the company hasn't faced a single full audit for a long time.

In March 2019, Tether Limited's management announced that USDT coins were backed not only by US dollars but also by loans provided to related companies. A month later, the company's lawyers admitted in the New York State Supreme Court that USDT coins were only 74% backed by real US dollars.

In August 2022, BDO Italia, the audit company, published its opinion on sufficiency of Tether Holdings' reserves to fully back the USDT stablecoin. The auditors have checked assets and liabilities of the issuer of the first stablecoin as of June 30, 2022. Tether Holdings' liabilities on the reporting date amounted to \$66.2 billion and its assets were \$66.4 billion. On the reporting date, the coin's capitalization was \$66.34 billion. By comparing the volume of the company's assets and the digital currency's capitalization on the reporting date, we can conclude that Tether stablecoins in circulation are fully backed. However, the issue of liquidity of these assets remains open (Table 2). [7]

In addition to UST, there is a number of other significant stablecoins in circulation: USD Coin, Binance

Coin, Dai, True Coin, etc. The total capitalization of all stablecoins is \$138 billion as of February 2023. With the development of other stablecoins, Tether's share of capitalization among all stablecoins is also gradually decreasing. It accounts for 49% of all stablecoins on the market. USDT is actively used for cross-border transfers. Some exchanges use USDT as an intermediate instrument for transactions without the need to have a USD account.

Notwithstanding, many stablecoin issuers avoid publishing details about their reserves. Although this issue is partially resolved under pressure from regulators, a complete solution is achievable by developing and introducing in practice reserve requirements similar to the corresponding requirements for banks and other financial institutions. [8]

Structurally, cryptocurrency exchanges play a significant role in cryptocurrency circulation. As of April 2023, there were 619 crypto exchanges. The largest one was Binance with a daily trading volume of \$6 billion that is a part of the ecosystem of the same name.

The Binance ecosystem also has its own blockchain called BNB Chain that operates on the basis of the Proof of Authority (PoA) consensus algorithm and is primarily aimed at optimizing operation of decentralized applications with a large number of users. The ecosystem also has a native cryptocurrency BNB and a dollar-backed stablecoin, Binance USD (BUSD).

As part of the fight against the crisis that arose during COVID-19 pandemic, the USA and Europe have increased issuance of national currencies, which led to excess liquidity and increased the desire of citizens and large enterprises to invest in securities and digital currencies. As a result, cryptocurrency prices rose sharply and their capitalization reached \$2.5 trillion in May 2021. Further growth in the value of cryptocurrencies was mainly hampered by the news from Tesla's management of their refusal to sell their products for Bitcoin and the decision of the Chinese leadership to introduce strict measures to ban issuance and circulation of digital currencies in the

country. However, two months later, digital currency prices went sky high again and in November 2021, capitalization of all cryptocurrencies reached a new record volume of RUB 2.8 trillion.

Nevertheless, after that, a decline began that intensified in June 2022. The value of Bitcoin, the first and largest digital currency by capitalization, fell below \$20,000, although in November 2021, at its peak, its value was estimated at \$69,000. The main reason for this fall was growth of consumer inflation rate in the United States to 9.1% in annual terms, a record high in 40 years. This growth in inflation was caused by the soft monetary policy of the Federal Reserve and financial regulators in other countries during the pandemic, as well as rising prices for raw materials and international logistics services. As part of the fight against high inflation, in June 2022, the Federal Reserve began to gradually raise the base interest rate. In November of the same year, it reached 3.75-4% per annum. Meanwhile the rate increase, in turn, led to an increase in the cost of loans, as a result of which the level of consumer activity, the rate of economic growth, and the level of activity of both private and institutional investors decreased. The declining demand for digital currencies has led to a decrease in their market value. [9]

All of this changed dramatically in 2020 when central banks of many developed countries increased the volume of their national currencies to combat the crisis caused by the COVID-19 pandemic, which increased investors' risk appetite and interest in securities. They also began to actively study cryptocurrencies. Accordingly, new major players with their own trading and investment strategies, analytical systems, and algorithms started investing in them. Thuswise, the demand for stocks and cryptocurrencies began to grow, as did the correlation between their prices.

The situation was further aggravated by the negative events that occurred within the digital currency sphere. Enter Terra Luna, one of the largest DeFi projects that had its own cryptocurrency Luna and algorithmic stablecoin TerraUSD (UST). The algorithm for maintaining the stable value of this stablecoin was the burning (see Glossary) of UST in exchange for Luna and vice versa, which was done by arbitrageurs interested in the UST to US dollar rate of 1:1. In early May 2022, an unidentified major crypto market player opened a short position on Luna and

sold 75,000 Bitcoin causing a fall in the Bitcoin rate. The next day, another unidentified player sold 350,000,000 UST, which sharply reduced UST's value against the US dollar. Investors rushed to burn UST, issuing Luna and exchanging it for another cryptocurrency to quickly exit the project. The supply of Luna increased leading to its depreciation.

Binance responded by suspending all Bitcoin withdrawal operations for several hours, explaining this by technical problems in the system. Another major crypto exchange, Coinbase, announced the layoff of 18% of its employees amid these events, explaining this decision by the onset of the so-called "crypto winter," i.e., a recession. These events led to panic among investors; many of them rushed to sell off their cryptocurrencies further exacerbating the decline in their value. This case increased doubts about the security of algorithmic stablecoins, as well as the reliability of details about the size and characteristics of the assets that act as collateral for stablecoins. [10]

Nevertheless, it is worth noting that the value of digital currency capitalization is still exceeding its level before the growth observed in 2021. This is due to the fact that many investors who invested in cryptocurrencies during the period of price growth in 2020—2021 chose not to withdraw their funds after the start of the recession and continue to invest in digital currencies, despite the losses incurred and the reduction in their portfolio volumes. This suggests that, despite more negative expectations, cryptocurrencies have proven to be more resilient to decline. One of the reasons for this is the fact that cryptocurrencies are widely used on a regular basis in developing countries. For citizens of these countries, digital currencies are of particular value amidst instability observed in the national economies of these countries. There is also a more regular demand for cryptocurrencies for the purpose of carrying out criminal transactions.

Since digital currencies are characterized by a more decentralized format, it is difficult to obtain the most accurate and reliable data on transactions. Some transactions carried out using anonymous platforms (VPN, DarkNet) are almost impossible to track. Analytical services often conduct research based on population surveys, website traffic data, and crypto service provider data. Despite the fact that this data may have a certain error, generally, it reflects a reliable picture of digital currency circulation. [11]

Should we analyze distribution of cryptocurrencies

Table 3 - Five Major Cryptocurrency Exchanges Website Usage by Country

	Binance	Huobi	Coinbase	Bithumb	Bitfinex
1	Turkey	Russia	The USA	South Korea	Russia
2	Russia	South Korea	The Great Britain	Thailand	India
3	Argentina	India	Germany	Paraguay	Brazil
4	Vietnam	Ukraine	Spain	China	Indonesia
5	Ukraine	The Great Britain	France	Turkey	Ukraine

by country, we would see how not uniform this distribution is. Using SimilarWeb, we have analyzed five major cryptocurrency exchange website usage by country and identified five countries with the highest indicators for each cryptocurrency exchange (Table 3). The reach of a particular cryptocurrency exchange may partially depend on its location, e.g., Coinbase is an American cryptocurrency exchange and, according to the table, is more popular in the USA and Europe, while Bithumb is a South Korean exchange and is more in demand in Asian countries. However, globally, the website usage parameter provides general information about the demand and popularity of digital currencies in specific countries. [12]

Internal statistics from the cryptocurrency service providers themselves also provide a relatively accurate picture for research. Singapore-based Triple A, a company specializing in digital currency transactions, has published a rating of countries based on their cryptocurrency ownership index, which is the ratio of the number of cryptocurrency owners to the total population of the country, based on internal statistics. According to this rating, most of the countries with the highest rates are countries with developing economies. [13]

The Chainalysis digital currency and blockchain research center has been annually releasing a report on the global index of digital currency adoption by countries in the national economy since 2020. This index is calculated based on five sub-indices, each of which is based on countries' use of various types of cryptocurrency services:

1. The value of digital currencies received in on-chain transactions by centralized exchanges weighted by purchasing power parity (PPP) per capita.

2. The value of digital currencies received by centralized exchanges in on-chain transactions at the level of non-professional private users weighted by

PPP per capita.

3. Trading volume on peer-to-peer (P2P) platforms weighted by PPP per capita and by the number of internet users.

4. The value of digital currencies received in on-chain transactions on DeFi platforms weighted by purchasing power parity (PPP) per capita.

5. The value of on-chain transactions at the level of non-professional private users received on DeFi platforms weighted by purchasing power parity (PPP) per capita.

Having calculated the above five sub-indices for 146 analyzed countries, Chainalysis researchers took the geometric mean of the rank of each country in all five sub-indices. Then, for each country, a score was obtained determining its position in the index. When calculating sub-indices, the analytical center used data from companies providing cryptocurrency services, as well as traffic from visiting the sites of these companies.

The World Bank classifies countries by income level and overall economic development into high-income, upper-middle-income, lower-middle-income, and low-income countries. Using this classification, seven of the top five countries in the ranking have lower-middle income (Vietnam, the Philippines, Ukraine, India, Pakistan, Nigeria, and Morocco), seven show upper-middle income (Brazil, Thailand, Russia, China, Turkey, Argentina, and Colombia), and one country is a high income one (the USA). Developing countries often use digital currencies to transfer money and store their savings during periods of volatility in the national currency exchange rate.

Accordingly, based on SimilarWeb platform data (Table 3), the cryptocurrency ownership index published by Triple A, and a more detailed cryptocurrency adoption index compiled by the Chainalysis think tank (Table 4), we can conclude that developing countries are more active in global circulation of digital currencies.

Table 4 - The Chainalysis Cryptocurrency Adoption Index

Countries	Overall Score	P1	P2	P3	P4	P5
Vietnam	1	5	5	2	7	6
The Philippines	2	4	4	66	13	5
Ukraine	3	6	6	39	10	14
India	4	1	1	82	1	1
The USA	5	3	3	111	3	2
Pakistan	6	10	10	50	22	16
Brazil	7	7	7	113	8	7
Thailand	8	12	12	61	5	3
Russia	9	8	8	109	11	12
China	10	2	2	144	6	4
Nigeria	11	18	18	17	20	17
Turkey	12	9	9	121	19	15
Argentina	13	13	13	26	21	25
Morocco	14	19	19	21	33	18
Colombia	15	23	23	10	27	29

This is facilitated by the ineffective monetary policy of financial regulators in these countries, the volatile exchange rate of the national currency, and the low level of financial infrastructure's development.

One of the fundamental segments in the field of digital currencies is the mining industry. It is mainly widespread in countries that have the infrastructure required for mining in the form of cheap electricity sources with appropriate mining equipment. According to the online service of the Cambridge Centre for Alternative Finance that shows current electricity consumption related to Bitcoin transactions, as of January 2022, the United States have the largest volumes of computing power used for Bitcoin mining (37.84%). Despite the fact that Bitcoin mining is prohibited in China, the country still ranks second (21.11%). The third and fourth lines are occupied by Kazakhstan (13.22%) and Canada (6.48%).

A ban on mining in one country leads to immigration of companies operating in this field to neighboring countries, ultimately leading to an overload of the power supply infrastructure in these countries and power outages. Case in point, Russia and Kazakhstan have experienced similar pressures after the ban on mining in China. [14]

The mining process is energy consuming and harmful to the environment. According to the Bitcoin Mining Council, in 2022, energy consumption of Bitcoin miners increased by 41% and reached 266 TWh. This is greater than the annual energy consumption of countries such as Australia, Turkey, or Spain. Many national and supranational regulators are requiring mining companies to switch to renewable and environmentally friendly energy sources. It is also worth noting that in the digital currency sphere, there is a popular trend of abandoning the Proof of Work consensus algorithm, within which transactions are verified by mining performed by nodes, in favor of other, less energy-consuming, more efficient and environmentally friendly algorithms. One of the most significant examples of this trend is the recent transition on the Ethereum platform from PoW to PoS. It is also important to keep in mind that many projects operating on the basis of the PoW algorithm use a halving system, i.e., a reduction in the miners' reward for a successfully mined block, which directly and negatively affects mining profitability.

Nevertheless, despite the indicated negative facts regarding further development of mining, the release of most digital currencies is still based on the PoW algorithm, and the consensus algorithm cannot be changed overnight. Accordingly, in the short and medium terms, mining will still remain relevant for digital currencies.

Digital currencies are expected to strengthen their positions as they improve. Digital currencies are giving impetus to the development of digital technologies, despite their volatile, pseudonymous,

and decentralized nature, which can be off-putting to many more traditional investors. The correlation with traditional financial instruments will grow and the demand for digital currencies will be more stable due to the need coming from citizens of developing countries. [15]

And so, having analyzed the worldwide circulation of digital currencies, we can highlight the following trends:

1. Despite their volatile nature, the popularity of digital currencies is growing. There is a regular demand for digital currencies from citizens of developing countries, as well as from individuals who use digital currencies for their criminal purposes preventing their rates from falling to minimum values during recessions.

2. With the growing participation of institutional investors in the circulation of digital currencies, the emergence of large digital ecosystems, the use of digital currencies by large international enterprises for their transactions, the correlation indicator between quotes of digital currencies and stocks has increased. Thus, digital currencies have ceased to be alternative instruments resistant to background economic shocks.

3. Digital currencies are more common in developing countries due to their poorly developed financial infrastructure, unstable national currency, and lack of access to international markets.

4. Despite a tendency to switch from the PoW consensus algorithm to PoS in digital currencies that eliminates the need for a mining procedure to verify transactions within blockchain and to issue new cryptocurrencies, in the short term, the PoW algorithm will still be the main one, and the mining industry will remain relevant.

CONCLUSION. As a result of the country analysis as part of this dissertation, we have found that developing countries are the main players in the global circulation of digital currencies due to poorly developed financial infrastructure, volatile exchange rate of their national currency, weak banking and financial infrastructure, and lack of direct access to foreign financial products. They and individuals using digital currencies in circulation for criminal purposes create a regular demand, preventing their rate from falling to minimum values during recessions. With the growth of activity in circulation of digital currencies of large institutional investors, transnational companies, the interdependence between digital currencies and securities has increased as well, although at the initial stages of the development of digital currencies, it was practically absent, which made digital currencies an alternative for investors that is resistant to background economic changes.

Currently, Kazakhstan plays a significant role in the global circulation of digital currencies. The analysis we conducted as part of this study indicates a significant role of digital currencies in the national economy. Due

to the availability of cheap and environmentally friendly sources of electricity in the country, there are prospects for conducting and developing mining activities. The availability of technological and resource potential, as well as the presence of a large number of qualified IT experts in the country, can contribute to the further development of the digital currency sphere, which will serve as a platform for the development of new digital products and the growth of the level of digitalization of many sectors of the economy.

The spread of digital currencies in developing countries in the absence of proper regulation directly leads to the growth of the cryptocurrencies' influence in the country's economy known as the cryptoization of the economy. With the growth of turnover in the use of stablecoins with foreign currency collateral, the degree of dollarization, which is the dominance of foreign currency in the national economy, also increases. These phenomena lead to a weakening of the country's monetary sovereignty and the monetary policy of the financial regulator.

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