# INTEGRATED PARADIGM OF SUSTAINABLE DEVELOPMENT: FROM ECONOMIC EFFICIENCY TO SOCIAL JUSTICE AND ENVIRONMENTAL BALANCE

**Scientific monograph**

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**Integrated paradigm of sustainable development: from economic efficiency to social justice and environmental balance. Scientific monograph. – Plovdiv: ANIS Publishing Complex, 2025. – 643 p.**

The authors of the scientific monograph concluded that sustainable development can be effectively achieved only within an integrated paradigm that ensures the systemic unity of economic efficiency, social justice, and environmental balance. The findings demonstrate that the harmonization of economic, social, and environmental objectives enhances the resilience of socio-economic systems, supports inclusive growth, and creates the preconditions for intergenerational equity. Basic research focuses on the conceptualization and theoretical substantiation of the integrated paradigm of sustainable development, including the identification of its core principles, structural components, and interrelationships between economic efficiency, social justice, and environmental balance. The results of the study can be used in the development and improvement of public policies, national and regional sustainable development strategies, and regulatory frameworks aimed at balancing economic, social, and environmental objectives. They may also be applied in corporate governance and strategic management to integrate sustainability principles into business models, as well as in academic and educational activities for teaching and further research in the fields of sustainable development, economics, public administration, and environmental management.

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## CRYPTO-TRANSFORMATION OF THE DIGITAL ECONOMY (CROSS-BORDER ASPECT)

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**Abstract**
*The article examines global and regional trends in the development of the crypto industry in the context of digital transformation of the economy. The impact of cryptocurrencies on financial processes, innovations in payment systems, and social and behavioural aspects of*

*using digital assets is considered. Particular attention is paid to regional market imbalances and cross-border aspects of the introduction of cryptocurrencies as a payment instrument. The article provides an analytical overview of the main factors shaping the development of the cryptocurrency market and highlights the practical implications of integrating digital assets into the financial and economic infrastructure.*

**Keywords:** *crypto industry, digital economy, digital assets, global trends, regional disparities, cross-border payments.*

## Introduction

The modern global economy as well as the international market environment functions and evolves in the context of large-scale global digital transformation, which causes profound changes in socio-economic, managerial and communication processes. In this context, the crypto industry is seen as a strategic component of the digital management ecosystem, contributing to the formation of new models of organisational interaction, increasing the transparency of business processes and strengthening trust between market participants. The integration of decentralised technologies into the management system opens up new opportunities for implementing the principles of sustainable development, optimising management decisions and ensuring the adaptability of organisations to the challenges of the digital economy.

With this approach, the crypto industry has become one of the leading drivers of the evolution of financial systems and international economic relations – a dynamic sphere encompassing cryptocurrencies, blockchain technologies, DeFi platforms, the NFT market, the Web3 ecosystem, digital exchanges, and new-generation financial instruments (Kyslakov & Moiseenko, 2023). The emergence of blockchain technology has become the basis for the development of not only cryptocurrencies, but also various decentralised applications (dApps), smart contracts and DeFi (decentralised finance) (Farynovych & Mutka, 2024).

The spread of cryptocurrencies is changing the architecture of the global economy contributing to the formation of a new paradigm of digital finance management based on decentralisation, blockchain and direct user participation in cross-border transactions. According

to the *IMF Global Financial Stability Report* (IMF, 2025), crypto assets increasingly being integrated into the financial systems of various countries, affecting macroeconomic stability, monetary policy and capital markets.

The relevance of the study is determined by the growing role of crypto technologies in the global economy and the need to analyse their impact on the digital transformation of financial management systems. Innovative financial solutions based on decentralised technologies are changing approaches to strategic management, corporate interaction and the formation of sustainable business models in the digital environment. The Chainalysis Geography of Cryptocurrency Report (Chainalysis, 2024) and the Triple A Global Crypto Adoption Report (Triple A, 2024) indicate that the number of crypto asset owners worldwide has already exceeded 550 million people, representing more than 6% of the planet's adult population. This indicates the transition of cryptocurrencies from a speculative asset to a mass financial instrument. As of 2023, there were over 300 companies operating in Ukraine related to blockchain technologies, including developers of software for crypto exchanges, wallets, payment gateways, and NFT platforms (Taran, 2025). According to estimates by the Ukrainian Blockchain Association, the export potential of blockchain services from Ukraine is estimated at 500-700 million USD annually with appropriate incentives from the state (Neskorodzhena et al., 2023).

At the same time, the development of the crypto industry is accompanied by new challenges: volatility, regulatory uncertainty, fraud risks, and concentration of capital in the hands of large exchanges and funds (Böhme et al., 2015). Therefore, important areas of research include not only assessing the scale of the global cryptocurrency market, but also identifying its structural imbalances and regional differences in implementation, particularly in the context of cross-border processes and sustainable digital development.

**Materials and Methods**

The study uses a comprehensive approach that combines quantitative and qualitative data analysis on global and regional cryptocurrency infrastructure development. Secondary data analysis was used, including research on global reports and indices such as

the IMF Global Financial Stability Report (2025), Chainalysis Geography of Cryptocurrency Report (2024), TripleA Global Crypto Adoption Report (2024), which made it possible to estimate the number of cryptocurrency owners, transaction volumes and regional disparities; quantitative analysis of blockchain data, which allows determining the concentration of capital and the structure of digital asset owners; statistical analysis of transaction dynamics and cryptocurrency usage patterns; review of behavioural and social factors that influence the population's readiness for crypto payments, priorities in the choice of payment methods, and income models.

This approach provides a comprehensive assessment of both the technological and socio-economic aspects of the crypto industry's development, allowing key global and regional trends to be identified.

**Results and Discussions**

In today's world, cryptocurrencies have become a key element of a new paradigm for managing financial innovation. With this approach, blockchain technology promotes a high level of decentralisation, where control and management of information or transactions are not concentrated in a single centralised institution but distributed among all participants in the system, transparency, security and autonomy of financial processes. As noted by the authors (Böhme et al., 2015), Bitcoin is seen not only as a digital currency, but also as an economic and technological phenomenon that combines financial innovation, decentralised management and the risks of energy consumption and capital concentration. The introduction of Bitcoin in 2009 marked the beginning of the era of digital finance, in which traditional monetary systems and mechanisms are gradually being integrated with decentralised alternatives, creating new forms of management and exchange in the economy. At the same time, the introduction of Bitcoin creates a number of management risks: high energy costs for mining, concentration of power in the hands of a limited number of operators, and the absence of legal mechanisms to compensation of losses, which increases the vulnerability of organisations to technical failures and fraud.

In addition to technological and economic factors, the spread of cryptocurrencies is largely determined by behavioural and cultural

aspects. In particular, studies show that consumers' decisions to use Bitcoin as a means of payment depend on trust in the technology, ease of use, and social acceptance (Bouri et al., 2024). This approach emphasises that the effective integration of cryptocurrencies into financial and management systems requires not only technical implementation but also consideration of psychological and social factors.

The authors of a study draw a similar conclusion on the adoption of payment methods via blockchain and cryptocurrencies, who emphasise the importance of the brand image of service providers in shaping consumer confidence in digital assets (Kara et al., 2024). This indicates that the crypto economy is developing not only as a technological innovation, but also as a new mechanism for social communication and a system of market trust, which is important for the strategic management and marketing decisions of organisations.

Some researchers believe that the main factors influencing the adoption of cryptocurrencies are trust in the technology, ease of use, and perception of its usefulness (Bouri et al., 2024). This suggests that the adoption of digital assets depends not only on technical capabilities or on economic conditions, but is also largely determined by psychological factors of trust and the social effects of recommendations in the network environment. The authors demonstrate that the brand image of a platform or service provider also significantly influences the decisions of both consumers and sellers to accept cryptocurrencies as a means of payment (Kara et al., 2024). This approach points to the formation of a new trust market, where digital financial instruments combine technological innovation with brand communication practices. Thus, even in countries with developed banking infrastructure, the growth of cryptocurrency transactions may reflect the cultural and behavioural attitudes of users.

Despite the rapid development of the crypto industry, its practical functioning remains difficult to analyse. In particular, determining the number of Bitcoin (BTC) users is inaccurate due to the anonymity of transactions, but based on data from blockchains, exchanges and global surveys, certain patterns of cryptocurrency ownership can be identified. It is estimated that about 1.29% of the world's population (approximately 106 million people) own bitcoins

(Kemmerer, 2025). However, the distribution of assets among owners is extremely uneven, as confirmed by the data in Table 1.13.

*Table 1.13*

**Distribution of BTC by owner wallets** ()

| *Number of wallets* | *Contents of BTC wallets* | *Characteristics of owners* |
|---|---|---|
| 988 627 | up to 1 | small holders, beginners or users experimenting with the crypto market |
| 151 657 | 10 or more | active investors |
| 18 463 | more than 100 | large private investors or small funds |
| 2100 | more than 1000 | cryptocurrency “whales” |
| 94 | more than 10 000 | large players, exchanges or institutional investors |
| 4 | more than 100 000 | largest holders with systemic influence on the market |

*Source: Kemmerer, 2025*

These indicators show that almost a million wallets contain less than one bitcoin, while only a few hundred addresses control a significant portion of the supply. Accordingly, most users are only testing the technology or storing small amounts, while the real concentration of capital is concentrated in the hands of a small number of players.

Consequently, bitcoin ownership has a pronounced concentration effect: the wide reach of users is combined with a high disparity in the distribution of assets. Nevertheless, bitcoin’s influence is growing globally, and interest in it indicates the gradual integration of cryptocurrencies into the global financial system.

In addition to analysing the distribution of bitcoin ownership, it is worth noting that the largest bitcoin wallet in the world currently holds 248 598 BTC (16.4 billion USD), which is approximately 1.25% of the total supply of bitcoin. This address – 34xp4vRoCGJym3xR7yCVPFHoCNxv4Twseo – belongs to the cold wallet of the Binance crypto exchange (Binance. (n.d.)

Cold storage is used to maximise the security of assets, as such wallets are not connected to the Internet and are therefore less exposed to the risk of hacking.

The presence of such a balance on a single wallet demonstrates the high concentration of bitcoins in large exchanges that act as

intermediaries between millions of users. This confirms that a significant portion of the BTC supply is actually controlled by a limited number of institutional players, while individual holders hold relatively small amounts. This situation creates a unique balance between mass adoption and the centralised influence of large participants. Let's also analyse the distribution of bitcoin holders by balance size, i.e. how concentrated BTC ownership is among different categories of wallets (Figure 1.9).

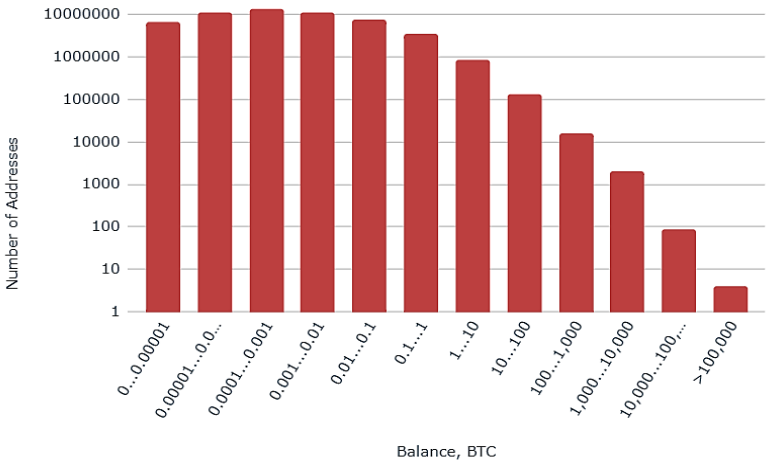


**Figure 1.9 Distribution of addresses by balance in BTC**
*Source: official CoinLedger table (Kemmerer, 2025)*

According to the data shown in the figure, the main patterns can be identified, namely:

1. *Small holders:* more than 24 million addresses (80% of all wallets) contain less than 0.01 BTC; collectively, these addresses hold less than 2% of all bitcoins, which indicates a wide but superficial user engagement; beginners, microinvestors, or participants in test transactions most often own such wallets.

2. *Medium holders:* wallets with a balance of 0.1 to 10 BTC account for about 8% of all addresses, but control about 15-16% of all bitcoins; these are likely to be active investors or those who accumulate BTC in the medium to long term.

3. *Large holders ("whales"):* less than 0.3% of addresses (≈150,000 wallets) contain between 10 and 1000 BTC, but together they own more than 67% of the total number of bitcoins; this indicates a high concentration of assets in a few large players – exchanges, funds or institutions.

4. *Ultra-large holders:* only 94 wallets (less than 0.0002% of all addresses) contain more than 10,000 BTC, holding more than 14% of the total turnover; the largest of these are cold wallets of exchanges (including Binance, Coinbase, Bitfinex) that store the assets of their users.

Therefore, the distribution of bitcoin has a pronounced pyramidal structure, with a broad base of small users with minimal volumes of BTC and a narrow peak where most of the capital is concentrated. These patterns can be seen in the graph (Figure 1.10).

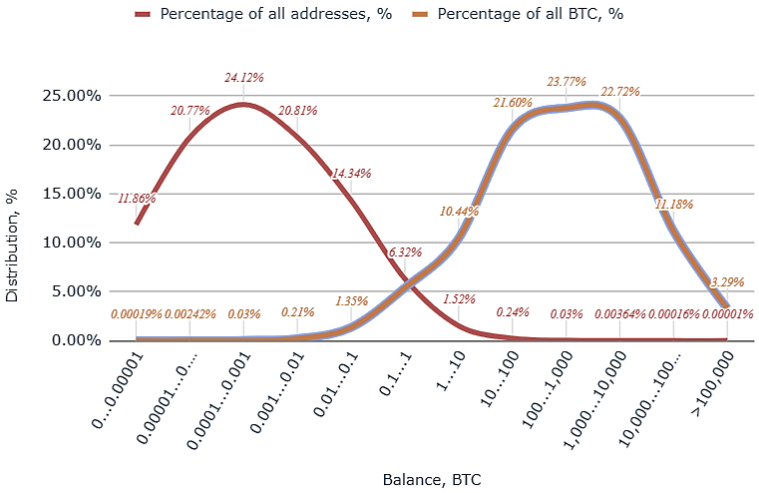


**Figure 1.10 Graph of the distribution of bitcoin-wallets compared to own BTC**

*Source: official CoinLedger table (Kemmerer, 2025)*

Analysing the graph, we can identify certain patterns:

Exponential concentration of assets – the larger the bitcoin balance, the fewer such wallets there are – but they own the vast majority of all BTC. This is a typical pattern for systems with an

uneven distribution of wealth, where the concentration grows almost exponentially with each level (according to the 80/20 or even 90/10 principle).

The graph shows that the number of wallets decreases sharply with the amount of BTC: more than 75% of all addresses have less than 0.01 BTC; while less than 0.3% of addresses have more than 10 BTC. This creates a "pyramid of ownership" effect, typical of markets with a strong concentration of capital.

Inequality of distribution: the smallest categories (0-0.001 BTC) make up the vast majority of addresses, but control less than 0.05% of all bitcoins. On the other hand, large wallets (>100 BTC) account for only 0.03% of all wallets, but control more than 60% of all BTC turnover. This is a clear manifestation of the Pareto effect (80/20), where a small proportion of participants owns most of the resources.

Institutional influence: the largest addresses (>10,000 BTC) are mostly cold wallets of large exchanges (Binance, Coinbase, Bitfinex, etc.). This means that the actual concentration of capital can be even higher, as these addresses contain the assets of thousands of users.

Stability of the lower segments: a large number of "small" addresses (<0.01 BTC) indicates a wide involvement of new users, even if their share in the total volume is insignificant. This may indicate an expanding owner base and the growing popularity of bitcoin as a technology, not just as an asset for accumulation.

In other words, bitcoin ownership has a pronounced asymmetry: widespread participation of small users, but with minimal amounts; high concentration of capital in a small number of addresses. This once again confirms that, although bitcoin has become massive in terms of the number of participants, financial influence remains in the hands of a small group of owners.

It is also worth analysing the global distribution of cryptocurrency ownership (2023-2024). Over the year, the total number of cryptocurrency holders in the world increased from about 417 million in 2023 to more than 551 million in 2024, which corresponds to an increase of 32%. However, the distribution by continent shows regional patterns of crypto market development (Table 1.14).

According to the table, Asia is the global leader in cryptocurrency ownership and has the largest user base in the world – more than 326 million, which is more than the rest of the continents combined. This

is due to high digitalisation, the widespread use of mobile wallets, and the popularity of crypto assets in countries such as India, Vietnam, Indonesia, and the Philippines.

*Table 1.14*

**Cryptocurrency ownership by continent**

| Continent | Cryptocurrency holders in 2023, million | Cryptocurrency holders in 2024, million | Absolute growth, million | Relative growth % |
|---|---|---|---|---|
| Asia | 268.2 | 326.8 | +58.6 | 21.80% |
| North America | 52.1 | 72.2 | +20.1 | 38.60% |
| South America | 25.5 | 55.2 | +29.7 | 116.50% |
| Europe | 30.7 | 49.2 | +18.5 | 60.30% |
| Africa | 40.1 | 43.5 | +3.4 | 8.50% |
| Oceania | 1.4 | 3.0 | +1.6 | 114.30% |

*Source: based on reports (Chainalysis, 2024; TripleA, 2024)*

South America and Oceania are showing the fastest growth. South America's +116.5% is the highest in the world. This is due to economic instability, inflation (in particular in Argentina and Venezuela), and the growing use of cryptocurrencies as a means of preserving value and making payments. Oceania (Australia, New Zealand): +114.3%, which indicates active institutional integration of crypto services and favourable regulation.

North America and Europe – stable, but not rapid growth. In the USA, Canada, Germany, and the United Kingdom, cryptocurrencies are viewed as an investment asset rather than a means of payment. Growth has been driven by the development of bitcoin ETFs, the legalisation of crypto funds, and the activity of institutional investors.

Although Africa has a high level of crypto use in Nigeria, Kenya and South Africa, the overall growth was only 8.5%. The reasons for this are regulatory uncertainty, limited access to exchanges, and low levels of digital literacy in some regions. Nevertheless, according to *Chainalysis* (2024), Africa will remain one of the fastest growing regions for P2P transactions.

Accordingly, we can say that there is a global trend where cryptocurrencies are spreading faster in regions with economic

turbulence or low levels of trust in the banking system, while maintaining their structure, where in developed countries crypto assets are perceived through the prism of investment logic (ETFs, regulation), and in developing countries as a financial necessity (inflation protection, transfers, alternative payments, etc.).

Let's take a closer look at the cryptocurrency market in Central, Northern and Western Europe (CNWE). According to the *Chainalysis* report (2024), Central, Northern and Western Europe (CNWE) is the second largest cryptocurrency economy in the world after North America. During the period from July 2023 to June 2024, the total value of blockchain assets in the region was 987.25 billion USD, this corresponds to 21.7% of the global transaction volume. Compared to the previous period of 2023, the level of crypto activity in the CNWE grew by an average of 44% year-on-year (YoY), indicating a gradual recovery in investment and payment activity after the market correction phase of 2022. The United Kingdom made the largest contribution to this volume, accounting for 217 billion USD in cryptocurrency revenues, the country was ranked 12th in the *Global Crypto Adoption Index* (2024). The market structure shows significant diversification by type of digital asset (Table 1.15).

*Table 1.15*

**Main parameters of cryptocurrency activity (CNWE) in 2023-2024**

| Indicator, transaction volume | Value, billion USD | Share of the global volume | Annual change (%) |
|---|---|---|---|
| Total | 987.25 | 21.7% | +44% |
| BTC | 212.3 | 4.7% | +75%* |
| Stablecoins | 422.3 | 9.3% | +62% |

*Source: based on reports (Chainalysis, 2024)*

Analytical data from Chainalysis shows that stablecoins have become the dominant tool in the region, accounting for 52.36% of all transactions under 1 million USD. This trend reflects the gradual transformation of the European market into an infrastructure-rich market focused on the practical use of cryptocurrencies in payment transactions, not just as a speculative asset.

This trend is confirmed by corporate data from BVNK Company, specialising in multi-currency platforms for stablecoin payments.

According to BVNK's internal observations, up to 90% of customer payments are made in stablecoins (BVNK Insights, 2024). The main crypto-active countries in the CNWE are shown in Table 1.16.

Therefore, it can be said that the European region has formed 21.7% of the global cryptocurrency turnover, retaining the status of the second largest crypto economy in the world. Stablecoins have become a key financial instrument in the region, accounting for almost half of transactions. The growth of stablecoin transactions indicates the market's reorientation towards practical payment functions and international settlements.

*Table 1.16*

**The volume of cryptocurrency revenues in CNWE countries (2023-2024)**

| Country | Revenue (billion USD) | Key characteristics |
|---|---|---|
| United Kingdom | 217 | Largest financial centre; active retail segment |
| Germany | ≈120 | Institutional participation, DeFi projects |
| France | ≈80 | Development of Web3 and asset tokenisation |
| Netherlands, Switzerland, Ireland | 50–60 | Crypto payment and exchange hubs |
| Scandinavia | ≈40 | B2B solutions based on stablecoins |

*Source: based on reports (Chainalysis, 2024)*

Analysing the Eastern European market, it can be determined that it ranked fourth in the world in terms of cryptocurrency transactions, having received 499.14 billion USD in the blockchain chain, which is 11% of the global volume (Figure 1.11). The region is showing a structural shift from centralised platforms to decentralised financial services (DeFi) (CoinDesk, 2024).

Eastern Europe remains the fourth largest cryptocurrency market in the world, with 499.14 billion USD in blockchain transactions, accounting for 11% of the global total. Centralised exchanges (CEX) accounted for the bulk of the transactions, with 324 billion USD, while the DeFi segment grew to 165.46 billion USD (approximately one-third of regional revenues).

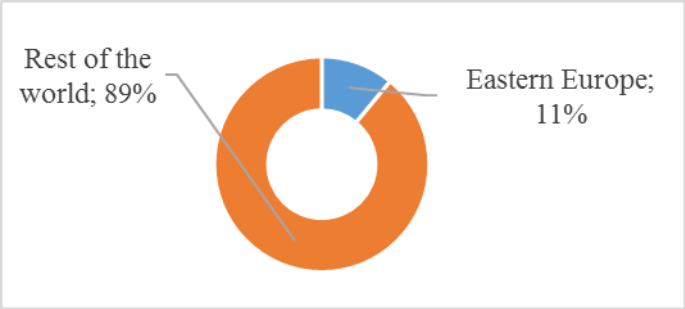


**Figure 1.11 Comparative analysis of the volume of cryptocurrencies received by Eastern European countries from July 2023 to June 2024, relative to the rest of the world**
*Source: CoinDesk, 2024*

Ukraine remains one of the leaders in this market (106.1 billion USD), ranking sixth globally in terms of the high share of institutional and professional remittances. This increase in activity is due to the search for financial stability during the war (Table 1.17). According to WhiteBIT, institutional transfers and purchases of BTC for hryvnia (UAH) reached 882.64 million USD, indicating that bitcoin is used as a means of preserving value amid inflation (peaking at 26.6% in December 2022).

*Table 1.17*

**Structure of cryptocurrency revenues in Ukraine**

| Indicator | Value billion, USD | Share / Change |
|---|---|---|
| Total cryptocurrency revenue | 499.14 | 11 % of global turnover |
| Centralised exchanges (CEX) | 324 | 65 % |
| DeFi sector | 165.46 | 33 % |
| Volume of BTC purchases per UAH | 882.64 | + significant growth |

*Source: based on reports (CoinDesk, 2024)*

DEXes (decentralised exchanges) have become the most dynamic element of the market, with Ukraine showing an increase of +160.23%, or 34.9 billion UAS. Other countries (Poland, Moldova, Hungary, and the Czech Republic) are showing growth in DeFi

lending, which has reached 11.29 billion USD. The highest growth rates in DeFi are in Hungary. The country is showing explosive growth in the Bridge (over 600%) and Lending (≈200%) segments, which indicates a rapid expansion of the infrastructure between network transactions and DeFi lending (Figure 1.12).

Romania and Poland demonstrate strong positions. NFT and DEX are actively developing in these countries, which may be due to the investment activity of small businesses and the growth of local DeFi projects. Ukraine remains stable, but with moderate fluctuations, showing positive dynamics in Bridge and DEX, but a slight drop in NFT, reflecting the focus on basic infrastructure. In Moldova, there is a noticeable decline in DeFi lending, but an increase in other segments, which may be due to the low liquidity of local markets and the reorientation of users towards stable tokens.


**Figure 1.12 DeFi growth in Eastern Europe by country and category year-on-year (July 2022 - June 2024)**

*Source: Chainalysis, 2024*

In general, Eastern Europe has seen a shift in focus from NFT to DEX, Lending and Bridge services, which indicates a maturing market and a shift to infrastructure and financial solutions.

It is also important to analyse the annual growth dynamics of DeFi activity broken down by transaction type (transfer size). The data illustrate that the main driver of regional growth is large

institutional transfers, while small retail activity remains stable or declines (Figure 1.13).

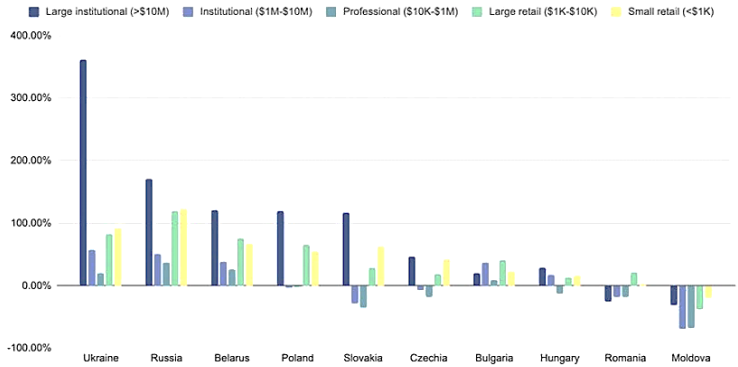


**Figure 1.13 DeFi growth in Eastern Europe by country and transfer size (July 2022 - June 2024)**

*Source: Chainalysis, 2024*

Ukraine has seen an increase in large institutional transfers (>$10 million): over 350% the highest in the region. Other categories (institutional, professional, retail) are also showing positive dynamics, which indicates the spread of cryptocurrencies among businesses and individuals. This growth pattern indicates an increasing role for institutional players, while moderate but steady participation of small users.

Poland and Slovakia are showing synchronised growth in the range of 100-150%, mainly in large institutional and professional segments. This indicates the institutionalisation of the crypto market – the participation of companies, investment funds and tech startups in DeFi.

Moldova, Romania, Hungary, Bulgaria, Czech Republic – stagnation or decline. Small transactions and the professional segment are experiencing negative dynamics, especially in Moldova and Romania. This may reflect the low liquidity of local markets, as well as the impact of regulatory or macroeconomic factors (e.g. capital controls or restrictions on cryptocurrency exchanges).

The dynamics of DeFi in Eastern Europe clearly correlates with geopolitical factors: war, sanctions, and currency instability stimulate demand for decentralised financial instruments. Unlike other regions of the world, Eastern Europe has seen a drop in the volume of transactions with ERC-20 tokens and stablecoins (USDT, USDC). Possible reasons for this include geopolitical instability, regulatory uncertainty, and the lack of need for financial inclusion (as most people have bank accounts).

It is also worth considering the sentiment towards cryptocurrency payments among digital asset owners (Table 1.18), as it reflects the market's readiness to introduce new financial instruments.

*Table 1.18*

**Payment attitudes among cryptocurrency owners**

| Indicator | Share of respondents, % | Interpretation |
|---|---|---|
| Would like to be able to pay for purchases with cryptocurrency | 65 | High readiness to use cryptocurrencies in consumption |
| Would choose a store that accepts cryptocurrency | 56 | Cryptocurrency becomes a factor in choosing a retail outlet |
| Would shop more often if cryptocurrency payments were available | 55 | Increased transaction frequency with the expansion of crypto infrastructure |
| Would spend more if cryptocurrency payments were available | 43 | Potential for growth in the average cheque |

*Source: official CoinLedger table (Kemmerer, 2025)*

Cryptocurrency owners demonstrate a high willingness to use digital assets as a means of payment and are interested in the possibility of cryptocurrency payments. This indicates the gradual institutionalisation of crypto payments in consumer behaviour, which is important for managing and developing strategies to integrating cryptocurrencies into commercial and payment systems.

The analysis of such sentiments allows us to predict the potential demand for crypto payments, assess risks, and identify effective approaches to their implementation in the digital economy.

The findings also show that more than half of crypto owners are

ready to integrate digital currencies into their everyday purchases, which is a prerequisite for further monetisation of the crypto sector in the real economy. At the same time, an analysis of the categories of goods and services shows a gradual expansion of areas where cryptocurrencies are considered as real means of payment (Table 1.19).

*Table 1.19*

**Areas where cryptocurrency is considered as a real means of payment**

| Category of goods/services | Share of interested crypto owners, % | Development potential |
|---|---|---|
| Everyday retail | 80 | Massive demand, prospects for POS crypto payments |
| Travel, hospitality, leisure | 70 | High attractiveness for international payments |
| Real estate, corporate or government services | 45 | Long-term segment with potential for B2B transactions |
| Entertainment (gaming, streaming) | 44 | Active digital audience accepting crypto payments |
| Valuables and speciality goods | 32 | Niche segment of the premium market |

*Source: official CoinLedger table (Kemmerer, 2025)*

The high level of acceptance of cryptocurrencies among users indicates the formation of the crypto community as a separate layer of digital consumers, characterised by growing confidence in digital assets and a desire to use them in practice.

The readiness to crypto payments, demonstrated by 65% of respondents, reflects the potential demand for expanding the network of merchants able to accept cryptocurrencies as a means of payment. At the same time, the spread of a mixed payment model (27%) indicates a transitional stage in the development of financial behaviour, when users combine traditional and digital instruments.

The dominance of interest in the use of cryptocurrencies in retail and travel indicates their gradual integration into everyday consumption segments. Overall, this evolution of payment behaviour reflects the emergence of a new economic culture in which

cryptocurrencies perform not only investment but also transactional functions, becoming a full-fledged element of the modern financial system.

We also note a moderate diversification between the three models of income generation: cryptocurrency, fiat, and mixed (Figure 1.14).

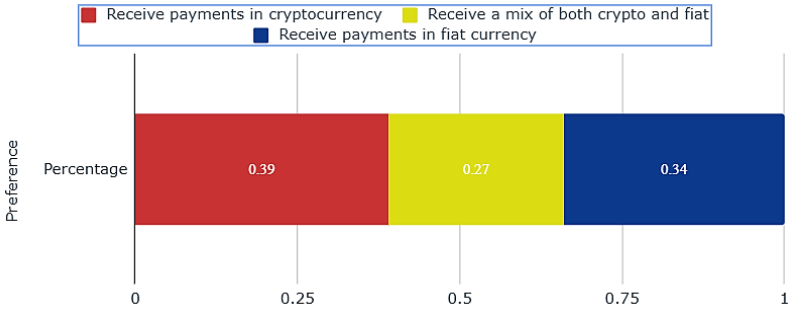


**Figure 1.14 Structure of preferences for the form of payment**
*Source: official CoinLedger table (Kemmerer, 2025).*

According to the data (Figure 1.14), 39% of respondents prefer payments in cryptocurrency, 34% – in fiat, while 27% support a mixed model.

The fact that 39% of respondents prefer to receive income directly in cryptocurrency indicates a growing trust in digital financial assets and the willingness of users to participate in the new economic ecosystem (Hayashi et al., 2025). The main reasons for this choice can be summarised as follows:

1. The desire to financial autonomy. Cryptocurrencies allow you to avoid intermediaries (banks, payment systems), providing direct control over your own assets.
2. The ability to preserve and increase value. Some users consider cryptocurrencies not only as a means of payment but also as an investment asset that is potentially more profitable than fiat.
3. Convenience in international payments. Borders do not limit cryptocurrency transfers, which makes them attractive for freelancers, IT professionals and entrepreneurs in the global market.
4. Technological identity of users. Representatives of the crypto community tend to be committed to innovation and digital freedom, so the choice of cryptocurrency is part of their value position.

5. Protection against inflationary risks. In countries with unstable monetary policies, cryptocurrencies may be perceived as a means of preserving purchasing power.

Thus, the choice of cryptocurrency payments reflects not only economic feasibility, but also ideological and cultural affiliation with the new digital financial paradigm.

A fiat currency is a monetary unit issued and guaranteed by a government that has no backing of its own but is recognised as legal tender through government regulation and public trust (Pew Research Center, 2024, October 24). Such currencies include the USD, EUR, UAH, etc. The fact that 34% of cryptocurrency owners choose fiat currency to receive payments is explained by several objective factors:

1. *Stability and predictability of value*. Unlike cryptocurrencies, which are subject to significant exchange rate fluctuations, fiat money provides relative price stability, which is important for planning income, expenses, and savings.

2. *Regulatory protection*. Fiat currency is subject to state financial control, deposit insurance, and consumer protection, which increases user confidence.

3. *Liquidity and universality*. Fiat money is accepted everywhere, unlike cryptocurrencies, which have a limited range of applications in the real sector.

4. *Convenience in everyday payments*. Most current payments, tax liabilities, and credit transactions are made in fiat currency, which makes it more practical for everyday use.

5. *Psychological habit and low level of financial risks*. For a significant part of consumers, fiat remains a more understandable and reliable tool, especially in the absence of full trust in digital assets or stable regulatory conditions.

Thus, the choice of fiat currency among a third of respondents reflects the desire to financial security, stability and universality of payments, even in an environment that is actively adopting digital financial technologies.

The preference for a mixed model among 27% of respondents demonstrates the desire for a balance between the stability of fiat currency and the innovation of crypto assets. This approach is typical of users seeking a gradual transition to digital financial solutions

without increasing risks. Main factors of choice:

1. *Diversification of financial risks*. The combination of the two types of assets allows you to minimise losses from cryptocurrency volatility and at the same time take advantage of their potential growth.
2. *Flexibility in payments*. Users have the opportunity to make everyday payments in fiat and keep part of their income in cryptocurrency for investment.
3. *Adaptive nature of behaviour*. This model is a transitional form between the traditional banking system and digital finance, which corresponds to the current stage of market development.
4. *Preparation for future crypto integration*. Respondents in this segment demonstrate openness to innovation, but remain cautious, observing the stability of the market.

In summary, the mixed payment model demonstrates a pragmatic approach to financial modernisation, where users combine the benefits of traditional stability with the potential of the digital economy.

In terms of such changes, there is a growing demand for expanding the possibilities of using digital assets in everyday transactions, which directly affects the development of crypto infrastructure.

In turn, the growth of crypto infrastructure is reflected in the rapid growth of businesses that accept digital assets. From just 11,000 in mid-2024 to more than 16,000 by mid-2025 the adoption of global cryptocurrency merchants is showing a steady accelerating trend (Figure 1.15).

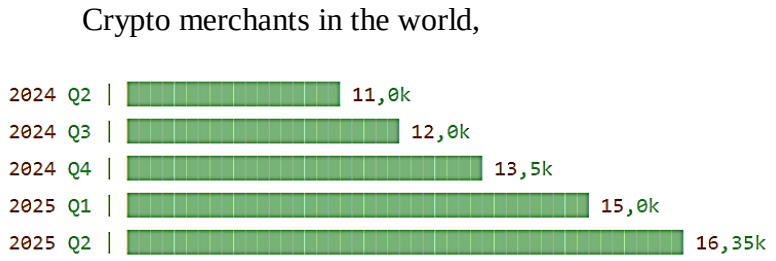


**Figure 1.15 Growth of crypto infrastructure**

*Source: adapted by the authors (Kemmerer, 2025)*

The figure shows the dynamics of growth in the number of crypto merchants in the world (i.e. companies accepting cryptocurrency as a means of payment) from the second quarter of 2024 to the second quarter of 2025. The data indicates a steady increase (Table 1.20).

*Table 1.20*

**Dynamics of growth the number of crypto merchants in the world** *()*

| Period | Number of crypto merchants | Growth to the previous quarter |
|---|---|---|
| 2024 Q2 | 11 000 | - |
| 2024 Q3 | 12 000 | +9% |
| 2024 Q4 | 13 500 | +12.5% |
| 2025 Q1 | 15 000 | +11% |
| 2025 Q2 | 16 350 | +9% |

*Source: Kemmerer, 2025*

The number of companies integrating crypto payments increased by ≈42% over the year. This indicates that cryptocurrencies are moving from niche segment to more widespread commercial circulation. The quarterly growth is relatively even (9-12%), which indicates not a short-term boom but a systematic expansion of the infrastructure. This situation may be related to technological drivers such as: development of Web3 payments and DeFi solutions for business (for example, payment gateways on the blockchain); integration of cryptocurrencies into POS systems (via API solutions Binance Pay, BitPay, etc.); emergence of regulated stablecoins (USDC, EURC) that reduce volatility risks; growth in the share of small and medium-sized businesses among crypto payment users; and the increasing role of AI analytics in tracking transactions and risks.

The main growth centres remain the EU, North America, South Korea, Singapore, and the UAE, where governments are promoting the digital transformation of finance.

The global adoption of cryptocurrencies in the real economy shows a pronounced unevenness, with the dominance of certain regions and the influence of national policies (Table 1.21). The calculations are based on the table “Leading countries by number of merchants accepting Bitcoin” (*Kemmerer, 2025*); countries are

grouped by geographical and economic principle to summarise trends. Latin America accounts for ~38% of all acceptors, despite representing only 19% of the countries in the sample.

*Table 1.21*

**Regional structure of crypto acceptors**

| Region / Country group | Number of countries | Total number of merchants | Average per country | Implementation characteristics |
|---|---|---|---|---|
| Latin America | 20 | 5 842 | 292 | Dominance; grassroots growth, government support |
| North America | 2 | 1 914 | 957 | High concentration; well-developed infrastructure |
| Europe | 35 | 5 512 | 158 | Uneven distribution; regulatory caution |
| Africa | 18 | 1 045 | 58 | Growth potential; focus on remittances |
| Asia and Oceania | 20 | 1 012 | 51 | Limited distribution; regulatory barriers |
| Others (Middle East, Caribbean, etc.) | 10 | 150 | 15 | Experimental nature |
| Total | 105 | 15 475 | 147 | Deep global inequality |

According to the table, Brazil tops the ranking with 1,781 crypto-accepting businesses, highlighting Latin America's leadership in integrating digital assets into everyday commerce. This phenomenon reflects an organic bottom-up shift, where emerging markets are outpacing developed economies in the practical application of cryptocurrencies.

El Salvador's third place (1 166 merchants) is significant, beating Germany (595), the United Kingdom (321), and Canada (479). This result illustrates the effectiveness of government policy: the legalisation of bitcoin as a legal tender in 2021 has stimulated grassroots adoption, turning the cryptocurrency into a tool for everyday transactions. At the same time, dozens of countries, including Saudi Arabia and Estonia, have only one or two acceptors, indicating a deep disparity in global adoption despite the overall growth of the market. These dynamics signal a shift from speculative hype to the strategic use of cryptocurrencies as an alternative to traditional payments. Emerging markets are serving as a catalyst, where adoption is outpacing regulatory frameworks, highlighting business adaptability to volatility and inflationary risks.

It is also worth investigating the relationship between the level of cryptocurrency adoption and the share of the population without bank accounts. This approach allows us to identify new patterns in the structure of global financial inclusion. The question arises whether the popularity of digital assets is growing in places where traditional financial institutions demonstrate a low level of accessibility. Such a comparison allows us to understand whether cryptocurrencies really perform a compensatory function for groups of people excluded from the classical banking system.

In the context of countries with a high share of the population without bank accounts, these results are particularly important. They confirm that the high adoption of cryptocurrencies may be a response to structural lack of financial infrastructure, not just a desire for innovation. Thus, cryptocurrencies are becoming an alternative channel of financial participation that compensates for the lack of institutional trust in the banking sector (Figure 1.16).

A comparative analysis suggests that the high level of crypto asset adoption in countries with a large share of the population without bank accounts is not a coincidence. This indicates the evolution of digital inclusion, where blockchain and cryptocurrencies play the role of not only a financial instrument but also a social innovation aimed at overcoming barriers to access to modern economic opportunities.

The graph shows an inverse relationship between the level of financial inclusion – a concept that encompasses access to and

participation in financial services, including alternative digital tools and the prevalence of cryptocurrencies – and countries with a high proportion of unbanked populations, which typically have higher levels of cryptocurrency ownership. This indicates the compensatory role of cryptocurrencies in providing alternative access to financial services.

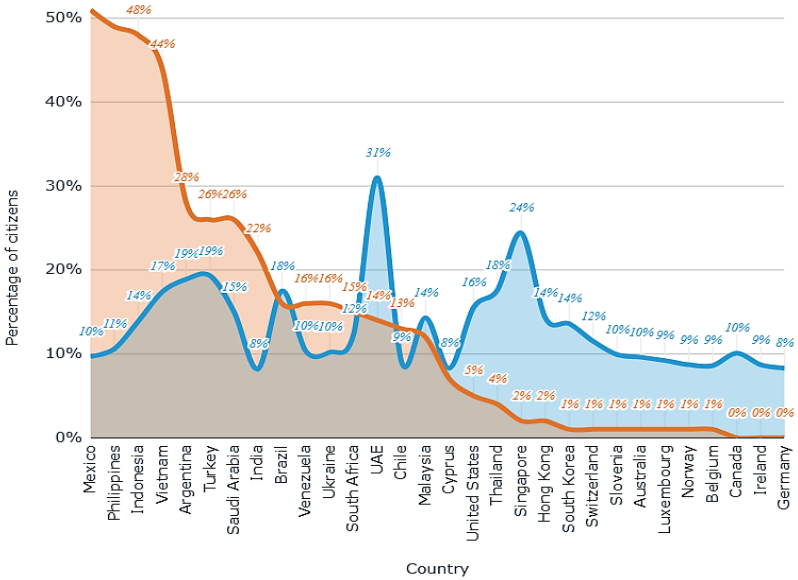


**Figure 1.16 The ratio of cryptocurrency ownership (%) and the share of the population without access to banking services (%) in different countries of the world**

*Source: Kemmerer, 2025*

Mexico, the Philippines, Indonesia, Vietnam, and Argentina are characterised by high indicators of both the unbanked population (28-48%) and crypto asset ownership (14-19%). This indicates that cryptocurrency acts as a tool for financial inclusion in conditions of limited access to traditional banking infrastructure.

Ukraine and South Africa demonstrate relatively low levels of unbanked populations (10-16%), but high indicators of crypto asset ownership (up to 31% in Ukraine). This indicates another motive for using cryptocurrencies – not only access to finance, but also

investment interest, digital literacy and the search for asset protection in conditions of macroeconomic instability.

In countries with high levels of financial inclusion – Germany, Canada, Ireland, Norway, Switzerland – the share of the unbanked population is 0-1%, while cryptocurrency ownership remains moderate (8-10%). Here, cryptocurrency is seen not as a means of accessing the financial system, but as a new form of investment or digital asset that is integrated into formal economic processes.

There is a nonlinear correlation between financial inclusion and the adoption of cryptocurrencies. In the early stages of reduced access to banking services, cryptocurrency performs a compensatory function, but once a certain level of digital maturity is reached (as in OECD countries) the growth of crypto ownership is driven by investment motives.

As cryptocurrencies become increasingly important in the global financial ecosystem, the need for a robust regulatory framework is becoming more critical. Anti-Money Laundering (AML) and Know Your Customer (KYC) rules have become key measures to prevent illegal activities such as money laundering, terrorist financing and fraud in crypto markets.

KYC is the process of verifying the identity of your users before they can access the exchange, which ensures that the platform is not used by criminals, sanctioned individuals, or fake accounts (ChainUp, 2025).

AML refers to the systems and processes that an exchange must implement to detect and prevent illegal financial activities such as money laundering, terrorist financing, or fraud (ChainUp, 2025).

Let us take a closer look at the main components of KYC and AML in the activities of cryptocurrency exchanges (Table 1.22).

Regulation of anti-money laundering (AML) and know your customer (KYC) processes is a key element of the modern crypto industry in the European Union. Given the growth in the volume of transactions with digital assets, European regulators are tightening requirements to transparency and traceability of transactions, which in turn is transforming the organisational models of operation crypto companies (Sammu & McDaniel, 2025). European legislation provides of a number mandatory procedures aimed at ensuring the transparency of transactions, reducing anonymity and minimising the

risks of illegitimate sources of funds. A summary list of key requirements is provided in Table 1.23.

*Table 1.22*

**Main KYC and AML components in cryptocurrency exchange operations**

| Step / Component | | Process content | Purpose and regulatory significance |
|---|---|---|---|
| KYC | **Identity verification** | Collection and verification of government documents (passport, ID card, driving licence). | Confirmation that the user is a real and identified person; prevention the creation of fake accounts. |
| | **Viability/biometrics verification** | Facial recognition, video selfie or other biometric test. | Prevention of the use of stolen documents; ensuring the user's "live" presence. |
| | **Address confirmation** | Provision of utility bills, bank statements or other supporting documents. | Additional verification for users with increased limits; compliance with the requirements of high-risk jurisdictions. |
| | **PEP and sanctions verification** | Screening of politically exposed persons and users from global sanctions lists. | Preventing illegal access to the exchange by persons with significant corruption or criminal risk. |
| | **Permanent customer monitoring** | Periodic data review, re-verification and activity monitoring. | Ensuring dynamic risk control and timely detection of suspicious behaviour. |
| AML | **Transaction monitoring** | Detection of suspicious transfers using rules, triggers, and behaviour patterns. | Prevention of money laundering, terrorist financing and fraud. |
| | **Blockchain analytics** | Analysis of on-chain data to track assets linked to the darkweb, mixers, or criminal schemes. | Identification of links to illegal sources and routing of risky transactions. |
| | **Sanctions screening** | Continuous verification of names, | Protection against transactions with |

| | | | |
|---|---|---|---|
| | | accounts, and blockchain addresses against OFAC, EU, UN, and other lists. | individuals or entities subject to international sanctions. |
| | **Travel Rule compliance** | Sharing information about the sender/recipient for transfers above a set threshold (≈1000 USD). | Ensuring transaction transparency in accordance with FATF requirements. |
| | **Suspicious activity reporting (SAR/STR)** | Reporting to regulators when suspicious customer behaviour is detected. | Strengthening the financial security system and preventing criminal schemes. |
| | **Internal procedures: training and auditing** | Staff training, regular audits, risk assessments, decision logging. | Improving compliance efficiency, supporting proper risk management. |

*Source: ChainUp, 2025*

The rise in complex cryptocurrency laundering schemes – including the use of DeFi protocols, mixers, privacy-coins and cross-chain transactions – reveals the limitations of traditional regulatory models. In response global jurisdictions (the US, EU, Singapore) and the FATF are introducing comprehensive oversight regimes that combine licensing of virtual asset providers, enhanced transaction monitoring, and mandatory customer verification (Zhou, 2023). At the same time, innovative technological solutions are emerging: catch-and-freeze models for identifying and freezing illegal assets, as well as private digital identities based on zero-knowledge proofs – cryptographic mechanisms that allow users to confirm compliance with AML/KYC requirements (e.g., residency, age or verification status) without disclosing personal data, ensuring a balance between regulatory compliance and privacy protection in the Web3 ecosystem, which ensure a balance between transparency and confidentiality. Together these instruments form a new regulatory landscape that supports the legalisation of the crypto market, minimises the risks of financial crime and increases the level of trust among institutional investors.

*Table 1.23*

**Main AML/KYC requirements for crypto businesses in the EU**

| Scope of regulation | Content of the requirement | Purpose of implementation |
|---|---|---|
| Know your customer (KYC) | Verification of identity using passport, ID card or residence documents | Identification of real users and reduction of anonymity |
| Enhanced due diligence (EDD) | Additional checks for PEP and high-risk customers; regular monitoring | Risk assessment and prevention of service use in illegal schemes |
| Transaction monitoring | Detection of unusual transactions, large or rapid transfers, risky patterns | Detection of potential money laundering |
| Suspicious activity reporting (SAR) | Transfer of data to national FIUs | Maintenance of financial security systems and early detection of violations |

*Source: generalised based on Sammu & McDaniel, 2025*

Despite the obvious need to regulation, it is important to remember that compliance with AML/KYC requirements poses a number of challenges for participants in the digital asset market. Let's take a closer look at them.

Firstly, the complexity and high cost of compliance procedures place a significant burden on business processes, especially for small businesses. The introduction of technological solutions for KYC, transaction monitoring and analysis requires investments that not all companies can afford.

Secondly, there is a conflict between regulatory requirements and user expectations regarding privacy protection. Part of the crypto community traditionally prefers anonymity, while the expansion of KYC procedures is perceived as a threat to personal freedom and confidentiality. The decentralised nature of blockchain makes it difficult to strike a balance between regulatory compliance and user privacy.

Thirdly, the complexity of transnational regulation necessitates simultaneous compliance with EU rules and the jurisdictions of other countries, which increases the risk of regulatory non-compliance and

complicates the operational activities of companies focused on global markets.

Regulatory norms significantly change the competitive structure of the European crypto market. On the one hand, they increase investor confidence, legitimise digital assets and form a stable institutional basis for raising capital. On the other hand, significant compliance costs stimulate market concentration: large companies gain economies of scale, while small innovative enterprises face the risk of being squeezed out. This is particularly noticeable in the DeFi sector, where traditional AML/KYC mechanisms are difficult to integrate without changing the architecture of protocols (Sammu & McDaniel, 2025).

Thus, cryptocurrency plays a dual role in the global economy: in developing countries, it acts as a mechanism of financial inclusion, while in developed countries it serves as a tool for asset diversification. This pattern highlights the importance of public policy in the field of digital finance aimed at balancing the accessibility and security of crypto-financial transactions.

**Conclusions**

Summarising the results of the study it can be argued that the processes discussed in the paper reflect a complex transformation of the financial and economic environment under the influence of digitalisation and the development of the crypto industry. The combination of traditional financial mechanisms with the latest digital tools forms a mixed model to receiving and making payments, which contributes to increased flexibility and efficiency of financial transactions. This approach ensures the simultaneous use of the advantages of classic stability tools and the potential of innovative digital assets.

The growth of crypto infrastructure is accompanied by the expansion of the functional capabilities of digital platforms, increased accessibility of crypto assets, and their gradual institutionalisation. The spread of blockchain technologies and digital payment solutions contributes to the formation of new models of economic interaction, including at the cross-border level, which opens up additional opportunities for users, businesses, and government institutions.

Thus, the results of the study confirm that the digitalisation of the financial sector and the development of cryptocurrency services are key factors in the modernisation of the contemporary economy. Further research into these processes is advisable given their dynamic nature, their impact on financial inclusion, and the need to develop regulatory solutions capable of ensuring the balanced development of digital financial ecosystems.

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