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V. Hanusych,
PhD in Economics, Associate Professor,
Associate Professor of the Department of Accounting and Auditing,
Ferenc Rakoczi II Transcarpathian Hungarian University
ORCID ID: <https://orcid.org/0000-0001-6902-6303>

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INFORMATION SUPPORT FOR ON-CHAIN ANALYSIS OF DIGITAL ASSET MARKETS: CLASSIFICATION OF SOURCES AND APPLICATION ALGORITHM

В. О. Ганусич,
к. е. н, доцент, доцент кафедри обліку і аудиту,
Закарпатський угорський університет ім. Ф.Ракоці II

ІНФОРМАЦІЙНЕ ЗАБЕЗПЕЧЕННЯ ОНЧЕЙН-АНАЛІЗУ РИНКУ ЦИФРОВИХ АКТИВІВ: КЛАСИФІКАЦІЯ ДЖЕРЕЛ ТА АЛГОРИТМ ЇХ ЗАСТОСУВАННЯ

The rapid development of blockchain technologies, decentralised financial ecosystems and digital assets has significantly transformed the informational environment of financial analysis. Unlike traditional financial systems, where access to transaction-level information is often fragmented, delayed or institutionally restricted, blockchain networks provide publicly accessible and continuously updated records of economic activity. This has created fundamentally new opportunities for analysing capital flows, liquidity conditions, ownership structures, behavioural patterns of market participants and internal transformations of decentralised financial systems through the direct interpretation of distributed ledger data. Under such conditions, on-chain analysis has gradually evolved into an independent direction of digital asset market research.

The purpose of the article is to develop a systematic methodological approach to the informational support of on-chain analysis of digital asset markets through the classification of blockchain-based data sources and the construction of an algorithm for their integrated application within the analytical research process. The article systematises the principal groups of information sources used in on-chain analysis, including primary blockchain ledgers, blockchain explorers, on-chain metric aggregators, address attribution platforms, DeFi analytical systems, exchange and derivatives platforms, and custom analytical environments. Their functional purpose, level of data processing and role in the formation of analytical conclusions are substantiated.

The study proposes a multidimensional classification model of data sources for on-chain analysis that incorporates the origin of data, the level of analytical transformation, functional purpose, level of market observation and degree of methodological transparency. An algorithm for the application of data sources in on-chain analysis is developed, combining the stages of blockchain-data verification, transaction-activity assessment, liquidity analysis, supply-structure evaluation, behavioural analysis of market participants, DeFi activity assessment and derivatives-market interpretation. It is demonstrated that the effectiveness of on-chain analysis is determined not by isolated metrics, but by the integrated interpretation of multi-level information sources. The obtained results form a methodological basis for the further development of systematic digital asset market analysis, the construction of integrated analytical models and the improvement of approaches to the interpretation of blockchain data within financial research.



Стрімкий розвиток блокчейн-технологій, децентралізованих фінансових екосистем та цифрових активів суттєво трансформували інформаційне середовище фінансового аналізу. На відміну від традиційних фінансових систем, у яких доступ до інформації про транзакції часто є фрагментованим або повністю обмеженим, блокчейн-мережі забезпечують відкриті та безперервно оновлювані записи економічної активності. Це створило принципово нові можливості для дослідження руху капіталу, ліквідності, структури власності, поведінкових моделей учасників ринку та внутрішніх трансформацій децентралізованих фінансових систем на основі безпосередньої інтерпретації даних розподілених реєстрів. За таких умов ончейн-аналіз поступово сформувався як самостійний напрям дослідження ринку цифрових активів.

Метою статті є розробка системного методологічного підходу до інформаційного забезпечення ончейн-аналізу ринку цифрових активів шляхом класифікації джерел блокчейн-даних та побудови алгоритму їх інтегрованого застосування у процесі аналітичного дослідження. У статті систематизовано основні групи джерел інформації для ончейн-аналізу, зокрема первинні блокчейн-реєстри, блокчейн-експлорери, агрегатори ончейн-метрик, платформи адресної атрибуції, DeFi-аналітичні системи, біржові та деривативні платформи, а також кастомізовані аналітичні середовища. Визначено їх функціональне призначення, рівень обробки даних та роль у процесі формування аналітичних висновків.

У дослідженні запропоновано багатовимірну класифікаційну модель джерел даних для ончейн-аналізу, яка враховує походження даних, рівень їх аналітичної трансформації, функціональне призначення, рівень ринкового спостереження та ступінь методологічної прозорості. Розроблено алгоритм застосування джерел даних в ончейн-аналізі, що поєднує етапи верифікації блокчейн-даних, оцінки транзакційної активності, аналізу ліквідності, структури позиції, поведінкових характеристик учасників ринку, DeFi-активності та деривативних індикаторів. Доведено, що ефективність ончейн-аналізу визначається не окремими метриками, а комплексною інтеграцією різнорівневих інформаційних джерел. Отримані результати формують методологічну основу для подальшого розвитку системного аналізу ринку цифрових активів, побудови інтегрованих аналітичних моделей та вдосконалення підходів до інтерпретації блокчейн-даних у фінансових дослідженнях.

Ключові слова: ончейн-аналіз, блокчейн-аналітика, цифрові активи, джерела блокчейн-даних, DeFi-аналітика, криптовалютний ринок.

Key words: on-chain analysis, blockchain analytics, digital assets, blockchain data sources, DeFi analytics, cryptocurrency market.

GENERAL STATEMENT OF THE PROBLEM AND ITS CONNECTION WITH IMPORTANT SCIENTIFIC OR PRACTICAL TASKS

The rapid development of blockchain technologies and the institutionalisation of digital asset markets have substantially transformed the informational foundations of financial analysis. Unlike traditional financial systems, where market information is usually mediated by financial institutions, reporting standards and trading platforms, blockchain networks generate continuously updated records of transactions, ownership movements and network interactions. This creates new opportunities for observing capital flows and behavioural patterns of market participants directly within distributed ledger infrastructures. At the same time, the increasing availability of blockchain data does not automatically ensure their analytical reliability or methodological consistency.

The main scientific problem lies in the fragmentation of the informational environment used in on-chain analysis. In contemporary analytical practice, researchers, investors and market

participants rely on a wide range of heterogeneous data sources, including primary blockchain ledgers, blockchain explorers, on-chain metric aggregators, address attribution platforms, DeFi analytical systems, exchange and derivatives platforms. Each of these sources performs a different function in the process of collecting, verifying, transforming and interpreting blockchain data. However, the methodological boundaries between raw data, aggregated indicators, attributed entities and market-context variables often remain insufficiently defined. As a result, on-chain analysis may be reduced to the mechanical use of platform-specific metrics without proper verification of their origin, calculation logic and analytical purpose.

This problem is particularly important because digital asset markets are characterised by high volatility, informational asymmetry, rapid technological change and growing institutional participation. Under such conditions, the quality of analytical conclusions depends not only on the selected metrics, but also on the correct choice and combination of data sources. Misinterpretation of

exchange flows, wallet activity, supply distribution, DeFi indicators or derivatives-market data may lead to distorted assessments of liquidity conditions, accumulation and distribution phases, investor behaviour and market-cycle dynamics. Therefore, the systematisation of information sources becomes not a purely technical task of data collection, but an essential methodological prerequisite for reliable on-chain research.

LITERATURE REVIEW

In contemporary scientific literature, several interconnected research directions have emerged concerning blockchain analytics, cryptocurrency market infrastructure and the methodological interpretation of on-chain data. One group of studies focuses on the structural characteristics of blockchain networks, transaction flows and supply distribution mechanisms within cryptocurrency ecosystems. Celig T., Ockenga T. A., Schoder D. [1], Ciaian P., Kancs d'Artis, Rajcaniova M. [2], Rudd M. A., Porter D. [3], and Biais B., Bisiere C., Bouvard M., Casamatta C., Menkveld A. J. [4] investigate the relationships between supply dynamics, market equilibrium, demand factors and Bitcoin price formation, emphasising the role of blockchain-level activity in the development of digital asset markets. Their studies demonstrate that transaction structures, ownership concentration and market participation significantly influence cryptocurrency valuation and market stability.

Another important direction of research concerns blockchain transaction networks, address identification and the technological mechanisms underlying blockchain analytics. Xia L., Zhu T., Jing Z., Wang Q., Ma Z., Huang Z., Yin Z. [5] analyse transaction-network structures and propose methods for cryptocurrency address identity recognition, highlighting the growing methodological importance of behavioural clustering and entity attribution in blockchain research. Misic V. B., Misic J., Chang X. [6] examine the optimisation of transaction messaging mechanisms within Bitcoin infrastructure, while Kim D., Ryu D., Webb R. I. [7] investigate the determinants of equilibrium transaction fees in the Bitcoin network. These studies contribute to understanding the technical and informational architecture of blockchain systems and provide a foundation for the further development of on-chain analytical methodologies.

A separate strand of scientific literature is devoted to decentralised finance, derivatives markets and trading activity within cryptocurrency ecosystems. Schar F. [8] explores the conceptual foundations of decentralised finance and the transformation of financial markets

through blockchain—and smart contract-based infrastructures. Aleti S., Mizrach B. [9] and Hung J.-C., Liu H.-C., Yang J. J. [10] investigate Bitcoin spot and futures market microstructure, trading activity and price discovery processes, demonstrating the growing importance of derivatives and liquidity-related indicators for interpreting cryptocurrency market behaviour. Sun W., Jin H., Jin F., Kong L., Peng Y., Dai Z. [11] analyse the spatial structure of global Bitcoin mining activity, thereby extending the analytical framework of blockchain research to infrastructure-level and geographical dimensions of digital asset ecosystems.

Another important direction concerns the broader financial characteristics, risk structure and investment properties of cryptocurrencies. Liu Y., Tsyvinski A. [12] examine the risk-return profile of cryptocurrencies and demonstrate that digital assets possess distinctive financial characteristics compared with traditional asset classes. Their findings strengthen the argument that cryptocurrency markets require specialised analytical approaches capable of integrating blockchain-level information, behavioural indicators and market-structure variables.

Existing studies predominantly focus either on individual metrics, market behaviour or technological aspects of blockchain systems, whereas the informational architecture of on-chain analytics, including the classification of data sources, their methodological functions and the algorithm of their practical application, remains insufficiently developed in academic research. This determines the necessity of constructing a systematic methodological framework for the classification and integrated use of information sources within the process of on-chain analysis of digital asset markets.

FORMULATION OF THE ARTICLE'S OBJECTIVES (SETTING THE TASK)

The purpose of the article is to develop a systematic methodological framework for the informational support of on-chain analysis of digital asset markets through the classification of blockchain-based data sources and the construction of an algorithm for their integrated application within the analytical research process.

In order to achieve this purpose, the following tasks are defined: to clarify the economic and methodological essence of information sources used in on-chain analysis; to develop a classification of information sources for on-chain analysis of digital asset markets; to construct a multidimensional classification model of information sources for on-chain analysis of digital asset markets; to develop

an algorithm for the application of blockchain-based information sources within the process of on-chain research, including the selection of relevant metrics, verification procedures and the formation of analytical conclusions.

PRESENTATION OF THE MAIN RESEARCH MATERIAL

The rapid expansion of blockchain technologies and decentralised financial infrastructures has fundamentally transformed the informational environment of digital asset markets. Unlike traditional financial systems, where access to transaction-level information is often fragmented, delayed or institutionally restricted, blockchain networks provide publicly accessible and continuously updated records of economic activity. This technological transparency has created fundamentally new opportunities for analysing capital movements, ownership redistribution, liquidity conditions and behavioural transformations of market participants through direct interpretation of distributed ledger data.

Under such conditions, on-chain analysis has gradually evolved into an independent analytical direction within the broader system of digital asset market research. The methodological significance of on-chain analysis is determined not only by the availability of large-scale blockchain datasets, but also by the possibility of observing structural market processes directly at the network level. Transaction histories, wallet interactions, exchange flows, smart-contract activity and network participation indicators form a multidimensional informational environment capable of reflecting internal transformations within decentralised financial ecosystems.

At the same time, the growing practical application of blockchain analytics has generated a significant increase in the number of platforms, databases, aggregators and analytical services providing access to on-chain information. In modern analytical practice, researchers and investors simultaneously use blockchain explorers, metric aggregators, exchange monitoring systems, wallet attribution platforms, decentralised finance dashboards and custom analytical infrastructures based on APIs and SQL-query environments. However, despite the widespread use of these instruments, the informational architecture of on-chain analysis remains insufficiently systematised in academic research. From a methodological perspective, the informational environment of on-chain analysis should be interpreted as a multi-level system of interconnected data sources performing different analytical functions within the process of blockchain research. Certain

sources provide direct access to raw blockchain records, others aggregate transaction-level information into structured indicators, while additional analytical systems perform behavioural interpretation, entity attribution or cross-network integration of blockchain activity. Consequently, the analytical reliability of on-chain research depends not only on the interpretation of individual metrics, but also on the correct selection, verification and integration of information sources used throughout the analytical process.

The growing complexity of blockchain ecosystems and the increasing institutionalisation of digital asset markets further strengthen the importance of developing a structured methodological approach to the classification of on-chain data sources. Systematisation of these sources creates the foundation for improving the consistency of blockchain-based market research, enhancing comparability of analytical results and reducing the risks associated with incorrect interpretation of aggregated indicators. In this regard, the classification of information sources becomes an important methodological component of on-chain analysis itself rather than merely a technical aspect of data collection (Table 1).

Primary blockchain ledgers constitute the fundamental informational basis of on-chain analysis. Their main function is to provide access to original transaction records, block data and network-level activity stored directly within distributed ledger systems. These sources serve as the primary layer of data verification, since all subsequent analytical platforms derive, process or interpret information that ultimately originates from blockchain records.

Blockchain explorers perform a verification and inspection function within the on-chain analytical process. They enable researchers to examine individual transactions, wallet addresses, blocks, token transfers and smart-contract interactions. Their role is especially important when analytical conclusions require confirmation at the level of specific blockchain events rather than aggregated indicators. In this sense, explorers provide a transparent link between raw blockchain data and applied market interpretation.

On-chain metric aggregators transform raw blockchain records into structured analytical indicators. Their functional purpose consists in systematising large volumes of distributed ledger data into metrics that describe transaction activity, liquidity conditions, supply distribution, network usage and investor behaviour. These platforms are particularly important for identifying market-cycle dynamics, structural changes and long-term regularities in digital asset markets.

Table 1. Classification of information sources for on-chain analysis of digital asset markets according to their analytical function and data processing level

Source category	Analytical content	Representative platforms and infrastructures	Analytical role in on-chain research
Primary blockchain ledgers	Direct records of blockchain transactions and network activity stored within distributed ledger systems	Bitcoin blockchain, Ethereum blockchain	Foundational level of blockchain data verification
Blockchain explorers	Interfaces for examining transactions, wallet addresses, blocks and smart-contract interactions	Etherscan, Blockchain.com, Blockchair, Mempool.space	Verification of individual transactions, addresses and blockchain events
On-chain metric aggregators	Analytical platforms providing aggregated blockchain indicators and market metrics	Glassnode, CryptoQuant, CoinMetrics, IntoTheBlock	Analysis of metric dynamics, market cycles and structural blockchain indicators
Address attribution platforms	Services for identifying wallets, entities and behavioural relationships between market participants	Arkham, Nansen, Breadcrumbs	Analysis of wallet behaviour, institutional activity, exchange flows and whale positioning
DeFi analytical platforms	Infrastructures providing data on decentralised finance protocols, total value locked, transaction volumes and protocol revenues	DeFiLlama, Token Terminal, Dune	Analysis of decentralised financial ecosystems and protocol-level economic activity
Exchange and derivatives platforms	Sources of data related to reserves, funding rates, open interest and derivatives market conditions	Coinglass, CryptoQuant, cryptocurrency exchanges	Complementing on-chain analysis with liquidity and derivatives market indicators
Custom analytical environments	User-defined analytical infrastructures based on APIs, SQL queries and blockchain datasets	Dune, Flipside, APIs	Development of customised analytical methodologies and blockchain research models

Source: developed by the author.

Address attribution platforms provide an additional behavioural and institutional layer of interpretation. Their function is to associate blockchain addresses with specific entities, such as exchanges, funds, protocols, large holders or institutional wallets. This makes it possible to move beyond anonymous transaction flows and analyse the behaviour of particular categories of market participants, including whale activity, exchange movements and institutional positioning.

DeFi analytical platforms are designed to capture economic activity within decentralised finance ecosystems. Their functional purpose is to provide data on total value locked, protocol revenues, transaction volumes, liquidity pools, lending markets and other indicators of protocol-level performance. These sources expand on-chain analysis beyond individual blockchain transactions and allow researchers to evaluate the functioning of decentralised financial infrastructures as independent market segments.

Exchange and derivatives platforms complement classical on-chain data with information from the trading and leverage environment. Their role is to provide indicators such as exchange reserves,

funding rates, open interest, liquidation volumes and derivatives market positioning. These data are important because the behaviour of digital asset markets is shaped not only by blockchain-level activity, but also by liquidity conditions, leverage structures and speculative pressure in exchange-based trading systems.

Custom analytical environments perform a methodological and research-design function. They allow researchers to construct independent datasets, formulate SQL queries, use APIs and develop customised dashboards adapted to specific research objectives. Their importance lies in the possibility of moving from the use of predefined platform indicators toward reproducible, flexible and author-defined analytical models of blockchain activity.

Taken together, these groups of sources form a multi-level information infrastructure for on-chain analysis. Primary ledgers provide the original data layer, explorers support verification, aggregators transform blockchain records into indicators, attribution platforms add behavioural interpretation, DeFi platforms expand the analysis to protocol ecosystems, exchange and derivatives

platforms connect on-chain data with market liquidity, while custom analytical environments enable the construction of independent research methodologies.

Publicly available web-traffic estimates indicate that the largest audience reach within the ecosystem of on-chain analytical platforms is not necessarily concentrated among the most methodologically complex research terminals. Instead, the highest visibility is often associated with platforms that provide rapid access to frequently used verification, monitoring and trading-context information. According to Similarweb estimates for April 2026 (Fig. 1), CoinGlass recorded approximately 12.9 million monthly visits, while Etherscan reached about 3.7 million visits, Blockchain.com about 2.8 million, Blockchair about 1.4 million, Mempool.space about 1.3 million and DeFiLlama about 1.2 million visits [13]. These figures suggest that mass demand in the field of on-chain analytics is largely shaped by platforms with low access barriers, high practical utility and repeated everyday use in transaction verification, blockchain monitoring and market-oriented information search.

At the same time, website traffic should not be interpreted as the only indicator of analytical significance. Official platform disclosures show that some infrastructures with lower public web-traffic visibility may possess deeper professional, institutional or methodological embeddedness within the digital asset analytical ecosystem. Dune states that its on-chain data platform is used by more than 1 million users and trusted by more than 20,000 companies, while also providing access to more than 100 blockchains and more than 1.5 million datasets [14]. Coin Metrics reports more than 21,000 weekly Community API users and more than 11,000 monthly Charts users [15]. Nansen discloses more than 500 million labelled

wallets or addresses within its blockchain intelligence infrastructure [16], which should be interpreted as an indicator of address-attribution coverage rather than as a user-count measure. Blockchain.com reports more than 39 million verified retail users, more than 1,500 engaged institutional clients and 100 million wallets created [17].

Therefore, the popularity of on-chain data platforms should be interpreted as a functionally differentiated phenomenon. Blockchain explorers tend to attract mass verification traffic because they are used for checking transactions, addresses and blocks. Derivatives and market-structure dashboards concentrate trading-oriented traffic because they provide time-sensitive information on funding rates, liquidations, open interest and exchange-related indicators. Institutional terminals, address-attribution systems and API-oriented analytical environments may appear less prominent in public web-traffic statistics, but they can remain highly influential in research, compliance, risk assessment and investment decision-making processes. For this reason, web traffic should be treated as an auxiliary proxy of public visibility and adoption, rather than as a direct measure of methodological quality, analytical reliability or scientific value.

The growing complexity of blockchain ecosystems and the rapid expansion of analytical infrastructures within digital asset markets necessitate the development of a systematic methodological approach to the interpretation of on-chain information sources. In contemporary analytical practice, blockchain data are no longer represented solely by isolated transaction records or individual analytical platforms. Instead, they form a multilayered informational environment in which raw blockchain data undergo successive stages of verification, aggregation, attribution and

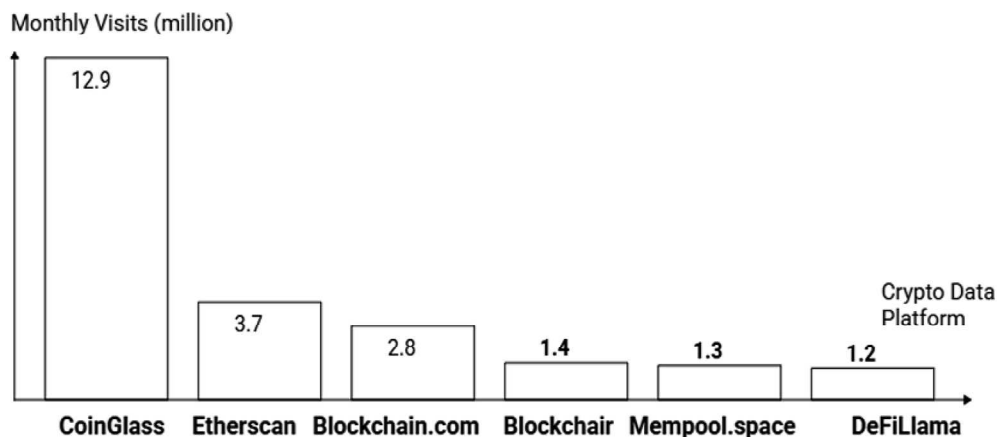


Fig. 1. Monthly website visits for crypto data platforms (April 2026)

Source: compiled on the basis of [13].

analytical transformation before becoming suitable for economic interpretation and market research. Under such conditions, the informational infrastructure of on-chain analysis should be considered as an integrated system of interconnected analytical layers that differ according to their origin of data, degree of processing, functional purpose and level of market observation. In order to systematise these relationships, a multi-dimensional classification model of data sources for on-chain analysis of digital asset markets is proposed (Fig. 2).

The model reflects the sequential transformation of blockchain information from primary distributed-ledger records to advanced researcher-defined analytical environments and simultaneously demonstrates the methodological interconnections between verification mechanisms, metric aggregation systems, attribution platforms, liquidity-context infrastructures and custom analytical models.

In order to systematise the practical application of blockchain-based informational infrastructures within the research process, the algorithm for applying data sources in on-chain analysis of digital asset markets is proposed in Table 2.

The proposed algorithm demonstrates that the use of data sources in on-chain analysis should not be reduced to the mechanical extraction of indicators from analytical platforms. Each stage performs a specific methodological function within the research process. Primary blockchain ledgers

and explorers provide the factual basis for verification, while metric aggregators transform raw blockchain records into indicators suitable for structural interpretation. Address attribution platforms add behavioural and institutional meaning to transaction flows, DeFi analytical systems expand the scope of research to protocol-level economic activity, and exchange or derivatives platforms provide the market context necessary for interpreting liquidity and leverage conditions.

A distinctive feature of the proposed algorithm is the connection between the source of data, the selected metric and the analytical conclusion derived at each stage. Transaction metrics make it possible to identify changes in the intensity of network activity. Liquidity and exchange-flow indicators support conclusions about accumulation, distribution and potential selling pressure. Supply distribution metrics reveal the structure of ownership and the behaviour of long-term and short-term holders. Address attribution data allow the researcher to distinguish between anonymous capital movements and the activity of exchanges, institutional participants or large holders. DeFi and derivatives indicators provide additional context for evaluating protocol sustainability, market leverage and speculative pressure.

Thus, the algorithm establishes a sequential but flexible methodological framework for conducting on-chain research. Its application allows the researcher to move from primary blockchain verification to multidimensional market interpre-

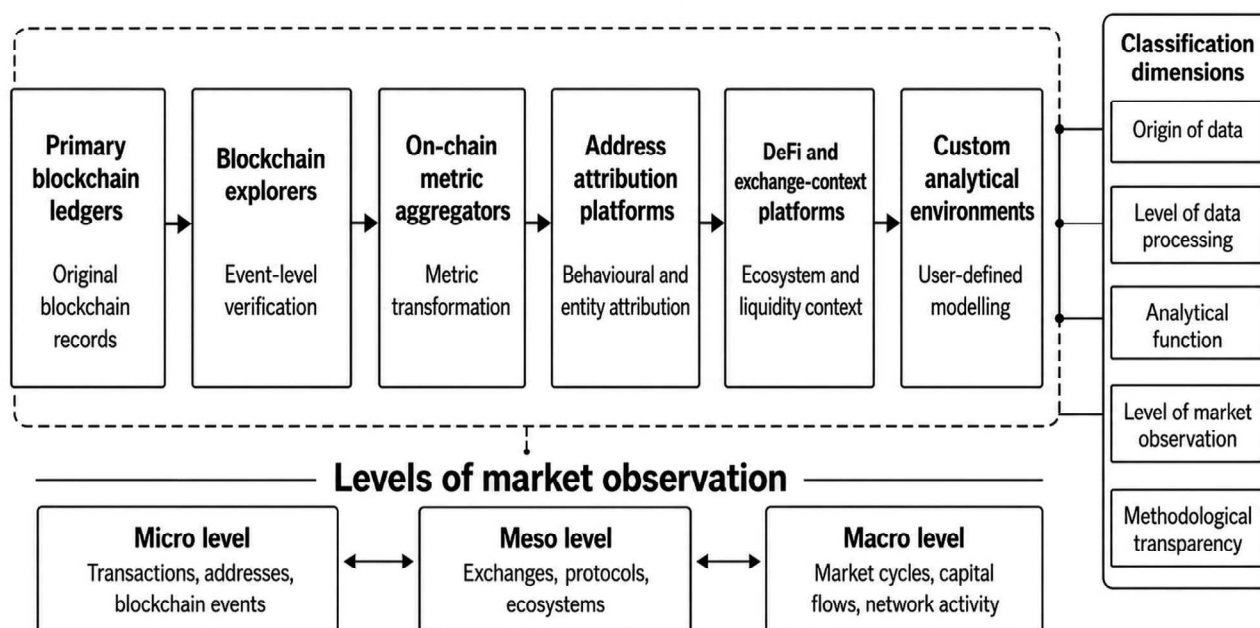


Fig. 2. Classification model of data sources for on-chain analysis of digital asset markets

Source: developed by the author.

Table 2. Algorithm for applying data sources in on-chain analysis of digital asset markets

Stage	Analytical objective	Data sources used	Key metrics or data extracted	Analytical decision or conclusion
1. Definition of research objective	To determine the analytical focus of the study	Research design, previous market data, selected blockchain ecosystem	Asset, blockchain network, time horizon, level of analysis	Selection of the analytical direction: transaction activity, liquidity, holder behaviour, DeFi activity or market-cycle diagnostics
2. Primary data verification	To confirm the factual basis of blockchain events	Primary blockchain ledgers, blockchain explorers	Transactions, blocks, wallet addresses, token transfers, smart-contract events	Verification of the reliability of the empirical basis and exclusion of incorrectly identified or irrelevant blockchain events
3. Transaction activity assessment	To evaluate the intensity of capital movement within the network	Blockchain explorers, Glassnode, Coin Metrics, CryptoQuant	Transaction count, transfer volume, average transaction size, active addresses	Identification of expansion or contraction in network-level economic activity
4. Liquidity and exchange-flow analysis	To assess the availability of assets for market circulation and potential selling pressure	CryptoQuant, Glassnode, CoinGlass, exchange data	Exchange inflows and outflows, exchange reserves, stablecoin flows, liquid and illiquid supply	Determination of whether the market is characterised by accumulation, distribution, liquidity expansion or liquidity contraction
5. Supply distribution analysis	To examine ownership structure and concentration of assets	Glassnode, Coin Metrics, Etherscan, Nansen, Arkham	Holder concentration, long-term holder supply, short-term holder supply, whale balances, realised capitalisation	Assessment of ownership concentration, strategic accumulation and redistribution of assets between market participants
6. Address attribution and behavioural analysis	To identify the behaviour of specific categories of market participants	Arkham, Nansen, Breadcrumbs, Etherscan	Exchange wallets, institutional wallets, whale transactions, labelled addresses, wallet clusters	Identification of behavioural patterns of exchanges, funds, large holders and institutional participants
7. DeFi ecosystem analysis	To evaluate protocol-level economic activity and decentralised financial interactions	DeFiLlama, Token Terminal, Dune	Total value locked, protocol revenue, transaction volume, lending activity, liquidity pool dynamics	Evaluation of the sustainability, growth or contraction of decentralised financial ecosystems
8. Derivatives and market-context analysis	To complement on-chain signals with trading-market conditions	CoinGlass, CryptoQuant, exchange platforms	Funding rates, open interest, liquidation volumes, long/short ratios, futures basis	Assessment of leverage, speculative pressure, market overheating or risk of forced liquidations
9. Cross-source verification	To compare signals from different types of data sources	Explorers, aggregators, attribution platforms, DeFi dashboards, exchange platforms	Consistency of transaction data, metric dynamics, labelled entities and liquidity indicators	Confirmation, rejection or adjustment of preliminary analytical conclusions
10. Integrated interpretation	To combine metrics into a coherent market diagnosis	All selected sources according to the research objective	Combined set of transaction, liquidity, supply, behavioural, DeFi and derivatives indicators	Formulation of the final analytical conclusion regarding market phase, capital flow direction, accumulation or distribution regime, liquidity condition and behavioural structure of participants

Source: developed by the author.

tation, where final conclusions are formed not on the basis of isolated metrics, but through the combined analysis of transaction activity, liquidity conditions, ownership structure, behavioural signals and market-context indicators.

CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH IN THIS AREA

The conducted research demonstrates that the informational environment of on-chain analysis should be interpreted as a complex multi-level analytical infrastructure rather than as a fragmented collection of independent blockchain platforms and digital services. The rapid expansion of blockchain ecosystems, the increasing institutionalisation of digital asset markets and the growing practical use of blockchain analytics have substantially transformed the methodological foundations of cryptocurrency market research. Under such conditions, the reliability and analytical depth of on-chain analysis depend not only on the interpretation of individual blockchain metrics, but also on the correct selection, verification and integration of information sources throughout the analytical process. The proposed classification of information sources systematises blockchain-based analytical infrastructures according to their analytical function, degree of data processing and role within the research process. The study substantiates that primary blockchain ledgers, blockchain explorers, on-chain metric aggregators, address attribution platforms, DeFi analytical systems, exchange and derivatives platforms, and custom analytical environments perform fundamentally different methodological functions within the architecture of on-chain analysis. Their combined application forms a sequential informational chain in which raw blockchain records are transformed into structured analytical indicators, behavioural interpretations and integrated market diagnostics.

An important result of the research is the development of a multidimensional classification model of data sources for on-chain analysis of digital asset markets. The proposed model demonstrates that blockchain-based informational infrastructures differ not only by technological form, but also by the level of market observation, methodological transparency and analytical purpose. This allows on-chain analysis to be interpreted as a structured system of interconnected analytical layers encompassing transaction verification, liquidity assessment, behavioural attribution, ecosystem analysis and market-context interpretation.

The research additionally develops an algorithm for the practical application of information sources

within the process of on-chain analysis. The proposed algorithm establishes a methodological sequence linking data sources, selected metrics, analytical procedures and final research conclusions. Unlike fragmented approaches based on isolated indicators, the developed framework emphasises the integrated interpretation of blockchain activity, liquidity conditions, supply distribution, behavioural signals, DeFi indicators and derivatives-market data. Such an approach significantly expands the analytical possibilities of blockchain research and improves the methodological consistency of digital asset market analysis. Prospects for further research are associated with the practical application of the proposed methodological framework to empirical analysis of cryptocurrency markets.

Литература:

1. Celig T., Ockenga T. A., Schoder D. Distributional equality in ethereum? on-chain analysis of Ether Supply Distribution and Supply Dynamics. *Humanities and Social Sciences Communications*. 2025. № 12 (1). DOI: <https://doi.org/10.1057/s41599-025-04728-9>
2. Ciaian P., Kancs d'Artis, Rajcaniova M. On- and off-chain demand and supply drivers of Bitcoin Price. *Economics*. 2026. № 20 (1). DOI: <https://doi.org/10.1515/econ-2025-0169>
3. Rudd M. A., Porter D. Bitcoin supply, demand, and Price Dynamics. *Journal of Risk and Financial Management*. 2025. № 18 (10). pp. 570. DOI: <https://doi.org/10.3390/jrfm18100570>
4. Biais B., Bisiere C., Bouvard M., Casamatta C., Menkveld A. J. Equilibrium bitcoin pricing. *The Journal of Finance*. № 78 (2). pp. 967—1014. DOI: <https://doi.org/10.1111/jofi.13206>
5. Xia L., Zhu T., Jing Z., Wang Q., Ma Z., Huang Z., Yin Z. A two-layer transaction network-based method for virtual currency address identity recognition. *Cryptography*. 2025. № 9(4). DOI: <https://doi.org/10.3390/cryptography9040065>
6. Masic V. B., Masic J., Chang X. Reducing the number of transaction messages in bitcoin. *Peer-to-Peer Networking and Applications*. 2022. № 15 (1). pp. 768—782. DOI: <https://doi.org/10.1007/s12083-021-01278-0>
7. Kim D., Ryu D., Webb R. I. Determination of equilibrium transaction fees in the Bitcoin Network: A rank-order contest. *International Review of Financial Analysis*. 2023. № 86. pp. 102487. DOI: <https://doi.org/10.1016/j.irfa.2023.102487>
8. Schar F. Decentralized finance: on blockchain- and smart contract-based financial markets. *Federal Reserve Bank of St. Louis Review*. 2022. № 103 (2). pp. 153—174. DOI: <https://doi.org/10.20955/r.103.153-74>



9. Aleti S., Mizrach B. Bitcoin spot and futures market microstructure. *Journal of Futures Markets*. 2021. № 41 (2). pp. 194—225. DOI: <https://doi.org/10.1002/fut.22163>

10. Hung J.-C., Liu H.-C., Yang J. J. Trading activity and price discovery in Bitcoin futures markets. *Journal of Empirical Finance*. 2021. № 62. pp. 107—120. DOI: <https://doi.org/10.1016/j.jempfin.2021.03.001>

11. Sun W., Jin H., Jin F., Kong L., Peng Y., Dai Z. Spatial Analysis of Global Bitcoin Mining. *Scientific Reports*. 2022. № 12 (1). DOI: <https://doi.org/10.1038/s41598-022-14987-0>

12. Liu Y., Tsyvinski A. Risks and returns of cryptocurrency. *The Review of Financial Studies*. 2020. № 34 (6). pp. 2689—2727. DOI: <https://doi.org/10.1093/rfs/hhaa113>

13. Website Traffic Checker: Traffic Analytics, Ranking and Audience Data. Similarweb. 2026. URL: <https://www.similarweb.com/website/>

14. Make onchain data work for you. Dune. 2026. URL: <https://dune.com/>

15. Crypto data for individuals. Coin Metrics. 2026. URL: <https://coinmetrics.io/individuals/>

16. Nansen: The leading blockchain intelligence tool for onchain data in 2025. Nansen. 2025. URL: <https://www.nansen.ai/post/nansen-the-leading-blockchain-intelligence-tool-for-onchain-data-in-2025>

17. About Blockchain.com. Blockchain.com. 2026. URL: <https://www.blockchain.com/about>

References:

1. Celig, T., Ockenga, T.A. and Schoder, D. (2025), "Distributional equality in ethereum? On-chain analysis of Ether supply distribution and supply dynamics", *Humanities and Social Sciences Communications*, vol. 12, no. 1. <https://doi.org/10.1057/s41599-025-04728-9>

2. Ciaian, P., Kancs, d'Artis and Rajcaniova, M. (2026), "On- and off-chain demand and supply drivers of Bitcoin price", *Economics*, vol. 20, no. 1. <https://doi.org/10.1515/econ-2025-0169>

3. Rudd, M.A. and Porter, D. (2025), "Bitcoin supply, demand, and price dynamics", *Journal of Risk and Financial Management*, vol. 18, no. 10, article 570. <https://doi.org/10.3390/jrfm18100570>

4. Biais, B., Bisiere, C., Bouvard, M., Casamatta, C. and Menkveld, A.J. (2023), "Equilibrium bitcoin pricing", *The Journal of Finance*, vol. 78, no. 2, pp. 967—1014. <https://doi.org/10.1111/jofi.13206>

5. Xia, L., Zhu, T., Jing, Z., Wang, Q., Ma, Z., Huang, Z. and Yin, Z. (2025), "A two-layer transaction network-based method for virtual currency address identity recognition", *Cryptography*, vol. 9, no. 4. <https://doi.org/10.3390/cryptography9040065>

6. Mistic, V.B., Mistic, J. and Chang, X. (2022), "Reducing the number of transaction messages in bitcoin", *Peer-to-Peer Networking and Applications*, vol. 15, no. 1, pp. 768—782. <https://doi.org/10.1007/s12083-021-01278-0>

7. Kim, D., Ryu, D. and Webb, R.I. (2023), "Determination of equilibrium transaction fees in the Bitcoin Network: A rank-order contest", *International Review of Financial Analysis*, vol. 86, article 102487. <https://doi.org/10.1016/j.irfa.2023.102487>

8. Schar, F. (2022), "Decentralized finance: On blockchain— and smart contract-based financial markets", *Federal Reserve Bank of St. Louis Review*, vol. 103, no. 2, pp. 153—174. <https://doi.org/10.20955/r.103.153-74>

9. Aleti, S. and Mizrach, B. (2021), "Bitcoin spot and futures market microstructure", *Journal of Futures Markets*, vol. 41, no. 2, pp. 194—225. <https://doi.org/10.1002/fut.22163>

10. Hung, J.-C., Liu, H.-C. and Yang, J.J. (2021), "Trading activity and price discovery in Bitcoin futures markets", *Journal of Empirical Finance*, vol. 62, pp. 107—120. <https://doi.org/10.1016/j.jempfin.2021.03.001>

11. Sun, W., Jin, H., Jin, F., Kong, L., Peng, Y. and Dai, Z. (2022), "Spatial analysis of global Bitcoin mining", *Scientific Reports*, vol. 12, no. 1. <https://doi.org/10.1038/s41598-022-14987-0>

12. Liu, Y. and Tsyvinski, A. (2020), "Risks and returns of cryptocurrency", *The Review of Financial Studies*, vol. 34, no. 6, pp. 2689—2727. <https://doi.org/10.1093/rfs/hhaa113>

13. Similarweb (2026), "Website Traffic Checker: Traffic Analytics, Ranking and Audience Data", available at: <https://www.similarweb.com/website/> (Accessed 8 May 2026).

14. Dune (2026), "Make onchain data work for you", available at: <https://dune.com/> (Accessed 8 May 2026).

15. Coin Metrics (2026), "Crypto Data for Individuals", available at: <https://coinmetrics.io/individuals/> (Accessed 8 May 2026).

16. Nansen (2025), "Nansen: The Leading Blockchain Intelligence Tool for Onchain Data in 2025", available at: <https://www.nansen.ai/post/nansen-the-leading-blockchain-intelligence-tool-for-onchain-data-in-2025> (Accessed 8 May 2026).

17. Blockchain.com (2026), "About Blockchain.com", available at: <https://www.blockchain.com/about> (Accessed 8 May 2026).

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