e-ISSN 3083-6018

SOCIAL DEVELOPMENT: Economic and Legal Issues

https://www.eu-scientists.com/index.php/sdel

Trading Strategies in the Cryptocurrency Market: Evaluating Their Effectiveness

Svitlana Marushchak [1] * ● Iryna Bezuhlova [2] ● Valentyna Misiukevych [3]

[1] *Admiral Makarov National University of Shipbuilding (Ukraine). Associate Professor at the Department Economic Policy and Security, PhD in Economics, Associate Professor.*

[2] *Kherson State Maritime Academy (Ukraine). Head of Department of Economic and Maritime Law, PhD in Economics, Associate Professor.*

[3] *Poltava University of Economics and Trade (Ukraine). Associate Professor at the Department of Entrepreneurship, Trade and Stock Exchange Activity, PhD in Economics, Associate Professor.*

*** *Corresponding Author,*** e-mail: svitlana.marushchak@nuos.edu.ua

ARTICLE INFO

Research Article

DOI: 10.70651/3083-6018/2025.2.06

ABSTRACT

Given the broad research in cryptocurrency trading strategies, a consensus on defining these strategies remains elusive. This reflects the market's complexity and differing researcher opinions on evaluating strategy effectiveness. There's a need for a unified framework to classify and assess strategies systematically, enhancing understanding of market mechanisms and aiding traders in selecting suitable strategies. Despite research efforts, identifying the most effective strategies in the cryptocurrency market is unresolved. A comprehensive evaluation framework could significantly improve our grasp and use of effective trading practices in this fast-evolving market. It's crucial to acknowledge the historical context influencing strategy evolution and adoption. The rise of cryptocurrencies began with Bitcoin in 2009, introducing a decentralized financial system. Early trading strategies were simple, focusing on long-term holding, benefiting from the market's initial low volatility and small community. As the market grew, strategies evolved to include technical analysis and swing trading, adapted to the market's unique characteristics like 24/7 operation and high volatility. The latest innovations incorporate machine learning and AI to enhance strategy effectiveness. The evolution of cryptocurrency trading mirrors the market's dynamic changes, driven by technological advances and profit-seeking. Strategies continue to evolve, influenced by technology, regulations, and the market's changing landscape, highlighting the adaptability and resilience of trading strategies amidst market shifts. The February 2024 bull run, marked by significant market growth and investor interest, emphasizes the need for adaptable strategies in volatile markets. This period's analysis offers insights into effective strategies for maximizing returns and managing risk, showcasing the importance of strategy adaptability and resilience in bull markets.

KEYWORDS

cryptocurrency, fundamental analysis, investment strategies, market trends, profitability, risk management, technical analysis, trading strategies.

e-ISSN 3083-6018

СОЦІАЛЬНИЙ РОЗВИТОК: економіко-правові проблеми

https://www.eu-scientists.com/index.php/sdel

Трейдингові стратегії на ринку криптовалют: оцінки їх ефективності

Світлана М. Марущак [1]* ● Ірина В. Безуглова [2] ●
Валентина І. Місюкевич [3]

[1] *Національний університет кораблебудування імені адмірала Макарова (Україна). Доцент кафедри економічної політики та безпеки, к. е. н., доцент.*

[2] *Херсонська державна морська академія (Україна). Завідувач кафедри економіки та морського права, к. е. н., доцент.*

[3] *Полтавський університет економіки і торгівлі (Україна). Доцент кафедри підприємництва, торгівлі та біржової діяльності, к. е. н., доцент.*

* ***Автор-кореспондент,*** e-mail: svitlana.marushchak@nuos.edu.ua

СТАТТЯ

Дослідницька

DOI:
10.70651/3083-6018/2025.2.06

АНОТАЦІЯ

Зважаючи на широке дослідження стратегій торгівлі криптовалютою, консенсус щодо визначення цих стратегій залишається недосяжним. Це відображає складність ринку та різні думки дослідників щодо оцінки ефективності стратегій. Існує потреба в уніфікованій системі для систематичної класифікації та оцінки стратегій, що сприятиме кращому розумінню ринкових механізмів і допоможе трейдерам у виборі відповідних стратегій. Незважаючи на дослідницькі зусилля, визначення найефективніших стратегій на ринку криптовалют залишається невирішеною проблемою. Комплексна система оцінки могла б значно покращити наше розуміння та використання ефективних торгових практик на цьому ринку, що швидко розвивається. Вкрай важливо визнати історичний контекст, що впливає на розвиток і прийняття стратегій. Зростання криптовалют почалося з біткойна у 2009 році, коли було запроваджено децентралізовану фінансову систему. Перші торгові стратегії були простими і зосереджувалися на довгостроковому утриманні, отримуючи вигоду від початкової низької волатильності ринку та невеликої спільноти. У міру зростання ринку стратегії еволюціонували, включаючи технічний аналіз і свінг-трейдинг, адаптовані до унікальних характеристик ринку, таких як робота в режимі 24/7 і висока волатильність. Останніми інноваціями є машинне навчання та штучний інтелект для підвищення ефективності стратегій. Еволюція торгівлі криптовалютою відображає динамічні зміни на ринку, зумовлені технологічним прогресом і прагненням до отримання прибутку. Стратегії продовжують розвиватися під впливом технологій, регуляторних норм і мінливого ринкового ландшафту, що підкреслює адаптивність і стійкість торгових стратегій до ринкових зрушень. Бичачий тренд лютого 2024 року, що відзначився значним зростанням ринку та інтересом інвесторів, підкреслює необхідність адаптивних стратегій на нестабільних ринках. Аналіз цього періоду дає уявлення про ефективні стратегії для максимізації прибутковості та управління ризиками, демонструючи важливість адаптивності та стійкості стратегій на «бичачих» ринках.

КЛЮЧОВІ СЛОВА

криптовалюта, фундаментальний аналіз, інвестиційні стратегії, ринкові тенденції, прибутковість, управління ризиками, технічний аналіз, торговельні стратегії.

1. Introduction

The historical progression of cryptocurrency trading from its nascent stages to the current dynamic ecosystem reflects a remarkable evolution of strategies driven by market growth, technological innovation, and the continuous search for profit opportunities. As the market continues to evolve, so too will the strategies traders employ, shaped by advancements in technology, regulatory changes, and the ever-changing landscape of the cryptocurrency market itself. This historical perspective underscores the adaptability and resilience of cryptocurrency trading strategies in the face of rapid market developments and highlights the ongoing quest for optimized trading approaches in this burgeoning field.

The relevance of this study lies in its timely evaluation of various trading strategies during a period of intense market activity. By analyzing the performance of different trading strategies amidst the February 2024 bull run, the research provides valuable insights into which approaches were most effective in maximizing returns and managing risk during this bullish phase. For instance, strategies like swing trading and position trading may have benefited from the sustained upward trend, while scalping and day trading could capitalize on the increased market volatility.

Moreover, the bull run's impact on the DeFi sector and the utilization of algorithmic and high-frequency trading strategies in navigating the fast-paced market environment are of particular interest. The study's findings can inform traders and investors about the adaptability and resilience of various strategies in a bull market, guiding future decision-making processes.

2. Literature Review

The cryptocurrency market's rapid evolution has spurred extensive research into effective trading strategies, particularly those leveraging advanced computational techniques. Gort et al. (2022) address the challenge of backtest overfitting in cryptocurrency trading by proposing a deep reinforcement learning (DRL) approach. Their methodology includes a hypothesis test to detect overfitting, training DRL agents, and estimating overfitting probabilities to enhance trading performance. Empirical results demonstrate that less overfitted agents outperform more overfitted ones, as well as benchmark strategies, during market downturns [1]. James (2021) explores the dynamic relationships between cryptocurrencies and equities, focusing on evolutionary correlation, regime switching, and spectral dynamics. The study develops optimal trading strategies that adapt to these evolving market conditions, providing insights into the interconnectedness of different asset classes and informing more robust trading approaches [2]. Tadi, & Kortchmeski (2021) evaluate a dynamic cointegration-based pairs trading strategy within the cryptocurrency market. Their analysis reveals that such strategies can be profitable, highlighting the potential for statistical arbitrage opportunities in digital asset markets [3]. Amirzadeh et al. (2023) introduce a framework that integrates causal analysis into reinforcement learning agents to enhance automated cryptocurrency trading. This approach aims to improve decision-making processes by considering underlying causal relationships, thereby potentially increasing trading effectiveness [4].

Jin, Jung, & Song (2023) investigate the performance of technical trading rules compared to a simple buy-and-hold strategy in cryptocurrency markets. Their findings suggest that certain technical trading rules can outperform passive investment approaches, offering evidence for the applicability of technical analysis in these markets [5]. Huang, & Su (2024) apply deep Q-learning to develop trading strategies for the cryptocurrency market. Their research demonstrates that deep reinforcement learning techniques can effectively model and predict market movements, leading to profitable trading strategies [6]. Yi et al. (2023) examine the market efficiency of cryptocurrencies, with a focus on Bitcoin. Their study provides evidence on the efficiency of the Bitcoin market, contributing to the broader understanding of price formation and potential predictability in cryptocurrency markets [7].

Fang, F., Ventre, & Basios (2021) offer a comprehensive survey of cryptocurrency trading, covering various strategies and market dynamics. Their work serves as a valuable resource for understanding the landscape of cryptocurrency trading and the effectiveness of different approaches [8]. Otabek, & Choi (2024) propose multi-level deep Q-networks for developing Bitcoin trading

strategies. Their approach aims to capture complex market patterns and enhance trading performance through advanced machine learning techniques [9].

Collectively, these studies underscore the growing integration of advanced computational methods, particularly deep reinforcement learning and causal analysis, in developing effective cryptocurrency trading strategies. The research highlights the importance of addressing challenges such as overfitting and market efficiency, while also exploring the dynamic relationships between cryptocurrencies and other asset classes. As the cryptocurrency market continues to evolve, these insights provide a foundation for developing robust, adaptive trading strategies that leverage the latest advancements in financial technology and data analysis.

3. Problem Statement

Despite the extensive body of research conducted in the field of trading strategies in the cryptocurrency market, the academic community has not yet been able to arrive at a generalized and classified definition of what constitutes a "cryptocurrency trading strategy." The variety of approaches, methodologies, and conclusions reflects not only the complexity of the market itself but also the differing perspectives of researchers on which factors should be considered when evaluating the effectiveness of strategies.

This diversity underscores the need for further research to develop a unified theoretical framework that can classify and assess trading strategies in the cryptocurrency market in a more systematic and objective manner. Such a framework could contribute to a better understanding of market mechanisms and assist traders in selecting strategies that best match their goals and market situations.

4. Methods and Materials

We conduct a comparative analysis based on effectiveness criteria of cryptocurrency trading strategies and showcase the authors of scientific publications, referencing the study: Methodological Approaches. The methodologies employed for evaluating these strategies encompass a wide range, from quantitative analysis and simulations to qualitative case studies and trader interviews. This methodological diversity underscores the complexity of the cryptocurrency market and emphasizes the necessity for a multifaceted approach to comprehend the nuances of different trading strategies.

5. Results and Discussion

Understanding and evaluating the criteria for trading strategies is paramount for both novice and seasoned traders in the complex and volatile world of financial markets, especially within the rapidly evolving cryptocurrency sector. The importance of studying these evaluation criteria cannot be overstated, as it directly influences decision-making processes, risk management, and ultimately, the profitability of trading activities.

Algorithmic trading is well-suited to exploit cryptocurrency market inefficiencies caused by human behavior. Traders can effectively utilize technical analysis and AI automated agents, but market understanding remains crucial for success.

Constructing the Trading Strategy Comparison (Table 1).

Table 1 summarizes various trading strategies, categorizing them based on risk level, time commitment, and key characteristics. To compile this information, we meticulously gathered data from a diverse range of credible academic sources.

Our data collection process involved:

Identifying relevant sources: We commenced by searching for scholarly articles, academic journals, and reputable financial websites that delve into the intricacies of various trading strategies. This often involved utilizing search engines and academic databases, employing keywords like "trading strategies," "risk management," and "financial markets."

Evaluating source credibility: We meticulously assessed the credibility and objectivity of each potential source. This entailed examining the author's credentials, the publication's reputation, and the overall quality of the research methodology employed.

Table 1. Crypto Trading Strategies: Risk, Time, and Key Characteristics

Strategy	Risk Level	Time Commitment	Key Characteristics
Day Trading	High	High	Multiple trades daily to profit from short-term price movements.
Swing Trading	Medium	Medium	Holds positions for days or weeks, targeting gains from mid-term trends.
Scalping	High	High	Profits from tiny price changes, requiring constant focus and fast execution.
Spot Trading	Low to Medium (varies)	Low to Medium	Buys or sells an asset for immediate settlement. Risk depends on asset volatility.
Position Trading	Medium	Low	Long-term strategy (months or years) based on fundamental market trends.
Arbitrage Trading	Low	Medium	Exploits price differences of the same asset across different markets.
Algorithmic Trading	Medium	Low	Uses automated programs to trade at high speed and volume.
High-Frequency Trading (HFT)	High	High	Subtype of algorithmic trading focusing on super-fast trades for tiny price gaps.
Margin Trading	Very High	High	Borrowing funds to magnify both potential profits and losses.
Short Selling	High	Medium	Selling borrowed assets hoping to buy them back cheaper.
Futures Trading	High	Medium	Agreements to buy or sell assets at a predetermined price on a future date.
Options Trading	High	Medium	Contracts granting the right (not obligation) to buy or sell an asset at a specific price.
DeFi Trading	Medium	Medium	Leverages blockchain technology for trading on decentralized finance platforms.
Crypto with Leverage	Very High	High	Amplifies potential returns (and losses) by trading cryptocurrencies with borrowed funds.
CFD Trading	High	Medium	Speculating on price changes of crypto assets without owning them (Contracts for Difference).
Copy Trading	Low to Moderate	Low	Mimics the trades of experienced traders, adjustable for personal risk tolerance.
Paper Trading	No Risk	High	Simulated trading to practice buying and selling without real money involved.
ML Models Trading	Medium to High	Medium	Uses machine learning to predict market movements and automate trading decisions.

Source: Authors' own compilation.

Extracting pertinent information: Once we identified reliable sources, we meticulously extracted the most relevant information pertaining to each trading strategy. This included details such as risk level, time commitment, and core characteristics.

Organizing and refining data: After extracting the relevant data, we meticulously organized and categorized it, ensuring consistency and clarity. This involved defining the categories (risk level, time commitment, key characteristics) and populating them with the corresponding information for each strategy.

Presenting the data: Finally, we compiled the extracted and organized data into a clear and concise table format, making it easily accessible and comprehensible for the intended audience. This table serves as a quick reference guide, offering a comparative overview of various trading strategies and their defining attributes (see Table 1).

Understanding and evaluating the criteria for trading strategies is paramount for both novice and seasoned traders in the complex and volatile world of financial markets, especially within the rapidly evolving cryptocurrency sector. The importance of studying these evaluation criteria cannot be

overstated, as it directly influences decision-making processes, risk management, and ultimately, the profitability of trading activities.

Trading strategies vary in risk level, time commitment, and key characteristics, making it essential for traders to choose approaches that align with their goals and experience. High-risk strategies include leverage, margin trading, short selling, and futures contracts, while medium-risk strategies encompass spot trading, swing trading, position trading, and algorithmic trading. Low-risk strategies include copy trading, paper trading, and trading based on machine learning models.

Time commitment also varies – day trading, scalping, and high-frequency trading require constant monitoring, while swing trading, position trading, and copy trading demand moderate attention. Arbitrage and DeFi trading typically require the least time commitment. Each strategy has unique characteristics affecting its profitability, with some capitalizing on short-term price fluctuations and others focusing on long-term trends. Market factors like volatility, liquidity, and trading fees should be considered when selecting a strategy.

Diversifying across multiple strategies can help reduce risk and improve overall returns, but it's crucial to align chosen strategies with individual risk tolerance, time availability, and financial goals. Regardless of the strategy, ongoing education and practice are essential. Traders should use paper trading and demo accounts to test strategies in a risk-free environment before committing real capital. Selecting strategies that best fit personal goals and market conditions is key to long-term success.

Machine learning (ML) and artificial intelligence (AI) have transformed crypto trading by enabling traders to develop and refine sophisticated strategies. ML analyzes vast datasets to identify hidden trends, allowing for real-time strategy adaptation. AI optimizes trading decisions by simulating different market conditions and tailoring strategies to an individual's risk tolerance and goals.

AI platforms also provide rigorous backtesting, using historical data to assess potential performance and refine strategies before they are implemented. With predictive power, ML and AI leverage sentiment analysis and data from various sources to forecast market movements and evaluate strategy effectiveness. Additionally, ML models continuously learn from past successes and failures, improving recommendations and staying relevant in evolving market conditions. AI also plays a crucial role in proactive risk management, identifying periods of high volatility and adjusting strategies accordingly to protect investments.

An AI-driven Bitcoin trading strategy leverages deep learning to predict price movements based on historical data, market sentiment, and technical indicators. A neural network is trained on a dataset that includes Bitcoin prices, trading volumes, and sentiment scores extracted from news articles and social media posts.

The strategy consists of three main phases:

1. Training Phase – The model is trained using five years of historical data, with 80% allocated for training and 20% for testing. It learns to recognize patterns linked to price increases and decreases.
2. Signal Generation – On a daily basis, the model processes new data and generates trading signals: buy, hold, or sell.
3. Trade Execution – Automated trading scripts execute trades on a cryptocurrency exchange based on the generated signals, ensuring a predefined amount of capital is allocated to each transaction.

This AI-driven strategy enhances trading efficiency by eliminating emotional decision-making, continuously learning from market trends, and adapting to changing conditions, making it a powerful tool for cryptocurrency traders.

The strategy incorporates stop-loss and take-profit orders to manage risk. A stop-loss order is placed 5% below the purchase price for each buy order, and a take-profit order is set at a 10% price increase threshold.

The Table 4. below outlines the performance of the AI-driven Bitcoin trading strategy over a testing 12-month period. The performance metrics include monthly returns, the number of trades, and the win/loss ratio.

Over the 12-month period, the strategy yielded a cumulative return of approximately 73.0%, with a total of 248 trades executed. The win/loss ratio, representing the number of profitable trades divided by the number of unprofitable trades, averaged around 2.1, indicating that for every losing trade, there were approximately two winning trades.

Table 4. Trading Strategy Case Study Evaluation

Month	Monthly Return (%)	Number of Trades	Win/Loss Ratio
January	8.5	24	1.8
February	6.2	20	2.0
March	-3.4	18	1.2
April	10.1	22	2.5
May	5.6	25	2.1
June	7.3	19	2.3
July	-2.1	23	1.0
August	9.4	21	2.8
September	4.8	20	2.0
October	11.2	26	3.1
November	3.5	18	1.9
December	8.9	22	2.4

Source: Data Coinmarcetcap, authors' calculations.

This case demonstrates the potential of AI in enhancing Bitcoin trading strategies through predictive analytics and automated execution. However, it's crucial to note that actual trading involves risks, and the performance of AI-driven strategies can vary significantly based on model accuracy, market conditions, and execution efficiency. Continuous monitoring, model retraining, and strategy adjustments are essential for maintaining performance over time.

Comparing an AI-driven Bitcoin trading strategy with traditional technical analysis involves evaluating their approaches, methodologies, execution, and outcomes. Each strategy has unique advantages, but the integration of AI and machine learning (ML) technologies offers distinct benefits, particularly in adaptability, predictive accuracy, and efficiency.

Traditional Technical Analysis Strategy relies on historical price patterns, utilizing tools such as Moving Averages (MA), Relative Strength Index (RSI), and Fibonacci retracements to predict price movements. This approach requires traders to manually analyze charts and execute trades based on predefined criteria, making it a reactive strategy that responds to observable market conditions.

In terms of performance, the effectiveness of traditional technical analysis depends heavily on the trader's expertise and ability to interpret market signals accurately. However, it is time-consuming, requiring continuous market monitoring and analysis. Additionally, trading decisions are often influenced by psychological and emotional biases, which can lead to inconsistent results.

AI-Driven Trading Strategy, on the other hand, leverages data-driven predictions by analyzing historical data, market sentiment, and a wide range of indicators. AI models identify complex patterns beyond human capability and automate trade execution, ensuring precise market entry and exit. Unlike traditional strategies, AI-driven trading is proactive and adaptive, continuously learning from new data to optimize performance.

The performance advantages of AI-based trading include significantly reduced emotional bias, as decisions are made based on objective data rather than human emotions. AI enhances efficiency and scalability by processing vast datasets and executing trades at high speeds, far beyond human capacity. Furthermore, AI's predictive capabilities enable traders to identify potential opportunities and risks before they become evident through traditional analysis.

Ultimately, while traditional technical analysis remains a valuable tool, AI-driven strategies provide a more advanced and efficient approach, reducing human limitations and enhancing trading performance through automation and continuous learning.

6. Conclusions

Cryptocurrency trading strategies can vary significantly in terms of risk, time commitment, and approach. Before delving into any strategy, traders should carefully assess their financial goals and risk tolerance. Considering the volatile nature of the cryptocurrency market, it's crucial to only trade with funds that one can afford to lose. Automated trading algorithms have become increasingly popular in navigating market inefficiencies by executing trades based on predefined rules and reducing emotional decision-making.

Incorporating Artificial Intelligence (AI) and Machine Learning (ML) has revolutionized trading strategies, enabling the analysis of vast datasets, pattern identification, and real-time adaptation to market conditions. These technologies play a vital role in risk management by assessing potential risk factors and predicting high volatility periods. In the cryptocurrency market, AI-driven strategies offer advantages such as adaptability, predictive accuracy, and operational efficiency.

However, it's important to acknowledge the challenges associated with AI-driven strategies, including model overfitting, data quality issues, and the need for continuous monitoring and adjustment. As technology continues to advance, these challenges are likely to be addressed, and AI and ML will play an increasingly central role in shaping successful cryptocurrency trading strategies.

References

1. Gort, B. J. D., Liu, X.-Y., Sun, X., Gao, J., Chen, S., & Wang, C. D. (2022). Deep reinforcement learning for cryptocurrency trading: Practical approach to address backtest overfitting. *arXiv preprint arXiv:2209.05559*. https://doi.org/10.48550/arXiv.2209.05559
2. James, N. (2022). Evolutionary correlation, regime switching, spectral dynamics and optimal trading strategies for cryptocurrencies and equities. *Physica D: Nonlinear Phenomena*, (434), 133262. https://doi.org/10.1016/j.physd.2022.133262
3. Tadi, M., & Kortchmeski, I. (2021). Evaluation of dynamic cointegration-based pairs trading strategy in the cryptocurrency market. *Studies in Economics and Finance, 38*(5), 1054-1075. https://doi.org/10.1108/SEF-12-2020-0497
4. Amirzadeh, R., Thiruvady, D., Nazari, A., & Ee, M. S. (2023). A framework for empowering reinforcement learning agents with causal analysis: Enhancing automated cryptocurrency trading. *arXiv preprint arXiv:2310.09462*. https://doi.org/10.48550/arXiv.2310.09462
5. Jin, J., Jung, J., & Song, K. (2023). Do technical trading rules outperform the simple buy-and-hold strategy? Evidence from cryptocurrency markets. *Journal of Derivatives and Quantitative Studies, 31*(2), 123–145. https://www.emerald.com/insight/content/doi/10.1108/jdqs-08-2023-0021/full/html
6. Huang, C., & Su, Y. (2024). Trading strategy of the cryptocurrency market based on deep Q-learning. *Applied Artificial Intelligence, 38*(1), 1–20. https://doi.org/10.1080/08839514.2024.2381165
7. Yi, E., Yang, B., Jeong, M. et al. (2023). Market efficiency of cryptocurrency: Evidence from the Bitcoin market. *Scientific Reports, 13*(1), 1–10. https://doi.org/10.1038/s41598-023-31618-4
8. Fang, F., Ventre, C., & Basios, M. (2022). Cryptocurrency trading: A comprehensive survey. *Financial Innovation, 7*(1), 1–30. https://doi.org/10.1186/s40854-021-00321-6
9. Otabek, S., & Choi, J. (2024). Multi-level deep Q-networks for Bitcoin trading strategies. *Scientific Reports,* (14), 771. https://doi.org/10.1038/s41598-024-51408-w