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NFT UNDER CONDITIONS OF CRITICAL TRANSFORMATIONS IN THE DIGITAL ASSET MARKET

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Abstract. The integration of information technologies into all spheres of human activity, the proliferation of online communities, and the expansion of the virtual world have precipitated a transformation in consumer needs and an influence on their preferences. This paradigm shift has established the foundations for the emergence and development of digital assets, one notable example being the non-fungible token (NFT). The present article aims to examine the prospects for the development of non-fungible tokens (NFTs) in the context of global transformations in the digital asset market. A graphical method was employed in the study to identify global trends in the development of the NFT market. The use of a systematic approach allowed the identification of differences between NFT 1.0 and NFT 2.0. A comparative analysis was conducted to identify the strengths and weaknesses of the functioning of NFTs, as well as the threats and opportunities for the future existence of NFTs. A descriptive literature review allowed the development of optimistic, neutral and pessimistic scenarios for the development of the non-fungible token market. Product, functional and technological approaches to understanding non-fungible tokens were identified. The article examines NFTs in two forms: as digital assets and as digital certificates. The traditional and non-traditional reasons for using NFTs have been clarified. A comparative characterisation of NFT 1.0 and NFT 2.0 was made based on characteristics, ownership, participants, personalisation and areas of use. The article presents an analysis of the NFT market with a focus on its structural changes. The current state of the non-fungible token market is characterised by a shift from speculation to increased utility of NFTs in various sectors. The strengths and weaknesses of the functioning of non-fungible tokens were identified, as well as the threats and opportunities for their development in the context of global transformations. The study allowed the formulation of scenarios for the development of non-fungible tokens in the midst of critical transformations in the digital asset market. Under the optimistic scenario, market capitalisation, trading volumes, the number of users, the share of non-traditional NFT segments, the use of artificial intelligence in the creation of NFTs, the technical modernisation of NFTs and the legal regulation of all related relationships will increase. The neutral scenario will be characterised by volatility in market capitalisation, trading volumes and the number of market participants. In this scenario, regulation will focus on combating fraud and terrorist financing in the NFT market. In a pessimistic scenario, all key market indicators will decline, resulting in losses from non-fungible token transactions. In some jurisdictions, certain types of NFT transactions will be banned. The conclusions emphasise that with the expansion of the virtual world, NFTs are acquiring the characteristics of a digital product with high potential for use in various fields. The development of the NFT market is characterised by a combination of conflicting trends. On the one hand, there has been an increase in NFT capitalisation in early 2025, along with the growth of holders, buyers, and sellers in 2024. Conversely, there has been a decline in NFT trading volumes. These trends may provide the basis for the implementation of an optimistic scenario for the future development of the non-fungible token market.

Keywords: non-fungible token, NFT, digital assets, metaverse, PFP NFT, Art NFT.

JEL Classification: G23, G32, G41, H84

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1. Introduction

In today's digital world, information technologies are integrated into all areas of human activity. Digitalisation processes can be divided into three online periods: Web 1.0 refers to the emergence and development of the Internet, Web 2.0 marks the rise and growth of social networks, and Web 3.0 signifies the global expansion of online communities and the virtual world. Web 3.0 has laid the groundwork for the transfer of certain user services from the virtual to the physical environment.

Traditionally, individual and institutional investors have invested in gold, bank deposits, real estate, foreign currencies and securities. Today, digital products, particularly cryptocurrencies and non-fungible tokens (NFTs), are becoming increasingly popular. Since their emergence in 2014, NFTs have played an increasingly important role in the evolving virtual asset ecosystem. NFTs guarantee ownership of digital products, while also enabling the tracking of ownership transfers for physical assets.

The existence of NFTs has created new opportunities for various entities in the online world. Initially rooted in the arts sector, NFTs have expanded globally into games, music, collectibles and sports. Today, NFTs are successfully integrated into marketing, healthcare and logistics. However, the future development scenarios of the non-fungible token market require further research.

2. Literature Review

The analysis of scientific literature, regulations, and analytical reports of practitioners has allowed to identify three approaches to understanding non-fungible tokens (NFTs): product, functional, and technological. The technological approach prevails among them. Its supporters define NFTs as:

– Unique computer files are created and stored in a digital ledger to track blockchain transactions (RES, 2024).

– Unique digital identifiers are recorded using distributed ledger technology, which can be used to verify the authenticity and ownership of associated rights or assets (Internal Revenue Service, 2023).

– Unique blockchain records that grant ownership rights to a specific asset (Skatteverket, 2024).

Within the product-based approach, NFTs are considered either a type of cryptocurrency (Wang, Li, Wang, Chen, 2021) or an electronic service (CIRCABS, 2023).

The functional approach is predicated on the premise that NFTs are regarded as distinctive and non-fungible digital assets that are stored on the blockchain (PWC, 2021). These assets possess the capability to verify ownership of both virtual and physical assets (Alizadeh et al., 2023).

A plethora of studies have hitherto analysed the pricing dynamics within the NFT market, the prevailing security issues, and the potential applications of NFTs in various sectors. Ante (2022) discovered that fluctuations in Bitcoin and Ethereum prices have a significant impact on the NFT market, while the converse is not true, i.e., the NFT market does not significantly affect cryptocurrency pricing. Das et al. (2022) conducted a study to examine the impact of various threats on security within the NFT ecosystem. As Li et al. (2024) demonstrated, the potential of NFTs to expand opportunities for artists through the tokenisation of digital assets was identified. Chohan & Paschen (2021) explored the role of NFTs in marketing activities, whilst Alnuaimi et al. (2022) analysed their applications in supply chain systems. Rai et al. (2023) investigated the use of NFTs in healthcare services, and Barua et al. (2025) highlighted their role in advancing the UN's Sustainable Development Goals, fostering entrepreneurship, and balancing business growth with social impact. These discourses have underscored the imperative for this study, as the persistent proliferation of NFT applications necessitates the identification of threats and opportunities in the market and the formulation of future development scenarios for NFTs. Furthermore, it is imperative to comprehend the critical design characteristics and trends of successful NFT artworks. Nevertheless, the opportunities and challenges inherent to NFT programming remain ambiguous.

The objective of this article is to determine the development prospects of non-fungible tokens amid the global transformations of the digital asset market.

In order to identify global trends in the NFT market, this study employs statistical data from CoinMarketCap (2025) and NFTGO (2025). The employment of a systems approach has facilitated the delineation between NFT 1.0 and NFT 2.0. A comparative analysis has been instrumental in elucidating the strengths and weaknesses of non-fungible token operations, as well as the threats and opportunities for their future existence. A thorough review of the extant literature has facilitated the formulation of three distinct scenarios for the future of the non-fungible token market: optimistic, neutral, and negative.

3. Results

In the context of the digital economy undergoing a transformation into a tool for the reshaping of consumer preferences and technological solutions (Melnychenko, 2020), there has been an increasing proliferation of digital products within the financial market. There is a global expansion of the Web3 digital asset sector, a trend that also affects non-fungible tokens (NFTs).

The groundwork for the creation of NFTs was laid in 2012 with the introduction of Coloured Coins, a concept that represented real-world assets on the bitcoin blockchain (CoinMarketCap, 2025). The first non-fungible token was the artwork Quantum, minted by Kevin McCoy on May 3, 2014, and later sold for 1.5 million USD at a Sotheby's auction in 2021 (De Mattei, 2022).

The main reasons for using NFT include:

– The desire to obtain ownership rights to a virtual or physical asset;
– expanding the composition of an investment portfolio (Volosovych et al., 2024);
– tokenising real assets to simplify transactions with them;
– allowing songwriters and artists to maintain control over their works;
– raising funds through charitable crowdfunding;
– enhancing engagement between sports teams and fans, as well as between brand manufacturers and consumers;
– ensuring seamless ownership transfers, which facilitates logistics and product identity verification;
– storing patient health information to improve the quality of medical services.

Over time, NFTs have evolved from NFT 1.0 to NFT 2.0. The differences between these stages are presented in Table 1.

Thus, one of the key differences between NFT 1.0 and NFT 2.0 is the purpose of NFT functionality. While NFT 1.0 focused on securing property rights, NFT 2.0 focuses on customer interaction.

4. State of the NFT Market

As shown in Figure 1, the boom in petroleum product trade occurred in late 2021 and early 2022. In 2023-2024, the market declined significantly in terms of this indicator. At the same time, the market capitalisation of NFTs peaked at 142,124.2 million USD in 2023, after which there was a decline until early 2025. However, in mid-February 2025, the market experienced growth. In particular, as of 3 February 2025, the market capitalisation of NFTs was 35,272.48 million USD, which is almost 50% higher than as of January 1, 2025.

As shown in Figure 2, the number of NFT holders will increase from January 1, 2024 to February 1, 2025. On January 1, 2024, the number of NFT holders was 6.68 million and by February 1, 2025, it had increased to 7.19 million. A slightly positive trend was also observed in the NFT purchaser segment. On January 1, 2024, the number of NFT buyers was 5.3 thousand, and by February 1, 2025, it had increased to 5.57 thousand (Figure 4). A similar trend can be seen in Figure 5, where the number of NFT sellers increases from 5.88 thousand to 6.01 thousand. This indicates a growing interest in this digital product, possibly due to changing user preferences in favour of new projects within the non-fungible tokens ecosystem. At the same time, the number of NFT traders decreased from 9.9 thousand to 9.03 thousand (Figure 3). Against the backdrop of a slight increase in market capitalisation in February 2025, the growth in the number of NFT holders, NFT sellers and NFT buyers could potentially signal a future market recovery.

Table 1
Comparative Characteristics of NFT 1.0 and NFT 2.0

Distinguishing features	Criteria	NFT 1.0	NFT 2.0
1. By Properties	Consistency	+	
	Dynamism		+
2. By ownership possibilities	Individual ownership	+	
	Joint ownership		+
	Rent		+
3. By participants	Private blockchain	+	
	Public blockchain		+
4. By personalisation potential	Personalised customer experience		+
	Without personalisation	+	
5. By areas of application	Art	+	+
	Collectibles	+	+
	Music		+
	Video games		+
	Fundraising		+
	Metaverse		+
	Identification, ownership records, and medical documentation		+

Source: compiled by the authors based on (Guidi & Michienzi, 2023) and own research

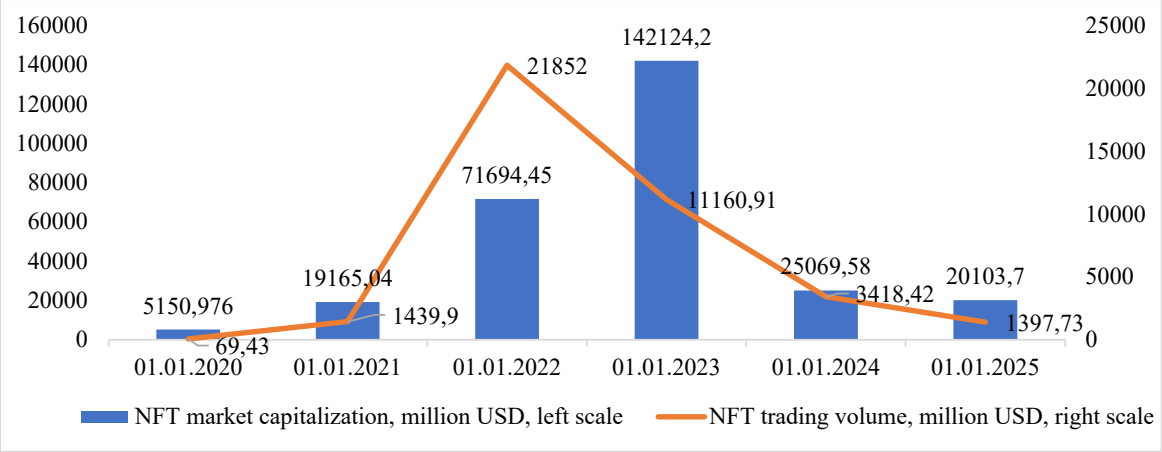

Figure 1. NFT market capitalisation and trading volume for 2020–2024

Source: compiled by the authors based on (Coinmarketcap, 2025)

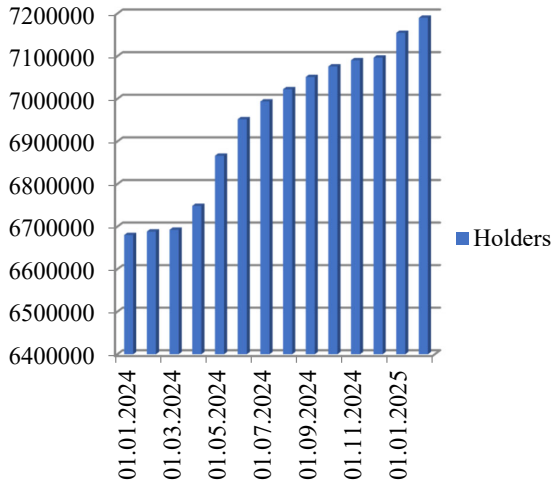

Figure 2. NFT holders (01.01.2024-01.02.2025)

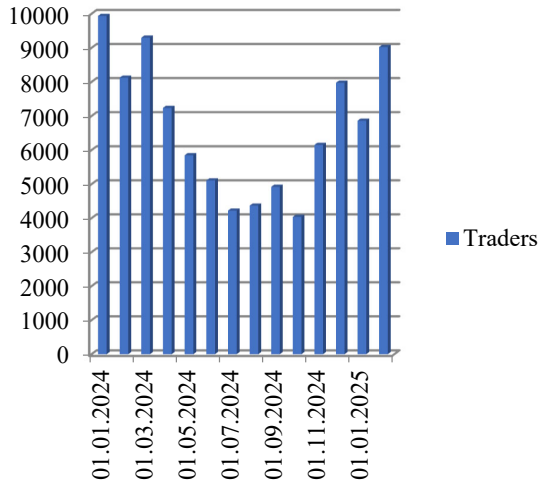

Figure 3. NFT traders (01.01.2024-01.02.2025)

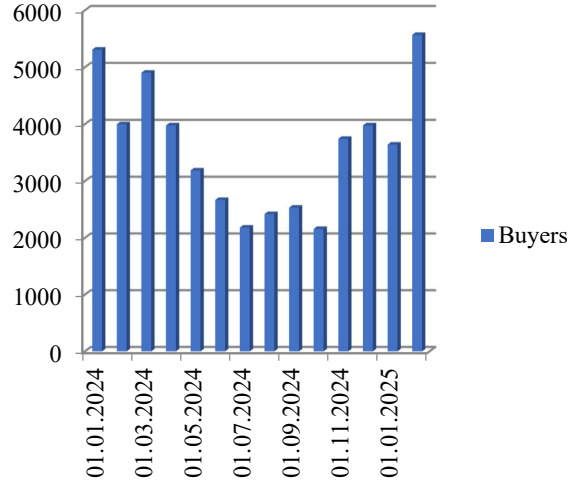

Figure 4. NFT buyers (01.01.2024-01.02.2025)

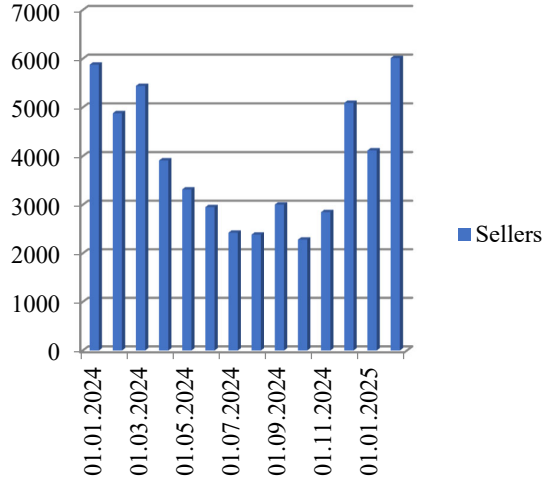

Figure 5. NFT sellers (01.01.2024-01.02.2025)

Source: compiled by the authors based on NTFGO (Market Overview. NTFGO, 2025, February 25)

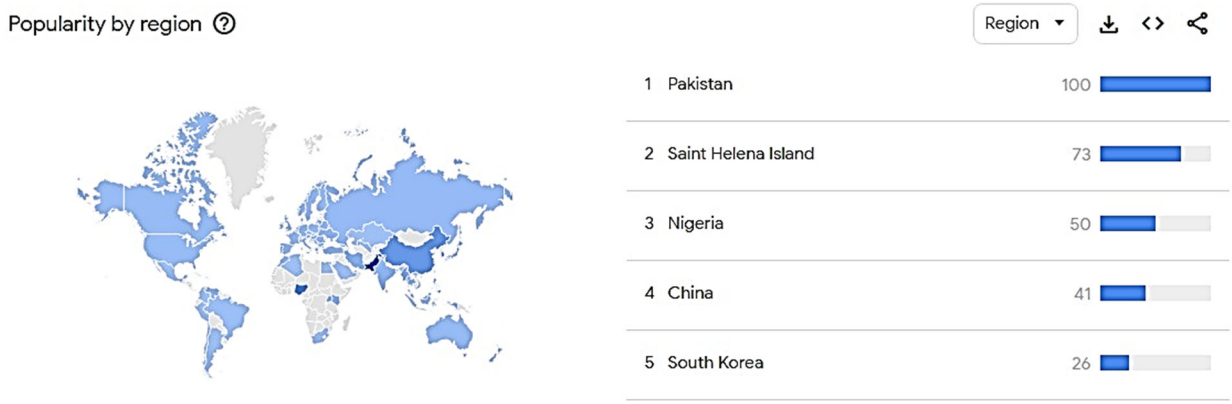

Figure 6. Google Search Interest Index for NFTs from February 2024 to February 2025

Source: compiled by the authors based on Google Trends (Google Trends, 2025, February 25)

As demonstrated in Figure 6, from February 2024 to February 2025, the highest search interest for "NFT" on Google was recorded in Pakistan, Saint Helena Island, Nigeria, China, and South Korea. Meanwhile, from 2020 to 2024, the top five countries with the highest search interest for "NFT" were China, Hong Kong, Singapore, Nigeria, and South Korea. This observation underscores the dynamic involvement of the Asian region in the evolution of the NFT market.

In the structure of NFTs by market capitalisation, picture-for-profile (PFP) tokens, which are personal digital profile pictures of the owner, take the leading positions. According to NTFGO (Market Overview. NTFGO, 2025, February, 25), the capitalisation of PFPs was 3,429.76 million USD. Art NFTs ranked second in capitalisation (811.24 million USD) and Collectible NFTs ranked third (449.11 million USD). Meanwhile, Game NFTs, Land NFTs and Metaverse NFTs have significant potential for growth in capitalisation.

With regard to liquidity, the distribution of NFTs is distinct. According to NTFGO (Market Overview. NTFGO, 2025, February, 25), Utility NFTs have the highest liquidity, followed by Game NFTs in second place, and PFP NFTs in third.

Based on an analysis of the scientific literature dedicated to the functioning of the non-fungible token market and the development of its individual segments, the strengths and weaknesses of NFTs, as well as the threats and opportunities for their further development, have been identified (Table 2).

Table 2
NFT SWOT analysis

Strengths	Weaknesses
High availability for users	High market volatility of NFTs
Access to exclusive bonuses and community benefits	Lower liquidity compared to traditional assets
Transparency of the transfer of property rights thanks to blockchain technology	Requires certain technical skills for NFT transactions
Confirmation of ownership through a record in the blockchain	Low level of market regulation
Guaranteed authentication	Relatively high transaction fees
Decentralisation of processes in the NFT market	Lack of standardisation and universal infrastructure for NFTs
Threats	Opportunities
High probability of technical risks materialising	The potential for high returns for investors in certain circumstances
Possibility of insider trading	The use of NFT as a means of fundraising by charitable organisations
The risk of acquiring NFTs for money laundering	Real-time tracking of products at all stages of production and delivery
The risk of fraudulent actions by the project team, money laundering (through various accounts to create artificially high demand)	Using NFTs as a means of supporting authors who can sell their work directly and earn revenue from each sale
Negative environmental impact due to blockchain technology based on Proof of Work	Improving marketing channels for companies to interact with customers with unique offers
	Generating revenue for game developers beyond traditional game sales and in-game purchases

Source: compiled by the authors based on (Anderson, 2024, December 30) and own research

5. NFT Market Development Scenarios

According to the optimistic scenario, the market growth trends in terms of capitalisation, trading volumes and number of users of non-fungible tokens (NFTs) will continue. NFTs will actively develop in such unconventional segments as identification, property records and medical documentation. At the same time, NFTs will increasingly be used in a somewhat new method of financing, such as loans secured by NFTs. The advent of NFTs has the potential to transform the relationship between sports fans and sports clubs/athletes. This is because NFTs provide fans with ownership of specific moments from their favourite sports, thus offering an additional source of funding for sports clubs/athletes. The close connection between public life, social media, and virtual assets suggests that the implementation of the optimistic scenario will lead to further growth in interest in meme coins. This is confirmed in particular by the release of the Trump meme coin, created on the Solana blockchain, which saw its price rise from 8.5 USD to over 70 USD just a few days after its release (Coinmarketcap, 2025, 23 February). The trend of using artificial intelligence to create NFTs, which began in 2022, will continue. The first decentralised protocol was Alethea AI, which creates intelligent avatars.

In the most optimistic of scenarios, legal regulation will encompass a substantial proportion of relations in the NFT market, including the creation, circulation on the market, taxation, and investor rights protection. The modernisation of the NFT market through technological advancements is imperative for the acceleration of transactions, the optimisation of user interfaces, and the enhancement of the market's ecological sustainability.

In the absence of any exogenous shocks, the neutral scenario is characterised by volatility in market capitalisation, trading volumes, and the number of NFT holders, NFT sellers, NFT buyers, and NFT traders. In periods of heightened demand for NFTs, the efficacy of "waiting rooms" is set to become a pivotal factor, given the tendency of blockchain platforms and websites, which emerged in 2022, to encounter escalating participation in trade activities.

In the neutral scenario, legislation will develop to protect consumer rights and to combat fraud and terrorist financing in the NFT market. This will primarily involve preventing anonymity in NFT transactions.

The pessimistic scenario anticipates a decline in capitalisation, trading volumes, and the number of NFT holders, sellers, buyers, and traders. In the context of national security, certain countries may implement a comprehensive or partial prohibition on transactions involving NFTs, citing the imperative to combat the financing of terrorism and the laundering of money. A significant impediment to the growth of the NFT market is its deleterious effect on the environment. On average, the creation of an NFT results in a carbon footprint in excess of 200 kg, which is equivalent to the carbon footprint of a typical American gasoline-powered car travelling 500 miles (Rumie, 2021). In light of the volatile nature of the NFT market, the probability of attaining potential rewards in the pessimistic scenario appears uncertain.

Thus, distinguishing between product, functional and technological approaches to understanding non-fungible tokens has allowed NFTs to be defined as both digital assets and digital certificates confirming ownership of a physical or virtual asset. This broadening of the understanding of NFTs as unique computer files (RES, 2024), digital identifiers (Internal Revenue Service, 2023), unique blockchain entries (Skatteverket, 2024), a type of cryptocurrency (Wang et al., 2021), an electronic service (CIRCABS, 2023), and non-fungible digital assets (PWC, 2021) has significant implications for the field. The present study extends the research initiated by Rahman (2024), incorporating not only a pessimistic scenario for the development of the NFT market but also positive and neutral scenarios, each with specific conditions for their realisation.

6. Conclusions

In the context of changes driven by the global expansion of online communities and the virtual world, as well as changes in users' needs and preferences, NFTs are becoming a digital product with high potential for use in a variety of ever-expanding areas. The current state of the non-fungible token (NFT) market is characterised by a shift from speculation to a greater emphasis on the utility of NFTs in many areas. This assertion is substantiated by the expanding utilisation of NFTs that transcends conventional domains. The utilisation of NFTs is expanding into a variety of fields, including but not limited to healthcare, logistics, real estate, concert organisation, lending, and charitable crowdfunding. Consequently, the applications of non-fungible tokens are becoming increasingly diverse.

The development of the NFT market is characterised by a combination of conflicting trends. Following a decline in trading volumes during 2022-2024, there was a reduction in the capitalisation of NFTs throughout 2024. However, the subsequent increase in NFT capitalisation in mid-February 2025, as well as the growth in the number of holders, buyers, and sellers from January 2024 to February 2025, allows for the conclusion of positive development trends in the NFT market and its structural transformation.

In conclusion, the NFT market can develop according to an optimistic, neutral, or pessimistic scenario, depending on the realisation of economic, technical,

and socio-psychological conditions. It is reasonable to hypothesise that the positive structural shifts witnessed in the non-fungible token market in early 2025, coupled with the potential for its continued development, will result in a high probability of an optimistic scenario for the growth of the NFT market.

Further scientific research could focus on analysing the relationship between the development of NFTs and commodity and financial markets.

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