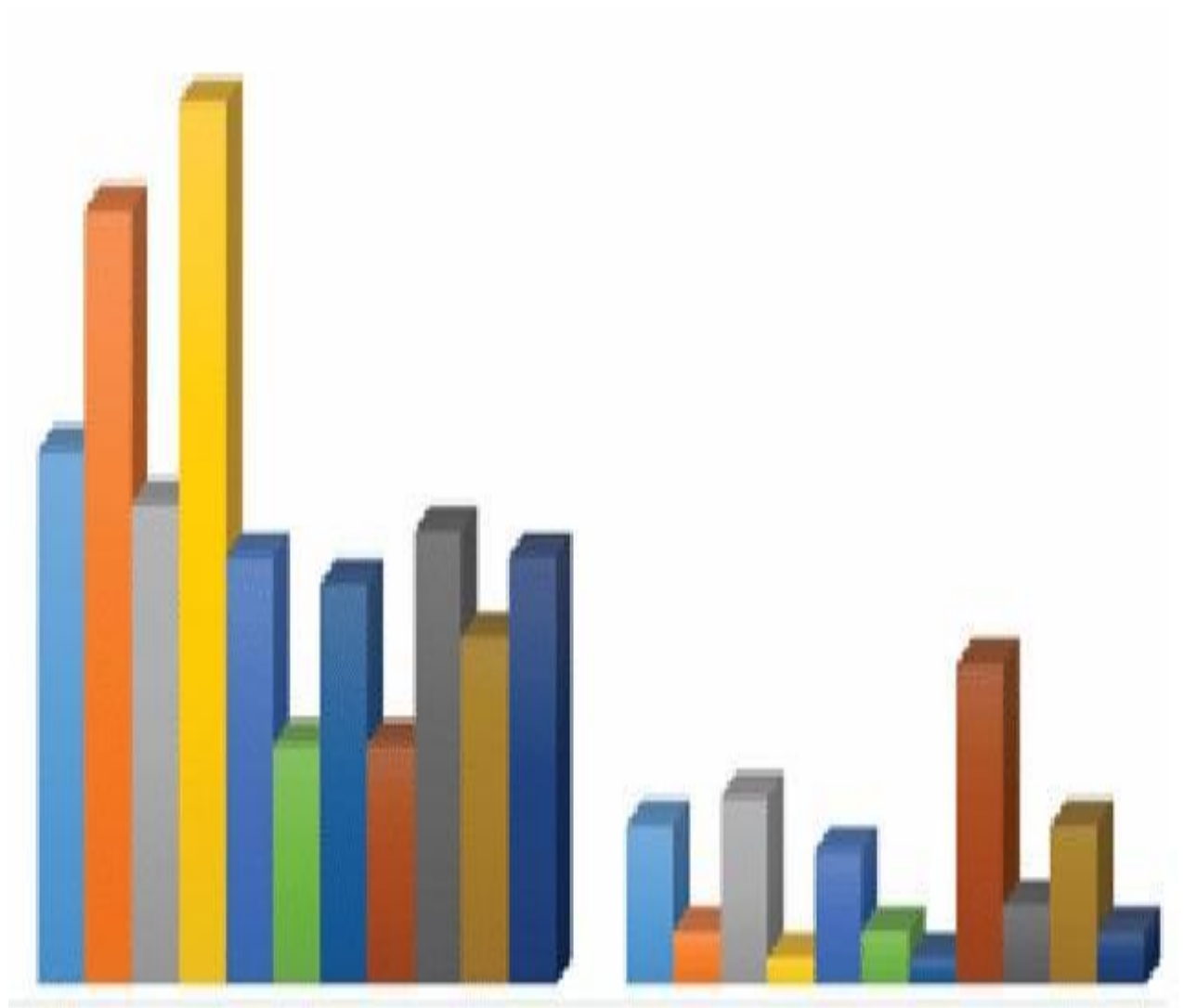


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Research Article

Perceptions of Sustainability in NFT-Based Art: A Qualitative Investigation of Artists and Collectors

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ABSTRACT

The rapid expansion of non-fungible tokens (NFTs) has transformed the digital art ecosystem by enabling decentralised ownership, new economic models, and global market access for artists and collectors. However, the sustainability of NFT-based art remains highly contested, particularly in relation to environmental, economic, and social dimensions. This study investigates stakeholder perceptions of sustainability in NFT-based art through a qualitative analysis of secondary data, including academic literature, industry reports, and documented narratives of artists and collectors. Grounded in socio-technical systems theory and sustainability transition theory, the study explores how technological developments, market dynamics, and social discourses shape sustainability perceptions. The findings reveal a complex and often contradictory landscape: while NFTs are perceived as empowering tools that enhance artistic autonomy and financial opportunities, they are also criticised for their environmental impact, speculative nature, and ethical challenges. Technological innovations such as proof-of-stake mechanisms and green NFTs are gradually reshaping perceptions, though scepticism persists. The study concludes that sustainability in NFT-based art is a socially constructed and evolving concept requiring integrated technological, economic, and social approaches.

Keywords: NFT art; sustainability perception; blockchain technology; digital art economy; green NFTs; socio-technical systems; sustainability transition

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1. Introduction

The emergence of non-fungible tokens (NFTs) has introduced a paradigm shift in the digital art ecosystem, redefining how art is created, distributed, and monetised. NFTs are blockchain-based cryptographic assets that certify ownership and authenticity of unique digital items, ranging from artworks and music to virtual real estate. Unlike cryptocurrencies such as Bitcoin or Ethereum, NFTs are non-interchangeable, meaning each token possesses distinct attributes and value (Wang et al., 2022). This technological innovation has enabled artists to establish verifiable ownership of digital creations, thereby addressing longstanding challenges associated with duplication and unauthorised distribution in digital environments.

The rapid expansion of the NFT art market during the early 2020s marked a significant transformation in cultural production and consumption. High-profile NFT sales, such as Beeple's *Everydays: The First 5000 Days*, which sold for \$69 million, drew global attention to the economic potential of NFT-based art (Dowling, 2022). This surge in popularity was accompanied by increased participation from artists, collectors, investors, and institutions, resulting in the establishment of new marketplaces and digital platforms. NFTs have democratized access to art markets by lowering entry barriers for emerging artists, enabling direct interaction between creators and buyers without reliance on traditional intermediaries such as galleries and auction houses (Nadini et al., 2021).

Despite these opportunities, the rise of NFTs has also generated significant debate concerning their sustainability. One of the most contentious issues is the environmental impact of blockchain technologies underlying NFT transactions. Many early NFT platforms relied on proof-of-work (PoW) consensus mechanisms, which require substantial computational power and energy consumption. Studies have shown that blockchain operations can produce considerable carbon emissions, raising concerns about their ecological footprint (Truby, 2018). As environmental awareness grows globally, these concerns have led to criticism of NFTs as environmentally unsustainable, particularly among environmentally conscious artists and audiences.

In response to such critiques, the NFT ecosystem has undergone notable technological transitions. The adoption of proof-of-stake (PoS) mechanisms, which significantly reduce energy consumption compared to PoW systems, represents a key development in improving sustainability (Tian, 2023). Additionally, innovations such as Layer-2 scaling solutions and carbon offset initiatives have emerged to address environmental concerns. These advancements suggest that the sustainability of NFTs is not static but evolving, influenced by both technological innovation and stakeholder engagement.

Beyond environmental considerations, sustainability in NFT-based art encompasses broader economic and social dimensions. Economically, NFTs offer new revenue streams for artists through mechanisms such

as royalties on secondary sales, thereby contributing to long-term financial sustainability (Ante, 2022). Socially, NFTs facilitate community formation, digital identity expression, and cultural participation, reshaping the relationship between artists and audiences. However, these benefits are counterbalanced by issues such as market volatility, speculative trading, and concerns about inclusivity and access (O'Dwyer, 2020).

Importantly, sustainability is not solely a technical or objective concept; it is also shaped by perceptions, values, and discourses. The way artists and collectors perceive the sustainability of NFTs influences their engagement with the technology and their decision-making processes. For instance, some artists reject NFTs due to environmental concerns, while others embrace them as tools for empowerment and innovation. Similarly, collectors may view NFTs either as sustainable digital assets or as speculative instruments with ethical implications.

This study seeks to explore these diverse and often conflicting perceptions through a qualitative investigation based on secondary data. By analysing existing literature, reports, and documented stakeholder narratives, the research aims to provide a comprehensive understanding of how sustainability is conceptualised within the NFT art ecosystem. The study is guided by the following research questions:

- How do artists and collectors perceive the sustainability of NFT-based art?

- What factors influence these perceptions across environmental, economic, and social dimensions?
- How do technological and market developments shape evolving sustainability narratives?

The significance of this research lies in its contribution to both academic and practical discourse. While existing studies have primarily focused on the technical and environmental aspects of NFTs, there is a growing need to examine the subjective dimensions of sustainability. Understanding stakeholder perceptions is crucial for designing policies, technologies, and practices that align with sustainable development goals.

Furthermore, this study adopts a theoretical lens grounded in socio-technical systems theory and sustainability transition theory, emphasising the interplay between technological innovation and social dynamics. By situating NFT-based art within broader sustainability debates, the research highlights the complexities and contradictions inherent in emerging digital economies.

In conclusion, the NFT phenomenon represents both an opportunity and a challenge for sustainability. As the ecosystem continues to evolve, it is essential to critically examine not only its environmental impact but also the perceptions and practices that shape its development. This study aims to contribute to this ongoing discourse by providing a nuanced analysis of sustainability perceptions among key stakeholders in the NFT art world.

2. Literature Review

The introduction of NFTs has fundamentally altered the structure and dynamics of digital art markets. Traditionally, digital art faced challenges related to ownership verification and monetisation due to its reproducibility. NFTs address these issues by leveraging blockchain technology to create unique, verifiable tokens linked to digital assets (Nadini et al., 2021). This innovation has enabled artists to assert ownership and authenticity, thereby enhancing the value of digital art.

Research indicates that NFTs have facilitated a shift toward decentralised art markets, where artists can directly engage with collectors without intermediaries (Dowling, 2022). This disintermediation reduces transaction costs and increases transparency, allowing artists to retain a greater share of profits. Moreover, smart contracts embedded in NFTs enable automatic royalty payments on secondary sales, providing artists with continuous income streams (Ante, 2022).

However, the NFT market is also characterised by volatility and speculative behaviour. Studies have shown that price fluctuations in NFT markets are influenced by factors such as social media trends, celebrity endorsements, and market sentiment (Nadini et al., 2021). This speculative nature raises questions about the long-term sustainability of NFT-based art economies.

2.1 Environmental Impact of Blockchain Technologies

Environmental sustainability is a central concern in discussions of NFTs. Blockchain

networks, particularly those using proof-of-work consensus mechanisms, consume significant amounts of energy. Truby (2018) argues that the energy-intensive nature of blockchain technologies poses substantial environmental risks, including increased carbon emissions and resource depletion.

NFT transactions involve multiple stages, including minting, bidding, and transferring ownership, each contributing to energy consumption. Early studies estimated that a single NFT transaction could generate a carbon footprint comparable to several days of household electricity usage (Digiconomist, 2021). These findings have fueled criticism of NFTs as environmentally unsustainable.

The transition to proof-of-stake mechanisms represents a significant development in reducing environmental impact. PoS systems require validators to stake cryptocurrency rather than perform energy-intensive computations, resulting in substantially lower energy consumption (Tian, 2023). Additionally, Layer-2 solutions, such as sidechains and rollups, further enhance efficiency by reducing the computational load on main blockchain networks.

Despite these advancements, scepticism persists regarding the actual sustainability of NFTs. Some scholars argue that technological improvements alone may not fully address environmental concerns, particularly if NFT adoption continues to grow rapidly (Truby, 2018). This highlights the need to consider both technological and behavioural factors in sustainability assessments.

2.2 Economic Sustainability and Creative Labour

NFTs have introduced new economic models for creative labour, offering opportunities for artists to achieve financial sustainability. The ability to sell digital art directly to global audiences has expanded market access and reduced dependence on traditional gatekeepers (Ante, 2022).

One of the most significant innovations is the implementation of royalties through smart contracts. Artists can receive a percentage of the resale value each time their work is traded, creating a continuous revenue stream. This feature contrasts with traditional art markets, where artists typically do not benefit from secondary sales.

However, the economic sustainability of NFTs is subject to several challenges. Market volatility, driven by speculative trading and fluctuating demand, can lead to unstable income for artists (Dowling, 2022). Additionally, the concentration of wealth among a small number of successful artists raises concerns about inequality within the NFT ecosystem.

Furthermore, the costs associated with minting NFTs, including transaction fees (gas fees), can be prohibitive for emerging artists. These financial barriers may limit accessibility and inclusivity, undermining the democratizing potential of NFTs.

2.3 Social and Cultural Dimensions of NFT Sustainability

Sustainability in NFT-based art extends beyond environmental and economic factors to include social and cultural dimensions.

NFTs have facilitated the formation of online communities centred around shared interests, artistic collaboration, and digital identity (O'Dwyer, 2020).

These communities play a crucial role in shaping perceptions of value and sustainability. For many artists, NFTs represent a means of gaining recognition and building networks, contributing to social sustainability. Similarly, collectors often view NFTs as cultural artefacts and expressions of digital identity.

However, the NFT ecosystem also raises ethical concerns. Issues such as plagiarism, unauthorised tokenisation of artworks, and scams have been widely reported. These challenges undermine trust and highlight the need for regulatory frameworks and ethical guidelines.

Moreover, the exclusivity associated with high-value NFT transactions may reinforce social inequalities. The perception of NFTs as speculative assets accessible primarily to wealthy investors contrasts with narratives of democratisation and inclusivity.

2.4 Perceptions of Sustainability in Emerging Technologies

Perception is a critical factor influencing the adoption and development of emerging technologies. Sustainability perceptions are shaped by a combination of objective information, media discourse, and individual values (Bocken et al., 2014).

In the context of NFTs, studies have identified a range of perceptions among artists and collectors. Sharma et al. (2022) describe NFTs as both a “blessing and a

curse,” reflecting the dual nature of their impact. On one hand, NFTs offer creative freedom and financial opportunities; on the other hand, they raise environmental and ethical concerns.

Media narratives play a significant role in shaping these perceptions. Negative coverage of the environmental impact of NFTs has contributed to public scepticism, while positive narratives emphasise innovation and empowerment. This interplay between discourse and perception highlights the importance of qualitative research in understanding stakeholder attitudes.

2.5 Toward Sustainable NFT Ecosystems

The concept of “green NFTs” has emerged as a response to sustainability challenges. Green NFTs aim to minimise environmental impact through energy-efficient technologies, carbon offsetting, and sustainable practices (Sereti et al., 2025).

Examples include the use of proof-of-stake blockchains, renewable energy sources, and eco-friendly marketplaces. These initiatives reflect broader sustainability transitions within the digital economy, driven by technological innovation and stakeholder demand.

However, achieving sustainability in NFT ecosystems requires a holistic approach that integrates environmental, economic, and social considerations. This includes addressing issues such as market volatility, inclusivity, and ethical practices.

2.6 Research Gap

While the literature provides valuable insights into the technical and economic aspects of NFTs, there is limited research on stakeholder perceptions of sustainability. Most studies focus on quantitative metrics, such as energy consumption and market performance, rather than qualitative experiences and attitudes.

This study addresses this gap by synthesising secondary qualitative data to explore how artists and collectors perceive sustainability in NFT-based art. By integrating multiple perspectives, the research contributes to a more comprehensive understanding of sustainability in digital art ecosystems.

3. Theoretical Framework

Understanding perceptions of sustainability in NFT-based art requires a multidisciplinary theoretical approach that captures the interplay between technology, society, and environmental discourse. This study adopts an integrated framework combining Socio-Technical Systems Theory and Sustainability Transition Theory, complemented by insights from Stakeholder Theory. Together, these perspectives provide a comprehensive lens for analysing how artists and collectors interpret sustainability within the NFT ecosystem.

3.1 Socio-Technical Systems Theory

Socio-technical systems (STS) theory posits that technological innovations cannot be understood in isolation from the social, cultural, and institutional contexts in which they are embedded (Geels, 2004). Technologies are co-constructed through

interactions between technical infrastructures and human actors, including users, organisations, and regulatory bodies.

In the context of NFT-based art, blockchain technology represents the technical component, while artists, collectors, marketplaces, and communities constitute the social dimension. Sustainability perceptions emerge from the dynamic interaction between these elements rather than from technological characteristics alone. For example, while blockchain systems may improve energy efficiency through technological upgrades, public perception of sustainability may lag due to persistent narratives about environmental harm (Truby, 2018).

STS theory is particularly useful in explaining why conflicting perceptions of NFT sustainability coexist. Artists may perceive NFTs as empowering tools that enable creative autonomy and financial independence, while simultaneously acknowledging their environmental drawbacks. Similarly, collectors may view NFTs as innovative digital assets while questioning their long-term ecological and ethical implications.

Furthermore, STS theory highlights the role of institutional frameworks and cultural norms in shaping sustainability perceptions. Media discourse, policy debates, and community values influence how stakeholders interpret the environmental and social impact of NFTs. This aligns with findings that sustainability is not solely a measurable outcome but also a socially constructed concept shaped by discourse and practice (Bocken et al., 2014).

3.2 Sustainability Transition Theory

Sustainability Transition Theory (STT) focuses on the transformation of socio-technical systems toward more sustainable configurations. It emphasises the role of innovation, policy, and societal change in driving transitions from unsustainable to sustainable practices (Geels, 2011).

The Multi-Level Perspective (MLP), a core concept within STT, conceptualises transitions across three levels:

- **Niche level** (innovations such as green NFTs, proof-of-stake blockchains)
- **Regime level** (established NFT marketplaces and blockchain infrastructures)
- **Landscape level** (broader environmental concerns, climate change discourse, regulatory pressures)

Within this framework, NFT-based art can be understood as part of a broader transition in digital economies. Initially, NFTs were associated with energy-intensive proof-of-work systems, contributing to negative sustainability perceptions. However, niche innovations such as energy-efficient blockchains and carbon-neutral NFT platforms are challenging this regime and promoting more sustainable alternatives (Tian, 2023).

The transition process is not linear and involves tensions between competing practices and values. For instance, while technological advancements reduce environmental impact, the rapid expansion of NFT markets may offset these gains through

increased transaction volumes. This paradox reflects the complexity of sustainability transitions in digital systems.

STT also underscores the importance of stakeholder agency in driving change. Artists and collectors play a critical role in shaping the direction of the NFT ecosystem by adopting or rejecting certain technologies and practices. Their perceptions of sustainability influence market demand, platform development, and innovation trajectories.

3.3 Stakeholder Theory

Stakeholder Theory provides an additional layer of analysis by emphasising the diverse interests and perspectives of actors involved in a system (Freeman, 1984). In the NFT ecosystem, key stakeholders include artists, collectors, developers, platform operators, and policymakers.

Each stakeholder group has distinct priorities and values, which influence their perceptions of sustainability. Artists may prioritise economic sustainability and creative autonomy, while collectors may focus on investment potential and cultural value. Environmental advocates, on the other hand, emphasise ecological sustainability and ethical considerations.

This diversity of perspectives contributes to the multiplicity of sustainability narratives within the NFT space. Stakeholder Theory highlights the need to balance competing interests to achieve holistic sustainability. For example, efforts to reduce environmental impact must also consider economic viability and social inclusivity.

Moreover, Stakeholder Theory aligns with the concept of triple bottom line sustainability, which integrates environmental, economic, and social dimensions (Elkington, 1997). This study adopts this framework to analyse sustainability perceptions across three interconnected dimensions:

- **Environmental sustainability:** energy consumption, carbon emissions, ecological impact
- **Economic sustainability:** income generation, market stability, financial inclusion
- **Social sustainability:** community engagement, accessibility, ethical practices

3.4 Conceptual Framework of the Study

Based on the integration of STS, STT, and Stakeholder Theory, this study proposes a conceptual framework in which sustainability perceptions are shaped by the interaction of:

- **Technological factors** (blockchain type, energy efficiency, innovation)
- **Economic factors** (market dynamics, income opportunities, speculation)
- **Social factors** (community norms, cultural values, ethical concerns)
- **External influences** (media discourse, environmental awareness, policy context)

These factors interact dynamically, producing diverse and sometimes contradictory perceptions among artists and collectors. The framework acknowledges that

sustainability is not a fixed attribute of NFTs but an evolving construct influenced by ongoing technological and social changes.

3.5 Implications of the Theoretical Framework

The integrated theoretical framework provides several key insights:

- Sustainability perceptions are socially constructed and context-dependent
- Technological improvements alone are insufficient to ensure perceived sustainability
- Stakeholder engagement is critical for driving sustainable transitions
- Conflicting perceptions reflect the transitional nature of NFT ecosystems

By applying this framework, the study contributes to a deeper understanding of how sustainability is interpreted and negotiated within emerging digital art markets.

4. Methodology

This study adopts a qualitative research design to explore perceptions of sustainability in NFT-based art. Qualitative approaches are particularly suitable for examining subjective experiences, meanings, and interpretations, which are central to understanding stakeholder perceptions (Creswell & Poth, 2018).

Given the exploratory nature of the research, the study employs a secondary data analysis approach. This involves the systematic examination and interpretation of existing data sources, including academic literature,

industry reports, and documented narratives from artists and collectors. Secondary qualitative analysis enables the synthesis of diverse perspectives across multiple contexts, providing a comprehensive understanding of the research problem.

4.1 Data Sources and Selection Criteria

The study utilises multiple types of secondary data to ensure depth and diversity of insights. These include:

- **Peer-reviewed journal articles** on NFTs, blockchain, and sustainability
- **Conference proceedings and working papers** (e.g., arXiv studies)
- **Industry and market reports** on NFT trends and environmental impact
- **Media articles and interviews** featuring artists and collectors
- **Case studies and documented narratives** from NFT platforms

To ensure relevance and quality, the following selection criteria were applied:

- **Topical relevance:** Sources must address NFTs, sustainability, or stakeholder perceptions
- **Credibility:** Preference for peer-reviewed and reputable publications
- **Recency:** Emphasis on studies published between 2018 and 2025
- **Diversity:** Inclusion of multiple perspectives (artists, collectors, researchers)

This purposive sampling approach aligns with qualitative research principles, which

prioritise depth and richness of data over representativeness (Patton, 2015).

4.2 Data Analysis Method: Thematic Analysis

The study employs thematic analysis to identify patterns and themes within the data. Thematic analysis is a flexible and widely used qualitative method for analysing textual data (Braun & Clarke, 2006).

The analysis followed a six-phase process:

- **Familiarisation:** Reading and re-reading data to gain an overall understanding
- **Initial coding:** Identifying relevant segments related to sustainability perceptions
- **Theme development:** Grouping codes into broader themes
- **Reviewing themes:** Refining themes for coherence and consistency
- **Defining and naming themes:** Clearly articulating the meaning of each theme
- **Interpretation:** Linking themes to theoretical concepts and research questions

Key themes identified include environmental concerns, technological optimism, economic empowerment, social dynamics, and ethical challenges.

4.3 Analytical Framework

The analysis is guided by the conceptual framework outlined in Section 3, which categorises sustainability into environmental, economic, and social dimensions. This framework facilitates a structured

interpretation of data while allowing for the emergence of new themes.

Additionally, the study adopts an interpretive approach, focusing on how stakeholders construct meaning around sustainability rather than measuring objective outcomes. This aligns with constructivist epistemology, which views knowledge as socially constructed (Creswell & Poth, 2018).

4.4 Validity and Reliability

Ensuring rigour in qualitative research involves addressing issues of validity and reliability, often conceptualised as credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985).

- **Credibility:** Achieved through triangulation of multiple data sources
- **Transferability:** Enhanced by providing detailed contextual descriptions
- **Dependability:** Ensured through transparent documentation of research procedures
- **Confirmability:** Maintained by minimising researcher bias and grounding interpretations in data

The use of diverse secondary sources strengthens the robustness of findings by capturing a wide range of perspectives.

4.5 Ethical Considerations

As the study relies on secondary data, it does not involve direct interaction with human participants. However, ethical considerations remain important. The research ensures:

- Proper citation and acknowledgement of all sources

- Respect for intellectual property rights
- Accurate representation of original authors' perspectives

These practices align with academic integrity standards and ethical research guidelines (Mannan & Farhana, 2026).

4.6 Limitations of the Methodology

While secondary qualitative analysis offers several advantages, it also has limitations:

- **Lack of primary data:** The study relies on existing narratives, which may not fully capture current perceptions
- **Context dependency:** Data may reflect specific contexts that are not universally applicable
- **Potential bias in sources:** Media and industry reports may present selective perspectives

Despite these limitations, the methodology provides valuable insights into sustainability perceptions by synthesising a broad range of existing knowledge.

4.7 Justification of Methodological Approach

The chosen methodology is appropriate for the study's objectives for several reasons:

- It allows for the exploration of complex and subjective perceptions
- It enables the integration of diverse perspectives across disciplines
- It is cost-effective and time-efficient compared to primary data collection
- It supports theory-driven analysis and interpretation

By combining thematic analysis with a robust theoretical framework, the study provides a comprehensive and nuanced understanding of sustainability in NFT-based art.

5. Findings and Analysis

The thematic analysis of secondary data reveals a complex and multi-layered perception landscape regarding sustainability in NFT-based art. The findings are organised into five major themes: environmental sustainability concerns, technological optimism and awareness, economic sustainability and artistic empowerment, social and ethical dimensions, and paradoxical and evolving perceptions.

5.1 Environmental Sustainability as a Dominant Concern

One of the most salient findings is the predominance of environmental concerns in shaping perceptions of NFT sustainability. Artists and collectors frequently associate NFTs with high energy consumption and carbon emissions, particularly due to their reliance on blockchain infrastructures historically powered by proof-of-work (PoW) mechanisms. Early critiques emphasised that blockchain transactions require significant computational resources, leading to a substantial environmental footprint (Truby, 2018).

Empirical estimates from industry analyses suggest that minting and trading NFTs involve multiple energy-intensive processes, including transaction validation and data storage. These concerns are amplified by comparisons between blockchain energy usage and national electricity consumption,

which have been widely circulated in media narratives (Digiconomist, 2021). As a result, NFTs have often been framed as environmentally harmful, particularly in public discourse.

For many artists, this perception has created ethical dilemmas. Some have publicly rejected NFTs, citing environmental responsibility as a key factor in their decision-making. Others have adopted a more cautious approach, engaging with NFTs while attempting to mitigate their environmental impact through selective platform use or carbon offsetting initiatives. Collectors, similarly, express ambivalence, balancing interest in digital ownership with concerns about ecological consequences.

Importantly, the persistence of environmental concerns reflects not only actual energy consumption but also the symbolic association of NFTs with unsustainable technological practices. This indicates that sustainability perceptions are shaped as much by discourse and representation as by empirical data (Bocken et al., 2014).

5.2 Technological Optimism and Awareness of Green Innovations

Despite widespread environmental concerns, a growing body of data highlights increasing awareness among stakeholders of technological advancements aimed at improving NFT sustainability. The transition from proof-of-work to proof-of-stake (PoS) consensus mechanisms represents a significant turning point in this regard. PoS systems dramatically reduce energy consumption by eliminating the need for

energy-intensive computational competition (Tian, 2023).

Many artists and collectors recognise this transition as a positive development, contributing to a more nuanced perception of NFT sustainability. The emergence of “green NFTs,” which utilise energy-efficient blockchains and incorporate carbon offsetting mechanisms, further reinforces this optimism (Sereti et al., 2025).

However, awareness of these technological improvements is uneven. While technologically informed stakeholders tend to adopt more favourable views, others remain sceptical due to limited understanding or distrust of claims regarding sustainability. This discrepancy highlights the importance of information dissemination and education in shaping perceptions.

Moreover, some stakeholders question whether technological improvements alone are sufficient to address sustainability concerns. The rebound effect—where increased efficiency leads to higher overall usage—raises concerns that reduced energy consumption per transaction may be offset by the rapid expansion of NFT markets (Truby, 2018). This tension underscores the complexity of sustainability transitions in digital ecosystems.

5.3 Economic Sustainability and Artistic Empowerment

A central theme in the findings is the perception of NFTs as economically empowering for artists. NFTs enable creators to monetise digital works directly, bypassing traditional intermediaries such as galleries and auction houses. This disintermediation

enhances financial autonomy and expands access to global markets (Ante, 2022).

Artists particularly value the ability to receive royalties from secondary sales, a feature enabled by smart contracts. This mechanism provides ongoing income streams, contributing to long-term economic sustainability. For many artists, NFTs represent a transformative opportunity to achieve financial independence and recognition.

Collectors, on the other hand, perceive NFTs as investment assets with potential for value appreciation. The uniqueness and scarcity of NFTs contribute to their perceived value, attracting both art enthusiasts and speculative investors (Dowling, 2022).

However, economic sustainability is not without challenges. The NFT market is characterised by volatility, with prices influenced by trends, hype, and external factors such as cryptocurrency fluctuations (Nadini et al., 2021). This instability creates uncertainty for both artists and collectors, raising questions about the long-term viability of NFT-based art markets.

Additionally, the concentration of wealth among a small number of successful artists and high-value transactions suggests unequal distribution of benefits. Emerging artists often face barriers such as high minting fees and limited visibility, which may undermine the inclusivity of the NFT ecosystem.

5.4 Social and Ethical Dimensions of Sustainability

Sustainability perceptions are also shaped by social and ethical considerations. NFTs have

facilitated the formation of online communities where artists and collectors interact, collaborate, and share knowledge. These communities contribute to social sustainability by fostering inclusion, creativity, and cultural exchange (O'Dwyer, 2020).

For many stakeholders, NFTs represent a new form of digital identity and cultural expression. Collectors often view NFTs not only as financial assets but also as symbols of belonging within specific communities. This social dimension enhances the perceived value and sustainability of NFTs beyond purely economic considerations.

However, ethical challenges remain significant. Issues such as plagiarism, unauthorised tokenisation of artworks, and scams have been widely reported. These problems undermine trust and raise concerns about the integrity of the NFT ecosystem.

Furthermore, the exclusivity associated with high-value NFT transactions has led to critiques of inequality. While NFTs are often promoted as democratizing tools, access to high-value markets is frequently limited to affluent individuals and established artists. This contradiction highlights the tension between inclusivity and exclusivity within the NFT space.

5.5 Paradoxical and Evolving Perceptions

A key finding of this study is the coexistence of contradictory perceptions regarding NFT sustainability. Stakeholders simultaneously recognise the benefits and drawbacks of NFTs, leading to ambivalent attitudes.

For instance, artists may view NFTs as both empowering and environmentally problematic, while collectors may perceive them as both innovative investments and speculative risks. This duality reflects the transitional nature of the NFT ecosystem, which is still evolving in response to technological, economic, and social changes.

Sharma et al. (2022) aptly describe NFTs as a “blessing and a curse,” capturing the inherent tension between opportunity and risk. This paradox is further reinforced by the dynamic interplay between innovation and sustainability.

Over time, perceptions of NFT sustainability appear to be shifting. As technological improvements reduce environmental impact and awareness increases, stakeholders are gradually adopting more nuanced views. However, scepticism persists, particularly among those who prioritise environmental and ethical considerations.

5.6 Synthesis of Findings

The findings suggest that sustainability perceptions in NFT-based art are shaped by multiple interacting factors:

- **Environmental concerns** remain dominant but are evolving with technological advancements
- **Technological awareness** influences the degree of optimism or scepticism
- **Economic opportunities** drive positive perceptions despite risks
- **Social and ethical factors** add complexity to sustainability narratives

- **Contradictions and uncertainties** reflect the transitional nature of the ecosystem

These insights highlight the need for a holistic understanding of sustainability that integrates environmental, economic, and social dimensions.

6. Discussion

The findings of this study provide a nuanced understanding of sustainability perceptions in NFT-based art, revealing a complex interplay between technological innovation, economic incentives, and social dynamics. This section interprets the findings through the theoretical frameworks outlined earlier, offering deeper insights into the implications for sustainability transitions and digital art ecosystems.

6.1 Sustainability as a Socially Constructed Phenomenon

One of the central insights of this study is that sustainability in NFT-based art is not merely an objective or technical attribute but a socially constructed phenomenon. Drawing on socio-technical systems (STS) theory, sustainability perceptions are shaped by interactions between technological infrastructures and social actors (Geels, 2004).

The persistence of environmental concerns, despite technological improvements such as the adoption of proof-of-stake systems, illustrates the importance of perception in shaping sustainability narratives. Even as energy consumption decreases, the association of NFTs with environmental

harm continues to influence stakeholder attitudes. This suggests that sustainability transitions require not only technological innovation but also shifts in discourse and cultural understanding.

Media narratives play a critical role in this process. Negative portrayals of NFTs as environmentally damaging have contributed to widespread scepticism, while positive narratives emphasising innovation and empowerment have fostered optimism. The coexistence of these narratives reflects the contested nature of sustainability in emerging technologies.

6.2 Tensions Between Innovation and Sustainability

The findings highlight a fundamental tension between technological innovation and sustainability. NFTs represent a significant advancement in digital art, offering new possibilities for ownership, monetisation, and creative expression. However, these benefits are accompanied by environmental and ethical challenges.

Sustainability Transition Theory provides a useful lens for understanding this tension. The NFT ecosystem can be seen as undergoing a transition from energy-intensive practices to more sustainable configurations. Innovations such as green NFTs and carbon-neutral platforms represent niche developments that challenge existing regimes (Geels, 2011).

However, the transition process is characterised by resistance and uncertainty. Stakeholders may be hesitant to adopt new technologies due to concerns about reliability, cost, or effectiveness.

Additionally, the rapid growth of NFT markets may offset the environmental benefits of technological improvements, creating a paradoxical situation in which progress in efficiency does not necessarily lead to overall sustainability.

6.3 The Role of Stakeholders in Shaping Sustainability

Stakeholder Theory emphasises the importance of diverse perspectives in shaping sustainability outcomes (Freeman, 1984). The findings demonstrate that artists and collectors play a crucial role in influencing the direction of the NFT ecosystem.

Artists, as creators, have the power to adopt or reject NFT technologies based on their values and priorities. Their decisions can drive demand for sustainable practices, such as the use of energy-efficient platforms. Similarly, collectors influence market dynamics through their purchasing behaviour, which can incentivise or discourage certain practices.

The diversity of stakeholder perspectives contributes to the multiplicity of sustainability narratives. While some stakeholders prioritise environmental sustainability, others emphasise economic or social benefits. Achieving holistic sustainability requires balancing these competing interests and fostering collaboration among stakeholders.

6.4 Economic Incentives and Sustainability Trade-offs

The economic dimension of NFT sustainability presents both opportunities and challenges. On one hand, NFTs provide new

revenue streams for artists, enhancing economic sustainability and creative autonomy (Ante, 2022). On the other hand, the speculative nature of NFT markets raises concerns about long-term stability and ethical implications.

The findings suggest that economic incentives often outweigh environmental concerns for many stakeholders. Artists may prioritise financial opportunities, particularly in contexts where traditional art markets are inaccessible or inequitable. Collectors, similarly, may focus on investment potential, sometimes overlooking sustainability considerations.

This dynamic reflects broader patterns in sustainability transitions, where economic and environmental objectives may conflict. Addressing these trade-offs requires the development of business models that align profitability with sustainability, such as green NFTs and transparent carbon accounting.

6.5 Social Sustainability and Community Dynamics

The social dimension of sustainability is a critical yet often overlooked aspect of NFT-based art. The findings highlight the importance of community, identity, and cultural participation in shaping sustainability perceptions.

NFT communities provide spaces for collaboration, learning, and creative expression, contributing to social sustainability. These communities also play a role in disseminating information and shaping norms, influencing how sustainability is understood and practised.

However, issues such as inequality, exclusivity, and ethical challenges undermine social sustainability. The concentration of wealth and the prevalence of scams raise questions about fairness and trust within the NFT ecosystem. Addressing these issues is essential for achieving a more inclusive and equitable digital art market.

6.6 Toward a Holistic Understanding of Sustainability

The study underscores the need for a holistic approach to sustainability in NFT-based art. Environmental, economic, and social dimensions are interconnected and must be considered together.

Technological solutions alone are insufficient to achieve sustainability. While innovations such as proof-of-stake systems reduce energy consumption, they must be complemented by changes in stakeholder behaviour, market practices, and regulatory frameworks.

Education and awareness are also critical. Increasing understanding of technological advancements and sustainability practices can help bridge the gap between perception and reality, fostering more informed decision-making among stakeholders.

6.7 Implications for Policy and Practice

The findings have several implications for policymakers, platform developers, and stakeholders:

- **Policy frameworks** should promote transparency and accountability in NFT markets

- **Technological innovation** should prioritise energy efficiency and sustainability
- **Market practices** should encourage inclusivity and ethical behaviour
- **Stakeholder engagement** should be fostered to align diverse interests

By addressing these areas, it is possible to support the transition toward more sustainable NFT ecosystems.

6.8 Future Research Directions

Future research should explore sustainability perceptions through primary data collection, such as interviews and surveys, to capture real-time stakeholder experiences. Comparative studies across regions and platforms could provide additional insights into contextual variations.

7. Conclusion

This study set out to explore perceptions of sustainability in NFT-based art through a qualitative investigation of secondary data, focusing on the perspectives of artists and collectors. The findings demonstrate that sustainability within the NFT ecosystem is a multifaceted and evolving construct shaped by environmental concerns, economic opportunities, and social dynamics.

Environmental sustainability emerged as a dominant concern, with many stakeholders associating NFTs with high energy consumption and carbon emissions due to blockchain technologies, particularly those previously reliant on proof-of-work systems (Truby, 2018). Despite significant technological advancements, including the

transition to proof-of-stake mechanisms and the development of energy-efficient platforms, scepticism remains prevalent. This highlights the enduring influence of public discourse and perception in shaping attitudes toward sustainability.

At the same time, NFTs are widely perceived as economically empowering, offering artists new avenues for monetisation, global exposure, and financial independence (Ante, 2022). Features such as smart contract-enabled royalties contribute to long-term income generation, enhancing economic sustainability. However, market volatility and speculative practices raise concerns about the stability and inclusivity of the NFT ecosystem (Dowling, 2022; Nadini et al., 2021).

Social and ethical dimensions further complicate sustainability perceptions. While NFTs facilitate community building, creative collaboration, and digital identity formation (O'Dwyer, 2020), they also present challenges related to inequality, fraud, and intellectual property rights. These issues underscore the importance of governance, transparency, and ethical standards in fostering sustainable digital art ecosystems.

Overall, the study reveals that sustainability in NFT-based art is not a fixed or purely technical attribute but a socially constructed phenomenon influenced by multiple interacting factors. The coexistence of positive and negative perceptions reflects the transitional nature of the NFT ecosystem, which continues to evolve in response to technological innovation and stakeholder engagement.

To achieve a more sustainable future for NFT-based art, a holistic approach is required—one that integrates technological efficiency, economic viability, and social responsibility. Policymakers, platform developers, artists, and collectors must collaborate to address environmental concerns, promote ethical practices, and ensure inclusivity. Future research should build on these findings by incorporating primary data and exploring regional and cultural variations in sustainability perceptions.

References

- Ante, L. (2022). Non-fungible token (NFT) markets on the Ethereum blockchain: Temporal development, cointegration and interrelations. *Blockchain Research and Applications*, 3(1), 100052.
- Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, 65, 42–56.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage Publications.
- Digiconomist. (2021). *NFT and cryptocurrency energy consumption analysis*.
- Dowling, M. (2022). Is non-fungible token pricing driven by cryptocurrencies? *Finance Research Letters*, 44, 102097.
- Elkington, J. (1997). *Cannibals with forks: The triple bottom line of 21st century business*. Capstone.
- Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman.
- Geels, F. W. (2004). From sectoral systems to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy*, 33(6–7), 897–920.
- Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, 1(1), 24–40.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.
- Mannan, K.A., & Farhana, K.M. (2026). *The Principles of Qur'anic Research Methodology: Deriving the Process of Knowledge from Revelation*. KMF Publishers. Open Access (CC BY 4.0). DOI: <https://doi.org/10.64907/xkmf.book.pqrm.26.02.12>
- Nadini, M., Alessandretti, L., Di Giacinto, F., Martino, M., Aiello, L. M., &

- Baronchelli, A. (2021). Mapping the NFT revolution: Market trends, trade networks, and visual features. *Scientific Reports*, 11, 20902.
- O'Dwyer, R. (2020). Limited edition: Producing artificial scarcity for digital art on the blockchain and its implications for the cultural industries. *Convergence*, 26(4), 874–894.
- Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). Sage Publications.
- Sereti, Z., Mavrikos, E., Cholevas, C., & Tsekouras, G. E. (2025). Green NFTs: Technologies related to energy-efficient non-fungible tokens. *Information*, 16(4), 305.
- Sharma, T., Zhou, Z., Huang, Y., & Wang, Y. (2022). It's a blessing and a curse: Unpacking creators' practices with NFTs. *arXiv preprint*.
- Tian, Z. (2023). Post-merge carbon footprint analysis and sustainability in the NFT art market. *Arts*, 12(5), 211.
- Truby, J. (2018). Decarbonising Bitcoin: Law and policy choices for reducing the energy consumption of blockchain technologies and digital currencies. *Energy Research & Social Science*, 44, 399–410.
- Wang, Z., Gao, J., & Wei, X. (2022). Do NFT owners really possess their assets? *arXiv preprint*.