

Decoding the intrinsic values of non-fungible tokens (NFTs): A dual approach via content analysis and in-depth interviews

解構非同質化代幣 (NFTs) 的內在價值: 內容分析與深度訪談的雙重方法

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Abstract: This research employs a mixed-method approach, integrating content analysis and qualitative in-depth interviews, to explore the intrinsic values of non-fungible tokens (NFTs). The first study maps the NFT landscape, identifying key themes and characteristics. The second study delves deeper, engaging with NFT stakeholders to uncover rich insights into their experiences and perceptions. The findings reveal six core value dimensions—Utility, Financial, Collectible, Provenance, Community, And Roadmap. With the cross-check of NFT holder perceptions, NFTs perform a complex and evolving role in digital ownership as well as cultural narratives.

Keywords: Non-fungible tokens, NFT value dimensions, digital assets, blockchain, web3.0.

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摘要：本研究採行雙重方法，結合內容分析法及質性深度訪談，以探索非同質化代幣（NFTs）的內在價值。透過內容分析，本研究首先繪製了 NFT 的整體框架，並確定其關鍵主題和特徵。接著，經由與 NFT 持有者的深入訪談，取得消費者經驗和觀點之洞見。乘綜合性分析揭示了六個核心價值構面-功能性、金融性、收藏性、來源、社群和藍圖，暨展示出 NFT 在數位所有權及文化敘事中複雜且不斷演變的角色。

關鍵詞：非同質化代幣(NFTs)、NFT 價值構面、數位資產、區塊鏈、互聯網
3.0

1. Introduction

The rise of non-fungible tokens (NFTs) from relative obscurity to a significant cultural and financial phenomenon since early 2021 has been nothing short of extraordinary (Park and Lim, 2023). Recognized as the 2021 word of the year by Binance (2021), NFTs have rapidly integrated into various aspects of modern culture. The market for NFTs saw a dramatic increase, with its volume jumping from \$26 billion in 2021 to over \$37 billion in the first half of 2022. This surge has sparked widespread discussions and debates about the true value of NFTs.

At its core, an NFT is a digital certificate of ownership encoded within a smart contract. This abstract nature has made their valuation both intriguing and complex (Chandra, 2022). NFTs sit at the crossroads of technology, finance, and culture, representing more than just a fleeting trend; they introduce a new asset class. Historically, the emergence of new asset classes is rare and transformative (Kaczynski and Kominers, 2021; Talwar *et al.*, 2021). While transactional data such as trade volumes offer insights into market activity, they do not fully explain the intrinsic, subjective value that different stakeholders see in NFTs. The current literature on NFT valuation is filled with uncertainties, ambiguities, and, at times, controversies (Baytaş *et al.*, 2022; Chohan, 2021; Liu *et al.*, 2023).

To address these challenges and ambiguities, our study aims to explore the core value drivers of NFTs. We introduce the Value Assessment Framework (VAF),

a pioneering model that examines NFTs through six core value dimensions. By analyzing 15 landmark NFT case studies, we aim to shed light on NFTs' nuanced attributes, providing a more detailed understanding of the NFT landscape.

Our study is guided by two critical research questions:

RQ1: What are the principal determinants that shape the perceived value of an NFT, and what mechanisms have been designed to embody these core values?

RQ2: How do the perceptions and experiences of NFT stakeholders, revealed through our mixed-method approach, enhance our understanding of NFT value dimensions and inform strategy development for marketers and investors in the NFT marketplace?

In the following sections, we will delve deeper into these questions, exploring the intricacies of NFT valuation and charting a path for future academic research and practical applications in this emerging and influential domain.

2. Theoretical framework

The rise of NFTs represents a significant milestone in today's digital era. These unique cryptographic assets, as underscored by Chandra (2022), are secured by decentralized blockchain platforms and are characterized by their digital representation and smart contracts, making them tradeable via digital cryptocurrencies. The discourse surrounding NFTs often focuses on their capacity to bridge the tangible and digital worlds (Ho, 2021; Liu *et al.*, 2023) and their transformative impact on art and virtual entrepreneurship (Chandra, 2022; Chalmers *et al.*, 2022). To fully grasp the valuation of NFTs, it is crucial to delve into their intrinsic nature, market potential, and business implications.

Despite the extensive discussions on the value dynamics of cryptocurrencies, a universally accepted definition of value remains elusive. Wingreen *et al.* (2020) pointed out the multifaceted factors that influence Bitcoin's value, highlighting the need for a nuanced understanding of the various value systems inherent to cryptocurrencies. Building on these scholarly debates and integrating insights from key studies on NFT values (Chalmers *et al.*, 2022; Chandra, 2022), our research proposes a VAF specifically designed for NFTs. This framework is based

on empirical evidence from 15 case studies and an extensive literature review.

In developing the VAF, we identified six critical values that consistently emerged as vital to the success and resilience of NFT projects. These values are Utility, Financial, Collectible, Provenance, Community, and Roadmap. Each value was selected for its significant presence in both academic literature and practical applications, ensuring our framework comprehensively captures the multifaceted nature of NFTs:

Utility value: This emphasizes the functional and practical applications of NFTs.

Financial value: reflects their economic impact and investment potential.

Collectible value: captures their uniqueness and rarity.

Provenance value: ensures authenticity and historical traceability.

Community value: underscores the role of social dynamics in enhancing project viability.

Roadmap value: outlines the strategic vision and developmental trajectory of NFT initiatives.

During the early stages of developing our framework, we considered additional potential values, such as “Aesthetic Value” and “Innovative Value.” However, “Aesthetic Value” was incorporated into Collectible Value due to its overlap in criteria related to the subjective aesthetic appreciation of NFTs. “Innovative Value,” while relevant, was often covered under Utility and Roadmap Values, which address the innovative functionalities and future planning of NFTs, respectively.

This deliberate selection and exclusion process ensure that our VAF captures the essential attributes of NFTs while maintaining clarity and focus in assessing their intrinsic values. The framework thus serves as a robust tool for both academic research and practical evaluation in the emerging field of digital assets.

2.1 Utility value

Central to the value proposition of NFTs is their “utility value”. As articulated by Carpenter (2008), Musan *et al.* (2020), and Park *et al.* (2022), the essence of

any digital asset lies in its utility. This value is manifested in NFTs through their tangible applications in bridging the physical and virtual worlds. Popescu (2021) sheds light on the burgeoning initiatives leveraging NFTs as membership cards or digital passes for exclusive access. Essentially, the inherent utility of NFTs bolsters their demand, with its magnitude being contingent on the asset's popularity and market traction (He *et al.*, 2023). Parrales and Batbayar (2022) further emphasize the versatility of NFTs, citing their potential expansion and adaptability, affirming that an NFT's true worth is derived from its multifaceted utility in both real and virtual dimensions.

2.2 Financial value

The financial aspects of NFTs present a fascinating area for exploration. Borri *et al.* (2022) call it important to understand the relatively recent market of NFTs from the finance point of view as NFTs have the potential to become a cornerstone of the metaverse and Web 3.0. They remind scholars of the small literature studying various aspects of NFTs, although NFTs might revolutionize how digital assets are marketed and monetized. With their efforts to create indices for the NFT market and its components, they observe that NFTs behave differently from the existing asset classes as well as cryptocurrencies since they have unique driving forces.

Musan *et al.* (2020) also underscore the potential of NFTs to reshape financial instruments, with Trichilo and Gabler (2022) exploring the multifaceted nature of NFT finance. Broadly, the financial value of NFTs can be categorized into debt-like, equity-like, and aggregation-like classes. These detailed classifications by researchers elucidate the mechanisms driving NFT finance and hint at its foundational significance for mainstream adoption. Essentially, NFT finance extends beyond art and collectibles, creating an interdependent cycle that amplifies both NFTs and financial technologies (Liu *et al.*, 2023; Zhang, 2023).

In our VAF depicted in Figure 1, the financial value of NFTs is further broken down into four core indicators that reflect these financial theories in practical terms. These indicators include staking rewards, trade NFTs, collateral loans, and royalty

revenues. Staking rewards are highlight the potential for NFTs to generate passive income through staking mechanisms. Trade NFTs emphasize the liquidity and tradability of NFTs within marketplaces. Collateral loans refer to the recognizing the growing trend of using NFTs as collateral for secured financial loans. Royalty revenues refer to capturing the perpetual benefits from original sales and subsequent resales, which are fundamental to the NFT ecosystem.

This structure allows us to examine the specific operational mechanisms of NFT financial dynamics, ensuring that our theoretical exploration aligns closely with empirical realities and observable market behaviors.

2.3 Collectible value

NFTs, by virtue of their distinctiveness, foster a pronounced collectible value. Kirjavainen (2022), Parrales and Batbayar (2022) underscore the attributes of rarity, uniqueness, and cultural resonance as integral to the valuation of NFTs. The principles of supply and demand, coupled with the inherent scarcity of a unique item, play a decisive role in determining their market value (Lee and Chow, 2020). Nadini *et al.* (2021) discuss the interplay between auction house features and NFT valuation, hinting at the nuanced factors influencing pricing dynamics. Further elaborating on the cultural dimensions of NFTs, Lee *et al.* (2024) argue that these digital assets embody complex narratives that reflect contemporary cultural and artistic movements, thereby enhancing their collectibility and market appeal. Similarly, Kirjavainen (2022) details how the cultural legacy and historical narratives embedded in NFTs' meta-data intensify their allure and perceived worth among collectors. These cultural attributions not only enrich the narrative depth of each NFT but also serve as critical determinants of their collectible value, showcasing the profound connection between digital tokenization and cultural heritage.

2.4 Provenance value

The assurance of an NFT's authenticity is anchored in its provenance value. The ability of NFTs to seamlessly track the origin and ownership lineage of a digital asset provides irrefutable evidence of its authenticity (Nadini *et al.*, 2021).

Historically, provenance served as a touchstone for the authenticity of valued objects, artworks, and originality (Hoang *et al.*, 2022; Septianto *et al.*, 2020). In the digital realm, NFT technology revolutionizes this by ensuring that the provenance of items, their creators, and even endorsements by notable entities can be unequivocally established (Kirjavainen, 2022). A comprehensive study of the creator, the history of the NFT, and its journey in the market amplifies its value and desirability (Wilson *et al.*, 2022). In conclusion, an NFT with a distinguished provenance is likely to be accorded a higher value in the marketplace.

2.5 Community value

Human behavior, driven by the inherent desire to belong, finds a unique expression in the NFT space. NFTs are more than mere digital assets; they foster community belongingness and affinity (Lee *et al.*, 2024). As posited by Kirjavainen (2022) and Chandra (2022), the allure of NFTs is accentuated when they become symbols of shared identity within communities. These communities are not only passive observers but also active contributors to the brand or creator's narrative (Park and Lim, 2023). Through engagement and co-creation, these communities can exponentially enhance the value of an NFT (Albayati *et al.*, 2023).

Research emphasizes the symbiotic relationship between NFTs and their communities. Luxury brands and the gaming sector have particularly harnessed the power of community engagement to bolster the value and demand for their NFTs (Albayati *et al.*, 2023; Kirjavainen, 2022). The potential of an NFT to foster and sustain long-term relationships within these communities translates to its success (Nadini *et al.*, 2021; Parrales and Batbayar, 2022). In a nutshell, the vibrancy and engagement of a community serve as harbingers of a successful NFT project.

2.6 Roadmap value

In the dynamic landscape of NFTs, the roadmap value functions as a beacon, illuminating the trajectory and vision of a project (Thaichon *et al.*, 2022). Serving as a digital compass, an NFT roadmap delineates the milestones, objectives, and

vision of an NFT project, offering a lucid glimpse into the project's future (Nadini *et al.*, 2021). It's not just about the presentation but also about the assurance it offers. A clear, well-defined roadmap can significantly amplify the perceived value of an NFT, bolstering trust and confidence among holders (Heidorn, 2022).

Nadini *et al.* (2021) research underscores the tangible impact of roadmaps on NFT valuation, suggesting a potential 33% surge in secondary market prices with the presence of a clearly articulated roadmap. Furthermore, the consistent unveiling of new initiatives, expansions, and technological advancements within top-tier NFT projects instills confidence and trust among stakeholders. In essence, the roadmap serves as both a guide and a gauge, outlining the path ahead while also indicating the potential of an NFT project (Baytaş *et al.*, 2022; Despotovic *et al.*, 2022).

3. Theoretical framework

This study introduces a comprehensive VAF for NFTs, derived from an in-depth examination of the extant literature and empirical analysis. As depicted in Figure 1, this framework articulates the principal value sources intrinsic to NFTs, delving into their specific features to offer a nuanced understanding of their multifaceted nature. These features, which serve as tangible indicators for each value dimension, are systematically derived from a synthesis of theoretical discourse and practical observations within the NFT landscape. This model is designed to equip both researchers and stakeholders with a robust tool to discern and evaluate the core values inherent in NFT projects.

In the development of our VAF depicted in Figure 1, the numbering of indicators for each value dimension follows a thematic rather than a sequential order. This methodological choice was intentional, aimed at facilitating clearer thematic grouping and analysis of features within each value dimension. For example, indicators under "Utility Value" are coded to reflect sub-categories such as "Identity and Access" and "Interactive Engagement", grouping related features together for a more intuitive understanding. This thematic approach allows for a structured analysis and discussion of how different aspects of utility, financial

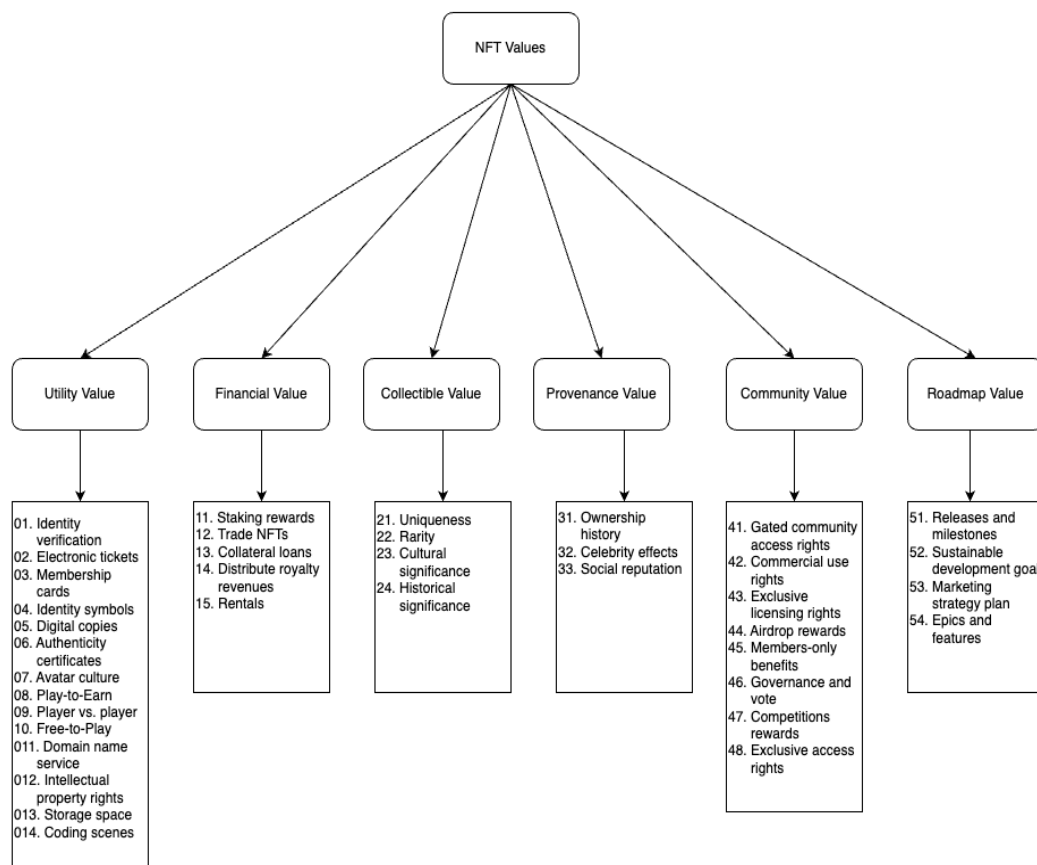


Figure 1
NFT value assessment framework

impact, collectibility, other dimensions are represented within the NFT ecosystem.

It also ensures clarity and maintains a logical flow in the presentation of our findings, where each indicator is numbered based on its association with specific sub-themes rather than a continuous sequence. This coding strategy is particularly useful in distinguishing between closely related but distinct features within broader categories, aiding in a more nuanced analysis and interpretation of results.

Utility Value emerges as a critical dimension, presenting a dichotomy between tangible and intangible benefits. Tangible benefits include measurable aspects such as play-to-earn crypto games and player-versus-player (PVP) battle

games, which are widely discussed in the context of blockchain gaming innovations (Proelss *et al.*, 2023). Intangible benefits, though less quantifiable, such as digital identity verification and digital event ticketing, are critical in establishing the utility of NFTs in digital ecosystems (Wang *et al.*, 2022).

Financial Value is delineated through four central tenets that encapsulate the economic impact of NFTs. These include mechanisms for accruing rewards, facilitating transactions, securing loans against NFTs as collateral, and generating royalties from digital sales. Each of these features is grounded in financial theories related to digital assets and blockchain economics (Wang *et al.*, 2022).

Collectible Value reflects the uniqueness and cultural significance of NFTs, emphasizing their role as collectibles. This value is highlighted by the uniqueness of digital items and their cultural resonance within the marketplace, which are significant factors in their appraisal and demand (Li and Chen, 2023).

Provenance Value focuses on the authentication and historical lineage of NFTs, from their creation to their current ownership. This aspect of NFTs is crucial for validating their authenticity and historical significance, which significantly enhances their market value (Li and Chen, 2023).

Community Value incorporates the social dynamics and community engagement surrounding NFTs. This dimension covers exclusive access rights, economic benefits, and the empowerment provided by governance models inherent in blockchain technologies, which foster a robust community ecosystem (Li and Chen, 2023).

Roadmap Value articulates the strategic trajectory and future development plans of NFT projects. This value dimension is critical for investors and stakeholders to assess the long-term viability and innovation trajectory of NFT initiatives (Bhujel and Rahulamathavan, 2022).

In summation, the VAF provides a structured and theoretically informed articulation of the values embedded within the NFT ecosystem. It facilitates a comprehensive understanding by integrating academic insights with empirical data, thereby offering a robust framework for evaluating the multifaceted nature of NFTs.

4. Method

4.1 Research design

Following the development of our value assessment framework for NFTs, the immediate objective shifted towards validating its empirical applicability within the evolving NFT market. Given the nascent nature of this market, we encountered dual challenges: the scarcity of comprehensive data and the pressing need to advance theoretical understanding of NFTs. In response, we selected projects that have shown notable success in the NFT space as primary subjects for our study, providing practical insights into the applications and implications of our framework.

To bridge existing gaps in the theoretical literature on NFTs and to gain nuanced insights, our research employed a refined methodological approach encompassing both content analysis and in-depth interviews:

Content analysis: inspired by Yin's (2013) advocacy for a robust examination of real-world phenomena, we adopted a multiple-case study design. This phase involved a detailed examination of top-performing NFTs on the OpenSea marketplace, focusing on their alignment with the six value dimensions outlined in our framework. This method allowed us to preserve the contextual integrity of each case while exploring the broader applicability of our theoretical constructs.

In-depth interviews: complementing the content analysis, we conducted in-depth interviews with holders of the "Lion Travel NFT," predominantly from the Generation Z demographic. The purpose of these interviews was to uncover the subjective values and perceptions that these individuals associate with their NFTs. These qualitative insights were then cross-examined against the findings from our content analysis, enriching our understanding of how theoretical value dimensions manifest in personal user experiences.

This pragmatic, sequential approach, recommended by Balasubramanian *et al.* (2021), was designed to intertwine the insights from both methodological strands effectively, thereby ensuring a comprehensive exploration of the NFT value spectrum. The empirical challenges presented by the novelty of the NFT

market underscore the necessity for methodologically sound, grounded solutions. Our approach, particularly the integration of content analysis with in-depth interviews, reflects and extends prior research in NFTs and blockchain technologies (Parrales and Batbayar, 2022; Kirjavainen, 2022; Balasubramanian *et al.*, 2021), further solidifying the validity of our research trajectory.

4.2 Study 1: Contents analysis

This study employed a multiple-case study design utilizing purposive sampling, specifically, the criterion sampling approach, which is critical in qualitative research for focusing on the most representative cases to answer the research questions. Our study targeted critical NFT cases, facilitated by the broad categorizations available on OpenSea, the leading NFT marketplace as of November 2022. Categories such as “art,” “collectibles,” “domain names,” “music,” “photography,” “sports,” “trading cards,” “utility,” and “virtual worlds” were considered, with cases selected based on their prominence in volume rankings, which were influenced by factors such as floor price, trading volumes, and network traffic.

To ensure the accuracy and reliability of the data collected, a rigorous multi-layer verification process was implemented:

Initial verification: the first layer of verification involved a thorough review of the whitepapers associated with selected NFT cases. These documents provided foundational information about the NFTs, detailing their creation, purpose, and the technology used.

Secondary verification: additional data were gathered by examining official websites and project roadmaps, supplemented by an extensive review of social media platforms like Twitter and Telegram. These sources offered real-time insights into the current status of NFTs, community engagement, and developmental updates.

Tertiary verification: a further layer involved engaging with community platforms such as Discord, where exclusive content regarding NFT developments, such as whitelisted wallets and developer updates, could be verified. This step was

crucial for understanding the NFTs' dynamic aspects and ongoing community interactions.

Quantitative cross-verification: although primarily qualitative, our verification process incorporated quantitative methods to enhance data integrity. This included analyzing trading volumes and network traffic statistics to quantify the popularity and user engagement of the NFTs. These quantitative measures helped validate the qualitative findings and ensure a comprehensive understanding of each case's significance within the NFT ecosystem.

The data collection phase, extending from May 2022 to August 2022, was meticulous in ensuring that multiple sources corroborated each piece of information, thereby adhering to the high standards of data rigor as recommended by Suri (2011). This multi-layered approach to verification not only strengthened the reliability of our findings but also enriched our insights into the NFT market, providing a robust foundation for our subsequent analysis.

4.3 Study 2: In-depth interviews

4.3.1 Research design

In Study 2, we employed a qualitative approach, conducting in-depth interviews to deepen our understanding of NFT values among Generation Z holders, specifically focusing on "Lion Travel NFT" owners. This pivot towards qualitative exploration was driven by the need to augment our findings from Study 1 with rich, narrative-based insights (Wang and Zhang, 2020).

In response to volatile market conditions and heightened competition, the tourism industry is increasingly turning to digital innovations to boost operational efficiency, cut costs, and enhance transparency (Năstase *et al.*, 2022). This sector embodies diverse experiential, communal, and origin-based values that echo the multifaceted propositions of NFTs. Integration of NFTs promises substantial benefits for tourism, including heightened competitive edge, enhanced customer satisfaction, and improved performance (Onder and Treiblmaier, 2023).

Lion Travel, Taiwan's premier travel company and a pioneering Web3 community in Chinese-speaking tourism stands at the forefront of this

convergence. Their launch of “Lion Travel NFT” illustrates how traditional service sectors can leverage digital assets to enrich customer interaction and forge new revenue streams. This innovative initiative serves as a pioneer case study to explore the practical applications and implications of NFTs in pioneering contexts. Our study focuses on “Lion Travel NFT” owners, providing nuanced insights into their subjective values and perceptions, thereby deepening our understanding of the broader NFT value landscape.

4.3.2 Interview objectives and methodology

In this qualitative phase of our study, we conducted in-depth interviews with 15 Lion Travel NFT holders. Our objective was to explore the complex motivations and value perceptions associated with the “Lion Travel NFT.” This focus on a specific NFT provided a nuanced lens through which we could examine its diverse value proposition, aligning with the six value dimensions identified in our foundational framework.

4.3.3 Interview process

The interview process was strategically structured to elicit rich, detailed insights. We began with an introductory phase, clearly communicating the study’s objectives and ensuring participants’ comfort with the recording process, as advised in previous research (Rutakumwa *et al.*, 2020). We then gathered essential demographic information and initial NFT engagement metrics, serving both as foundational data and a segue into deeper discussions about NFT values (Albayati *et al.*, 2023).

To provide a comprehensive context for subsequent analysis, we included additional demographic variables such as income, occupation, and the value of NFTs held. This enriched dataset allows for a more detailed and meaningful exploration of the factors influencing NFT ownership and value perceptions among the interviewees.

4.3.4 Synthesis of findings

The synthesis of findings from both Study 1 and Study 2 was conducted to

Table 1
Demographics of Lion Travel NFT holders

Participant Number	Year of Birth	First NFT Purchase Year	Number of NFTs Owned	Income Level (USD)	Occupation	Value of NFTs Held (USD)
1	1986	2022	1-3	30,000-5,0000	Software Engineer	10,000-15,000
2	1989	2021	4-6	30,000-5,0000	Marketing Manager	20,000-25,000
3	1992	2021	More than 10	75,000-100,000	Financial Analyst	50,000-60,000
4	1982	2021	More than 10	30,000-5,0000	Entrepreneur	60,000-70,000
5	1992	2021	More than 10	30,000-5,0000	Graphic Designer	15,000-20,000
6	1989	2021	More than 10	30,000-5,0000	Consultant	50,000-60,000
7	1985	2022	More than 10	30,000-5,0000	Teacher	20,000-25,000
8	1986	2023	More than 10	50,000-75,000	Project Manager	30,000-40,000
9	1999	2022	More than 10	Below 30,000	Student	5,000-10,000
10	1994	2022	More than 10	50,000-75,000	Software Developer	50,000-60,000
11	1993	2022	1-3	Below 30,000	Sales Representative	10,000-15,000
12	1988	2022	More than 10	50,000-75,000	Product Manager	30,000-40,000
13	1995	2021	4-6	30,000-5,0000	Research Scientist	20,000-25,000
14	1996	2021	More than 10	50,000-75,000	Mechanical Engineer	15,000-20,000
15	2000	2021	More than 10	Below 30,000	Content Creator	10,000-15,000

ensure a cohesive integration of insights derived from the content analysis and in-depth interviews. Study 1, through a rigorous content analysis of multiple case studies, provided macro-level insights into the application of the six value dimensions within the NFT marketplace. This analysis identified prevalent themes and value indicators across successful NFT projects, establishing a comprehensive framework for understanding NFT value propositions.

Study 2, involving in-depth interviews with Lion Travel NFT holders, offered a micro-level perspective, focusing on individual motivations, experiences, and perceptions related to NFT ownership. These personal narratives were critical in contextualizing the broader themes identified in Study 1.

The integration of findings from both studies was achieved through a multi-step process. Initially, the themes and value indicators identified in Study 1 were used to develop the interview guide for Study 2, ensuring that the interview questions were aligned with the theoretical framework. During the synthesis phase, the qualitative data from the interviews were analyzed to identify patterns and correlations with the findings from the content analysis. This comparative analysis highlighted how the macro-level themes manifested in individual experiences and perceptions.

For instance, the concept of “Community Value” identified in Study 1 was further explored in the interviews, revealing how NFT holders derived a sense of belonging and identity from their participation in the Lion Travel community. Similarly, the “Provenance Value” theme was enriched by personal anecdotes about the importance of ownership history and authenticity in enhancing the perceived value of NFTs.

By triangulating the data from both studies, we were able to validate and refine our value assessment framework, ensuring that it accurately reflects both the theoretical constructs and practical realities of the NFT market. This integrated approach provides a holistic understanding of NFT values, bridging the gap between broad market trends and individual user experiences.

5. Data analysis

5.1 Analysis and findings for Study 1

The structured categorization and coding process applied to our data enabled the identification of principal NFT values, with sub-themes further detailing individual features. To maintain coding integrity, a pair of authors conducted the process independently, followed by validation from the other two authors. This approach aligns with best practices in qualitative research, ensuring the reliability of the coding process (Bryman, 2016).

The analysis unfolded in two stages. Initially, thematic analysis, a widely accepted method in qualitative research (Braun and Clarke, 2006), was used to categorize data into one of the six critical NFT values. The coding process involved several steps:

Initial reading and familiarization: both authors independently read through the collected data multiple times to become thoroughly familiar with the content.

Generating initial codes: each author identified initial codes related to the six value dimensions: Utility, Financial, Collectible, Provenance, Community, and Roadmap. Codes were derived based on recurring themes and relevant textual segments.

Collating codes into themes: codes were then collated into overarching themes corresponding to the six value dimensions. Each value dimension was further subdivided into specific features.

Reviewing themes: themes were reviewed for consistency and coherence. Any discrepancies between the authors' coding were discussed and resolved through consensus.

Defining and naming themes: final themes were defined, named, and organized into a cohesive framework for analysis.

A grading system of "Low," "Moderate," or "High" was subsequently applied to each NFT case, based on the prominence and intensity of identified features. This methodological approach is consistent with the evaluative techniques used in content analysis (Krippendorff, 2018). Independent summarization by two authors further solidified the findings, resonating with the layered analysis approach in

qualitative studies (Flick, 2022).

The results were organized according to the six values and their features, with tables summarizing the frequency of each feature across case studies. This presentation style mirrors the structured content analysis approach, facilitating clear interpretation and discussion (Neuendorf, 2017). Appendices A and B provide comprehensive summaries of the categories and value assessments for the fifteen NFT cases, reflecting a meticulous and systematic approach to data analysis.

5.1.1 Explanation of table values and relationship

The numbers in Table 2 represent the frequency with which each feature was identified across the 15 NFT cases. These frequencies were derived from our content analysis, where each feature was coded and counted for its presence in the NFT cases under study. The frequency count reflects how commonly each feature appears, indicating its relative importance within the sample.

Table 3 summarizes the evaluation of each NFT category (e.g., art, collectibles, domain names) across the six value dimensions (Utility, Financial, Collectible, Provenance, Community, and Roadmap). Each category was assessed as “High,” “Moderate,” or “Low” based on the cumulative presence and intensity of features identified in Table 2.

The relationship between Table 2 and Table 3 is established through the following evaluative process:

Frequency analysis: we analyzed the frequency of each feature within a value dimension for each NFT case. Features with higher frequencies indicated a greater prominence and were more likely to contribute to a “High” or “Moderate” rating in Table 3.

Qualitative weighting: beyond mere frequency, we considered the qualitative impact and significance of each feature. For example, features critical to the functional or market success of an NFT (such as “identity verification” in Utility or “trade” in Financial) were given additional weight.

Categorical summarization: for each NFT category, we summarized the frequencies and weighted significance of features within each value dimension to

Table 2
The results of the analysis of the features of value

Value Dimension	Feature	Frequency	Proportion (%)
Utility Value	Identity verification	15	100
	Authenticity certificates	1	7
	Domain name service	2	13
	Electronic tickets	2	13
	Avatar culture	2	13
	Intellectual property rights	1	7
	Membership cards	2	13
	Play-to-Earn	9	60
	Storage space	1	7
	Identity symbols	2	13
	Play vs. player	1	7
	Coding scenes	1	7
	Digital copies	4	27
	Free-to-Play	1	7
	Financial Value	Staking rewards	11
Collateral loans		8	53
Rentals		3	20
Trade NFTs		15	100
Distribute royalty revenues		2	13
Collectible Value	Uniqueness	15	100
	Rarity	15	100
	Cultural significance	3	20
	Historical significance	1	7
Provenance Value	Ownership history	15	100

	Celebrity effects	8	53
	Social reputation	11	73
Community Value	Gated community access rights	14	93
	Airdrop rewards	12	80
	Competitions rewards	2	13
	Commercial use rights	5	33
	Members-only benefits	2	13
	Exclusive access rights	1	7
	Exclusive licensing rights	2	13
	Governance and vote	3	20
Roadmap Value	Releases and milestones	2	13
	Marketing strategy plan	5	33
	Epics and features	6	40
	Sustainable development goal	6	40

Note: The figures in the table represent the total number of cases that have the evaluated feature and their proportion among the total 15 cases.

determine an overall rating. A “High” rating indicates pervasive and significant presence of multiple key features, a “Moderate” rating indicates moderate presence and impact, and a “Low” rating indicates limited presence or lesser significance of features.

This systematic approach ensures that the evaluations in Table 3 accurately reflect the detailed findings presented in Table 2, providing a comprehensive and coherent summary of the value framework across different NFT categories.

5.1.2 Utility value

Utility value is of decisive importance. Each case study consists of at least two utility value features, with “art,” “collectibles,” “domain names,” “music,”

Table 3
Summary of value framework on the nine categories of NFT cases

Value	Category	Utility	Financial	Collectible	Provenance	Community	Roadmap
Art	High (100%)	Low to Moderate (40%)	Moderate (60%)	Low to Moderate (40%)	High (100%)	Low (20%)	Moderate (60%)
Collectibles	High (100%)	Low to Moderate (40%)	Moderate (60%)	Low to Moderate (40%)	High (100%)	Low (20%)	Moderate (60%)
Domain names	Moderate (60%)	Moderate (60%)	Moderate (60%)	High (100%)	Moderate (60%)	Low (20%)	Low to Moderate (40%)
Music	Moderate (60%)	High (100%)	Moderate (60%)	Low (20%)	Moderate to High (80%)	Low (20%)	Moderate (60%)
Photography	High (100%)	Low (20%)	Moderate (60%)	Moderate (60%)	Low (20%)	Moderate (60%)	Moderate (60%)
Sports	High (100%)	Low (20%)	Moderate (60%)	Moderate to High (80%)	Moderate to High (80%)	Low (20%)	Low (20%)
Trading cards	Moderate (60%)	Moderate (60%)	Low (20%)	High (100%)	Moderate (60%)	Low (20%)	Low (20%)
Utility	High (100%)	Moderate to High (80%)	Moderate (60%)	Low (20%)	Moderate to High (80%)	Low (20%)	Moderate (60%)
Virtual worlds	Low to Moderate (40%)	High (100%)	Low (20%)	Low to Moderate (60%)	High (80%)	Moderate (60%)	High (100%)

Note: The numbers and percentages in the table represent the ratio and proportion of cases that have been evaluated with each value dimension, categorized as “High,” “Moderate,” or “Low” based on the presence and intensity of features identified in Table 2.

and “utility” occupying the top five categories, each rated as “High.” Among the 14 features of utility value, the findings indicate that “identity verification” is the most critical feature, present in all cases. The second critical feature is “play-to-earn,” found in nine cases (60%). The third critical feature is “digital copy,” found in four cases (27%).

5.1.3 Financial value

Each case emphasizes its financial value. Of the five features of financial value, all 15 cases adopt at least one financial feature. “Trade” is the most vital feature, present in all NFT cases. The second vital feature is “staking rewards,” found in 11 cases (73%). The third vital feature is “collateral loans,” shared by eight cases (53%). Notably, the category of virtual worlds encompasses four-fifths of features, suggesting significant financial market management in the virtual worlds market.

5.1.4 Collectible value

All 15 cases are associated with collectible value. Each case has at least two of the four collectible value features. The categories of “art” and “collectibles” possess about three-fourths of features, indicating that collectible value is crucial in these categories. “Uniqueness” and “scarcity” are key features, present in all cases. “Cultural significance” and “historical significance” are less common, found primarily in the “art” or “collectibles” categories.

5.1.5 Provenance value

Each case uses provenance to add value and gain competitiveness. The categories of “art,” “collectibles,” “trading cards,” and “virtual worlds” adopt all features of provenance, suggesting its key role. “Ownership history” is crucial, present in all cases. “Social reputation” is the second most important feature, shared by eleven cases (73%). “Celebrity effects” are present in eight cases (53%).

5.1.6 Community value

Fourteen cases (93%) emphasize community value, with the “photography” category as the exception. The findings indicate that “art,” “collectibles,” and “virtual worlds” highly value community. “Gated community access rights” is the most important feature, present in 14 cases (93%). “Airdrop rewards” is the second key feature, found in 11 cases (73%). “Commercial use rights” is present in five cases.

5.1.7 Roadmap value

Six cases (40%) provide a roadmap, including categories such as “art,”

“collectibles,” “music,” “photography,” “utility,” and “virtual worlds.” The “virtual worlds” category is more likely to provide roadmap value. “Sustainable development goal” and “epics and features” are tied for first place, present in six cases (40%). “Marketing strategy plan” is the second critical feature, found in five cases (33%). “Releases and milestones” is present in two cases.

5.2 Analysis and findings for study 2

The qualitative data from our second phase of the study provided rich insights into the various values ascribed to NFTs by Lion Travel’s customers, resonating with the theoretical perspectives discussed in our referenced literature.

5.2.1 Utility value

Our exploration into NFT utility value revealed a blend of stakeholder perspectives that both confirm and contrast with existing literature. Stakeholder A’s extended commentary,

“(…) NFTs have transcended mere digital art, now encompassing a wide array of functionalities like interactive gaming and tangible real-world rewards. This marks a shift from their traditional aesthetic focus to becoming versatile digital assets, integrating seamlessly into various aspects of our lives,” (stakeholder A)

aligns with and broadens the scope outlined by Serada *et al.* (2021). Simultaneously, Stakeholder C’s detailed observation, echoes and expands upon the experiential utility discussed by Kim *et al.* (2022):

“(…) the value of owning an NFT lies in its ability to provide unique experiences, blending the digital with the tangible. It’s about the exclusivity and the sense of connection it fosters” (stakeholder C).

In contrast, Stakeholder B’s insight, offers a fresh perspective, diverging from the predominantly social focus highlighted by Sharma *et al.* (2022):

“(…) NFTs not only serve as digital assets but also create a strong sense of community. They are a source of shared identity and belonging, offering more than just transactional value” (stakeholder B).

5.2.2 Financial value

In exploring the financial value of NFTs, our study uncovered a blend of views that both affirm and evolve beyond existing research. Stakeholder E provided a detailed perspective,

“NFTs unlock diverse economic opportunities, notably staking, which goes beyond mere visual appeal, introducing a realm of innovative financial strategies,” (stakeholder E)

this insight resonates with and extends Bose *et al.*'s (2023) discussion on economic opportunities in NFTs. Stakeholder G offered an in-depth comparison,

“(…) investing in NFTs is similar to stock market dynamics but marks a transition to a new, more intricate economic model,” (stakeholder G)

this observation not only aligns with traditional investment strategies but also signals a shift to more sophisticated economic interactions within the NFT market. Furthermore, Stakeholder F's experience,

“(…) my engagement with NFTs evolved from passive collecting to active financial participation, opening up novel avenues for economic involvement,” (stakeholder F)

both support and challenge the prevailing notions of financial empowerment in digital assets.

5.2.3 Collectible value

Our research on NFTs' collectible value presents a rich tapestry that both confirms and redefines traditional perspectives. Stakeholder H elaborated,

“(…) NFTs represent unique digital artistry, blending artistic creativity with technological innovation. Each piece is not just a collectible but a symbol of a new digital expression era, transcending conventional art forms,” (stakeholder H)

this view aligns with, yet extends beyond, Masset and Weisskopf's (2018) traditional views on collectability by emphasizing the art-technology synergy. Stakeholder C commented, “The rarity of NFTs is their allure, owning something scarce enhances their value.” This observation aligns with Wang and Zhang's (2020) focus on rarity and ownership, yet offers a fresh perspective on scarcity in the digital realm.

Further, Stakeholder C's insight, "Collecting NFTs reflects personal taste and status, indicating a shift towards identity in the digital collectibles space," aligns with Valeonti *et al.*'s (2021) insights on identity expression, while also underscoring a new narrative dimension. Together, these insights weave a complex picture of NFTs' collectible value, integrating aspects of uniqueness, scarcity, and personal identity.

5.2.4 Provenance value

In assessing NFTs' provenance value, our study enriches the understanding of NFTs' provenance value, providing a balance between contrasting and confirming established perspectives. Stakeholder D detailed,

"(...) provenance in NFTs goes beyond the mere history of ownership. It embodies the story and legitimacy of the piece, offering a narrative that weaves together the art's origin and its journey, enriching its significance," (stakeholder D)

this insight extends beyond Valeonti *et al.* (2021) and Wang and Zhang's (2020) focus, suggesting a more story-driven value. Furthermore, the role of celebrity endorsements was emphasized as enhancing the prestige and narrative of NFTs.

"(...) when a renowned figure endorses an NFT, it elevates the asset's value by associating it with their legacy," (stakeholder C)

stakeholder C noted, expanding the traditional view of digital asset value. Additionally, participants acknowledged the indisputable nature of blockchain-proven provenance, aligning with and reinforcing existing discussions on digital authenticity. These diverse views collectively portray provenance in NFTs as an intricate blend of historical narratives, celebrity influence, and technological verification.

5.2.5 Community value

Our study delves into NFTs' community value, integrating both alignment and divergence with previous research. Stakeholder F elaborated,

"(...) being part of an NFT community transcends mere asset ownership; it's

about uniting with others who share a passion for digital artistry and innovation. This shared interest creates a strong sense of belonging and collective identity,” (stakeholder F)

this statement emphasizes a deeper, more emotional aspect of community bonding in the NFT space, enriching the community experience beyond what Casale-Brunet *et al.* (2022) described. Stakeholder E highlighted,

“(…) NFT ownership provides exclusive membership to a distinct community, it’s not just about owning an asset; it’s about being part of a pioneering digital movement,” (stakeholder E)

complementing and extending Wang *et al.*’s (2021) findings on the exclusivity and value of digital collectibles. The focus on collective growth and networking within NFT communities, as mentioned by stakeholders, aligns with existing discussions but also suggests a more collaborative, interconnected ecosystem, portraying NFTs as platforms fostering both social and professional relationships.

5.2.6 Roadmap value

In examining the roadmap value of NFTs, our study presented a complex picture that both aligns with and diverges from current scholarship. Stakeholder G expanded on this, stating,

“(…) Investing in NFTs is a forward-looking endeavor, heavily reliant on the roadmap set by creators. It’s about trusting in their vision and potential, which goes beyond mere asset value and taps into the promise of future growth and innovation.” (stakeholder G)

This viewpoint offers a fresh perspective on NFT investment, aligning with yet reinterpreting Despotovic *et al.* (2022) by emphasizing the importance of visionary planning.

Another participant elaborated,

“(…) a robust roadmap builds trust through its clear milestones and updates. It’s not just about the project’s reliability but also its adaptability and responsiveness to community feedback,” (stakeholder I)

this insight extends beyond the traditional focus on reliability in roadmaps, as discussed by Baytaş *et al.* (2022), and indicates a shift towards a more dynamic and collaborative roadmap development process in NFT projects.

6. Discussions

6.1 Conclusions

This research, utilizing a mixed-method approach, has provided a comprehensive understanding of the diverse intrinsic values of NFTs. Study 1's content analysis outlined six fundamental value dimensions: Utility, Financial, Collectible, Provenance, Community, and Roadmap. Building upon this, Study 2, through detailed interviews, not only corroborated these dimensions but also revealed subtle variations and unique insights, thereby enriching our understanding. Particularly, stakeholders in Study 2 brought new depth to the utility and financial aspects, highlighting tangible applications and the evolving economic landscape. Similarly, insights into the collectible, provenance, community, and roadmap aspects underscored the multifaceted role of NFTs in digital culture and forward-looking initiatives, positioning them as critical elements in the narrative of digital ownership and cultural evolution.

6.2 Theoretical implications

This research enriches the theoretical landscape of NFTs through its multidimensional analysis. First, it deepens the understanding of NFT value dimensions, notably the utility value, which Study 2 reveals as having significant real-world applications and practical benefits. Secondly, the research underscores the intricate relationship between digital innovation and socio-cultural factors. This is particularly evident in the community value dimension, where NFTs are seen as fostering unique social dynamics and communal engagement.

Finally, the mixed-method approach used in this study highlights the complexity of NFT valuation. The contrasting findings between Study 1 and Study 2, especially in terms of roadmap value, emphasize the importance of diverse research methodologies to capture the multifaceted nature of NFTs. Fourthly, this

research advances the field by employing multi-dimensional models for digital asset analysis, offering a more comprehensive view of NFTs, as seen in the evolving perceptions of their collectible value. Finally, the research accentuates the balance between objective and subjective valuation in understanding NFTs. The personal experiences and sentiments expressed in Study 2, particularly regarding the provenance value of NFTs, illustrate the significance of this equilibrium.

6.3 Managerial implications

This study underscores several strategic considerations for NFT market stakeholders:

First, the VAF proposed in this study offers a structured approach for evaluating NFTs. NFT creators and marketers can use the VAF to identify and enhance key value dimensions in their projects. For example, focusing on utility value by incorporating features such as identity verification and play-to-earn mechanisms can significantly enhance market appeal.

Second, the community engagement. Building strong, passion-driven communities is essential. Projects should foster environments that encourage community interaction and engagement, as this can significantly increase loyalty and trust. Utilizing community value effectively can turn NFT holders into brand advocates.

Third, the provenance and authenticity. The value placed on provenance highlights the importance of transparency and storytelling. NFT projects should ensure clear documentation of ownership history and leverage storytelling to enhance the perceived value and authenticity of their NFTs.

Fourth, the innovative user engagement. The shift towards tangible benefits in NFTs suggests opportunities for innovative user engagement strategies. NFT projects can explore ways to provide tangible utility to their holders, such as exclusive access or additional content, guided by the VAF to maximize value.

Finally, the roadmap and future planning. Emphasizing roadmap value is crucial for maintaining stakeholder confidence and project relevance. Clear,

detailed future plans and milestones should be communicated to NFT holders to ensure sustained interest and investment.

6.4 Academic contributions

This study contributes to academic literature in several ways:

First, the mixed-method approach. The integration of content analysis and in-depth interviews provides a comprehensive methodological framework for studying NFTs. This approach highlights the value of combining quantitative and qualitative data to capture the complexity of NFT valuation.

Second, the multi-dimensional model. By employing a multi-dimensional model, this research offers a holistic view of NFT value, advancing the theoretical understanding of digital assets. This model can serve as a foundation for future research exploring different dimensions of NFTs.

Third, the balance between objective and subjective valuation. The study emphasizes the importance of considering both objective metrics and subjective perceptions in NFT valuation. This balance is critical for understanding the full spectrum of NFT value and can inform future methodological approaches in digital asset research.

6.5 Limitations and future research directions

Acknowledging its scope, this research has certain limitations. According to Borri *et al.* (2022), the NFT market is a market where individual asset properties are heterogeneous and assets are traded infrequently. For example, the NFT market consists of various forms of assets, including games, collectibles, and avatars. Even within a single domain, the properties of each item vary greatly. Still, their findings indicate that there is a common component in the NFT market that can be captured by their NFT market index. When our paper tries to aggregate all sorts of NFTs to encourage NFT creators all kinds of possibilities to mix and match various value dimensions, we in the meantime consider it a limitation and suggest future research to dive into a specific dimension or form of asset for further exploration. Moreover, given the dynamic and rapidly evolving nature of the NFT market and related technologies, some value dimensions may shift over time, potentially

impacting the long-term relevance of the results. The specific demographic profile of NFT stakeholders involved might affect the broader applicability of the findings. Future studies could focus on a more varied and representative sample, perhaps through longitudinal research to better understand the evolving value of NFTs. Additionally, incorporating viewpoints from NFT creators could offer deeper insights into the creative and technological aspects of NFTs and their socio-cultural impact. Such an expanded approach would enhance the comprehension of NFTs and contribute to more robust, inclusive theoretical models in digital asset research.

Appendix A. Top 2 NFT cases sorted of each category by total sales volume up until 1 May 2022

Category	Name	Description	References
Art	CryptoPunks	CryptoPunks is the earliest NFT collection and the largest market minted on the Ethereum blockchain. Initially, NFTs were given away for free. It was introduced in June of 2017 by Larva Labs and acquired by Yuga Labs in 2022. The generated is composed of 10,000 unique 24×24-pixel art images. Each character with unique attributes such as humans, zombies, aliens, and apes.	Dowling (2022); Schaar and Kampakis (2022)
	Bored Ape Yacht Club (BAYC)	BAYC is one of the most popular NFT Collections. It was introduced in April of 2019 by four anonymous developers. The digital collectible is a collection of 10,000 unique ape avatars on the Ethereum blockchain, of which each ape has a different composed of attribute values. Each NFT doubles as a Yacht Club membership card, which grants the holder access to members-only benefits and provides unlimited commercial rights.	Chandra (2022); Suchow and Ashrafimoghari (2022)
Collectible	CryptoPunks	CryptoPunks is the earliest NFT collection and the largest market minted on the Ethereum blockchain. Initially, NFTs were given away for free. It was introduced in June of 2017 by Larva Labs and acquired	Dowling (2022); Schaar and Kampakis (2022)

		by Yuga Labs in 2022. The generated is composed of 10,000 unique 24×24-pixel art images. Each character with unique attributes such as humans, zombies, aliens, and apes.	
	Bored Ape Yacht Club (BAYC)	BAYC is one of the most popular NFT Collections. It was introduced in April of 2019 by four anonymous developers. The digital collectible is a collection of 10,000 unique ape avatars on the Ethereum blockchain, of which each ape has a different composed of attribute values. Each NFT doubles as a Yacht Club membership card, which grants the holder access to members-only benefits and provides unlimited commercial rights.	Chandra (2022); Suchow and Ashrafimoghari (2022)
Domain names	ENS: Ethereum Name Service	The ENS was first launched in 2017. It is a distributed naming system, open, and extensible naming system on the Ethereum blockchain. The functionality greatly resembled the Internet Domain names system (DNS). However, compared with DNS, ENS registries are constituted by Ethereum smart contract that maps the ENS name into a human-readable name to the wallet address.	Béres <i>et al.</i> (2021); Bodziony <i>et al.</i> (2021)
	Unstoppable Domains	Unstoppable domains are a Domain names service that was released in 2018 by San Francisco-based start-up. It establishes an architecture called Crypto Name Service (CNS) on the Ethereum blockchain. The company's aim is to give human-readable blockchain addresses and censorship-resistant servers.	Krishnan (2020); Rehman <i>et al.</i> (2021)
Music	WVRPS by WarpSound (Official)	WVRPS by WarpSound (Official) is the first hybrid generative PFP + AI-composed music NFTs with minted and recorded on the Ethereum blockchain. Since launched in 2022. It is 9,999 unique NFTs that are comprised of pairs generative art and AI-composed music.	https://www.warpsound.ai/
	EulerBeats Genesis	Eulerbeats is the first case of generative audio NFT. Since it was launched in February of 2021, to bundles of artworks, music and royalties create a unique digital	Allen <i>et al.</i> (2022)

		piece of art for artists. Each original NFT has a limited set of prints that increases the value of each print through each transaction.	
Photography	Justin Aversano - Twin Flames - Collection of 100 Twin Portraits	The piece by artist Justin Aversano is the most expensive NFT photography on Christie's auction house. It was minted in 2021. Justin Aversano photographed a series of 100 portraits of Twins to honor of his fraternal twin. The aim focus on the existence of multiple births and the phenomena of twindom.	https://www.justinaversano.com/twinflames
	Women Unite - 10k Assemble	As NFTs, Women Unite - 10k Assemble combines a collection of artistic fashion and photography. Since it was introduced in January of 2022, focuses on women's empowerment and promotes sustainable development. It is composed of 6,765 pieces of NFT collection stored on the Ethereum blockchain. When they are sold every time, the 10% of full royalty is support women that need help.	https://www.womenunitenf.com/
Sports	Sorare	Sorare is the earliest official NFT fantasy soccer game. Since it was launched in January of 2020, it has been growing steadily in trading volume. Sorare is a fantasy soccer game with a cryptocurrency, of where play to earn based on setting up a team by the variety of rewards.	https://sorare.com/
	ZED RUN Legacy	ZED is a provably fair digital racehorses game built on the Ethereum blockchain that offers the chance to earn in-game. It was launched in early 2019 by the parent company Virtually Human Studio, where all racehorses come from one of four bloodlines that a total supply of 38,000. The case's aim is to create a digital sport.	https://zed.run/
Trading Cards	Parallel Alpha	Parallel Alpha is a science fiction trading card game (TCG) in early development. Since it was introduced in 202, serial NFT airdrops boost player engagement. The case is composed of five roles that aim to create a can collect cards and build decks to fight with each other online.	https://parallel.life/
	Sorare	Sorare is the earliest official NFT fantasy	https://sorare.com/

		<p>soccer game. The company is headquartered in Paris. Since it was launched in January of 2020, it has been growing steadily in trading volume. Sorare is a fantasy soccer game with a cryptocurrency, of where play to earn based on setting up team by the variety of rewards.</p>	
Utility	Explore Treeverse	<p>Treeverse is one of metaverse games that massively multiplayer online role-playing game (MMORPG) available. It launched in 2020 with aim is to develop a NFT social media platforms, of where communication and experience game.</p>	<p>Allen <i>et al.</i> (2022); https://www.treeverse.net/</p>
	Frontier Game	<p>Frontier game is a community-driven Online game on the Ethereum blockchain. Since it launched in 2022, supported play-to-earn (P2E) and player vs. player (PvP). The GameFi case consists of 3,000 series, which aim to hold global competitions.</p>	<p>https://www.missingfrontier.com</p>
Virtual Worlds	Decentraland	<p>Decentraland as the digital currency with the fourth largest market, and largest decentralized virtual reality platform. It launched in 2017 and opened to the public in 2020. They have composed of 90,601 Plots, there are 43,689 private land parcels. Each LAND is 16m by 16m plot of virtual land.</p>	<p>Dowling (2022); Vidal-Tomás (2023)</p>
	The Sandbox	<p>The Sandbox is one of the most popular metaverses cases. It was originally launched as a game on iOS and Android in 2012 and opened to the public in 2018 on Ethereum blockchain. It is a blockchain-based game where you can build virtual world, own and monetize their gaming experiences. It is composed of 166,464 LANDs, in a square map of 408x408.</p>	<p>Franceschet (2021); Nakavachara and Saengchote (2022)</p>

Appendix B. Summary of NFT value assessment of cases

	Utility	Finance	Collectible	Provenance	Community	Roadmap
CryptoPunks	01 Identity verification	11 Staking rewards	21 Uniqueness	31 Ownership history	41 Gated community access rights	No
	04 Identity symbols	12 Trade NFTs	23 Cultural significance	32 Celebrity effects	42 Commercial	

	07 Avatar culture	13 Collateral loans	24 Historical significance	33 Social reputation	use rights	
	08 Play-to-Earn				44 Airdrop rewards	
					45 Members-only benefits	
BAYC	01 Identity verification	11 Staking rewards	21 Uniqueness	31 Ownership history	41 Gated community	52 Sustainable development goals
	03 Membership cards	12 Trade NFTs	23 Cultural significance	32 Celebrity effects	42 Commercial use rights	54 Epics and features
	04 Identity symbols	13 Collateral loans		33 Social reputation	44 Airdrop rewards	
	07 Avatar culture				45 Members-only benefits	
	08 Play-to-Earn					
ENS:	01 Identity verification	11 Staking rewards	21 Uniqueness	31 Ownership history	41 Gated community	No
Ethereum Name Service	011 Domain names service	12 Trade NFTs	22 Rarity	32 Celebrity effects	42 Commercial use rights	
		13 Collateral loans		33 Social reputation	44 Airdrop rewards	
Unstoppable Domains	01 Identity verification	12 Trade NFTs	21 Uniqueness	31 Ownership history	41 Gated community	No
	011 Domain names service		22 Rarity	33 Social reputation	42 Commercial use rights	
					44 Airdrop rewards	
WVRPS by WarpSound (Official)	01 Identity verification	12 Trade NFTs	21 Uniqueness	31 Ownership history	41 Gated community	52 Sustainable development goals
	05 Digital copies	14 Distribute royalty revenues	23 Cultural significance		42 Commercial use rights	53 Marketing strategy plan
					44 Airdrop rewards	54 Epics and features
EulerBeats Genesis	01 Identity verification	11 Staking rewards	21 Uniqueness	31 Ownership history	41 Gated community	No
	05 Digital copies	12 Trade NFTs	22 Rarity	33 Social reputation	42 Commercial use rights	
		13 Collateral loans			43 Exclusive licensing rights	
		14 Distribute royalty revenues				

Justin Aversano - Twin Flames - Collection of 100 Twin Portraits	01 Identity verification 05 Digital copies 06 Authenticity certificates	12 Trade NFTs	21 Uniqueness 22 Rarity	31 Ownership history 32 Celebrity effects 33 Social reputation	no	No
Women Unite - 10k Assemble	01 Identity verification 03 Membership cards 05 Digital copies	11 Staking rewards 12 Trade NFTs	21 Uniqueness 22 Rarity	31 Ownership history	41 Gated community access rights 44 Airdrop rewards	51 Releases and milestones 52 Sustainable development goals 53 Marketing strategy plan 54 Epics and features
Sorare	01 Identity verification 08 Play-to-Earn 012 Intellectual property rights	11 Staking rewards 12 Trade NFTs	21 Uniqueness 22 Rarity	31 Ownership history 32 Celebrity effects 33 Social reputation	41 Gated community access rights 42 Commercial use rights 43 Exclusive licensing rights	No
ZED RUN Legacy	01 Identity verification 02 Electronic tickets 08 Play-to-Earn	12 Trade NFTs	21 Uniqueness 22 Rarity	31 Ownership history 33 Social reputation	41 Gated community access rights 44 Airdrop rewards	No
Parallel Alpha	01 Identity verification 08 Play-to-Earn	11 Staking rewards 12 Trade NFTs 13 Collateral loans	21 Uniqueness 22 Rarity	31 Ownership history 32 Celebrity effects 33 Social reputation	41 Gated community access rights 44 Airdrop rewards	No
Explore Treeverse	01 Identity verification 08 Play-to-Earn 013 Storage space	11 Staking rewards 12 Trade NFTs 13 Collateral loans 15 Rentals	21 Uniqueness 22 Rarity	31 Ownership history	41 Gated community access rights 44 Airdrop rewards	No
Frontier Game	01 Identity verification	11 Staking rewards	21 Uniqueness 22 Rarity	31 Ownership history	41 Gated community	52 Sustainable development

	02 Electronic tickets	12 Trade NFTs			access rights	goals
	09 Play-to-Earn				44 Airdrop rewards	53 Marketing strategy plan
	10 Player vs. Player				46 Governance and vote	54 Epics and features
					48 Exclusive access right	
Decentraland	01 Identity verification	11 Staking rewards	21 Uniqueness	31 Ownership history	41 Gated community	52 Sustainable development
	08 Play-to-Earn	12 Trade NFTs	22 Rarity	32 Celebrity effects	access rights	goals
	014 Coding scenes	13 Collateral loans		33 Social reputation	44 Airdrop rewards	53 Marketing strategy plan
		15 Rentals			46 Governance and vote	54 Epics and features
					47 Competitions rewards	
The Sandbox	01 Identity verification	11 Staking rewards	21 Uniqueness	31 Ownership history	41 Gated community	51 Releases and milestones
	08 Play-to-Earn	12 Trade NFTs	22 Rarity	32 Celebrity effects	access rights	52 Sustainable development
	010 Free-to-Play	13 Collateral loans		33 Social reputation	44 Airdrop rewards	goals
		15 Rentals			46 Governance and vote	53 Marketing strategy plan
					47 Competitions rewards	54 Epics and features

Appendix C. Interview protocol: understanding NFT value perceptions among generation z holders of lion travel NFTs (born between 1990-2010)

Introduction:

- Firstly, thank you for participating in this interview. I am [Researcher's Name], the interviewer for today.
- The purpose of this interview is to understand NFT holders' perspectives on the continued holding of NFTs. We have a total of six primary questions, and this interview will take approximately 10 minutes.
- With your permission, may we record this interview for accuracy? Please be

assured that the recording will only be used for academic purposes and will not be made public.

- Our analysis will focus on general trends and insights and will not pinpoint individual responses. Remember, there are no right or wrong answers, so please feel free to share your thoughts candidly.
- Can you hear me clearly? If everything's okay, we'll proceed.

Demographics:

- May I ask your age? How many NFTs do you currently hold, and when did you first purchase an NFT?
- Value Perception of Lion Travel NFT:
- Do you believe the "Lion Travel NFT" holds value? What kind of value do you think it offers?
- Subtopics: Guided around four values from Lion Travel's NFT project.

NFT values:

- Utility: In its 2022 launch, Lion Travel released 400 NFTs, allowing holders daily free coffee redemptions at all Gonna entertainment venues. They also offer a variety of bonuses, like lodging vouchers, five-star hotel meal vouchers, movie tickets, and more. More recently, new offers like lodging discounts and monthly travel product lotteries were introduced for NFT holders. Do these tangible benefits add value to their NFT for you?
- Financial: Lion Travel NFTs come with various functionalities, such as redeeming 30 cups of coffee. Do you think they hold resale value?
- Collectible: With Lion Group moving towards Web3 and offering both virtual and real-world benefits, they've maintained a limited release for their NFTs. Does this make you want to collect them?
- Provenance: Lion Travel is one of the most renowned and largest travel agencies in the country and is a listed company. Does its brand reputation add value to its NFTs for you?
- Community: Lion Travel NFTs will be symbolic in the metaverse and community in the future, with holders able to redeem real-world services from the Lion Group. For instance, community members have benefits like

free minting, priority participation, and reward redemption. Moreover, sharing experiences in the community grants a 10% points rebate. Does the community aspect enhance the value of the NFT for you?

- Are the values attributed to the "Lion Travel NFT" personally appealing to you? Could you briefly share why?
- Are you satisfied with the values bestowed by the "Lion Travel NFT"? Could you briefly share why?
- Do you feel that the values provided by the "Lion Travel NFT" you currently hold are unique? Could you briefly share why?
- Do you wish to continue holding the Lion Travel NFT because of its uniqueness?
- Would you want to retain it due to its appeal?
- Would you keep it because of your satisfaction with it?

Conclusion:

- That concludes our questions for today. Are there any additional comments or thoughts you'd like to share?
- Finally, thank you for your time and valuable insights.

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