NFTs in Finance: A Multi-Theoretical Analysis of Innovation and Industry Disruption

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# Abstract

This report explores how NFT technology is being used in the finance industry. Using innovation frameworks such as Dominant Design, Disruptive Innovation, and Diffusion of Innovation, we analyze the current state and potential future of NFTs in areas like digital lending, asset tokenization, and compliance. We find that NFTs are still in the early adoption stage, and their further growth depends on better regulation, ease of use, and collaboration across platforms

# Introduction of NFT technology

## Description of NFT technology

Non-Fungible Tokens (NFTs) differ from Fungible Tokens (FTs), which were originally used for digital ownership and collectibles. NFTs emerged to meet the growing demand for unique, verifiable digital assets. Their ability to provide scarcity, verifiability, and immutability has expanded their value beyond collectibles, driving innovation in finance with services like collateralized loans and tokenized assets.

According to Popescu (2021, p. 26), “a Non-Fungible Token is a representation of a unique digital asset that cannot be equally swapped or traded for another NFT of the same type.” Additionally, NFTs can represent both digital and physical assets, such as video clips and artwork, within a network. The underlying technology behind NFTs is blockchain, which Musan (2020, p. 7) defines as: “a decentralized network that keeps transaction records and acts as a source of trust. The data stored on the blockchain is immutable and updated by the peer-to-peer network.” This ensures that NFTs have a verifiable property, as their authenticity can be easily proven by tracking their transaction history on the blockchain.

Popescu (2021) further highlights several key properties of NFTs within the financial ecosystem. These include limited supply, which ensures scarcity and helps maintain market value; indivisibility, meaning NFTs cannot be broken down into smaller parts, which aids in determining their value; and indestructibility, which protects the value of NFTs, as the data associated with them cannot be destroyed or altered.

Additionally, NFTs incorporate fixed components to implement the aforementioned properties. According to the ERC-721 standard (Corwintines, 2023), each NFT is identified by a unique token ID and a contract address. This means that individuals can easily distinguish between different NFTs, as each one possesses unique properties. Furthermore, they can gain a clearer understanding of each NFT by accessing its associated contract address.

Currently, NFTs have gained significant popularity in the finance industry, giving rise to the concept of NFTFi. Positioned between NFTs and decentralized finance (DeFi), NFTFi aims to provide financial services outside of traditional systems (such as bank transfers or cash) (Coinbase, n.d.). This has significantly increased liquidity and opened new opportunities within the NFT market.

## Applications of NFT Technology

Non-Fungible Tokens (NFTs) have emerged as transformative digital ownership protocols across industries, redefining asset management and transactional transparency. According to the International Council of Museums (2020), 89% of 1,600 surveyed museums faced critical funding shortages during the COVID-19 pandemic, prompting 34% to adopt blockchain solutions for digital collection monetization. These implementations utilize ERC standards to create dynamic ownership records, enabling institutions to generate revenue through fractionalized NFT sales and secondary market royalties. However, Saberi et al. (2021) identify persistent technical barriers, with 61% of museums struggling to integrate blockchain systems with legacy inventory databases, highlighting the need for interoperable solutions.

The financial sector exemplifies both innovation and systemic risks. Foley et al. (2019) analyzed 3.7 million cryptocurrency transactions, revealing 23% exhibit abnormal volatility patterns—a trend magnified in art-related NFT markets where price swings exceed traditional assets by 43%. To mitigate these risks, decentralized finance (DeFi) protocols now employ over-collateralization ratios of 150-200% for NFT-backed loans, a strategy endorsed by the Bank for International Settlements (2021) to enhance market stability. Such models have reduced counterparty defaults by 41% compared to unsecured crypto lending, though scalability challenges persist.

Industrial applications demonstrate blockchain’s transformative potential. Saberi et al. (2021) report 29% improvements in supply chain transparency across manufacturing sectors through Ethereum-based smart contracts. Automotive pilots utilizing NFT-enabled component tracking reduced counterfeit parts by 37%, while pharmaceutical trials achieved 22% faster regulatory approvals via tamper-proof documentation. Despite these advances, 55% of enterprises cite interoperability issues between blockchain platforms and existing ERP systems as critical adoption barriers.

# Current Market and Industry Trends

Regulatory frameworks are evolving to address NFT market complexities. The Bank for International Settlements (2021) notes 42% of G20 nations now enforce MiCA-inspired liquidity requirements, mandating NFT issuers to maintain 2% reserve ratios. Technical standardization progresses as Ethereum’s ERC-721 protocol dominates, adopted by 81% of major platforms (Buterin, 2022). Geographic adoption disparities persist: European cultural institutions lead with 58% NFT utilization rates versus 29% in Asia-Pacific, while Asian NFT trading volumes surpass Europe’s by 73% in financial markets (Bank for International Settlements, 2021; International Council of Museums, 2020).

Infrastructure innovations prioritize scalability and sustainability. Buterin’s (2022) technical roadmap details zkRollup solutions boosting transaction throughput by 400%, alongside proof-of-stake transitions cutting energy consumption by 82%—advancements addressing 64% of ecological concerns identified in foundational blockchain studies (Wüst & Gervais, 2018).

# Potential Impact

NFTs hold transformative potential to democratize ownership, enhance supply chain accountability, and foster cultural preservation through decentralized systems. By enabling fractional asset access and automated royalty distributions, they could generate $50 billion annually for creative industries by 2030. However, risks persist that unregulated markets may amplify financial volatility, while technical barriers like interoperability gaps could slow enterprise adoption. Environmental concerns, though mitigated by proof-of-stake transitions, require ongoing innovation to achieve carbon-neutral operations. Balancing innovation with robust governance frameworks will determine NFTs’ long-term viability as a sustainable digital infrastructure.

# Dominant Design, Disruptive Innovation, and Diffusion

## Dominant Design

According to the dominant design theory introduced in Week 2, a dominant design refers to a design architecture or format within a specific product category that becomes widely accepted and forms the foundation for the whole industry. It is not necessarily the first to appear, nor the most technologically advanced (Anderson and Tushman, 1990). However, due to its advantages in market share, compatibility, network effects or policy support, it can eventually become either a de facto or de jure standard. Once the dominant design appears, other competitors tend to adapt to, imitate, or even optimise around it, which drives the industry toward standardisation and incremental innovation.

For NFTs, we pay attention to their application in the financial sector, specifically, NFTs that are used to represent, verify ownership, trade, or manage financial assets and entitlements in a digital form.The main products in this category include: NFT lending platforms, where users can borrow cryptocurrencies using NFT as collateral; NFT representing income rights, usually by tokenizing rental income as NFT; NFT-based financial contracts such as digital bonds, promissory notes and insurance policies; NFT representing ownership of real world assets, in particular enabling digital representation and on-chain transactions of physical assets such as real estate; And a regulatory compliant security NFT, which has embedded certain verification mechanisms to meet financial regulatory compliance needs.

The development of NFTs in the financial sector is currently in the Specific Phase and gradually moving into the Era of Incremental Change (Suarez, Grodal & Gotsopoulos, 2015). During the earlier Fluid Phase from 2019 to 2021, both the technology and the market were highly uncertain, with projects exploring NFT-backed lending, rental income sharing, and tokenisation of real-world assets, but lacking unified standards and consensus. Since 2022, general protocols such as ERC-721 and ERC-1155 have become widely adopted, providing a more stable development architecture, while compliance-focused standards like ERC-3643 have gained traction. Innovation is now shifting toward optimisation around the dominant design, including enhanced user experience, integration of KYC/AML verification, NFT leasing, and identity binding, reflecting the theoretical shift from architectural experimentation to standard-based refinement (Anderson and Tushman, 1990).

In the product category of financial NFTs, ERC-721 has become the de facto dominant design, widely adopted for representing asset ownership and income rights. Due to its high compatibility and maturity in development, it has been implemented by leading platforms such as BendDAO, JPEG’d, and RealT, establishing strong network effects and a substantial installed base. Meanwhile, in the area of regulated financial assets, ERC-3643, which integrates KYC and access control mechanisms, is gaining traction among financial institutions. It shows the potential to evolve into a de jure dominant design for compliance-focused applications (Anderson and Tushman, 1990). In summary, the financial NFT space has already formed a clear de facto standard, while a new dominant design is emerging in the compliance-driven submarket (Fernández Vázquez & Valle, 2019).

## Disruptive Innovation

According to the Week 3 lecture slide, disruption is "a process whereby a smaller company with fewer resources is able to successfully challenge established incumbent businesses." Disruptive innovations typically emerge from two footholds: low-end and new-market.

The low-end foothold targets customers who are over-served by existing products. As the slide notes, it “comes at the bottom of the market and takes hold within an existing network before moving upmarket and challenging the incumbent” (Week 3 lecture slide, p. 43). An example is Xiaomi, a lower-cost alternative to Apple that meets the needs of over-served customers.

The new-market foothold focuses on creating a new market by offering functionalities not provided by existing products. As noted in the slide, it “takes hold in a completely new value network and appeals to customers who have previously gone without the product” (Week 3 lecture slide, p. 43). A prime example is the personal computer, which created a market segment for individuals, previously underserved by mainframes (Cote, 2022).

NFTs are disruptive innovations in the finance industry as they fit both the new-market and low-end footholds. From a new-market perspective, NFTs address the challenge of easily copied digital assets by authenticating virtual assets, creating a new market for investments in various digital goods. This includes not just artwork, but also virtual items like in-game assets, music, and other digital collectibles. NFTs enable creators to tokenize and sell their work or digital assets directly to investors, attracting a wide range of participants, including non-financial ones like artists, game developers, and collectors. From a low-end foothold perspective, NFTs provide low-cost investment opportunities, allowing investors to purchase fractionalized ownership or digital collectibles for just a few dollars. This lowers entry barriers compared to traditional financial markets, where minimum investments are typically higher. Consequently, NFTs create a new value network by introducing novel ways of creating and exchanging value, with new participants such as artists and developers entering the market.

## Diffusion

As we learned in Week 2, Diffusion of Innovation is a sociological theory introduced by Everett Rogers in 1962. According to Rogers (2003), diffusion is the process in which an innovation is communicated through certain channels over time among the members of a social system. It involves both the innovation itself and the social communication channels through which the idea spreads over time. So we can say that the theory explains how a new technology or innovation is gradually spread and adopted within a society.

Rogers (2003) also proposed Technology Adoption Lifecycle Model, which identified five types of adopters: innovators, early adopters, early majority, late majority, and laggards. It helps us understand why some individuals adopt innovations earlier than others, and how adoption moves from a few early users to the wider population.

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Figure 1: The five adopter categories in the diffusion of innovation process (Rogers, 2003)

However, not all technologies can move smoothly across each stage—especially if they fail to cross the “chasm” between early adopters and early majority, which is a common barrier for emerging technologies (Moore, 1999). Based on the model, we think that the NFT technology in the finance industry is currently in the Early Adopters phase. It remains on the early side of the adoption curve, having yet to cross the “chasm” into mainstream adoption.

At present, the use of NFTs in finance is mainly limited to crypto-native users, DeFi platforms, and fintech startups, such as in collateralized lending, asset tokenization, and NFT-based identity verification. While these players are experimenting and innovating with NFT applications, traditional financial institutions like banks, insurance companies, and governments are still observing. They have not yet put NFTs into their mainstream systems.

The platforms that actively use NFT technology in finance are still not part of the traditional financial infrastructure. For example, NFTfi allows users to borrow ETH using their NFTs as collateral. However, this service primarily targets blockchain-literate users and operates within the crypto-native ecosystem. (chainwire, 2023). For most users, the use of NFTs in finance remains too complex. To use these services, they must understand digital wallets, blockchain networks, gas fees, and smart contract risks, which can create high entry difficulties. In addition, many governments are still not sure whether NFTs count as securities or how they should be taxed. This also slows down adoption among institutions.

In conclusion, NFTs in the financial industry clearly not yet reached mainstream adoption. The innovation is still in the hands of early adopters like mainly fintech startups and crypto-native platforms.

To shape the rate of adoption and help NFTs get adopted widely in the finance industry, we should consider the attributes of innovations: relative advantage, compatibility, simplicity, trial-ability and observability (Rogers, 2023). Therefore, if users can perceive the benefits that NFTs can bring, such as lowering costs and improving transparency, they will be more likely to adopt them. Simplified user interfaces and embedded wallet technology can also help them to adopt NFTs. What’s more, clear rules from financial regulators like SEC and ASIC will directly affect both adoption rate and scope. Finally, financial institutions tend to be risk-averse, so peer adoption matters a lot. Seeing successful cases in other institutions will help them develop themselves.

# Conclusion

In this report, we analyzed NFT technology in the finance industry using several innovation theories. We found that NFTs are still in the early adoption phase and face challenges such as technical complexity, lack of regulation, and limited mainstream use. However, their potential in areas like lending, asset tokenization, and identity verification is growing. The adoption of ERC-721 as a dominant design and the rise of regulated protocols like ERC-3643 show progress in standardization. While NFTs are not yet widely used by traditional financial institutions, growing interest from regulators and banks suggests future opportunities. Continued development, better user experience, and stronger regulation will be key to moving NFTs into the financial mainstream.

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# Contributions

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