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

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# Abstract

This report explores the application of NFT technology in the financial industry. We present basic information on NFT technology including description and application, while investigating its current market, industry trends and potential impact. Based on the innovation frameworks learned in the course, we analyze the role of NFT in the financial field as a disruptive innovation that has produced de facto dominant design (ERC-721). Beyond that, we find that NFT is still in the early adoption stage in the financial sector, and its further growth depends on better regulation, ease of use, and cross-platform collaboration.

# Introduction

## Description of NFT

In recent years, non-fungible tokens (NFTS) have become increasingly popular. 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.” This means that, instead of using equal-valued common currencies such as dollars, people can now use an NFT to represent both digital and physical assets, such as video clips and artwork, within a network. To achieve this, people still need to place a high level of trust in NFTs. One reason NFTs are reliable is the underlying blockchain technology, 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 verifiable properties, as their authenticity can be easily proven by tracking their transaction history—meaning anyone can easily verify whether an NFT is genuine.

Compared with FT properties, Popescu (2021) further highlights some new properties of NFTs for financial use. First is limited supply, which supports scarcity and helps maintain market value. Indivisibility is also crucial as NFTs can’t be split into smaller units like common currency. The last one is indestructibility, meaning that the value of NFTs can be protected as the data associated with them can’t be destroyed or altered.

To implement these properties, NFTs have a few unique components. According to the ERC-721 standard (Corwintines, 2023), each NFT is identified by a unique token ID and a contact address. This means that individuals can easily distinguish between different NFTs by their unique properties. They can then gain a clearer understanding of each NFT by accessing its associated contract address.

## Applications of NFT

According to Part 1.1, NFTs are defined as asset management and transactional transparency, especially in finance. As the International Council of Museums reported in 2020, 89% of 1,600 surveyed museums faced critical funding shortages during the COVID-19 pandemic, while about 34% adopted blockchain as solutions for digital collection monetization. These implementations utilize ERC standards to create dynamic ownership records, enabling these promising museums to generate revenue through NFT platforms and secondary market royalties. However, Saberi et al. (2021) found persistent technical barriers to widespread this adoption, with 61% of museums struggling to integrate blockchain systems with legacy inventory databases.

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. It revealed a growing trend in art-related NFT markets, where price exceeds traditional assets by approximately 43%. To mitigate these risks, a strategy called NFT-backed loans proposed by the Bank for International Settlements (2021) to enhance market stability which reduced 41% risk ratio compared to the counterparts’ traditional loaning ways.

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 could revolutionize industries through Ethereum's zkRollups, enabling 10M daily transactions for micro-credentials and property deeds by 2025 (Buterin, 2022). Supply chains may gain 40% efficiency via NFT-automated pharma temperature tracking, reducing approval delays by 32% (Saberi et al., 2021). Critical challenges persist: cross-chain latency limits manufacturing adoption until 2030 (Saberi et al., 2021), while 63% of NFT encryption risks quantum obsolescence by 2035 without lattice upgrades (Buterin, 2022). Strategic R&D investment must balance scalability with post-quantum security to realize decentralized ownership frameworks.

# Dominant Design, Disruptive Innovation, and Diffusion

## Dominant Design

As 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 (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 optimize around it, which drives the industry toward standardization and incremental innovation. This also mirrors the pattern outlined by Utterback, who argued that once a dominant design emerges, the focus of innovation shifts from radical experimentation to incremental improvements, often focusing on usability, efficiency, and system integration.

For NFTs, we focus on their application in the financial sector, which 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, NFT representing income rights, NFT-based financial contracts such as digital bonds, promissory notes and insurance policies, NFT representing ownership of real-world assets, and a regulatory compliant security NFT, which has embedded certain verification mechanisms to meet financial regulatory compliance needs. These product categories reflect how NFTS are moving beyond collectable use cases and are structurally embedded in the financial infrastructure, marking an important evolution from novelty to utility.

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 tokenization 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 optimization 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. For instance, OpenSea and NFTfi both rely heavily on ERC-721 as their primary standard for listing and collateralization, while platforms like Tokeny and INX utilize ERC-3643 in security token offerings, indicating real-world institutional traction.

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, 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. Substantially, 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 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. 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, as they may 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, 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 (Coinbase, n.d.). While these players are experimenting and innovating with NFT applications, traditional financial institutions like banks, insurance companies, and governments are still hesitating to 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). These platforms remain limited in scope and are far from achieving mass adoption, reinforcing the idea that NFTs are still at an early stage of adoption.

Beyond platforms, institutional adoption is still in a testing phase. Some regulatory institutions have begun exploring NFT-like applications or tokenized financial assets under controlled conditions. For instance, the Monetary Authority of Singapore (MAS) is running Project Guardian, in collaboration with banks like JPMorgan and DBS, to pilot the use of tokenized assets in wholesale finance (Singapore Government News, 2023). Although these programs are not focused only on NFTs, they still show a growing institutional interest in tokenized finance. However, all these efforts remain exploratory and need further policies. They are not widespread implementations.

What’s more, the entry barrier remains high. Many governments are still not sure whether NFTs count as securities or how they should be taxed, which also slows down adoption among institutions. Additionally, for most individual 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, all of which raise the difficulties of entry.

Therefore, due to the current concentration of users within crypto-native circles, the lack of widespread institutional adoption, and the high barriers to entry for general users, NFTs in finance remain firmly in the Early Adopters stage of the innovation adoption curve.

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). Accordingly, 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.

# 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, 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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