



A COMPLETE OVERVIEW OF NON-FUNGIBLE TOKENS

Ms.Sumi M, Vaisakh M

Assistant Professor, MCA scholar

Department of MCA,

Nehru College Of Engineering And Research Center, Thrissur, India

Abstract: This research explores how Non-fungible Token (NFT)s are spreading throughout the market. NFTs have the potential to invade all of our lives from education to sports NFTs is in the play now. The outcome of this research highlights the current trend, history, and the future potential this holds.

Index Terms - Non-Fungible Tokens , Opensea, Counterparty, Cryptopunks, Ethereum, Cryptokitties.

I. INTRODUCTION

In recent months, the NFT market has been growing exponentially as it appears to be the most widely accepted business application of Blockchain technology [1], since the introduction of crypto. With the emergence of the metaverse [2], it is clear that NFTs will play a huge role in tomorrow's internet [3] due to their ability to make digital items have scarcity, uniqueness, and proof of ownership, similar to physical items [4]. Human interactions of the next decade on the internet may entirely rely on NFTs. *What are NFTs?*

NFTs are provably scarce unique digital assets that can be used to represent ownership [5]. They can be one-of-a kind rare artworks, collectible trading cards, and other assets with the potential to increase in value due to scarcity [6], [7]. While being digital assets, they also can be used to represent physical assets. A digital certificate of land/ qualification can be identified as a couple of examples. The biggest winners in the NFT space over the last few months have been digital artists who were able to sell art worth over \$2.5 Billion [8].

NFTs were introduced by Ethereum [9] as an improvement proposal [10], [11] in the Ethereum Request for Comments (ERC)-721 standard [5]. This allows anyone to implement a Smart Contract with the ERC-721 standard and let people mint NFTs as well as, keep track of the tokens produced by it. This allows the created tokens to be validated.

Smart Contracts & ERC standards

Smart Contracts in simple terms are the code that is running on the Blockchain. 3 of the notable ERC standards can be identified in Table I.

ERC-721	ERC-777	ERC-1155	ERC-20
Non-fungible tokens	Non-fungible tokens [12]	Semi-fungible tokens [13]	Fungible tokens
Each token is completely unique	A richer standard for Fungible tokens, enabling new use cases and building on past learnings. Backwards compatible with ERC20.	Tokens begin trading as Fungible tokens then may end up being non-fungible in the long run	All coins of one kind are equivalent and hold the same value
CryptoKitties [14]		Concert tickets, gift vouchers, coupons	Cryptocurrencies - Bitcoin, ETH

TABLE I: COMPARISON OF ERC STANDARDS

Each of the created tokens is unique from the other tokens created by the same Smart Contract, unlike fungible tokens which were introduced with cryptocurrencies and are denoted by the ERC-20 standard [15] on the Ethereum network. A Bitcoin can be swapped with another Bitcoin, but each and every NFT is unique. Then, the deployed Smart Contract will be responsible to keep in-check of the tokens created by it on the network.

For each and every NFT, the contract address & tokenId are globally unique on any blockchain. This allows Decentralized Applications (DApps) [17], [18] to take the tokenId and present the image/ asset that is identified by the particular NFT.

OpenSea, which was the first NFT marketplace is also considered to be the largest. In the attempt to become the "Amazon of NFTs", OpenSea raised \$23 million in a Series A [19], following a \$100 million raise in a Series B round, ending the company in a valuation of \$1.5 billion [20], [21]. Open Sea saw nearly \$150 million in sales in the month of June. These marketplaces are now set to increase access to the digital goods industry [22]. An NFT purchased on an Ethereum marketplace can be traded on any other Ethereum marketplace for a completely different NFT. Creators don't need to sell their NFT on a market. They can do the peer-to-peer transaction, completely secured by Blockchain. No one is needed to act as an intermediate and an owner isn't locked onto any platform [5].

II.HISTORY OF NFTs

Non-fungible tokens have been around for a long time. After Bitcoin was founded in 2009 and the initial hike and hype in token types such as Litecoin, Ripple, and so on, many people were looking to innovate on blockchain technology to create newer, more powerful tokens. In this section, we present a walkthrough on the brief history of NFTs.

The study comprised of non-financial companies listed at KSE-100 Index and 30 actively traded companies are selected on the bases of market capitalization. And 2015 is taken as base year for KSE-100 index.

1.Colored Coins

The predecessors of non-fungible tokens were arguably colored coins, which were first formulated in a blog post by Yoni Assia in March 2012. They were very small parts of Bitcoin that were "colored" with specific attributes/characteristics coded into the metadata using Bitcoin's scripting language. In this way, units as small as one satoshi (named after Satoshi Nakamoto) (0.0000001 BTC) could represent any asset you can imagine, be it a dollar, shares in a company, a house, or digital collectibles. Although the concept of colored coins was very promising and potentially powerful, it had major flaws and drawbacks:

- 1.The Bitcoin network did not officially support colored coins. So, it was up to wallet providers to recognize the existence of colored coins.
- 2.The minimum transaction size for a Bitcoin back then was 5,430 satoshi (0.000543 BTC), which was much too large for the implementation of colored coins.
- 3.Colored coins are allowed for not just the creation of NFTs, but also for any asset. Therefore, the creation of Ethereum's ERC-20 token standard in 2015 took away much of the purpose of colored coins, since ERC-20 are much more flexible. And platforms such as Counterparty took over colored coins' NFT function.

As for now, colored coins slowly fizzled and are out of the league. Coin prism, the first wallet to support colored coins, shut down in 2018, citing regulatory pressure and the inflexibility and relative sluggishness of the Bitcoin network.

2. COUNTERPARTY.IO

Counterparty was supported in 2014, building on the thought of colored coins to issue non-fungible and semi-fungible tokens. Counterparty's founders understood that Bitcoin didn't support the options that may leave the creation of sturdy plus creation and commerce platforms. In 2015, the mobile game Spells of Genesis became the primary to issue in-game assets onto any blockchain, doing thus through Counterparty. The platform saw success in 2016 because of the fashionable card game Force of can-issued cards on Counterparty. At the time, Force of can was the fourth most well-liked card game in North America, behind home names like Magic: The Gathering, Pokémon, and Yu-Gi-Oh. Even though blockchain-based in-game assets would still see use, the most important innovation came in 2016 once folks began provision edition Rare Pepes on Counterparty, supporting the favored and now and then polemic culture character Pepe the Frog. Of course, the concept of a "rare" online image is absurd since they'll simply be traced, however, folks had been discussing the notion since 2015. Although you'll be tempted to dismiss Rare Pepe cards as silly, in reality, they function as a robust demonstration of the human want to have one thing that's rare and has some usually perceived aesthetic or collectible price, a mixture that allowed Rare Pepes to become a moment sensation. Rare Pepes will sell for thousands of bucks, with the top being a landmark digital art auction in 2019, where ever associate ultra-rare, one-of-a-kind Homer Simpson Pepe (pictured above) sold for \$38,500.

3. CryptoPunks

With Rare Pepes providing a recipe for success, John Watkinson and Matt Hall in June 2017 created CryptoPunks – algorithmically-generated, 24x24 pixel characters that live on the Ethereum blockchain. Only 10,000 characters with unique appearances were created. The CryptoPunks founders allowed anyone to claim the Punks for free all 10,000 were quickly claimed.

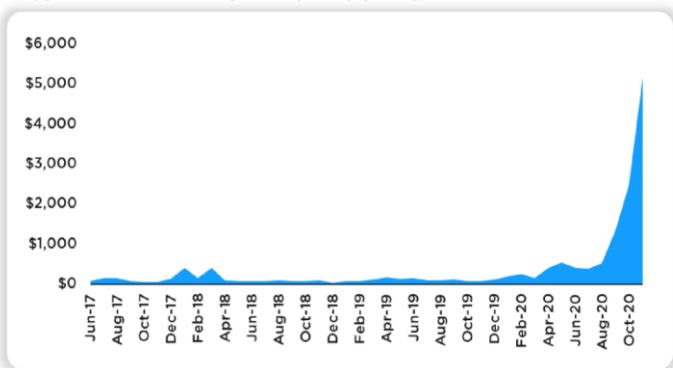


Figure 1: Cryptopunks Appearance

Different Punk types and attributes have different rarities, and certain specific combinations of rare or desirable traits/attributes can be tremendously valuable. For example, ape-types are the second rarest. The most expensive Punk ever, an Ape Punk with a Hoodie, sold for 150 ETH (US\$71,403) just this month. Although CryptoPunks were already a viral sensation when they first launched, lately they have really been catching the attention of the NFT community. As the earliest “true NFT” launched on Ethereum, many are beginning to treat Punk ownership as a badge of honour, almost as a status symbol demonstrating that the owner is a “true OG” of the crypto world.

CryptoPunks Average Price per Transaction

CryptoPunks are selling for a pretty penny as traders seek collectibles



As of October 31, 2020

Figure 2: average pricing per transaction of cryptopunks

Since CryptoPunks was created before the invention of the ERC-721 non-fungible token standard, the founders had to use a modified version of the ERC-20 token for the Punks (token address). CryptoPunks served as the inspiration the ERC-721 standard, paving the way for the truly viral NFT sensation to come: CryptoKitties.

III. VALUE-DRIVING FACTORS OF NFTS

A. Benefits of NFTs for creators, collectors & buyers

NFTs have a feature to allow a creator to make a certain percentage as royalty whenever the NFT is transferred to a new buyer. Since the items can be verified on the Blockchain, it also ensures that the original creator of the NFT can be tracked down and given due credit, on any date in the future, no matter how many wallets it gets passed through [22]. Apart from the fact that a buyer can claim the right of ownership of the original item, they also get to financially support the creator. Ultimately, NFTs may gain value over time due to their scarcity. This gives collectors an additional advantage of being able to sell it for a higher price later on.

Creators can also create “shares” for their NFT. This allows investors and fans to own a portion of an NFT without having to purchase the entire thing [5].

B. Pricing of NFTs

When considering the ownership desire of NFTs, it is understood that the increase in the price of an NFT has the possibility of being a factor to be considered when making a purchase.

The very first study done examining the pricing of NFTs suggests that “prospects for future studies are potentially limitless, as at the beginning of any new market” [27]. As a future study, the author has suggested identifying if there’s a fundamental model that drives the price determination in NFTs.

“The value of an NFT is entirely determined by what someone else is willing to pay for it.”[6]

The value of an NFT has been identified to be heavily reliant on the public's acceptance of the item. Demand is expected to drive price rather than technical, or economic indicators which are the usual factors that affect stock prices and investor demand.[5]

It cannot be replicated. Similar to a Mona Lisa painting, popularity helps improve the value of the original, and only the original is identified as the truly original painting with immense value, even though anyone can Google and get a copy of the painting.

However, knowing Crypto price prediction models is important since Wavelet coherence analysis indicates a co-movement between these two markets [1].

IV. TOP PROJECTS IN NFTS

Since 2017, many projects have sprung up in NFTs. According to The Block Research, there are at least 73 NFT platforms today – we list some of the most prominent ones below in the Table II:

Collectibles	<p><i>CryptoPunks</i>: Collectible characters that were algorithmically generated, created by Larva Labs .</p> <p><i>Avatars</i>: Users can mint and collect avatars</p> <p><i>Meme</i>: Farming tokens that can be used to redeem limited edition collectible NFTs.</p>
Gaming	<p><i>Axie Infinity</i>: Collect, raise, and breed Axies to take into battle</p> <p><i>CryptoKitties</i>: Purchase, breed, trade, and collect unique digital cats</p> <p><i>Sorare</i>: Fantasy football game where users can collect, trade, and field player cards</p>
Virtual World	<p><i>Decentraland</i>: Virtual world based on Ethereum, where users can trade virtual real Estate.</p> <p><i>Cryptovoxels</i>: Buy land in this virtual world, build stores and art galleries, and host events.</p>
Domain Names	<p><i>Ethereum Name Service</i>: Register a named .eth domain to receive payments</p> <p><i>Unstoppable Domains</i>: Platform to register blockchain domains for your crypto wallets.</p>
Marketplaces	<p><i>SuperRare</i>: Marketplace for digital art</p> <p><i>Rarible</i>: Marketplace for digital collectibles. Trade on Rarible to farm RARI token</p> <p><i>OpenSea</i>: P2P marketplace for all NFTs</p>
DeFi	<p><i>Aavegotchi</i>: Own and trade avatars backed by interest-bearing tokens representing loans on</p> <p><i>Defi</i>: lending platform Aave</p> <p><i>NFTfi</i>: Use NFTs as collateral for a loan.</p>

TABLE II: TOP ADVANCES / PROJECTS USING NFTs

V. ROADBLOCKS TO MASS ADOPTION

Inaccessibility: The most popular uses for NFTs are collectibles, art, and gaming. Although the market for these kinds of assets should naturally be very large, the fact is that NFTs are limited mainly to relatively veteran crypto users familiar with who know how to use Dapps.

Novel Technology: The technology behind NFTs is merely some years previous, having been created in their current type some years ago. The understanding around these assets continues to be terribly poor, leading several to question NFT's safety and believability. This possible implies that current adoptive parents of NFT technology square measure still well inside the first adopter, niche user demographic.

Transaction Fees: As NFTs live mostly on the Ethereum blockchain today, creating and transacting NFTs can depend highly on the network activity at any given moment. During the height of the DeFi craze in September as Uni-swap launched their token and yield farming incentive, gas prices reached a staggering 1000 gwei.

Difficult Real-World Linkage: Even if NFTs will represent planet assets, really guaranteeing a NFT holders' claim to possession on a true plus will be powerful. For instance, however will a user take care that a NFT purportedly joined to a real-world plus really guarantees him the possession of a physical item? In order to attain this, planet firms can have to be compelled to issue their own NFTs or partner with crypto firms to attain this. it' s conjointly questionable whether or not NFTs would confer any edges over a standard info.

Regulation: Due to NFTs ability to be accustomed represent planet assets, NFT comes run the chance of those tokens being thought-about securities and catching the eye of regulators. this could be a deterrent to developers UN agency may be on the fence regarding building new NFTs.

These roadblocks area unit something however trivial, however we tend to area unit seeing hopeful signs that the business is setting out to address them. to handle the user-unfriendliness of NFTs, blockchain-based games area unit setting out to rethink their approach to the user expertise. From our perspective, we tend to believe NFTs can have achieved mass adoption if there area unit legion users interacting with NFTs while not even being alert to these tokens' existence – in different words, a seamless user expertise. However, we should always note, because the founding father of Opensea will during this piece, that “abstracting away the blockchain,” though a stimulating construct, ultimately area unit less enticing to the additional hardcore community that comprise the first adopters that structure the NFT community nowadays. Addressing the opposite roadblocks, on the opposite hand, may be a matter of your time. For real-world linkages, we tend to area unit seeing additional and additional firms setting out to adopt NFT technology, in industries like auction homes, shopper product, property, and more.

VI. CONCLUSION

In conclusion, although we have seen promising signs of life within the NFT space, there is still a long way to go before this novel application of blockchain technology reaches mass adoption. The technology has definitely come a long way since its inception in 2012, but it will undoubtedly take some more time before it is proven that NFTs are more than just an ultra-niche sector for early adopters to play in.

Key Takeaways

- Non-fungible tokens mix the simplest traits of decentralised blockchain technology with non-fungible assets to form demonstrably distinctive, demonstrably scarce, and demonstrably authentic tokens utilizing blockchain technology.
- NFTs are applicable in a wide range of use cases, including: collectibles, gaming, art, virtual assets, tokenizing real world assets. They also allow for a flexible way to store, control, and protect the information related to one's identity.
- Non-fungible tokens have had a long history, since 2012 with the introduction of colored coins built on the Bitcoin network. Since then, NFTs have primarily moved to Ethereum, where non-fungible token standards such as ERC-721 and ERC-1155 can be minted and traded easily and seamlessly.
- The first NFT collectibles that really took off in popularity were Rare Pepes. This was followed by CryptoPunks, and then arguably the most successful and well-known NFT project ever, CryptoKitties.
- During the Ethereum boom of late 2017 and early 2018, NFT activity in CryptoKitties drove a huge spike in activity. When the market crashed in 2018, however, interest in NFTs was also impacted and stagnated until late 2020, when NFTs saw a resurgence.
- Despite this, the adoption of NFTs is still low relative to the tens of millions of people who own cryptocurrencies worldwide. The roadblocks preventing mass adoption of NFTs are: inaccessibility, the newness of the technology, the volatility of transaction fees, difficulty to link real-world assets to NFTs, and regulation.

VII. REFERENCES

- [1] [1] M. Dowling. (Apr. 29, 2021). "Is non-fungible token pricing driven by cryptocurrencies? — elsevier enhanced reader," [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S1544612321001781?via%3Dihub> (visited on 06/23/2021).
- [2] Casey Newton. (Jul. 22, 2021). "Mark Zuckerberg is betting Facebook's future on the metaverse - the Verge," The Verge, [Online]. Available: <https://www.theverge.com/22588022/mark-zuckerberg-facebook-ceo-metaverse-interview> (visited on 11/20/2021).
- [3] Peter Allen Clark. (Nov. 15, 2021). "What is the metaverse? here's why it matters — time," Time, [Online]. Available: <https://time.com/6116826/what-is-the-metaverse/> (visited on 11/20/2021).
- [4] (). "Non-fungible tokens (NFT)," ethereum.org, [Online]. Available: <https://ethereum.org> (visited on 11/20/2021).
- [5] (). "ERC-721 non-fungible token standard," ethereum.org, [Online]. Available: <https://ethereum.org> (visited on 07/19/2021).
- [6] R. Conti. (Apr. 29, 2021). "What you need to know about non-fungible tokens (NFTs)," Forbes Advisor. Section: Investing, [Online]. Available: <https://www.forbes.com/advisor/investing/nft-non-fungible-token/> (visited on 07/19/2021).
- [7] J. Fairfield, "Tokenized: The law of non-fungible tokens and unique digital property," Social Science Research Network, Rochester, NY, SSRN Scholarly Paper ID 3821102, Apr. 6, 2021. [Online]. Available: <https://papers.ssrn.com/abstract=3821102> (visited on 04/18/2021).
- [8] (Jul. 5, 2021). "Off the chain: NFT market surges to \$2.5b so far this year," Aljazeera, [Online]. Available: <https://www.aljazeera.com/economy/2021/7/5/off-the-chain-nft-market-surges-to-2-5b-so-far-in-2021> (visited on 07/15/2021).
- [9] D.G. Wood, "ETHEREUM: A SECURE DECENTRALISED GENERALISED TRANSACTION LEDGER," p. 39, 2014. (visited on 07/15/2021).
- [10] <https://hbr.org/2021/11/how-nfts-create-value> (). "ERC," Ethereum Improvement Proposals, [Online].

