

The Non-Fungible Token (NFT) Marketplace : Technological Innovation and Opportunities for Creators

A. C. Balaji¹
Padmakumar K.²
S. Anuradha³

Abstract

Purpose : The study concentrated on identifying several use cases for NFTs and analyzing their potential for creators in the marketplace. The purpose of this paper was to provide a foundational understanding of NFTs and their market applications. The current global market capitalization of NFTs is \$40 billion, which is approaching the \$50 billion global market capitalization of art. In India, Bollywood artists and athletes have their own NFT marketplaces to sell their merchandise.

Methodology : The paper conceptually analyzed the use cases of NFTs and their market potential while emphasizing some trading-related issues. As the concept of NFTs is still in its infancy, there is a severe lack of research on NFT use cases. This paper attempted to resolve the lack of research in this field.

Findings : NFT has the potential to create new opportunities for a creative market that has been hampered by a variety of factors related to issues of authentic ownership. NFTs enable artists to sell their products directly to all consumers. No matter how frequently an asset is transferred, NFTs provide secure transactions recorded on the blockchain. Due to the instantaneous global commerce of digital products, barriers no longer exist between artists and collectors. Creators may be eligible for royalties based on a percentage of future sales of their NFT artwork, depending on the terms of the licensing agreement.

Practical Implications : NFTs have the ability to destabilize economies, cultures, and society as a whole. As with any new technology, NFTs have enabled the introduction of a new business model. Since there is no specific legal framework for NFTs in India, they are governed by contract law's fundamental principles. Until cryptocurrencies are formally sanctioned, it is premature to estimate the impact of NFTs under the current circumstances.

Originality : In contrast to previous research on NFTs, the current work expands upon conceptualizing NFTs and analyzes their market applications and issues.

Keywords : non-fungible token, NFT, marketplace, blockchain, cryptocurrency, decentralized finance, opportunities, digital art, gaming industry, metaverse, crypto community

Paper Submission Date : September 15, 2022 ; **Paper sent back for Revision :** May 19, 2023 ; **Paper Acceptance Date :** June 20, 2023 ; **Paper Published Online :** August 16, 2023

¹ Assistant Professor (Corresponding Author), Bahrain Polytechnic, PO Box 3349, Isa Town, Kingdom of Bahrain. (Email : balajeeac@yahoo.com) ; ORCID iD : <https://orcid.org/0000-0003-4811-4413>

² Head of Department – Corporate Communication, Manipal Institute of Communication, Manipal Academy of Higher Education, Manipal - 576 104, Karnataka. (Email : padmakumar.k@manipal.edu)
ORCID iD : <https://orcid.org/0000-0002-7753-0865>

³ Lease & Content Analyst, SJ Enterprises, #G4, Regal Park, Anantha Nagar, Manipal - 576 104, Karnataka. (Email : anuimago@yahoo.com) ; ORCID iD : <https://orcid.org/0009-0000-0346-4853>

DOI : <https://doi.org/10.17010/ijom/2023/v53/i8/172973>

Non-fungible tokens (NFTs) are digital assets stored digitally that define digital creative works or intellectual assets, such as the “soundtrack,” “digital artworks,” “games,” “animated gifs,” and “short video clips.” Fungible means to mention that an asset's units are all the same, interchangeable, and dividable. Physical currencies like INR, Bitcoin, Monies, and even incentive points are all examples of fungible assets. On the other hand, non-fungible assets refer to assets in which each unit is distinct from the others. For example, real estate is a non-fungible asset because each property is unique, with its own set of distinct characteristics, such as the design and layout of the building and its location and estimation. Non-fungible in the context of NFT refers to the tokens that cannot be exchanged. This is done by creating a cryptographic key as a distinctive unit that points to a specific digital asset. NFT is a term used to describe a digital token on a blockchain where each token represents a discrete digital or physical object, such as an in-game item or a collection of rare trading cards (“What is an NFT (non-fungible token)?”, 2021). Tokens are comprised of electronic information whose value can be transferred in cryptocurrencies. The NFTs are the network portion under the Blockchain of Ethereum (Bamakan et al., 2022). Blockchain is a system that maintains the transaction data of Bitcoin or any other cryptocurrency transactions through a peer-to-peer network of interconnected computers in chronological order. In a decentralized blockchain, each network participant owns a copy of the transaction, which anyone can do. Contrarily, only the recognized participants can transact in a centralized Blockchain network. This is very similar to the working model of any organization.

Decentralized finance (DeFi) fee is like the transaction fee but is called the “gas fee,” typically a fraction of the token. The developers collect these charges to process the transaction on the Blockchain (Chandra, 2022). Blockchain-based assets evolved from cryptocurrencies, moving further on to stablecoins, governance tokens, and utility tokens. NFTs represent a new digital asset with a unique ownership and distribution model. Cryptocurrencies, like “Ethereum,” use non-fungible Blockchain networks like NFTs to represent unique physical and digital assets. The idea expanded upon the non-fungibility. It is possible to trace the origin of any NFT via a public Blockchain, which validates and tracks the ownership of each NFT. An NFT is best defined as an “authenticity certificate” issued on the Blockchain by the original inventor, proving cryptographically that whoever owns an official item to which an NFT is attached has full ownership rights to that commodity. Benefits of NFTs include allowing the creators to sell their digital artwork, empowering games to produce provably in-game items, creating new digital collectible ecosystems, and many more utilities via NFTs (Rehman et al., 2021).

The concept of a “metaverse” is one of the most exciting aspects of blockchain technology. Despite the lack of an official description for the metaverse, one can think of it as a parallel Augmented Reality (AR), where various linked virtual worlds come together to create new economic and social activities that mimic our present society. The metaverse influence can be seen throughout games. Now people can participate in a metaverse game environment like never before. In reality, the future metaverse is likely to feel like the largest digital game ever created. Games will benefit from improved engagement, virality, and monetization of the metaverse through augmented reality (AR) and virtual reality (VR) capabilities. People can engage with and support their favorite athletes in new ways by integrating e-commerce, NFTs, and other collectibles.

People can engage in the metaverse and earn third-party cash via “Playermon,” a single game. Real money may be exchanged for in-game currency as part of a more complex in-game economy. Space Gem (SGEM) tokens, which can be acquired by completing tasks, are provided by the game. To bridge the gap between gamers, who want to make additional money, and those who want to have fun, the “play-to-earn” gaming model will be used. Game developers and publishers will be forced to rethink how they do business, and this new paradigm will also allow them to become crypto investors (Salem, 2021).

Following a worldwide disaster, the earth will be transformed into a digital and virtual environment in the 2018 film “Ready Player One” by Steven Spielberg. Although this dystopian vision is a little negative, it is not completely untrue. Non-fungible tokens will continue to grow and be adopted in the coming years in light of these

facts. To an extent, the future of our social connections lies in these non-traditional settings. In view of this fact, these are the places where all of the socialization, animation utilities, gaming, artworks, sports, etc., intersect with NFT. Individuals use their avatars to participate in the virtual world or metaverse. Similar to the social networks of the late 2000s, professional and personal chats might be conducted in 3D digital avatar characters, allowing real-world interactions not constrained by physical limitations like demography, social group, or even health. The NFT industry's worth is not derived from the short-term financial value of assets but rather from the intricate social and economic constructs that value those assets. The owner's emotional tie to specific assets, sentiments, and attitudes toward a potential exhibition that relates to its perceived significance in the place, both at present and in the future, are all instances of these community sentiments (L'Atelier, 2020). In the metaverse economy, NFTs will play a significant role. While in the past, even the most devoted players were not compensated for their contribution to the success of a game, this will enable them to legally enjoy the rewards of their involvement in the success of a game.

The Growth of NFTs

The creative business stands to benefit from its recent growth in prominence greatly. The very first message sent out by Jack, Twitter's co-founder, was sold for \$2.9 million in March 2021 to Sina Estavi, the CEO of Bridge Oracle. Mark Zuckerberg, CEO of Facebook, said that the next digital avatars individuals use in the virtual world would be NFTs while discussing the company's metaverse intentions under the moniker "Meta." NFTs are also used inside the metaverse by smaller organizations like "Decentraland." The Land is an NFT asset in the virtual world of "Decentraland," supported by cryptocurrency and NFTs. Players may earn the token "MANA" for spending time there. Gamers may purchase and sell digital real estate; some even make long-term plans for their digital real estate holdings in South Korea. In "Sandbox," which just launched its Metaverse Alpha version, players may profit from their time in the metaverse because of the virtual gaming world's rewarding system. NFTs may be created, sold, and owned by gamers due to the platform's relationships with several IPs. It will be fascinating to observe how this pattern develops as the metaverse grows in popularity in the days to come (Salem, 2021).

Technology Companies and Start-Ups

Information technology (IT) giants are investing vast sums of money and resources to conquer the metaverse. For example, the Metaverse branch at Facebook has budgeted at least \$10 billion this year, while the Metaverse division at Microsoft has already started taking shape. The smaller firms are also making waves; the metaverse has been around for a while now, with smaller firms working on their versions. Aldin Dynamics, an Icelandic virtual reality software company, is creating a virtual environment based on the video game "Waltz of Wizards." There is a good probability that the next big innovation will come from a smaller business as long as the notion is still gaining traction (Salem, 2021).

NFT Economy

In 2017, "CryptoKitties," an Ethereum-based decentralized app, was launched, allowing users to breed and acquire digital cats. NFTs, on the other hand, have gained substantial popularity in 2021 (Bamakan et al., 2022). Regarding non-fungible tokens, the ERC721 standard—a complex smart contract that describes how an NFT interacts with other smart contracts and users—is often used like the ERC20 standard. "Rarible," "OpenSea," and "SuperRare" are just a few examples of the new markets made possible by the ERC721 standard. The

development of the NFT ecosystem is made possible by the availability of online markets for the listing, purchasing, and selling of NFTs. There are over 100,000 active users in these markets as of 2021, and they're generating more than \$1 billion in volume each month in NFTs (“What is an NFT (non-fungible token)?”, 2021).

Theoretical Perspectives

This conceptual paper examines NFTs as an innovation guided by the diffusion of innovations theory (Everett, 1962). The diffusion of innovations theory seeks to explain how, why, and how quickly new ideas and technology spread. The diffusion of innovations shows how new ideas and scientific advancements spread throughout civilizations and cultures, from their introduction to widespread use. As its name implies, this theory aims to explain how and why new concepts, ideas, and behaviors are embraced over a range of timescales. How inventions are shared and what the users' perspectives are regarding the inventions play a significant role in deciding how quickly they spread. People (innovators) prepared to take risks and be the first to test a new concept are crucial figures in the “diffusion of innovations” theory. People (early adopters) are interested in experimenting with new technologies to see whether they fit into society. They provide the groundwork for the public's early and broad adoption of new technologies. People (late majority), although not among an invention's early adopters, are still a part of society. Innovative items and novel concepts that are not widely adopted by the (laggards) general people (Halton, 2021).

Stages of Adoption of NFTs

The NonFungible.com Twitter account published a poll in December 2020 to better understand the relationship between NFT owners and their assets. The poll findings indicate that most NFT owners may not only evaluate their assets from a financial standpoint but also are likely to have a personal relationship with the material in their portfolio. NonFungible.com further wanted to learn more about the motives of NFT collectors based on the survey findings. In a series of interviews with NFT collectors and NFT creators, the subsequent perspectives were generally observed in sharing and developing NFT communities. The investigation's goal was to examine the social aspects of NFT and what it means to belong to a community of NFT enthusiasts. The observations were: Digital experiences are no longer about the user's connection with their assets but rather about their relationships with other users. This has been developed because of NFT; digital social interactions have become more of a reagent (Dvoskin, 2022).

Whether a buyer purchases a collectible, a piece of art, animated GIFs, or a video game component, NFTs provide an opportunity to connect with other people with similar interests. To comprehend, some of the NFT ecosystem remains intangible, and difficult to quantify the value of the assurance and the strength of the communities. One of the most important elements to keep an eye on is the growth of communities with similar interests, which will undoubtedly contribute to the widespread adoption of NFTs. It is hard to think of a better way to spend one's time than with like-minded people who are interested in technology and share their interests. Two major concepts emerged from the conversation with the creator of “Gods Unchained” concerning the evolution of the NFT ecosystem and community : (a) The significance of keeping personal connections with others in one's community; (b) Certain presales with a short-term favorable influence on ecosystem growth may come with concerns linked to excitement (L'Atelier, 2020).

Applications of Various Types of NFTs and Their Relevance

There are several methods to add value to digital and physical assets using NFTs, which may be used to track

ownership of these assets on a Blockchain network. NFTs have many applications, some of which are listed below. Although the use cases are in the early stages, it is evident that individuals would benefit from this technology daily. In addition to making many services more accessible, NFT will boost transparency in many transactions, particularly regarding tangible commodities like real estate, art, or an idea.

Digital Art NFTs

Having ownership of digital art is a well-known NFT use case. It is now possible for artists to make a living by tokenizing their work and selling it to everyone with an Internet connection. In the traditional setup, the artists need to look for physically established art galleries that sometimes extract high commissions and demand hefty listing fees (Mani, 2021). Artist Beeple is an example of NFT work that has suddenly garnered national attention. His “*Everydays: The First 5000 Days*,” a 13-year-long collage of 5,000 pictures, was tokenized on Ethereum and sold for nearly \$69 million (Figure 1). Beeple could commercialize his digital artwork and produce cryptographic evidence that the particular NFT was a legitimate copy using the widely used ERC721 token standard. NFTs, like Beeple's work, are available in tens of thousands of variations throughout the globe (“What is an NFT (non-fungible token)?”, 2021).

NFT Cartoons

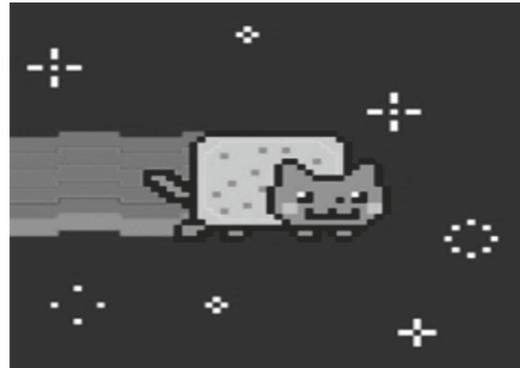
A few ideas exist about how a buyer differentiates between NFTs that catalog many cartoon characters and custom-made NFT-like artworks pushed by popular artists in galleries. The original “Disaster Girl” meme picture was sold for \$500k in 2021. Pixel Blocks' gif animation of the “Nyan Cat” (Figure 2) was sold for \$60,000. Millions of creators throughout the globe stand to benefit significantly from this technology (Fitzsimons, 2021). Jeff Koons, a New York artist, is among those artists who ventured into NFT art. These NFTs were tied to a real-life sculpture the artist planned to launch into space in 2022. At \$2 million each, his sculptures, shaped like that of a moon, were linked to NFTs on the top list. Cai Guo Qiang, an artist from China who is well-known for his use of gunpowder in his work, sold out of 7,000 of his NFTs in less than a minute, according to the NFT art site “TRLab,” which announced the sale at the beginning of May 2022 (Vigna, 2022).

Figure 1. *Everydays : The First 5,000 Days*



Source : Reproduced from Beeple. (2021). *Everydays : The first 5000 days*. Christie's. <https://onlineonly.christies.com/s/beeple-first-5000-days/beeple-b-1981-1/112924>

Figure 2. *Nyan Cat*

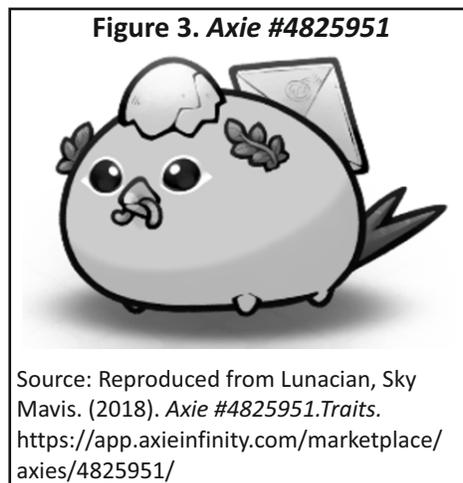


Source : Reproduced from Nyan Cat. (2011, April 6). *Nyan Cat* [video]. YouTube. <https://www.youtube.com/watch?v=QH2-TGUiWu4>

Gaming NFTs

NFTs form an essential part of a blockchain-based video game as they allow unique “in-game” shopping using tokens that can be tracked and transferred. In the traditional setup, a central publisher controls the distribution, ownership, and qualities of in-game objects that frequently define the worth of specific characters and game results in conventional online video games. All of the stuff gamers may have spent hours, days, weeks, or even months accumulating is gone if the publisher goes out of business; whereas, NFTs open up a new world of possibilities for gamers. The gamers can manage their game goods, distribute them, and randomize the rewards on the NFT Blockchain. These rewards are compatible with the metaverse universe; things from one game can be used and exchanged in another game. The “play-to-earn” concept allows the players to make money from their gaming based on time and effort (“What is an NFT (non-fungible token)?”, 2021).

The blockchain-based video game “Axie Infinity,” a Pokemon-inspired realm with unique fantasy creatures known as “Axies,” is a popular NFT-based game. Each “Axie” (Figure 3) in the game is linked to an NFT that provides information on the creature's qualities, appearance, and ownership. As a result of Chainlink VRF, some “Axies,” like Quad Mystic, may be rendered probably uncommon via a fair and verifiable distribution method, making them more appealing to other players in the Axie world. “Axie Infinity” and “Battle Pets,” two more games in the Pokémon genre, feature tradeable characters and accessories (“The future of NFTs: 7 innovative use cases,” 2021).



Those who play video games are perfect customers for NFTs since they are already acquainted with alternative currencies and virtual worlds. Peer-to-peer markets may transfer tokenized in-game objects, which can be traded or sold. Characters, superpowers, character looks, characteristics, and virtual land are examples of in-game objects. “Decentraland,” a game built on the Blockchain that allows the players to own virtual assets completely, is an excellent example of a blockchain-based marketplace in action (“The future of NFTs: 7 innovative use cases,” 2021).

Channel for Gaming Sales

The gaming industry is incredibly lucrative, and games have a tonne of potential as marketing vehicles in addition to increasing public awareness and encouraging involvement. Brands would kill to own some of the hottest games available right now, like “Fortnite,” “Minecraft,” or “Animal Crossing.” In 2020, companies like Valentino and

Marc Jacobs started donating outfits that 30 million Animal Crossing players could download and use to customize the game's avatars. "H&M" and "Glossier" are just some brands highlighted on the website. With Nike's most recent partnership with Fortnite, users can purchase trainers before making them available in the real world. In China, India, and other countries, there is an expanding HENWY (high-earning, not yet rich) population, and playing video games is a well-liked pastime among young people. Businesses are conscious of this. As a result, companies will be looking for new gaming companies to partner with as the metaverse expands to sell goods in these markets and generate content together with them to reach new audiences (Salem, 2021).

NFT Collectibles

NFTs enable a new form of digital collectibles, similar to trading cards or postage stamps. Collectors may show their appreciation for a certain firm, brand, game, or artist by purchasing digital items they feel are valuable. Since NFTs are digital, they can be transferred in seconds and never deteriorate in quality, unlike physical collectibles that may be cumbersome to carry and expensive to maintain. Twitter and Discord are noticing a rise in the usage of collectible NFTs as profile images. As a result, individuals who share an interest in NFT collections may use this as a potent signaling method to join a group of like-minded people. Furthermore, because of the Blockchain, the users may confirm that they own the image or photo by cryptographically proving it ("What is an NFT (non-fungible token)?", 2021).

Wearable NFT technology produces entirely virtual images and exists in digital space. Watch Skins, a pioneer in the confluence of reality and blockchain, is a brilliant example of how NFT can assure the legitimacy and accountability of high-end brands. Users and creators of digital skins for smartwatches may now create, collect, sell, and monetize NFT watch skins. Watch skins were launched in 2019, supported by blockchain technology, which offers fashion brands and creators protection and security against fake designs. Buyers may now show the NFT collection on their wristwatches to the world. They can also buy, sell, and trade tokens through a peer-to-peer marketplace that allows secure trading directly with other users, where each skin has a tracker (Watchskins, 2020).

↳ ***NFT CryptoPunks***. Simply put, it is a collection of 10,000 different, original 8-bit characters. According to Figure 4, it is the most sought-after NFT collectible of the year. It is a low-resolution image, not "art," made rare and exclusive through marketing. Referring to Figure 5, one of Crypto Punks's top sales in 2022 was \$23.7 million (Thomas, 2023). One of the earliest NFTs ever created, CryptoPunks provided free NFTs. Customers who want to possess an authentic piece of NFT history are still drawn to them.

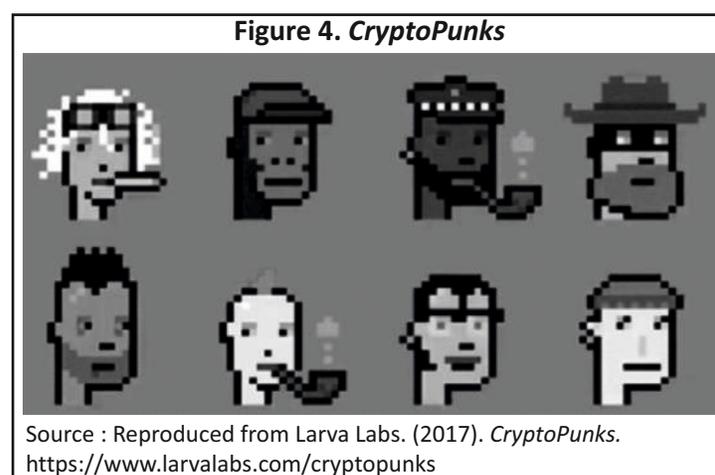


Figure 5. *CryptoPunk 5822*



#5822
8KE (\$23.7M)
Feb 12, 2022

Source : Reproduced from OpenSea. (2017). *CryptoPunk #5822*. <https://opensea.io/assets/ethereum/0xb47e3cd837ddf8e4c57f05d70ab865de6e193bbb/5822>

Figure 6. *Bored Ape*



Avatars of the founding apes, clockwise from top left: Emperor Tomato Ketchup, Gordon Goner, No Saus, and Gorgonm!

Source : Reproduced from OpenSea. (2021). *Bored Ape Yacht Club*. <https://opensea.io/collection/boredapeyachtclub>

Figure 7. *Bored Ape #6748*

Owned by 843570 • 1.9K views • 80 favorites

Sale ends June 13, 2022 at 7:13pm GMT+8:30

Current price
+ 96 (\$168,895.68)

Buy now • Make offer

Price History

All Time Avg Price: 545.644

Source : Reproduced from OpenSea. (2022). *Bored Ape Yacht Club #6748*. <https://opensea.io/assets/ethereum/0xbc4ca0eda7647a8ab7c2061c2e118a18a936f13d/6748>

↳ **NFT-Bored Apes.** Bored Ape is similar to CryptoPunks with 10,000 unique images (Figure 6), but with more attention to exclusivity by creating an online exclusive social club called the Bored Ape Yacht Club (BAYC). Bored Ape was launched in April 2021. It was sold in 12 hours for mostly \$200 each. Now the cheapest is \$200,000 each and can sell for as much as \$2 million. This yacht club conducts exclusive parties and meet-up events where ownership of the NFT gets you free access to meet celebrities who own the NFT. They even recently held a real-life yacht party. Many BAYC is on sale in “OpenSea.” The current offer is \$168,895 in 2022 (Figure 7).

In addition, many imitators can create a parody of an NFT project out of a popular one and make money like “PHAYC” and “Phunky Ape Yacht Club,” which offer mirror image NFTs of the Bored Apes (Van Boom, 2022).

Music Album NFTs

Using blockchains, music artists may now tokenize their albums to earn money and build a stronger relationship with their fans. As a result of the COVID-19 epidemic, the music business faced an 85% drop in revenue. However, NFTs have helped musicians overcome these losses while allowing fans exclusive benefits like limited-edition mementos and even direct access to the artists for a special chat and dining. Tokenization has generated millions of dollars for a broad spectrum of musicians, including 3LAU, Kings of Leon, Shepard Fairey, and Eminem. Thus, NFTs have emerged as a new and more exciting medium for developing fan reward programs and mobilizing support for artists within the community. “The Crystal Method,” a musical band, sells NFTs related to songs; this includes show tickets and dinner with the band members (Vigna, 2022).

Documentation for NFT

NFTs may also be used to assert ownership of real-world assets like real estate to provide more liquidity in the real estate markets. When real estate is tokenized, the transfer of ownership is significantly more efficient, and a single source of information regarding the legitimacy and provenance of a specific piece of real estate is made available. By using this notion, physical artwork, official documents, certifications, and degrees might all be tokenized. Real-world asset tokenization as NFTs opens up new opportunities, such as rental income-backed tokens and digital credentials without a paper equivalent. These documents may also be converted to digital format, enabling new forms of automation and more credential transparency (“What is an NFT (non-fungible token)?”, 2021).

Ticketing NFT

According to a CNBC investigation, 12% of people who bought concert tickets online were defrauded. NFTs may help in the fight against ticket fraud by making it easier to verify who is the ticket owner, validate a ticket, and transfer ownership in a safe and timely manner. Additionally, NFTs would enable venues to restrict ticket transfers, making it more difficult to resell individual tickets. An excellent example of how “GUTS” plans to fight ticket scams is the Blockchain-based ticketing service provider (Leonhardt, 2018).

NFT Certifications

Degrees, certifications, licenses, medical histories, travel visas, and birth and death certificates, among other papers, can all be verified using NFTs. Recruiting firms can quickly evaluate a candidate's qualifications, like certificates. Credential verification on the distributed ledger is now possible, thanks to Blockchain services like “Blockcerts,” which can verify academic credentials (Leonhardt, 2018).

NFT Physical Assets

It is possible to use NFTs to authenticate the ownership of real-world assets like homes, lands, cars, shares, and bonds. NFT can assist in solving the issue by preventing the real estate sector from reselling items that do not belong to their owners. In order to estimate when repairs and replacements are necessary, NFTs can also quickly determine when and where each automotive and home item was produced (Leonhardt, 2018).

↳ ***Digital Real Estate Worldwide.*** Propy (<https://propy.com>), an Internet real estate company, changed the course of real estate in June 2021, making history in the process. One can now buy and sell properties as NFT and pay with Propy cryptocurrency after Propy advertised a real estate property in Ukraine as NFT, which was sold. The process



takes weeks and necessitates a tonne of paperwork, eliminating the need for third parties. The ownership rights to a property are transferred when it is sold or bought online, thanks to NFT, and rental income is immediately generated (Yoon, 2021).

↳ **Fractional Real Estate.** “RealT” (<https://realt.co/>) and “Futurent” (<https://futurent.io/>) are two websites that allow investors from all over the world to purchase real estate online (Figure 8). Real estate can be bought in fractions, meaning a single property can have several owners and be divided into shares. To purchase the properties, Futurent is now offering its coins, called “FUTR.” Similar to crowdsourcing, the idea is still in its infancy. NFT has led to the current perception of real estate as a secure investment (RealT, n.d.). One of the newest initiatives using the LAND coin is “Landshare” (<https://landshare.io/>; Landshare, 2022).

NFT in Supply Chains and Logistics

NFTs, which offer timestamped data, can be used to track items moving through supply networks. As goods transit through supply chains, NFTs are scanned, and updated timestamped data is added. NFTs can be incorporated in several ways into supply chains and logistical systems. NFTs, on the other hand, demand that the same infrastructure be used at every level of the chain. Given the large number of businesses and parties engaged globally, deploying these technologies may take some time. The Blockchain-based logistics systems “TradeLens” and “Foot Trust” are already in use. Both rely on technology that is NFT-friendly (Leonhardt, 2018).

NFT : Big Brands and Celebrities

Musicians, artists, celebrities, and businesses got on board with NFTs in 2021 and helped raise the reputation of “Zeitgeist.” NFTs minted by Adidas and Nike were related to their footwear businesses. McDonald's' NFT was connected to the relaunch of its popular sandwiches. Big brands like Adidas (Figure 9, Adidas with Bored Ape) and Coca-Cola are selling original NFTs, and one of the Coca-Cola “Friendship Loot Box” (Figure 10, Friendship Loot Box) NFTs sold for nearly \$570,000 (“Coca-Cola NFT auction,” 2021).

Figure 9. Adidas with Bored Ape



Source : Reproduced from Bored Ape Yacht Club. (2021, December 11). *Adidas x Bored Ape Yacht Club - Into the Metaverse* (video). YouTube. <https://www.youtube.com/watch?v=-1vdk6lksQ0>

Figure 10. Friendship Loot Box



Source: Reproduced from The Coca-Cola Company. (2021, July 28). *Coca-Cola to offer first-ever NFT collectibles in International Friendship Day Charity Auction*. <https://www.coca-colacompany.com/news/coca-cola-to-offer-first-ever-nft-collectibles>

NFT in Dividend Plans

Like company shares, NFTs may be used to prove the ownership of company stocks, as dividends need to be paid to the right shareholders. This dividend strategy might apply to nearly any asset that produces revenues. An investor acquired a digital F1 “Monaco-Race-Circuit” in the “Delta Time” game. From the races and ticket sales, the NFT, representing the racing track, pays the investors 5% of their stake earned through the sale of tickets and races (Leonhardt, 2018).

NFT in Domain Names

One may utilize a domain name as a crypto address or handle on the Blockchain. Similar to a person's Twitter or Instagram username, their crypto address is particular to them. With this domain ownership, one may receive and handle any coin, token, or NFT. Two services that do this are “Ethereum Name Service” and “Unstoppable Domains” (Leonhardt, 2018). Since Mike Winkelmann's \$70 million sale of digital artwork in 2017, NFTs have acquired popularity among cryptocurrency aficionados, and piqued the public's attention. NFTs showed a lot of interest in the sale, and ever since, their growth has been accelerating due to the extensive attention that both fans and creators have given them. Despite being regulated, NFTs have developed a market with \$1.2 billion worth of transactions in 2021 (Mani et al., 2021). Despite the fact that NFT is a developing technology, it has attracted a lot of attention from academics. Several application cases for NFTs have developed recently; they are not limited to “digital assets” (Rehman et al., 2021).

NFT Marketplace in India

An annual growth rate of 35% is forecast for the worldwide NFT market from 2022 – 2027, from \$3.0 billion to \$13.6 billion. The rising impact of celebrities, the restructuring of the game industry, and the steady growth in demand for digital artworks fuel the NFT business. It is also expected that the growing usage of NFT in supply chain management, retail and fashion, and customization will lead to future profitable prospects for NFT

providers. In addition, NFT, Metaverse, and eSports developments are predicted to drive the industry to 153 billion by 2024 (KPMG, 2022).

India is already a significant player in the online gaming market, with most Gen Z and millennial participants having credible knowledge about crypto and NFTs. India will be among the largest markets for NFTs despite the current regulatory tightening; however, the market is extremely responsive to initiatives with measurable benefits. Over the past two years, India has reported a significant rise in NFTs and the emergence of new companies focused on this virtual asset. As of April 2022, India has more than 86 active NFT-based start-ups. Some existing tech start-ups across various enterprises have also created NFT-centered offerings on their platforms. Animated gifs, gaming, collectibles, marketization, and social networks are key sector examples for NFTs currently in India (Ghosh, 2022).

As NFTs can demonstrate the authentication of ownership rights to specific assets on the Blockchain, thereby ensuring the owner's exclusivity, they can contribute significantly to the verification of licenses and certifications. Several major industries, such as sports, entertainment, etc., are plagued by counterfeit tickets and merchandise. Blockchain is the ideal alternative for easily resolving such issues. "GuardianLink" is a marketplace in India that cautiously develops tangible utilities for its NFTs. It sold over 50,000 utilities connected to cricket games within a few minutes of its release, surpassing all previous sales records. The financial sector is not immune to NFTs. Innovative NFTs can indeed generate passive income, not to mention the multi-billion dollar gaming market that includes "CryptoPunks," "Bored Ape," "Yacht Club," and "Azuki," which are numerous noticeable start-ups that have aided the crypto community gain exposure to NFTs (Ghosh, 2022). Some of the popular NFT marketplaces in India are Wazirx, GuardianLink, Jupiter Meta, Beyondlife, Bollycoin, Colexion, BuyUCoin, MetaOneVerse, Nifty Gateway, Nftically, Rarible, and Foundation (Gopani, 2022).

The First Gaming NFTs in India

Online gaming is becoming a more common source of income for people worldwide, and this is not because they are idle. India's growing middle class has led to a paradigm change and exponential growth in the country's online gaming industry. In India, a new era of online gaming is beginning. By 2025, it is anticipated to have 657 million members and earn 290 billion in revenue, up from its current 433 million users and 136 billion in revenue (KPMG, 2022).

IPC's introduction of Indian poker in 2015 was a significant development for Spartan Group's expansion of poker in India. The goal is to establish a complete and responsible atmosphere for people who like real-money gambling. The 12th India Online Poker Championship (IOPC) has something extra special in store for all of our contestants this year, something that has never happened in Indian gaming history. Despite the fact that the technology is still in its infancy, several institutions are at the forefront of pioneering in NFTs, Web 3.0, and Blockchain. The technologies used in the game industry can be used to commercialize a virtual asset. Online sports increasingly use play-to-earn models, which will help the industry transition to one and alter the incentive system for those who participate. As a logical extension of the play-to-earn services, NFTs are on par with, if not more valuable than, digital assets. They already have a lot of intrinsic and monetary worth in addition to being innovative. As evidenced by their prior incentives, NFT owners are content with their appreciation (Mediawire, 2022).

Discussion and Conclusion

The resurgence of interest in NFTs has led to an explosion of novel applications that creatively take advantage of their non-fungibility. The objective of improving asset transfer efficiency and removing the need for

intermediaries that siphon value away from creators and markets has been accomplished. NFTs, which are still in their infancy, have a lot of space for expansion. They also have a lot of room for innovation from creative developers, artists, and traditional institutions that want to add unique assets to the blockchain (“What is an NFT (non-fungible token)?”, 2021). As a result of their intrinsic scarcity, luxury products have the potential to be seriously disrupted by NFTs. They can reach out to the crypto-wealthy, who value individuality and collectability on par with streetwear fans—two markets with a long history of cooperation and organic synergy (Marsh, 2021). The desire to display exclusivity or riches is one of the less obvious uses for NFT. Many individuals desire to own something special, so they purchase a limited-edition watch or car that performs the same functions as a standard vehicle but has a price tag of 10–100 times more. NFTs are a prime example of this, according to Thomas (2023).

Furthermore, the amount of electricity used in each NFT transaction would have a significant negative impact on the environment. High-powered computers engage in intense competition with one another to obtain NFTs. For any artist seeking to sell their work as NFTs, however, this harmful process will be unavoidable (Fitzsimons, 2021). Several cryptocurrency buyers have upped their purchases due to the new Union Budget recommendations regarding cryptocurrency tax rules. In the marketplace, celebrities and athletes are pushing the usage of NFTs (Herrera, 2021). Despite their rising popularity, NFTs and cryptocurrencies are still subject to the 30% tax on virtual digital assets as of April 2022. The government can look at NFTs and assess if providing users with lower tax brackets or more favorable tax ratios would be possible. Virtual assets must support future financial transactions rather than fiat money (Ghosh, 2022).

NFTs give artists the ability to sell their products directly to everyone. NFTs provide secure transactions that are recorded on the blockchain regardless of how frequently an item is traded. Due to the instantaneous global commerce of digital goods, barriers between artists and collectors are no longer present. Depending on the terms of the licensing agreement, creators may be eligible for royalties based on a proportion of any future sales of their NFT artwork (Butani & Thakur, 2022). Therefore, this method should enable digital producers to receive the proper credit for their work. Although blockchain contracts make it easier to manufacture cryptocurrency and protect its intellectual property rights, they have not yet been tested or proven in court. It is necessary to acknowledge the need for education in art and art-based investment and have the appropriate legal protections in place to introduce this socio-techno transformation to the art world and make artists and art collectors a part of this new technological, economic innovation (Fitzsimons, 2021; KPMG, 2022). As more investors and content producers pay attention to NFTs in the coming years, one should expect to see even more significant development in digital markets.

Managerial Implications

NFTs have the power to upend economies, cultures, and society at large. As with any new technology, NFTs have made it possible for a new form of business to be launched. Since there is no special legal framework for NFTs in India, they are governed by the fundamental principles of contract law. Many developers contend that NFTs could be exempted from the cryptocurrency and regulation of the Official Digital Currency Bill, 2021's ban on cryptocurrencies. Given the situation, it is too soon to estimate the impact of NFTs until cryptocurrencies are formally approved. If the Indian government decides to outlaw cryptocurrencies, it is more prudent to wait and see what effect NFTs would have.

Limitations of the Study and Areas for Future Research

The exponential expansion of NFTs in recent years has the potential to alter the nature of the commercial world. But the world needs to learn more about this technical innovation's fundamental design. For society to fully benefit

from this discovery, significant R&D is required. NFTs can be examined from a variety of angles, including “decentralization finance technology,” “utopia-dystopia,” “gamification,” “affordability,” and “governance.” Finding opportunities for innovation and new business ideas will be valuable as well. NFTs might be advantageous for the economy and society as a whole. Therefore, there is a need for researchers to carry out more extensive research on the intriguing new field of NFTs.

Authors' Contribution

Dr. A. C. Balaji, Dr. Padmakumar K., and S. Anuradha contributed to the design and implementation of the research, the analysis of the results, and the writing of the manuscript.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this manuscript.

Funding Acknowledgement

The authors received no financial support for the research, authorship, and/or for publication of this article.

References

- Bamakan, S. M., Nezhadsistani, N., Bodaghi, O., & Qu, Q. (2022). Patents and intellectual property assets as non-fungible tokens; key technologies and challenges. *Scientific Reports*, 12(1), Article 2178. <https://doi.org/10.1038/s41598-022-05920-6>
- Beeple. (2021). *Everydays: The first 5000 days*. Christie's. <https://onlineonly.christies.com/s/beeple-first-5000-days/beeple-b-1981-1/112924>
- Bored Ape Yacht Club. (2021, December 11). *Adidas × Bored Ape Yacht Club - Into the Metaverse* (video). YouTube. <https://www.youtube.com/watch?v=-1vdk6lksQ0>
- Butani, V., & Thakur, F. (2022, January 12). *Decoding NFTs and their regulation in India*. Mondaq. <https://www.mondaq.com/india/fin-tech/1149624/decoding-nfts-and-their-regulation-in-india>
- Chandra, Y. (2022). Non-fungible token-enabled entrepreneurship: A conceptual framework. *Journal of Business Venturing Insights*, 18, e00323. <https://doi.org/10.1016/j.jbvi.2022.e00323>
- Coca-Cola NFT auction on OpensSea fetches more than \$575,000. (2021, June 08). *Coca-Cola News*. <https://www.coca-colacompany.com/news/coca-cola-nft-auction-fetches-more-than-575000>
- Dvoskin, L. (2022, January 17). *Why community is the secret to NFT success*. Rolling Stone. https://www.rollingstone.com/culture-council/articles/community-secret-nft-success-1283244/?sub_action=logged_in
- Everett, R. (1962). *Diffusion of innovations* (5th ed.). The Free Press of Glencoe.

- Fitzsimons, E. (2021, July 29). *NFT art: What is it, how it works and what it means for the creative industry*. 99designs.com. <https://99designs.com/blog/web-digital/nft-art/#:~:text=NFT%20art%20is%20a%20totally,the%20rewards%20for%20their%20creativity>.
- Ghosh, D. (2022, April 23). 71 NFT start-ups were launched in India in 2021. *Businessline*. <https://www.thehindubusinessline.com/info-tech/71-nft-start-ups-were-launched-in-india-in-2021/article65348294.ece>
- Gopani, A. (2022, February 24). Top NFT marketplaces in India. *Analytics India Magazine*. <https://analyticsindiamag.com/top-nft-marketplaces-in-india/>
- Halton, C. (2021). *Diffusion of innovations theory: Definition and examples*. Investopedia. <https://www.investopedia.com/terms/d/diffusion-of-innovations-theory.asp>
- Herrera, P. (2021, December 17). *2021 Dapp industry report*. DappRadar. <https://dappradar.com/blog/2021-dapp-industry-report>
- KPMG. (2022). *EY FICCI media entertainment report: Tuning into consumer*. Ernst & Young. https://assets.ey.com/content/dam/ey-sites/ey-com/en_in/topics/media-and-entertainment/2022/ey-ficci-m-and-e-report-tuning-into-consumer_v3.pdf
- L'Atelier. (2020). *The NFT yearly report 2020 - Everything you need to know about the NFT Ecosystem*. L'Atelier BNP Paribas.
- Landshare. (2022, May 31). *Real estate on the Blockchain: 4 benefits that will transform the industry*. <https://landshare.io/2022/05/31/real-estate-on-the-Blockchain-4-benefits-that-will-transform-the-industry/>
- Larva Labs. (2017). *CryptoPunks*. <https://www.larvalabs.com/cryptopunks>
- Leonhardt, M. (2018, September 14). About 12 percent of people buying concert tickets get scammed. *CNBC*. <https://www.cnbc.com/2018/09/13/about-12-percent-of-people-buying-concert-tickets-get-scammed.html>
- Lunacian, Sky Mavis. (2018). *Axie #4825951. Traits*. <https://app.axieinfinity.com/marketplace/axies/4825951/>
- Mani, A., Verma, S., & Marwaha, S. (2021). A comprehensive study of NFTs. *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, 9(4), 1656–1660. <https://doi.org/10.22214/ijraset.2021.34017>
- Marsh, I. (2021, June 30). *The power of hype? How NFTs are fuelling exclusivity*. Green Room. <https://greenroomdesign.com/blog/the-power-of-hype-the-nft-virtual-brand-activity-that-has-fuelled-the-appetite-for-exclusivity/>
- Mediawire. (2022, January 21). Spartan Poker launch India's first-ever gaming NFTs in the upcoming flagship event IOPC. *The Times of India*. <https://timesofindia.indiatimes.com/gaming/spartan-poker-launch-indias-first-ever-gaming-nfts-in-the-upcoming-flagship-event-iopc/articleshow/89041535.cms>
- Nyan Cat. (2011, April 6). *Nyan Cat* [video]. YouTube. <https://www.youtube.com/watch?v=QH2-TGUlWu4>
- OpenSea. (2017). *CryptoPunk #5822*. <https://opensea.io/assets/ethereum/0xb47e3cd837ddf8e4c57f05d70ab865de6e193bbb/5822>

- OpenSea. (2021). *Bored Ape Yacht Club*. <https://opensea.io/collection/boredapeyachtclub>
- O p e n S e a . (2 0 2 2) . *B o r e d A p e Y a c h t C l u b # 6 7 4 8* .
<https://opensea.io/assets/ethereum/0xbc4ca0eda7647a8ab7c2061c2e118a18a936f13d/6748>
- RealT. (2022, August 13). *Understanding the technical mechanisms related to RMM*. <https://realt.co/understanding-the-technical-mechanisms-related-to-rmm/>
- RealT. (n.d.). *Property listings*. <https://realt.co/marketplace/>
- Rehman, W., Zainab, H. e., Imran, J., & Bawany, N. Z. (2021). NFTs: Applications and challenges. In, *22nd International Arab Conference on Information Technology (ACIT)* (pp. 1–7). <https://doi.org/10.1109/ACIT53391.2021.9677260>
- Salem, A. (2021, December 7). *The metaverse is the next big thing, but what will it mean for gaming?* Pocket Gamer. <https://www.pocketgamer.biz/comment-and-opinion/77694/the-metaverse-is-the-next-big-thing-but-what-will-it-mean-for-gaming/>
- The Coca-Cola Company. (2021, July 28). *Coca-Cola to offer first-ever NFT collectibles in International Friendship Day Charity Auction*. <https://www.coca-colacompany.com/news/coca-cola-to-offer-first-ever-nft-collectibles>
- The future of NFTs: 7 innovative use cases. (2021, September 16). *Future Business Tech*. <https://www.futurebusinesstech.com/blog/the-future-of-nft-7-use-cases>
- Thomas, L. (2023, April 26). *A guide to CryptoPunks NFTs: Pricing, how to buy, and more*. Nft Now. <https://nftnow.com/guides/cryptopunks-guide/>
- Van Boom, D. (2022, August 11). *Bored ape yacht club NFTs explained*. CNET. <https://www.cnet.com/culture/internet/how-bored-ape-yacht-club-nfts-became-400k-status-symbols/>
- Vigna, P. (2022, May 3). NFT sales are flatlining. *The Wall Street Journal*. <https://www.wsj.com/articles/nft-sales-are-flatlining-11651552616>
- Watchskins. (2020). *NFT smart watch faces, configure your own*. https://watchskins.com/?utm_source=nonfungible-yearly-report-2020
- What is an NFT (Non-Fungible Token)? (2021, September 14). *Chain Link*. <https://chain.link/education/nfts#verifiable-randomness-for-nfts>
- Yoon, S. (2021, November 03). 7 entrepreneurs share their solutions for climate action. *World Economic Forum*. <https://www.weforum.org/agenda/2021/11/7-tech-pioneers-share-their-solutions-to-fight-climate-change/>

About the Authors

Dr. A. C. Balaji is an Assistant Professor at Bahrain Polytechnic, Kingdom of Bahrain. His work focuses on 3D lighting, look development, and surface shading. His areas of interest are graphics & animation, UX/UI, interface & motion design. His research areas are character design, branding, merchandising, licensing, and television cartoon shows.

Dr. Padmakumar K. is an Associate Professor and HOD - Corporate Communication at Manipal Institute of Communication, MAHE, Manipal, Karnataka. His interests include media audience studies, the interplay between radio and social media, radio aesthetics, media and participation, understanding user-generated content, and alternative media & digital marketing.

S. Anuradha is a Lease & Content Analyst at SJ Enterprises; her interest is writing content for documents and digital media, studying blockchain, and investing in cryptocurrencies.