

## RESEARCH ARTICLE

# Non-Fungible Tokens (NFTs): A Shari‘a Perspective

Noha Selim

---

## ABSTRACT

Non-fungible tokens (NFTs) have experienced an unprecedented surge in popularity in 2022. This growth has attracted attention of experts and researchers keen on understanding the vast potential of NFTs, which has already impacted various industries including arts, gaming, collectibles, films, music, and ticketing. NFTs can represent not only digital assets but also rights to physical assets, with ownership and registration done through a blockchain. Typically, the Ethereum network ensures authenticity and transferability of ownership. However, while NFTs present significant opportunities for innovation and growth, their rapid rise has also raised concerns and questions, particularly regarding their compliance with shari‘a rules and higher objectives. This research paper aims to investigate shari‘a compliance concerns related to NFTs based on Islamic jurisprudence (*fiqh*) and examine whether NFTs comply with shari‘a objectives (*maqasid al-shari‘a*). Additionally, the paper will explore the legal and technical aspects of NFTs to gain a comprehensive understanding of this phenomenon. Although NFTs have the potential to facilitate secure transactions and safeguard asset ownership, it is crucial to address any potential shari‘a compliance concerns. The paper will provide recommendations for using NFTs in a

---

Received 05 September 2023; accepted: 10 September 2023; published 15 December 2023

© 2023 The Author(s), HBKU College of Islamic Studies.

**Cite this article as:** Selim, N. (2023). Non-Fungible Tokens (NFTs): A Sharia‘a Perspective.

*Astrolabe: A CIS Student Research Journal*, (5)

<https://www.hbku.edu.qa/sites/default/files/nftshariah.pdf>

manner to comply with shari'a principles. By exploring the shari'a aspects of NFTs, the research aims to provide a deeper understanding of this emerging technology and its implications from a religious perspective.

**Keywords:** Non-Fungible Tokens (NFTs), shari'a compliance, digital assets, Ethereum network, ownership transformation

## 1. INTRODUCTION

In 2022, non-fungible tokens (NFTs) saw a significant rise in popularity, with trading volumes jumping to \$23 billion from \$19.8 billion the previous year, according to Binance Research (2023). This growth has sparked interest from various sectors, as NFTs influence areas like art, gaming, music, and even real estate and healthcare. Notably, NFTs can represent both digital and physical assets, with ownership recorded on blockchains like Ethereum. Their recent high-profile sales have brought acclaim, yet also controversies and questions. This research aims to explore the shari'a compliance of NFTs from an Islamic jurisprudence (*fiqh*) standpoint, looking into their alignment with shari'a rules and objectives. As NFTs offer considerable prospects, it is vital to ensure their compatibility with shari'a principles. Also, this study seeks to deepen the understanding of NFTs' religious implications and offer shari'a-compliant recommendations for their future use.

## 2. THE BACKGROUND

### 2.1 NFTs Market Analysis

NFT sales rose by 10.6% in 2022 reaching \$21.9 billion from \$19.8 billion in the previous year. The year started strong with sales of \$18.3 billion in the first half, comprising 83% of the year's total. Yet, sales slowed in the latter half due to market shifts. Binance Research indicates a significant 73% drop in the average NFT sale price, from \$400 in H1 to \$110 in H2. Transaction volume only fell by 24% in the same period. As NFTs are often priced in tokens like ETH, SOL, and BNB, which saw a US\$ value decline, such a trend is anticipated (Piech, 2022).

### 2.2 NFTs' Historical Overview

Comprehending the evolution of NFTs offers insights into their progression, challenges, and potential. Knowing their origins aids in innovative applications and overcoming challenges.

#### 2.2.1 Origins of NFTs

##### First Stage (2012–2016)

NFTs as we know them evolved from early blockchain explorations into unique digital assets. While Ethereum is now synonymous with NFTs, they have roots in the Bitcoin blockchain. In fact, the first attempt at it was Colored Coins (2012). Initiated by Yoni Assia

and Ethereum's future founder, Vitalik Buterin, Colored Coins on the Bitcoin blockchain was among the earliest representations of this concept. Beyond merely representing money, it could signify assets like metals, bonds, or digital collectibles where each 'color' stood for a different asset type (Etoro, n.d.). This was followed by the Rare Pepe & Counterparty Tokens, developed on Bitcoin's Counterparty platform. Rare Pepe represented the early digital trading cards. Moreover, Counterparty tokens, unique and non-fungible like NFTs, symbolized various assets. This platform extended Bitcoin's functionality, letting users trade unique digital assets without a new blockchain. It played a crucial role in NFT development by demonstrating blockchain's capability in asset creation and management (Marcobello, 2022).

Despite similarities, NFTs and Counterparty tokens have distinctions. The former mainly utilizes Ethereum, while the latter is Bitcoin-based. NFTs gained traction in digital art and gaming, whereas Counterparty tokens remained less adopted. However, both highlighted blockchains' potential for unique digital asset creation, paving the way for NFTs (Creighton, 2023).

### **Second Stage (2017–2020)**

Before the emergence of NFTs in 2017, no cryptocurrency counterpart existed for the non-fungible token concept. Early NFT projects included CryptoPunks, a collection of 10,000 unique pixel art characters developed by Larva Labs on Ethereum in June 2017; and CryptoKitties, a game by Axiom Zen, launched in November 2017 on Ethereum in which users traded digital cats. Both projects played pivotal roles in defining and popularizing NFTs, with CryptoKitties even causing Ethereum network congestion (Lodge, 2023; Takahashi, 2018).

However, these initial NFT ventures were largely speculative, offering limited tangible societal value and catering mostly to affluent collectors. This exclusivity resulted in a skewed distribution of potential profits. However, despite the significant market attention, many viewed these early NFTs as more speculative assets than genuine value additions.

### **Third Stage (2021–Present)**

Starting around 2020, the NFT expansion saw a surge in NFT sales and the rise of new marketplaces. Artists, musicians, and creators embraced NFTs to monetize their work across industries like gaming, entertainment, finance, and real estate. NFTs evolved into assets backed by real-world items like art and property, providing proof of ownership. They became collateral in decentralized finance, enabling innovative borrowing models. In gaming, NFTs represented in-game assets and ownership in platforms introducing diverse revenue streams. NFTs' potential for innovation is only beginning to unfold.

## **3. ARE NFTS CONSIDERED MĀL (PROPERTY)?**

### **3.1 The Fiqh Literature**

The shari'a perspective on NFTs begins with a consideration of the concept of *māl* (property). This is followed by an exploration of the various types of *māl*, the shari'a

classification. It is crucial to discuss the concept of *māl* in shari'a to determine whether NFTs can be classified as *māl* or not. In fact, this has implications for the legal treatment and rulings governing their ownership and use under the Islamic law. If NFTs are considered *māl*, then they may be subject to the same legal protections and regulations as other forms of property that are under the Islamic law. This includes rules governing their transfer, inheritance, taxation, and liability, among other regulations. On the other hand, if NFTs are not considered *māl*, then they may not be entitled to legal protection, and their ownership and use may be subject to different rules and regulations.

In fact, the concept of *māl* has been given multiple definitions by classical jurists, with varying interpretations depending on the juristic approach. According to Ibn 'Ābidīn's explanation of the Ḥanafī stance on this matter, *māl* refers to something that humans have a natural inclination to possess and can be retained for a certain period (Ibn Abidin, 2011). Also, the Mālikī jurist al-Qāḍī 'Abd al-Wahhāb defined *māl* as something that can be utilized and accepted as consideration (*'iwaq*) (Bouheraoua, 2015). Al-Zarkashī, a Shāfi'ī jurist, defined *māl* as anything that can be utilized for either corporeal matters (*a'yān*) or usufructs (*manāfi*) (1982). Ibn Qudāmah, a Ḥanbalī jurist, stated that *māl* refers to anything that can be utilized in non-necessity situations (1994).

Furthermore, based on the aspect of similarity, property can be classified into two categories: comparable property (*māl mithlī*) and non-comparable property (*māl qīmī*). *Māl mithlī* refers to property that is readily available in the market and has a high degree of similarity with other items of the same type to the point where any slight differences are negligible to traders or consumers (Al-Zuhaili, 2008). For example, a large quantity of a specific brand of handbags that can be easily replaced in case of damage as they are commonly available in the market is an example of *māl mithlī*. On the other hand, *māl qīmī* refers to property for which there is no equivalent replacement (Al-Zuhaili, 2008). This may be because it is unique, like the painting of Mona Lisa, or because it is no longer available in the market such as a brand that has been discontinued and is therefore impossible to replace in the event of damage.

Property can also be classified into two categories from the aspect of recognition and protection under Islam: *māl mutaqaawwam* and *māl ghayr mutaqaawwam*. *Māl mutaqaawwam* refers to property that is legally recognized and protected under the Islamic law (Al-Zuhaili, 2008). This includes any property that is rightfully owned and can be lawfully utilized. *Māl ghayr mutaqaawwam*, on the other hand, refers to property that has no rightful owner or is not permitted for lawful use under Islamic law (Al-Zuhaili, 2008). This includes items such as wine which is not permitted for consumption in Islam.

### 3.2 Conclusion on Fiqh

Firstly, NFTs display characteristics of money in Islam because people are naturally drawn to them. In today's digital age, virtual elements are essential, and NFTs safeguard the rights and value of a virtual content. Secondly, NFTs can be stored securely on blockchains like Ethereum, ensuring tamper-proof ownership and reducing fraud or ownership disputes. Thirdly, NFTs are versatile, representing both tangible assets like real estate,

simplifying transactions; or intangible items like cartoons with no tangible benefits. Fourthly, NFTs' diverse uses challenge their classification as *mutaqawwam* or *ghayr mutaqawwam*. While they can represent assets like wine, they may also symbolize video clips, which could vary in compliance with Islamic law. Therefore, an NFT's classification depends on its represented asset's nature and purpose. Finally, NFTs are unique digital assets considered *māl qīmī*. Some can be semi-fungible tokens (SFTs). The distinction is that NFTs become unique assets once traded, whereas SFTs retain their nature. Thus, in certain scenarios, NFTs can be viewed as *māl mithlī*.

## 4. ISSUES RELATED TO NFTS

### 4.1 NFTs and Extravagance

One potential issue with NFTs is that they can be seen as a form of extravagance. In fact, Allah (SWT) says in the Holy Qur'an:

﴿يَا بَنِي آدَمَ خُذُوا زِينَتَكُمْ عِنْدَ كُلِّ مَسْجِدٍ وَكُلُوا وَاشْرَبُوا وَلَا تُسْرِفُوا إِنَّهُ لَا يُحِبُّ الْمُسْرِفِينَ﴾ (7:31)

“O Children of Adam, take your adornment at every masjid, and eat and drink, but be not excessive. Indeed, He likes not those who commit excess” (Saheeh International, 1997).

Then He says, deterring people from wastefulness and excess:

﴿إِنَّ الْمُبَذِّرِينَ كَانُوا إِخْوَانَ الشَّيَاطِينِ ۗ وَكَانَ الشَّيْطَانُ لِرَبِّهِ كَفُورًا﴾ (17:27)

“Indeed, the wasteful are brothers of the devils,” meaning that they resemble them in that regard (Saheeh International, 1997).

It is evident that Allah has allowed his servants to enjoy the blessings He has bestowed upon them, including food, drink, and clothing. He has also instructed them to maintain family ties and give to those in need. However, Allah (SWT) has prohibited extravagance and wastefulness in spending and giving. Shaykh al-Sa'di (may Allah have mercy on him) said that committing excess means either consuming more than is sufficient and eating too much of foods that are harmful to the body; going to extremes in choosing the most luxurious and fanciest of foods, drinks, and clothing; or going beyond that which is permissible to that which is unlawful (1988). While NFTs themselves may not be inherently *haram* (prohibited), the high prices paid for them can be considered as a form of extravagance. If a person spends large amounts of money on NFTs, particularly if it leads to financial hardship or neglect of more important obligations, it can be considered a violation of the Islamic teachings on responsible spending and stewardship of wealth. In Islam, Muslims are encouraged to spend their wealth wisely and to avoid wasting it on unnecessary or excessive purchases.

In Islam, Muslims are guided to make purposeful financial decisions that benefit themselves, their families, and communities, emphasizing moderation and avoiding wasteful spending. Also, Islamic economics encourages individuals to consider the broader societal consequences of their financial actions. Investing in assets like NFTs,

which might lack intrinsic value, can be seen as financial irresponsibility from an Islamic viewpoint. The core objective in Islamic finance is not mere wealth accumulation but promoting societal welfare. Thus, Muslims should prioritize investments that spur genuine economic growth and community development, avoiding speculative or non-essential luxuries that do not contribute to societal well-being.

## 4.2 Speculations over NFTs

NFTs have garnered mixed reactions. They were criticized for environmental concerns and potential fraud. Yet, they have broader applications than just speculative investments. We will first delve into NFTs' negative aspects before discussing their potential. In fact, many see NFTs as speculative assets. Often, NFTs are purchased with hopes of reselling at a profit. For example, one might buy a rare NFT artwork, anticipating its value to grow due to its scarcity. Such NFTs tied to significant events, like the World Cup or trending memes, also lure investors aiming at future profits. Furthermore, the limited release of NFTs, known as 'drops,' further fuel their speculative nature.

### What are NFT Drops?

'NFT drops' are events releasing new NFT collections, which provide a limited window to acquire sought-after digital assets (Dean, 2022). Announced beforehand, these drops may employ 'blind box' systems or auctions and often attract participants eyeing potential future value increases. These primary sales differ from subsequent secondary sales on platforms like OpenSea. While the exclusivity and potential appreciation of NFTs entice investors, speculation based on predicted rather than intrinsic value can foster asset bubbles. Such bubbles, if burst, can redirect resources and detrimentally impact the economy.

### Speculation in NFT Trading

The NFT market is characterized by high risk and unpredictability, largely due to its novelty and lack of extensive historical data for sound analysis. The value of NFTs is highly volatile, often swayed by buyer demand. An illustrative example is an NFT sale on OpenSea, where an asset acquired for 22.5 ETH (\$61,329) was resold in just two weeks by the same account for 39 ETH (around \$124,205). Such rapid price changes highlight the erratic nature of NFT investments. While lucrative profits might tempt some, it is crucial for potential investors to exercise diligence, understand the risks, and thoroughly research the NFT landscape before committing financially.

### Meebits and the NFT Market's Volatility

Since their May 2021 debut, Meebits' prices have been erratic as shown in Figure 1, with some artworks reselling for millions after initial modest sales. CryptoPunk's average prices fluctuated drastically within months, exemplifying market instability. Jack Dorsey's tweet sale and the aggressive bidding on Beeple's artwork indicate speculative trading in the NFT realm, driven more by hype than genuine economic value. Also, speculation can intensify income inequality, leading to established players profiting while newcomers

struggle. When celebrities like Jimmy Fallon, Paris Hilton, Gwyneth Paltrow, and Justin Bieber flaunt their NFTs, it exemplifies the influence of the affluent on market dynamics where few gain at the expense of many (Clark, 2022).

### Volume and Price

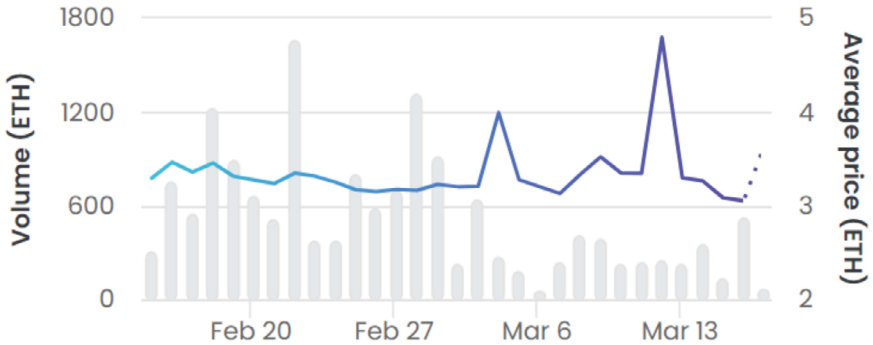


Figure 1. The price volatility of Meebits. Source: OpenSea marketplace.

### 4.3 The Shari‘a Perspective on NFTs Trading

Based on *qiyas* (analogical reasoning), the high level of speculation in NFTs can be linked to gambling. This is because both activities involve taking risks and offer the possibility of winning or losing without producing any tangible value. In fact, buying NFTs solely for the purpose of speculation, with hopes to sell them later at a profit, can be viewed negatively in Islam, especially given the high volatility of NFT trading. Due to the speculative nature of NFTs, caution should be exercised when considering trading them. The value of NFTs can be influenced by various factors such as hype, demand, and the creator’s reputation. However, it is important to stress that excessive risk (*gharar*) is the key element that brings in the gambling aspect.

Moreover, in adherence to Islamic principles, individuals should avoid engaging in speculative trading on NFTs, which could lead to financial losses and harm and is expressly forbidden by Islamic law, since gambling is described as an abomination and a source of enmity and hatred among people in the Qur’an. It is crucial to note that the prohibition on speculative trading of NFTs is linked to their high volatility, and this rule only relates to trading. This suggests that if the price of an NFT stabilizes, the rule may change.

In fact, the Qur’an mentions gambling in several verses, including:

﴿يَسْأَلُونَكَ عَنِ الْخَمْرِ وَالْمَيْسِرِ قُلْ فِيهِمَا إِثْمٌ كَبِيرٌ وَمَنَافِعُ لِلنَّاسِ وَإِثْمُهُمَا أَكْبَرُ مِن نَّفْعِهِمَا وَيَسْأَلُونَكَ مَاذَا يُنْفِقُونَ قُلِ الْعَفْوَ كَذَلِكَ يُبَيِّنُ اللَّهُ لَكُمْ الْآيَاتِ لَعَلَّكُمْ تَتَفَكَّرُونَ﴾ (2:219)

“They ask you about intoxicants and games of chance. Say: In both, there is great harm as well as benefit for people, but their harm is greater than their benefit” (Saheeh International, 1997).

﴿يَا أَيُّهَا الَّذِينَ آمَنُوا إِنَّمَا الْخَمْرُ وَالْمَيْسِرُ وَالْأَنْصَابُ وَالْأَزْلَامُ رِجْسٌ مِّنْ عَمَلِ الشَّيْطَانِ فَاجْتَنِبُوهُ لَعَلَّكُمْ تُفْلِحُونَ﴾ (5:90)

“O you who have believed, indeed, intoxicants, gambling, [sacrificing on] stone alters [to other than Allah], and divining arrows are but defilement from the work of Satan, so avoid it that you may be successful” (Saheeh International, 1997).

Based on these verses, Islamic scholars agree that gambling is prohibited in Islam, and Muslims are advised to avoid it as it can lead to harm for themselves and others. According to Al-Dibian (2011/1432 H.), gambling inherits enmity and hatred among the manipulators, because gambling robs money for nothing in return. If a person loses in gambling, this calls him to engage in it again in hopes to compensate for his loss, and it may happen that he does not get what he wants, but rather his loss increases and his problems worsen, leading him to continually re-enter into the situation hoping for compensation. Moreover, when he loses his money and becomes destitute, he looks at those people who were the cause of his loss as being among his staunch enemies, and thus it appears that gambling is a great cause of provoking enmity and hatred among people. Therefore, it is important to exercise caution and avoid engaging in speculative trading on NFTs that could lead to financial losses and harm.

#### 4.4 NFTs’ Impact on the Real Economy

Concerns arise that NFT hype may spawn speculative bubbles and shift resources from other economic sectors. Islam promotes a productive economy focused on trading and entrepreneurship, emphasizing just and equitable wealth creation. Like the prohibition of usury aimed at fostering a sustainable economy, valueless NFTs can encourage unproductive actions. NFT investments, being speculative, may prioritize short-term gains over sustainable value creation, pulling talents and resources away from activities benefiting society. Furthermore, NFT investments can intensify financial inequality, as those who are able to invest might disproportionately profit, sidelining broader societal benefits.

The significant returns from NFT investments can result in resource misallocation. Notably, 2021’s NFT spending equaled the funds pledged at COP26 to phase out coal or the World Bank’s allocation for COVID-19 vaccines (Howcroft, 2022). This poses a question: is heavy investment in NFTs judicious compared to addressing global challenges like climate change or the pandemic?

#### 4.5 NFT Scams

The rapid surge in NFTs’ popularity has concurrently seen a rise in scams. Investors may encounter ‘rug-pull’ scams, such as the Frosties NFT project, which disappeared with over \$1.3 million, prompting a US court case (United States Department of Justice, 2022). There



is also the risk of phishing, where hackers use misleading links on platforms like Twitter and Discord to obtain NFT account details; for instance, a Bored Ape Yacht Club collector lost \$2.2 million in Ethereum due to a disguised scam email (Chawla, 2022). Furthermore, plagiarized NFTs have become prevalent. OpenSea, in August 2021, observed that over 80% of NFTs uploaded via their Collection Manager tool were potentially inauthentic, emphasizing the market's need for better regulations (OpenSea, 2021).

### **The Shari'a Perspective on NFT Scams**

It is important to note that under Islamic law, illegal minting of NFTs is not tolerated as it constitutes a form of theft by infringing upon someone else's digital property rights without their permission. In fact, Islamic law recognizes the significance of protecting property rights, including the digital property, as previously discussed. Any unauthorized use or duplication of someone else's digital property such as NFTs is deemed a violation of their property rights and is not permitted under the shari'a. Aside from the negative impact on the victim of theft, Islam places great emphasis on the moral and ethical implications of this act. Theft is viewed as a breach of trust and a betrayal of the social contract between individuals and society, thereby undermining the foundations of a just and fair society that rests on the principles of honesty, respect, and mutual trust. Indeed, theft erodes trust among individuals in society, promotes injustice, and disrupts the economy. Since NFTs offer a means for businesses and individuals to create value and earn income through their efforts and creativity, illegal minting can lead to losses and adversely affect the NFT market, thereby diminishing the potential value and benefits of this innovative technology.

### **4.6 Off-Chain Issues with NFTs**

Challenges arise when NFTs are linked to physical goods that can be harmed or lost. Smart contracts can automate ownership transfers and manage data. For instance, smart contracts may orchestrate ownership transfers based on conditions like the delivery of a tangible item. Yet, ensuring off-chain data accuracy, proper execution of smart contracts and legal considerations remain concerns.

### **4.7 Liability in NFT Technical Issues**

The digital nature of NFTs creates ambiguity for liability in technical issues. If an NFT platform malfunctions, causing loss or inaccessibility of an NFT, accountability is unclear. Similarly, in the event of an NFT's loss due to security breaches, assigning responsibility can be problematic (Vallabhaneni, 2021). This ambiguity can deter potential NFT buyers. Future regulations and tech innovations are likely to address these concerns.

## **5. CASES OF NFT USES**

Beyond being a speculative investment, NFTs can revolutionize business models by tokenizing assets and enabling unique value exchanges. They exemplify smart contracts' potential and a vast scope of blockchain technologies, steering focus toward broader applications rather than just monetary gains.

When considering its compatibility with shari'a, *maqasid al-shari'a* outlines the objectives of Islamic law, highlighting social justice and well-being. NFTs can resonate with these objectives by offering a unique way to preserve wealth, promoting economic growth, ensuring creators receive fair compensation, and safeguarding intellectual property against fraud.

### 5.1 NFTs: Beyond Speculation to Utility

NFTs, beyond being speculative collectibles, are revolutionizing areas like supply chains, gaming, and ticketing by tokenizing assets and bridging the digital and physical realms. They offer new ways to verify ownership and can serve functions like utility tokens, an example being loyalty rewards in coffee shops. Historically, creators relied on intermediaries, reducing their earnings; but NFTs are empowering them to directly reach audiences, enhancing their revenue and autonomy. Built on blockchain's decentralized nature, NFTs promise transparency and trust, allowing buyers to authenticate originality and shifting authority in the arts and entertainment sectors.

### 5.2 Multilayer Product

The NBA's 'NBA Top Shot' offers fans digital collectible videos or 'Moments' capturing iconic plays, acting as blockchain-based digital trading cards licensed by the NBA. Collectors can enhance their collection and potentially access rarer pieces. By regulating the number of editions, the NBA controls Moment values through scarcity. Apart from collectibles, Moments can offer perks like access to exclusive NBA events. Their value fluctuates based on market demand and is influenced by the NBA's supply control. NBA Top Shot website sells packs with random Moments, introducing an element of surprise for collectors.

#### The Shari'a Perspective on 'Blind Box' Approach in Selling NFTs

In Islamic finance, *gharar* denotes prohibited excessive uncertainty or ambiguity in transactions. The randomized nature of NBA Top Shot pack purchases, where collectors can receive duplicates or undesired Moments, embodies this concept. The inherent uncertainty, not knowing the contents' real value, contradicts Islamic principles of risk-sharing and transparency. The potential of receiving a low-valued or duplicate Moment can introduce unfairness and exploitation, opposing Islamic finance's tenets for justice and fairness. Thus, NBA Moment packs could be viewed as problematic from an Islamic finance angle due to excessive risk. However, interpretations of *gharar* can differ among Islamic scholars and institutions.

### 5.3 The Art Industry

NFTs have revolutionized the art sector, providing a transparent and tamper-proof method to confirm digital artwork ownership (British Broadcasting Corporation (BBC), 2022). It addresses previous challenges surrounding digital art replication and distribution (*The Economist*, 2022). NFTs enhance the art market by ensuring trustworthiness, empowering artists, and streamlining licensing. Beeple's "Everydays: The First 5000 Days" auctioned

for \$69.3 million, drawing attention to Christie's and highlighting NFTs' potential (Christies, n.d.). While NFTs and blockchain validate authenticity, art value is still tied to the artist's reputation. Concerns about plagiarized NFTs emphasize the need for ensuring genuine and ethical transactions.

## 5.4 The Real Estate Industry

NFTs have shown revolutionizing potential in the real estate sector by automating processes and improving transparency. Property transactions, including ownership histories, become more transparent with blockchain ledgers (Sonnenreich, 2022). Platforms like NFT Asset Properties encapsulate all transaction details within an NFT. Propy, a notable example, employs blockchain to simplify international property dealings and automate processes like title transfers through smart contracts (Propy, n.d.). Challenges, such as lost cryptocurrency keys, have been raised by experts like Natalia Karayaneva from Propy. NFTs can enhance property transfers by eliminating intermediaries with smart contracts automating tasks like payments (Hajji, 2022). A significant innovation is fractional ownership, ideal for joint investments, facilitated through asset tokenization (Stefanoski & Sahin, 2021). Ventures like Black Manta Capital Partners have showcased the concept's feasibility with real estate token offerings (Black Manta Capital Partners, 2023). The rise of NFTs in real estate hints at democratizing asset access. However, the process requires meticulous planning, addressing legal, technical, and market-related challenges and urging stakeholders to proceed cautiously.

## 5.5 NFTs as Collateral for Loans

NFTs can act as collateral for loans, allowing borrowers to leverage their asset's value without selling. Platforms like NFTfi and Nexo offer such services. NFTfi facilitates cryptocurrency loans using NFTs as collateral, while Nexo provides fiat currency loans. NFTfi claims to have processed about \$300 million in loans since May 2020. Borrowers must be wary of hidden fees and high interest rates. Despite the advantages, it is crucial from an Islamic finance perspective to ensure that NFTs used as collateral are *halal* (permitted). Any lending should be structured in adherence to shari'a laws, ruling out conventional debt contracts. Both the NFTs' status and the contracts' structure require scrutiny for shari'a compliance.

# 6. LEGAL ASPECTS OF NFTS

## 6.1 Linking a Robust Legal Framework to *Maqasid al-Shari'a*

Crafting a rigorous legal framework for digital assets including NFTs aligns with *maqasid al-shari'a*. Such a framework can champion key objectives like safeguarding property rights, spurring economic development, ensuring consumer rights, and endorsing ethical behavior, which are all cornerstones of Islamic law. Ensuring property rights, a prime concern in *maqasid al-shari'a*, would give confidence to digital asset holders. Encouraging economic growth through a well-defined legal structure would invigorate the sector and

foster innovation. Protecting consumers in the digital asset market can ensure safety, fairness, and correct information dissemination. Moreover, abiding by ethical standards to avert fraud is vital, and a robust legal framework would enforce these values.

However, selling NFTs internationally brings forth the challenge of multiple legal jurisdictions. Each nation has distinct laws governing digital assets, and sellers must be cautious to respect the legal demands of every country involved, covering areas like intellectual property, digital assets, taxation, and consumer rights, to name a few. It underscores the necessity of meticulously considering and adhering to the pertinent legal prerequisites of each jurisdiction when transacting NFTs.

## 6.2 Legal Complexities of Cryptocurrencies in the Arab Nations

Global NFT transactions, especially between Arab countries and the US, encounter challenges due to variances in digital asset laws. Many Arab nations are in the early stages of crafting clear regulations around NFT sales, leading to potential legal ambiguities. While some Arab nations restrict or even prohibit cryptocurrencies, which might imply similar treatment for NFTs, their stances vary. Some have adopted more receptive approaches by implementing frameworks to govern cryptocurrencies and associated technologies. For instance, Bahrain's Central Bank initiated in 2019 a regulatory sandbox for cryptocurrency experimentation (Goud, 2021). Similarly, the United Arab Emirates took proactive steps in 2020 when its Securities and Commodities Authority (SCA) rolled out regulations for crypto assets.

## 6.3 Discrepancies in NFT Regulations between Qatar, the US, and Arab Nations

Qatar's Central Bank has banned Bitcoin transactions, emphasizing concerns over illicit activities, money laundering, and volatile pricing (Al Saad, 2022). Conversely, the US has a more developed legal framework for digital assets leading to differences in legal obligations, especially considering the significant US NFT market. Intellectual property laws crucial for NFTs vary, with some Arab nations having unique regulations. Moreover, while the US has clear tax guidelines for digital assets, Arab countries differ or lack NFT-specific tax regulations. Consumer protection laws for NFTs also vary between the US and certain Arab nations.

## 6.4 Shari'a Issues around Cryptocurrencies

Since the only way to buy and sell NFTs is through using cryptocurrencies, it is important to view the shari'a perspective on cryptocurrencies. In fact, Islamic scholars have different opinions about cryptocurrencies, as it is a relatively new phenomenon and its implications for Islamic finance and law are still being debated. Some scholars view cryptocurrencies as a form of currency and are supportive of their use, while others are more cautious or outright skeptical.

Scholars who support the use of cryptocurrencies argue that they can serve as a means of exchange, similar to traditional currency. They also suggest that cryptocurrencies may have the potential to provide financial inclusion and access to banking services to those

who are unbanked or underbanked. On the other hand, some scholars are critical of cryptocurrencies due to their lack of intrinsic value and their potential to be used for illegal activities such as money laundering and financing terrorism. They also raise concerns about the speculative nature of cryptocurrencies and their potential for price manipulation. In fact, the Islamic scholarly community is still in the process of evaluating cryptocurrencies and their compatibility with Islamic law and finance. The opinions on this matter may continue to evolve as cryptocurrencies continue to gain prominence and their impact on the global economy becomes clearer.

## 6.5 Importance of Legal Framework for NFTs

Historically, digital artists have struggled with monetizing their works due to easy online replication. NFTs offer a solution by tokenizing unique versions of these works, enabling artists to earn and maintain the distinctiveness and worth of their creations. Without a robust legal framework, however, the genuine value of NFTs can be undermined. Hence, laws safeguarding artists' intellectual property and ensuring transactional transparency in the NFT sphere are crucial for market trust, attracting investments, and the sector's evolution (Goutay and Wittek, 2022).

## 6.6 Legal Dimensions of NFTs and Intellectual Property

With NFTs surging in popularity, understanding legal bounds linked to copyrighted works is essential. An NFT buyer might assume that they have procured the linked art; but typically, the original artist retains the copyright, holding exclusive rights unless they are specifically transferred (Devin, 2022). In many scenarios, NFT purchasers get only the token and limited non-commercial usage rights of the connected artwork. Sellers may be legally accountable if rights related to the underlying work are miscommunicated. Hence, a clear comprehension of intellectual property rights is crucial for both parties. For instance, purchasing an NBA Top Shot or Board Ape Yacht Club NFT grants the owner a distinct digital asset. However, these typically do not convey copyright ownership. The terms of both NBA Top Shot and Board Ape Yacht Club grant the buyer limited and non-commercial licenses without transferring underlying intellectual property rights.

### 6.6.1 The Shari'a Point of View on Protecting Copyrights

Since copyrights have value and are considered from the perspective of the Shari'a, they should be protected. In fact, according to the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) standards 42, copyrights and trademarks are financial rights, and the owner is fully entitled to its rights. Moreover, in the Qur'an, Allah (SWT) says:

﴿يَا أَيُّهَا الَّذِينَ آمَنُوا لَا تَأْكُلُوا أَمْوَالَكُمْ بَيْنَكُمْ بِالْبَاطِلِ إِلَّا أَنْ تَكُونَ تِجَارَةً عَنْ تَرَاضٍ مِّنْكُمْ وَلَا تَقْتُلُوا أَنْفُسَكُمْ إِنَّ اللَّهَ كَانَ بِكُمْ رَحِيمًا﴾ (4:29)

“O you who have believed, do not consume one another's wealth unjustly but only [in lawful] business by mutual consent. And do not kill yourselves [or one another]. Indeed, Allah is to you ever Merciful” (Saheeh International, 1997).

According to Al-Sa'di in his book, the meaning of this verse is to not take the wealth of others without right because a Muslim should love for his brother what he loves for himself and should respect his brother's wealth as he respects his own. Taking someone else's wealth is not only unjust, but can also invite others to do the same to his own wealth if he were to be in a similar situation. Therefore, it is important to treat others' wealth with the same level of respect and care as one's own.

Since copyrights have value and can be bought and sold, just like any other asset, Islamic law recognizes the importance of protecting copyrights and provides legal remedies to ensure that owners are able to exercise their rights. Therefore, if NFTs can help protect copyrights then they should be encouraged under Islamic law. Moreover, the Islamic financial and legal systems should adapt to recognize and accommodate the emergence of NFTs, so that they can be fully integrated into the Islamic economic system and the broader financial industry while also ensuring that they are used and traded in a fair and ethical manner.

In fact, NFTs have the potential to revolutionize copyright protection by providing a secure and transparent way to verify ownership and authenticity of digital content. With NFTs, creators can prove their ownership of the original works and have control over the use and distribution of their content without the need for intermediaries or third-party platforms. Still, there may be some legal issues that can lower the efficiency of the use of NFTs.

### **6.7 NFTs and Real Estate Regulation**

NFTs can modernize real estate transactions but getting governments on board is a challenge. The regulated nature of real estate demands that NFT transactions align with existing laws, like property and tax regulations. Convincing authorities would necessitate substantial regulatory alterations (Sonnenreich, 2022). Additionally, the large values in real estate underline the need for a fail-proof NFT system. A broad acceptance of NFTs also demands a paradigm shift in the perceptions of all industry participants. Hence, close collaboration between NFT advocates and policymakers is vital to navigate these hurdles.

Setting up a legal committee for NFT usage in real estate can be a possible approach to standardizing and regulating the sector. The committee, comprising experts and stakeholders, can establish best practices, ensure law compliance, and resolve NFT-related disputes in real estate.

### **6.8 NFTs, Money Laundering, and Shar'ia Compliance**

Money laundering, a longstanding concern in the art sector, can find a new avenue with NFTs. The US Treasury fears that NFTs can be manipulated for self-laundering where a criminal buys an NFT with illicit money and then repurchases it using clean funds, legitimizing the money's source. This technique, combined with the innate nature of NFTs to allow artists to gain from each sale, emphasizes the need for stronger regulations in the NFT market (Barnett & McCrory, 2022).

Shari'a, grounded in the teachings of the Qur'an and Sunnah, takes a stricter stand against money laundering than conventional laws, emphasizing wealth's ethical acquisition and use. Islam's prohibition of usury and the values of clarity and justice underscore the significance of transparent and fair financial dealings. Clarity demands clear transaction intents, making it a potential antidote to money laundering. Justice, meanwhile, champions fair social financial systems (Hoque et al., 2021). Reference can also be made to historical Islamic narratives, such as the interaction between Omar Ibn al Khattab and his governor Amr Ibn al-Aas, where the former sought clarification on how the latter acquired great wealth in a short time. It is said that Amr Ibn al-Aas responded with an account of his legitimate earnings; this highlights the emphasis on transparent wealth accumulation (Al-Andalusi, 1983).

## 7. THE TECHNOLOGY BEHIND NFTS

### 7.1 Blockchain Technology

NFTs are underpinned by blockchain technology, a decentralized database maintained by a network of computers rather than a central authority (Vacca et al., 2020). This design fosters decentralized, redundant, and transparent database management by networks. NFTs are 'minted' on this technology, specifically on platforms like Ethereum, using token standards like ERC-721 and ERC-1155 (Sharma, 2023). Ethereum has also given rise to major NFT marketplaces like OpenSea, Rarible, and SuperRare.

### 7.2 Gas Fees

Interactions on the Ethereum network necessitate gas fees to compensate miners. These fees ensure network security and prevent spamming. Every NFT-related action incurs these fees, with platforms like OpenSea and Rarible sometimes deferring fees through lazy minting, passing the cost to buyers (Alchemy, 2022). Ethereum's previous proof-of-work mechanism, now transitioning to proof-of-stake, had significant energy implications, comparable to an entire country's consumption (Digiconomist, 2022a, 2022b).

### 7.3 Smart Contracts

Smart contracts, which are digital agreements on blockchains, automate execution when conditions are met, promoting efficiency, trust, and transparency by removing intermediaries and ensuring tamper-proof data (Frankenfield, 2023; International Business Machines Corporation (IBM), n.d.). Integrated with NFTs, smart contracts confirm authenticity and combat counterfeits by verifying an NFT's origin (Binance, 2022). Challenges arise from their immutable nature; once deployed, smart contracts cannot be easily altered, demanding precision in their creation. Errors, being permanent, emphasize the need for expert programmers and thorough testing to avoid biases or unforeseen issues (Apostolou, 2023; Corporate Finance Institute (CFI), 2022).

### **The Shari'a Consideration Regarding NFTs Using Smart Contracts**

Under Islamic law, smart contracts may satisfy the requirements for a valid sale contract including offer and acceptance, subject matter, and involved parties (Al-Zuhaili, 2008). In

NFT sales via smart contracts, the offer is presented by the seller, and the buyer's acceptance is recorded. The contract's clarity ensures the item's lawfulness and rightful ownership. Payments are direct, eliminating intermediaries. Smart contracts also automate NFT transfers, executing only when agreed-upon conditions, like payment amounts, are met. However, verifying the actual identity behind a smart contract remains challenging, posing potential transactional concerns.

#### **7.4 Technical Issues with NFTs**

NFTs, in most cases, do not store the digital asset directly. Rather, they contain URLs or references pointing to the asset on a separate computer network. A potential issue with this is that if the storage network goes offline or faces security breaches, the associated NFT becomes void or meaningless. This system also complicates the validation of the digital asset's authenticity and ownership when it resides on another network (Vallabhaneni, 2021). Furthermore, gas fees associated with NFT transactions on platforms like Ethereum can be unpredictable due to fluctuating gas prices. During high-demand periods, these fees can sometimes exceed the NFT's actual value (Garg et al., 2021). Another significant concern with NFTs is scalability. The inherent architecture of popular NFT platforms like Ethereum limits transaction speeds due to their proof-of-work consensus mechanism, which demands extensive computational power. This limitation often leads to network congestion, delayed transactions, and increased gas fees (Binance Research, 2022).

#### **7.5 Environmental Impact and Considerations for NFTs**

NFTs have garnered attention due to their potential environmental repercussions. Gas fees, primarily paid through mined cryptocurrencies, largely derive energy from non-renewable sources. In early 2021, Ethereum's energy consumption was comparable to a small country. However, the network has made commendable progress in lowering its environmental footprint by transitioning from a proof-of-work to a proof-of-stake consensus mechanism, achieving a staggering 99.95% reduction in energy use (Digiconomist, 2022a, 2022b). Despite these advancements, the environmental toll of NFTs remains a subject of concern. As per Digiconomist, a single NFT transaction on Bitcoin equates to the emissions of 1.7 million Visa transactions or watching YouTube for 124,714 hours. Ethereum's NFT transactions are considerably less damaging, but they still have an impact (Digiconomist, 2022a, 2022b). To genuinely address these concerns, a multifaceted approach is essential. This involves adopting more energy-efficient blockchain technologies, like proof-of-stake, and fostering responsible consumption patterns. Both creators and consumers must emphasize sustainability and ethical considerations in the realm of NFTs.

#### **7.6 The Shari'a Point of View on the Environmental Impact of Using NFTs**

From the shari'a perspective, Muslims, as stewards of the earth, must consider the environmental repercussions of using technologies like NFTs. According to Nomanul Haq and Ozdemir (2017), the Qur'an emphasizes humans as God's vicegerents on earth, and



harming the environment is akin to self-injury, violating Qur'anic ethics. The value of NFTs, often based on subjective opinions and sometimes fetching extravagant prices, could be seen as wasteful, especially when juxtaposed against environmental concerns. Islam prohibits wastefulness, and resources once depleted are largely irrecoverable. The Prophet Muhammad (PBUH) highlighted the importance of resource conservation, exemplifying with the prudent use of water. Therefore, Muslims should evaluate the environmental impacts of NFTs against their intrinsic value, ensuring their actions align with Islamic values and ecological responsibility.

## 8. RECOMMENDATIONS

NFTs have the potential to be a powerful tool for supporting economic development and providing access to financing companies that are not able to access traditional bank loans. Islamic finance principles require financial transactions to be structured in a way that is consistent with Islamic law. In countries where there is no access to such Islamically compliant loans, NFTs can play a significant role. In fact, NFTs can provide a new way to structure financial transactions that is more in line with Islamic principles, allowing companies to access funding in a way that is both Islamically compliant and innovative. By using NFTs to provide financing, Muslim communities can support the growth of new businesses and industries, creating jobs and driving economic development.

Additionally, NFTs can be used to create new investment opportunities for individual investors, providing a more accessible and equitable way for Muslims to participate in the global economy. In fact, the use of NFTs for Islamically compliant financing has the potential to be a game-changer for Muslim communities, helping to build a more inclusive and sustainable economy.

NFTs can also be used to empower Muslim communities and build a more inclusive and equitable economy. By leveraging the unique properties of NFTs, such as their ability to represent ownership of digital and physical assets, Muslim communities can create new economic opportunities and eliminate intermediaries that may not share the same values and principles. For example, NFTs could be used to create new markets for Islamic art and culture, allowing Muslim artists and creators to benefit directly from the sale of their work. NFTs could also be used to support Islamic philanthropy and charitable giving, creating a more transparent and efficient system for the distribution of funds. By utilizing NFTs in these ways, Muslim communities can take control of their economic destiny and build a more just and equitable society.

## 9. CONCLUSION

NFTs have emerged as a revolutionary technology that has the potential to transform a wide range of industries. NFTs offer a new way to represent ownership and value in a digital world, providing opportunities for creators and investors to monetize unique digital assets such as art, real estate, and other forms of content. However, as with any emerging technology, there are also challenges to consider, including the environmental impact of

NFTs and the potential for fraudulent activity. It is important for stakeholders to carefully consider the implications of NFTs on ethics and sustainability and work to ensure that they are used in responsible and socially conscious ways.

Indeed, NFTs currently have a variety of uses. NFTs can be used to represent unique digital artwork, giving artists a new way to monetize their creations and collectors a way to own and display digital art in a verifiable and secure way. They can be used to represent the ownership of a property or a fraction of it, allowing for easier and more transparent ownership transfer and fractional ownership opportunities. They can also be used as collateral for loans, with the token representing a valuable asset that can be used as collateral and transferred to the lender until the loan is repaid. NFTs can be used as utility tokens, representing access to a particular service or product, such as a membership or subscription. NFTs can also be used to prove ownership of a particular piece of content, such as a song or a video, and enable creators to earn royalties for their work.

Overall, the potential of NFTs is vast, and it will be exciting to see how this technology continues to develop and evolve in the coming years. Moreover, NFTs are complex and varied. One of the primary concerns is the lack of clarity regarding ownership rights and intellectual property infringement. As NFTs allow for the creation and sale of unique digital assets, there is a risk of copyright infringement, especially in cases where the underlying content is not original. There are also questions regarding the enforceability of smart contracts and the legal status of NFTs in various jurisdictions. Additionally, there are concerns about money laundering and other illegal activities associated with NFT transactions, requiring regulators to keep a close eye on the NFT market. As NFTs continue to gain popularity, it is likely that these legal issues will need to be addressed through legislation and regulation to ensure the protection of intellectual property rights and prevent criminal activity.

From a shari'a perspective, the use of NFTs can be seen as a form of financial speculation which can lead to economic injustice and harm to society. Also, there are concerns that NFTs can be used for gambling or other illegal activities, which are prohibited in Islam. Additionally, the high value of some NFTs can be seen as a form of extravagance or hoarding, which goes against the principles of moderation and generosity in Islam. Some use cases of NFTs may also be prohibited if they include an extensive level of *gharar*. Therefore, there is a need for careful consideration of the *maqasid al-shari'a* in the use of NFTs to ensure that they are used in a way that is consistent with the values and objectives of Islamic law.

## ABOUT THE AUTHOR

### Noha Selim

Noha Selim is a graduate of the Master's program in Islamic Finance (Class of 2023) from the College of Islamic Studies (CIS) at Hamad Bin Khalifa University (HBKU), with a previous degree in accounting and an additional Certificate of Islamic Studies from the Ministry of Islamic Affairs in Qatar. Her current research interests include Islamic fintech and Islamic finance. She is particularly drawn to the transformative potential of these domains in fortifying Muslim communities and catalyzing economic development.  
nohahishamselem@gmail.com

## REFERENCES

- Accounting and Auditing Organization for Islamic Financial Institutions. (n.d.). Sharia'a standards. Retrieved March 17, 2023, from <https://aaoifi.com/shariaa-standards/?lang=en>
- Al-Andalusi, A. b. (1983). *Aleaqd alfarid*. Dar Alkutub Aleilmia.
- Al-Dibian, D. (2011/1432 H.). *Financial Transactions, Original and Contemporary* (2nd ed). The Sixth Requirement in the Prohibition of Gambling. Al-Maktabah Al-Shamillah. <https://shamela.ws/book/14474>
- Al Saad, R. (2022, June 23). Legal Perspectives on the Reality of Digital Currencies in Qatar. *Al-Raya Newspaper*.
- Al-Sa'di, A. N. (1988). *Tayseer Al Karim Al Rahman in the interpretation of the words of Al Mannan*. Dal AlMadani.
- Al-Zarkashi, M. (1982). *al-Manthūr fi al-Qawā'id al-Fiqhiyyah*. Wizārah al-Awqāf wa al-Shu'ūn al-Islāmiyyah.
- Al-Zuhaili, W. b. (2008). *Islamic jurisprudence and its evidence*. Dar Al Fikr.
- Apostolou, D. (2023, January 9). Upgrading smart contracts. ethereum.org. Retrieved March 17, 2023, from <https://ethereum.org/en/developers/docs/smart-contracts/upgrading/>
- Barnett, K., & McCrory, C. (2022, February 22). Department of Treasury releases study on money laundering risks in art and NFTs. JD Supra. Retrieved March 17, 2023, from <https://www.jdsupra.com/legalnews/department-of-treasury-releases-study-3355488/#:~:text=On%20February%204%2C%20the%20Department%20of%20the%20Treasury,its%20propensities%20for%20money%20laundering%20and%20illicit%20financing>
- Binance. (2022, August 5). All you need to know about NFT smart contracts. *Binance Blog*. Retrieved March 17, 2023, from <https://www.binance.com/en/blog/nft/all-you-need-to-know-about-nft-smart-contracts-568745413587703085>
- Black Manta Capital Partners. (2023). Capital Market Listings. Retrieved from <https://blackmanta.capital/listings/>
- Bored Ape Yacht Club. (n.d.). Terms of service. Retrieved March 17, 2023, from <https://boredapeyachtclub.com/#/terms>
- British Broadcasting Corporation. (2022, December 16). What are NFTs and why are some worth millions? *BBC News*. Retrieved March 17, 2023, from <https://www.bbc.com/news/technology-56371912>
- Dean, I. (2022). 10 NFT trends that could change the world in 2022. Creative Bloq. <https://www.creativebloq.com/features/nft-trends-2022>
- Chawla, V. (2022, February 28). Bored ape NFT collector loses \$2.2m in phishing scam. *Crypto Briefing*. Retrieved March 16, 2023, from <https://cryptobriefing.com/bored-ape-nft-collector-loses-2-2m-in-phishing-scam/>
- Christies. (n.d.). Bepple (b. 1981). Christies.com. Retrieved March 17, 2023, from [https://onlineonly.christies.com/s/bepple-first-5000-days/bepple-b-1981-1/112924?ldp\\_breadcrumb=back](https://onlineonly.christies.com/s/bepple-first-5000-days/bepple-b-1981-1/112924?ldp_breadcrumb=back)
- Clark, N. (2022, January 27). Why celebrities are buying Bored Ape NFTs: Inside the Tonight Show's most uncomfortable recent segment. Polygon. Retrieved from <https://www.polygon.com/22904893/nft-explainer-why-celebrities-buy-bored-ape-yacht-club-jimmy-fallon-paris-hilton> (30 November 2023).
- Corporate Finance Institute. (2022, December 8). Smart contracts. Corporate Finance Institute. Retrieved March 17, 2023, from <https://corporatefinanceinstitute.com/resources/valuation/smart-contracts/>
- Creighton, J. (2023, January 26). NFT timeline: The beginnings and history of NFTs. *NFT Now*. Retrieved March 16, 2023, from <https://nftnow.com/guides/nft-timeline-the-beginnings-and-history-of-nfts/>
- Devin. (2022, April 27). *NFTs are legally problematic ft. Steve Mould & Coffeexilla* [Video]. YouTube. Retrieved March 17, 2023, from [https://www.youtube.com/watch?v=C6aeL83z\\_9Y](https://www.youtube.com/watch?v=C6aeL83z_9Y)
- Digiconomist*. (2022a, December 6). Bitcoin energy consumption index. *Digiconomist*. Retrieved March 17, 2023, from <https://digiconomist.net/bitcoin-energy-consumption>
- Digiconomist*. (2022b, December 6). Ethereum energy consumption index. *Digiconomist*. Retrieved March 17, 2023, from <https://digiconomist.net/ethereum-energy-consumption>

- The Economist. (2022, February 3). *What are NFTs?* [Video]. YouTube. Retrieved March 17, 2023, from [https://www.youtube.com/watch?v=EJzB\\_Fa27ko&amp;t=569s](https://www.youtube.com/watch?v=EJzB_Fa27ko&amp;t=569s)
- Ethereum. (n.d.a). Non-fungible tokens (NFT). *ethereum.org*. Retrieved March 16, 2023, from <https://ethereum.org/en/nft/>
- Etoro. (n.d.). What are NFT crypto coins and how do they work? *etoro*. Retrieved March 16, 2023, from <https://www.etoro.com/crypto/what-are-colored-coins/>
- Frankenfield, J. (2023, February 10). What are smart contracts on the blockchain and how they work. *Investopedia*. Retrieved March 17, 2023, from <https://www.investopedia.com/terms/s/smart-contracts.asp>
- Garg, P., Gupta, B., Chauhan, A. K., Sivarajah, U., Gupta, S., & Modgil, S. (2021). Measuring the perceived benefits of implementing blockchain technology in the banking sector. *Technological Forecasting and Social Change*, 163, Article 120407.
- Goud, S. (2021, January 26). *Central Bank of Bahrain issues regulations governing crypto-asset services*. Al Tamimi & Company. Retrieved March 17, 2023, from <https://www.tamimi.com/law-update-articles/central-bank-of-bahrain-issues-regulations-governing-crypto-asset-services/#:~:text=Crypto-asset%20service%20licensees%20can%20undertake%20transactions%20with%2Fon%20behalf,a%20natural%20person%20above%20the%20age%20of%2021>
- Goutay, P., & Wittek, N. (2022, April 1). Key U.S. legal considerations for NFTs. *Jones Day*. Retrieved March 17, 2023, from <https://www.jonesday.com/en/insights/2021/04/nfts-key-us-legal-considerations-for-an-emerging-asset-class#:~:text=The%20result%3A%20The%20current%20U.S.%20regulatory%20and%20legal,cybersecurity%20concerns%20and%20state%20laws%20governing%20virtual%20currencies>
- Hajji, J. (2022). Guide To Using NFTs In Real Estate. Retrieved from <https://www.forbes.com/sites/forbesbusinesscouncil/2022/08/04/guide-to-using-nfts-in-real-estate/?sh=62dac11f5e8a>
- Hoque, M. N., Said, J., Abdullah, M. F., & Ahmad, A. U. F. (2021). Money Laundering From Maqāsīd Al-Sharī'ah Perspective With Particular Reference to Preservation of Wealth (Hifz Al-mal). *Journal of Legal, Ethical and Regulatory*. 24(Special Issue 1). <https://ssrn.com/abstract=4558324>
- Howcroft, E. (2022, January 11). *NFT sales hit \$25 billion in 2021, but growth shows signs of slowing*. Reuters. Retrieved March 16, 2023, from <https://www.reuters.com/markets/europe/nft-sales-hit-25-billion-2021-growth-shows-signs-slowing-2022-01-10/>
- Ibn Abidin, M. A. (2011). *Radd al-Muhtar ala al-Durr al-Mukhtar*. Beirut: Dār al-Fikr.
- Ibn Qudāmah, . I.-M. (1994). *al-Mughni Dār al-Fikr*. International Business Machines Corporation. (n.d.). *What are smart contracts on Blockchain?* IBM. Retrieved March 17, 2023, from <https://www.ibm.com/topics/smart-contracts>
- Lodge, M. (2023, March 1). What are cryptopunks? *Investopedia*. Retrieved March 16, 2023, from <https://www.investopedia.com/what-are-cryptopunks-6825717>
- Marcobello, M. (2022, December 30). What is counterparty? Historical NFTs built on Bitcoin. *Decrypt*. Retrieved March 16, 2023, from <https://decrypt.co/resources/learn-counterparty-historical-nfts-built-bitcoin>
- NBA Top Shot. (n.d.a). Latest listings. Retrieved March 16, 2023, from <https://nbatopshot.com/marketplace>
- NBA Top Shot. (n.d.b). Terms of use. Retrieved March 17, 2023, from <https://nbatopshot.com/terms>
- NFTfi. (n.d.). Home. Retrieved March 17, 2023, from <https://nftfi.com/>
- Nomanul Haq, S., & Ozdemir, I. (2017). *8/14 major contemporary environmental issues and some religious and ethical resources for addressing them*. CILE. Retrieved March 15, 2023, from <https://www.cilecenter.org/publications/publications/814-major-contemporary-environmental-issues-and-some-religious-and>
- OpenSea. (n.d.). Meebits analytics. Retrieved March 17, 2023, from <https://opensea.io/collection/meebits/analytics>
- OpenSea. (2022, February 16). The original tweet said 80% of NFTs minted with our lazy minting tool violate our terms of service. that isn't right. 80% of nfts \*we remove\* for violations are lazy minted. *Twitter*. Retrieved March 16, 2023, from <https://twitter.com/opensea/status/1493787767029088262>
- Piech, S., Chua, J. X., & Sharma, S. (2022, July 11). Half-year report 2022. *Binance Research*. Retrieved March 16, 2023, from <https://research.binance.com/en/analysis/half-year-2022>
- Propy. (n.d.). Real estate transaction automated. *Propy*. Retrieved March 17, 2023, from <https://propy.com/browse/>
- Takahashi, D. (2018). *CryptoKitties: Blockchain-based collectible hit debuts in China*. *VentureBeat*. <https://venturebeat.com/commerce/cryptokitties-blockchain-based-collectible-hit-debuts-in-china/>
- Saheeh International. (1997). English translation of the Qur'an. Available from [https://archive.org/details/thequran\\_saheehinternational](https://archive.org/details/thequran_saheehinternational)
- Securities and Commodities Authority. (n.d.). Retrieved March 17, 2023, from <https://www.sca.gov.ae/en/home.aspx>
- Sharma, T. K. (2022, September 8). Security tokens vs. utility tokens: A concise guide. *Web3 & blockchain certifications*. Retrieved March 16, 2023, from <https://www.blockchain-council.org/blockchain/security-tokens-vs-utility-tokens-a-concise-guide/>
- Sharma, R. (2023, April 6). Non-Fungible Token (NFT): What It Means and How It Works. *Investopedia*. Retrieved from <https://www.investopedia.com/non-fungible-tokens-nft-5115211>

- Sonenreich, A. (2022, April 14). Council post: NFTs and the future of commercial real estate. *Forbes*. Retrieved March 17, 2023, from <https://www.forbes.com/sites/forbesbusinesscouncil/2022/02/16/nfts-and-the-future-of-commercial-real-estate/?sh=743357319bac>
- Stefanoski, D., & Sahin, O. (2021, July 22). Non-fungible tokens (NFTS) in the spotlight. *EY*. Retrieved March 17, 2023, from [https://www.ey.com/en\\_ch/blockchain/non-fungible-tokens-nfts-in-the-spotlight](https://www.ey.com/en_ch/blockchain/non-fungible-tokens-nfts-in-the-spotlight)
- The United States Department of Justice. (2022, March 25). Two defendants charged in non-fungible token (“NFT”) fraud and money laundering scheme. Retrieved March 16, 2023, from <https://www.justice.gov/usao-sdny/pr/two-defendants-charged-non-fungible-token-nft-fraud-and-money-laundering-scheme-0>
- Vacca, A., Di Sorbo, A., Visaggio, C. A., & Canfora, G. (2020, December 28). A systematic literature review of blockchain and smart contract development: Techniques, tools, and open challenges. *Journal of Systems and Software*. 174, 110891. Retrieved March 18, 2023, from <https://www.sciencedirect.com/science/article/abs/pii/S0164121220302818>
- Vallabhaneni, P. (2021, April 20). *The rise of NFTS – opportunities and legal issues*. White & Case LLP. Retrieved March 17, 2023, from <https://www.whitecase.com/insight-alert/rise-nfts-opportunities-and-legal-issues>