

A Study of Social Acceptability of NFTs

Kohei Ichihara*

Sumitomo Mitsui Banking Corporation, Sumitomo Mitsui Banking East Building, Tokyo, Japan.
The Japan Research Institute, Limited, Osaki Forest Building, 2-18-1 Higashi-Gotanda, Shinagawa-ku, Tokyo, Japan.

* Corresponding author. Email: Ichihara_Kohei@ea.smbc.co.jp (K.I.)

Manuscript received November 11, 2022; accepted April 27, 2023; published July 10, 2023.

DOI: 10.18178/IJBTA.2023.1.1.9-14

Abstract: In 2022, the Japanese government is strongly proposing to focus on developing the Web3 industry. The government is exploring the use of NFTs to commercialize content such as Japanese animations and games as Web3 businesses. NFT (Non-Fungible Token) means "unique and non-substitutable data unit recorded in blockchain". NFT indicates the owner of digital content by linking the NFT with digital content such as image or audio data. On the other hand, NFTs are constructed using complex technologies such as "blockchain" and "smart contracts". For this reason, many people do not understand the technical mechanism of NFTs. There are also aspects of excessive expectations for NFTs based on misunderstandings. I think that the bubble caused by excessive expectations negatively affects the development of technology. Therefore, in this research, I investigated what kind of value people find after understanding the mechanism of NFTs. Also, based on the survey, I find the functions desired for NFTs. Specifically, I made a video for non-technical people to easy to understand how NFTs work. And I showed the non-technical people the video with a demonstration of NFT tampering. After showing the video to the viewers, I surveyed them to investigate how their understanding of NFTs and the perceived value of NFTs changed. As a result, people understood that NFTs were not used as keys to access contents, but rather as a way to brag about what the holders had.

Keywords: NFT, non-fungible token, ethereum, blockchain

1. Introduction

NFT (Non-Fungible Token) means "unique and irreplaceable (non-Fungible) data unit recorded in blockchain". NFT is used to indicate the owner of digital content by linking the NFT with digital content such as image data or audio data. The case where an NFT linked to a digital artist's work (image data) was sold at an auction for about \$69.3 million attracted attention [1]. On the other hand, there are also voices pointing out signs of an excessive bubble and a rapid decline as a reaction to it [2].

The interest of this research is what the technical specification of NFT should be. So, first, I researched and understood the technical reality of NFT. Then I made a video for those who are not familiar with information technology to easy to understand how NFTs work. Chapter 2 of this article, which explains the technical reality of NFTs, is equivalent to that video. And I showed the non-technical people the video with a demonstration of NFT tampering. After showing the video to the viewers, I surveyed them to investigate how their understanding of NFTs and the perceived value of NFTs changed. I will also describe the results of the survey and methods to solve the problems identified by the survey.

2. The Technical Reality of NFTs

2.1. Technical Overview of Ethereum Blockchain

NFTs are originally issued using Ethereum, a leading public blockchain. A feature of Ethereum is that it has a "Smart Contract". "Smart Contract" (or simply "Contract") in the context of Ethereum is a program that

is recorded in a block. This freely programmable feature allows anyone to issue their original tokens on Ethereum.

EVM (Ethereum Virtual Machine), which is Ethereum's own bytecode execution environment, is used to execute the contract code. In addition, Solidity is mainly used as Ethereum's high-level language for generating bytecode that runs on EVM. As of 2022, Visual Studio Code, a popular IDE, has already developed an extension that enables syntax highlighting and other functions for Solidity. Therefore, it provides a comfortable development environment that is comparable to general programming languages.

OpenZeppelin, a library of typical contract templates, has also already been developed. This is standardly used in development with Ethereum. ERC721 is a standard for NFT contracts, and it is also included in OpenZeppelin.

2.2. Outline of NFT Contract (NFT Program)

This section outlines the contents of the ERC721 code, which is a standard for NFT contracts.

First, I will explain the mechanism that realizes a "unique and irreplaceable" record. This is very simple. Specifically, the mechanism simply assigns a serial number to the token. That is, each NFT managed by one contract (collection of NFTs) has a unique serial number called a token ID. Therefore, each NFT has a uniqueness because the token ID is designed so that it does not overlap.

Next, I will explain the mechanism that defines the unique holder. This is also very simple. The mechanism is to record the Ethereum account address as the holder at 1on1 correspondence for each token ID. (It means that the NFT issuer creates a mapping between the token ID and account address.)

Finally, I will explain what the metadata of NFTs are and explain the mechanism of linking metadata and NFTs. First of all, the metadata of NFT is information about NFT that is not recorded on the blockchain. For example, in an image NFT, the image file itself is not stored in the blockchain. The image file is stored on any server managed by the NFT issuer, given a URL, and made public. Information such as the URL of the image is described in the JSON format file. This JSON file is also stored outside the blockchain (on a server managed by the NFT issuer). Therefore, metadata does not have the tamper resistance of blockchain. In other words, metadata can be tampered with by administrators' malicious intent or by external cyberattacks. Only the URL where this JSON file is saved is recorded in the blockchain. The blockchain records a 1on1 correspondence (mapping) between the token ID and the URL where the JSON file is saved. It is just like the correspondence between the token ID and the holder's account address. This mapping enables the linking of NFTs and metadata.

3. NFT Demonstration and Technical Explanation (Demonstration of NFT Issuance and Metadata Falsification)

I gave an NFT demonstration and technical explanation to my colleagues at work. In this section, I report on the contents of the demonstration and technical explanation, as well as the questionnaire survey that was conducted afterward.

3.1. Issuance of NFTs

I used OpenZeppelin's ERC721 contract template for creating the NFT for this survey. I deployed this contract to the Ethereum public test network "Rinkeby". OpenSea, the world's largest NFT marketplace, offers services for the test network [3]. As of May 2022, this service for the test network was only intended for the Rinkeby test network. The NFTs issued on the Rinkeby were able to get services equivalent to OpenSea's main services. I was able to confirm my NFTs on OpenSea.

I used a rental server from Ninja Tools Inc. [4] for storing metadata. (URL: <https://jef.at-ninja.jp/>)

For the NFT image file, I used an unofficial character (named "Moudame-Kun") created by our internal SNS community. This is because I planned to have non-technical employees feel familiarity and interest. In addition, by using images that combine uniformity and individuality with pixel art of these characters, I intended to make the viewers of the technical explanation recall the same feeling as the NFTs in the real world. Fig. 1 shows images of the "Moudame-Kun" NFTs. "

3.2. Technical Explanation and Demonstration of NFT

I showed a demo video that includes an explanation equivalent to that described in Chapter 2 of this article and a demonstration of falsifying NFT metadata to my colleagues (hereafter referred to as "the

viewers”).

The explanatory video is about 10 minutes long and consists of two parts. One of the parts is the voice explanation while displaying the PowerPoint slides. In addition to this, it consists of a voice explanation on a video that captures the operation of NFT tampering on a desktop computer. The voice explanation was created using the text-to-speech software (“VOICEVOX” [5]). And an avatar is also displayed on the video screen as an explainer. The avatar was created using face-tracking software (“REALITY” [6]). Fig. 2 is a screenshot of this explanation and demonstration video. This video will be posted on our company's YouTube channel. (<https://www.youtube.com/watch?v=osaVl-1m0f0>)

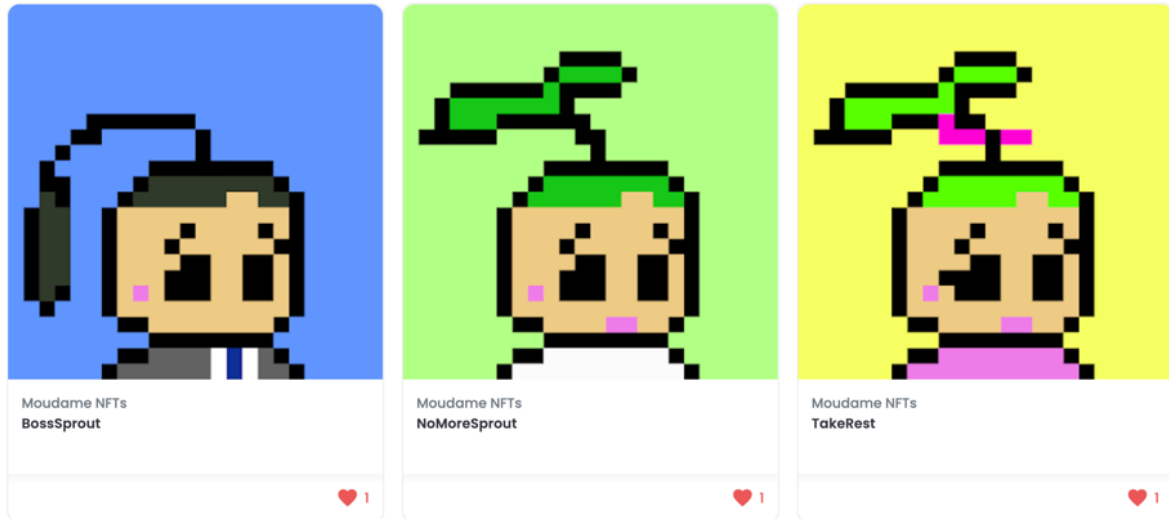


Fig. 1. Image files I used for the NFTs

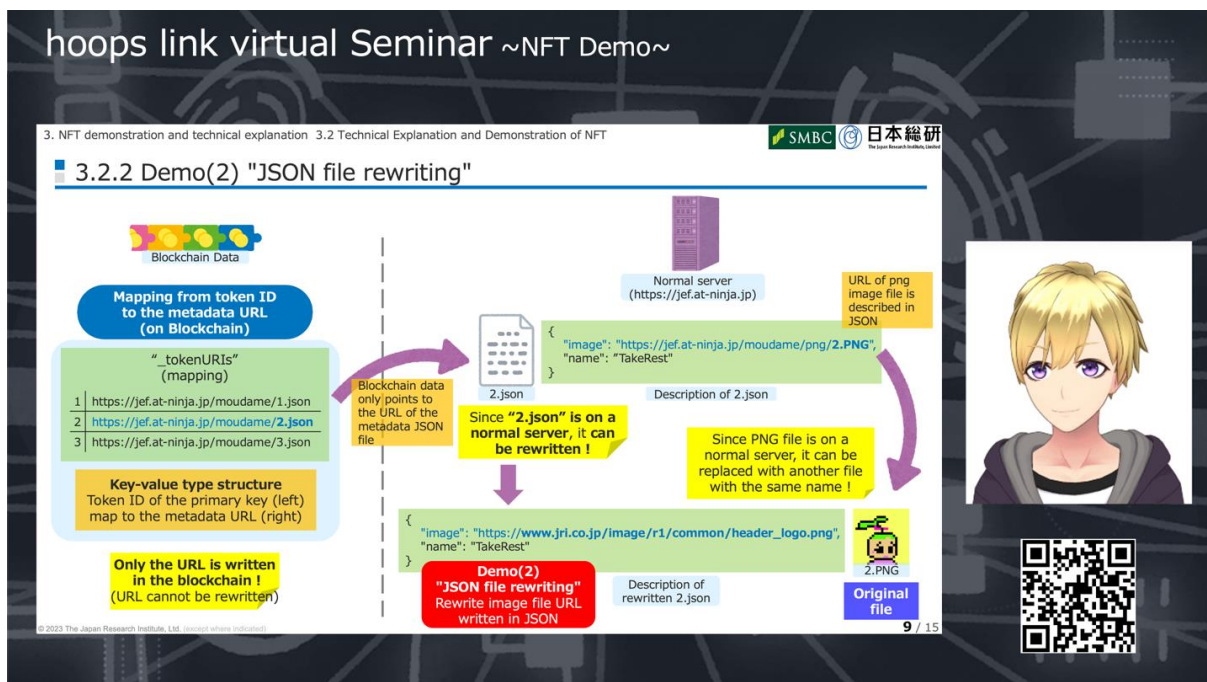


Fig. 2. Image of the explanation and demonstration video.

Two demonstrations were conducted as NFT tampering demonstrations.

Demonstration (1) is as follows. I replaced the NFT image file (1.PNG) which is saved in my server(<https://jef.at-ninja.jp/>) and whose token ID is 1 in this NFT collection with another file with the same name. By doing this, I showed that the image displayed on the marketplace (OpenSea) can change without touching the data of the Ethereum blockchain and OpenSea.

Next, demonstration (2) is as follows. I rewrote the image file URL described in the JSON file (2.json) of

the metadata of the NFT whose token ID is 2 in this NFT collection. The rewritten URL* is the URL of the corporate logo image file on the website of my company. As a result, image files that are not even under the control of the NFT issuer (me) can be shown to the OpenSea without even knowing the original owner of the logo image file (= public relations department at my company) or the operator of OpenSea (Ozone Networks, Inc). (* https://www.jri.co.jp/image/r1/common/header_logo.png)

3.3. Survey Results

I asked my colleagues to watch the demo video and answer the questionnaire after watching it on the company's SNS. I conducted this survey using Microsoft Forms of the internal system. There were 36 respondents to the questionnaire. The breakdown of the respondents was 22 employees of Sumitomo Mitsui Banking Corporation and 14 employees of the Japan Research Institute, Ltd., a group company.

Table 1 summarizes the questions and results of this questionnaire. Also, part of the questionnaire screen (Q1 to Q3) is shown in Figure 3. Likert scale (5-point scale) questions were mandatory, and the descriptive questions were optional.

Table 1. Questionnaire Texts and Summary of Results**

	Questionnaire text	Respondents	Avg. Score
Q1	"I understand what data is difficult to falsify and what data can be changed in NFTs."	36	4.58
Q2	"If the image file, which is the metadata of the NFT, disappears or changes, I feel that the NFT has lost its value."	36	4.08
Q3	Please state the reason for your answer to the previous question.	26	
Q4	"I feel that NFT is meaningless unless it is impossible to falsify, including the content of metadata."	36	3.72
Q5	Please state the reason for your answer to the previous question.	24	
Q6	"I feel that there is no value in NFTs unless there is a mechanism in which only NFT holders can access content data (image files, etc.)."	36	2.83
Q7	Please state the reason for your answer to the previous question.	23	
Q8	"Please answer if there are any particular changes in your perception and awareness of NFT between before and after watching this explanation and demo."	22	

** The actual question text was presented in Japanese.

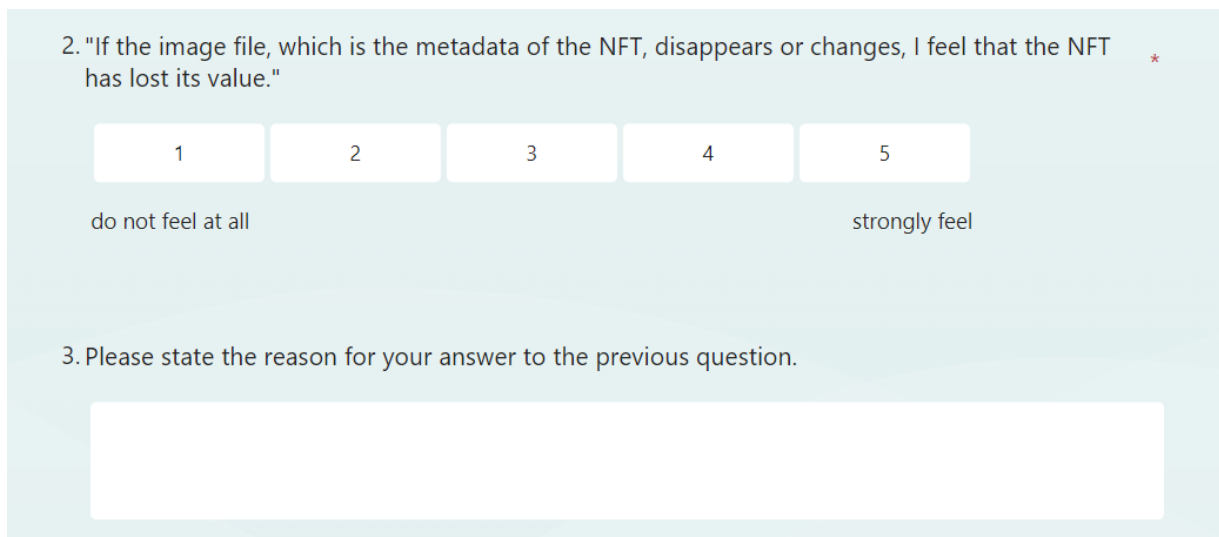


Fig. 3. Image of questionnaire screen.

3.3.1. Results of Q1

The question text for Q1 is "I understand what data is difficult to falsify and what data can be changed in NFTs." For the Likert scale options, the "1" option was given as "not understood at all" and the "5" option was given as "very much understood." The average of the results was "4.58". It was suggested that most of the viewers understood well.

In addition, seven responses to Q8 highly evaluated the clarity of the video explanations.

3.3.2. Results of Q2 and Q3

The question text for Q2 is "If the image file, which is the metadata of the NFT, disappears or changes, I feel that the NFT has lost its value." For the Likert scale options, the "1" option was given as "do not feel at all" and the "5" option was given as "strongly feel". The average of the results was "4.08". It was suggested that many viewers "feel that the NFT has lost its value if the image file, which is the metadata of the NFT, disappears or changes."

In Q3, which asks the reason for answering Q2, the viewers who chose options the "4" option and the "5" option in Q2 (28 people) cited that they find value in digital content data such as image files as the reason for their answer.

On the other hand, many other viewers answered that there would be a record of proof that the NFT holder paid the artists.

3.3.3. Results of Q4 and Q5

The question text for Q4 is "I feel that NFT is meaningless unless it is impossible to falsify, including the content of metadata." For the Likert scale options, the "1" option was given as "do not feel at all" and the "5" option was given as "strongly feel". The average of the results was "3.72".

In Q5, which asked the reason for the answering Q4, many reasons given was that content data (metadata) also need to be tamper-resistant because they found value in content data, as well as Q3.

On the other hand, there were several opinions that even if the content data was tampered with, NFT is not meaningless because there are some use cases such as financial support for artists.

3.3.4. Results of Q6 and Q7

The question text for Q6 is "I feel that there is no value in NFTs unless there is a mechanism in which only NFT holders can access content data (image files, etc.)." For the Likert scale options, the "1" option was given as "do not feel at all" and the "5" option was given as "strongly feel". The average of the results was "2.83", which was lower than the other questions.

In Q7, which asked the reason for answering Q6, many viewers commented that access restrictions were unnecessary. The common reason was that NFT holders should have a desire to show off their rare NFTs to others.

3.3.5. Results of Q8

The question text for Q8 is "Please answer if there are any particular changes in your perception and awareness of NFT between before and after watching this explanation and demo." Q8 was almost like a free-form column, and many comments were received regarding the entire video.

Many comments were that they were surprised that NFTs, which are said to be immutable, can be easily rewritten. In addition, there were many opinions that it would be dangerous to be socially recognized as a system that could never be tampered with.

3.4. Solution

I will present my observations based on the above survey. The results of the questionnaire suggested that many people attach great importance to the tamper resistance of metadata. Metadata tampering resistance can be realized by the following method in the case of image NFT, for example. First, I calculate the hash value of the target image file. Then I put that hash value in a JSON file as metadata. And I use the method of accessing the JSON file by specifying the hash value of the metadata JSON file. Specifically, a service named IPFS (Inter Planetary File System) exists as such a method and is used in some production workloads. We cannot detect that the file has changed to another one if we use the method of accessing the file by specifying the location of the file by URL. However, if we use the method of accessing by specifying the hash value of the target file, we can always access the same file because if the file is changed, the hash value will also change.

4. Conclusion

In this research, I ran a demo to help non-technical people understand how NFTs work. The results of the questionnaire suggested that the viewers were able to fully understand the content. Many viewers perceive that metadata also needs to be tamper-resistant. For this reason, it is desirable to use storage that provides tamper resistance to metadata such as IPFS when issuing NFTs.

Conflict of Interest

The authors declare no conflict of interest.

Acknowledgment

The author thanks to everyone who cooperated with the questionnaire.

References

- [1] BBC.com. (2023). Everyday: The first 5000 days—will Gompertz reviews Beeple's digital work ★★ ★☆☆. [Online]. Available: <https://www.bbc.com/news/entertainment-arts-56368868>
- [2] Forbes.com. (2023). Why Jack Dorsey's first-tweet NFT plummeted 99% in value in a year. [Online]. Available: <https://www.forbes.com/sites/jeffkauflin/2022/04/14/why-jack-dorseys-first-tweet-nft-plummeted-99-in-value-in-a-year/?sh=5b31f65665cb>
- [3] Ozone Networks, Inc. (2023). OpenSea testnets. [Online]. Available: <https://testnets.opensea.io/>
- [4] Ninja Tools Inc. (2023). [Online]. Available: <https://www.ninja.co.jp/>
- [5] H. Kazuyuki. (2023). [Online]. Available: <https://voicevox.hiroshiba.jp/>
- [6] REALITY, Inc. (2023). [Online]. Available: <https://reality.app/>

Copyright © 2023 by the authors. This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited ([CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)).