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THE IMPACTS OF THE BRAZILIAN CRYPTOASSETS LAW IN NFT SOLUTIONS

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ABSTRACT

This article aims to establish the applicability of Law No. 14,478, enacted on December 21, 2022 (hereafter referred to as the Brazilian Cryptoassets Law), to the trading of non-fungible tokens (NFTs) that utilize Blockchain and Smart Contract technologies. The article covers (i) the use of Smart Contracts and Blockchain in relation to NFTs, (ii) the current state-of-the-art NFT solutions, and (iii) the key articles and legal obligations outlined in the Brazilian Cryptoassets Law. It's important to note that the Brazilian Cryptoassets Law applies differently to various NFT solutions depending on their intended use, which is the distinguishing factor in determining whether the law is applicable to a particular NFT transaction.

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1. INTRODUCTION

Throughout history, people have collected a wide range of items, from old coins and baseball cards to watches and other valuable objects. In the digital age, this tradition continues, with people seeking out exclusive and unique items in what is often called the Internet of Value Era. One significant difference between NFT trading and the physical selling of items like baseball cards is that NFT trading is conducted entirely online and without the need for a trusted third party. NFT solutions are known for their unique and exclusive qualities, which have generated significant interest since 2021.

As with traditional cryptoasset trading, NFT exchanges require a way to ensure the validity of transactions, and this is achieved through Blockchain technology, which provides auditability and traceability. Most NFT solutions also rely on Smart Contracts, a technology that enables order-sensitive executions. It's important to note that not all NFTs are considered cryptoassets under the Brazilian Cryptoassets Law, as will be explained further in this paper. This distinction is critical in delimiting consumer rights in NFT transactions within the Brazilian jurisdiction. To establish the applicability of the Brazilian Cryptoassets Law to NFTs, this paper will explore the most important use cases for NFTs and shed light on the regulation of these assets.

2. SMART CONTRACTS

Since most NFT solutions rely on the technologies of Blockchain and Smart Contracts, it's essential to analyze these technologies to investigate the usage of NFTs and their treatment under the Brazilian Cryptoassets Law. The term "Smart Contract" was coined by Nick Szabo in 1996, who described it as "a set of promises, specified in digital form, including protocols within which the parties perform on these promises." In simpler terms, a Smart Contract is a program that automatically executes based on digital input. Szabo envisioned that Smart Contracts could translate the terms of an agreement into code, making it self-executing and minimizing the cost of contracting between transacting parties. The main idea behind a Smart Contract is that a clause is executed automatically when predefined conditions are met. In contrast, traditional arrangements require centralized completion by a trusted third party, adding to the implementation time and cost [27]. To explain the entire cycle of a Smart Contract, it can be divided into four steps, which are:

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(1) Creation. The creation of a Smart Contract, much like a traditional contract, involves defining prohibitions, obligations, and rights. These terms are then translated by software engineers into a computer language with auto-execution triggers. For instance, in NFT solutions, when an individual transfers their cryptoassets to NFT ownership, the ownership of the NFT changes automatically [9].

(2) Deployment. Typically, this step is carried out on a Blockchain. When a Smart Contract is stored on a Blockchain, it cannot be altered due to the immutability characteristic, as further explained in the next section. If changes need to be made to the Smart Contract, a new contract must be created. In the context of NFTs, the deployment step is triggered when cryptoassets are blocked to ensure payment for the acquisition of the NFT [4].

(3) Execution. The execution step involves fulfilling the conditions set out in the Smart Contract. Once the contractual terms are met (such as the transfer of the required sum of cryptoassets to pay for an NFT), the contractual procedures are automatically executed, and the payee receives their NFT [22].

(4) Completion. The completion step of the Smart Contract cycle involves updating the states. For instance, in the case of NFT solutions, the completion step confirms that the ownership of an NFT has been transferred to a new party.

The rational construction exposed in this paper, such as the above steps division, is grounded on very specific literature on Smart Contracts. In this sense, it is important to highlight some recent studies about this theme, such as (i) the presentation of comprehensive surveys regarding Blockchain and Smart Contracts [28]; (ii) the survey of the vulnerabilities on Ethereum Smart Contracts programming [18]; (iii) the survey about the verification methods of Smart Contracts languages [7]; (iv) the report of teaching Smart Contracts programming and students mistakes [12]; (v) the empirical study regarding Smart Contracts [16].

3. BLOCKCHAIN

Ten years after the early stages of the Smart Contracts idealization, in 2008, Satoshi Nakamoto, a pseudonym, publicized the paper *Bitcoin: a peer-to-peer cash system*, introducing the cryptoasset Bitcoin and the new technology that would make possible transactions with this *new money*: the Blockchain, a term that was not mentioned in Satoshi's paper but is widely used in the crypto market.

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The technology presented by Satoshi called Blockchain is capable of preventing historical problems in the development of a new type of currency apart from Central Banks: the double-spending and the Byzantine fault.

The double-spending problem arises from the need to establish clear ownership of a cryptoasset and its transfer. For example, if person A sends an e-mail to person B with a document attached, this document does not disappear from person's A computer. However, in financial transactions, double-spending cannot occur. If person A send ten dollars to person B by a banking transaction, person A will lose these ten dollars. The same that happens with dollars needs to occur with cryptoassets transactions [17].

The Byzantine fault has a connection with the decentralization of the validation of a transaction. Once Bitcoin and the cryptoassets were created based on decentralization, they are exchanged without a trusted third party, such as a bank, and the validation of the transaction is executed by several decentralized computers. In spite of this decentralization, the decision regarding the validation of the transaction needs to be convergent. It refers to a situation where a group of people or computers need to make a decision together, but some members of the group may be giving out false information or trying to sabotage the decision-making process. It is like a group of friends trying to decide on a restaurant to eat at, but some members of the group are secretly working for a competing restaurant and are trying to sway the decision in their favor. This is the Byzantine problem. In simple words, the problem is to converge a decentralized system [15].

The technology of Blockchain deals with these two problems and solve them via a Proof-of-Work (PoW) system — a species of competition among computers in a decentralized system in order to find a solution to a complex equation by CPU power.

Blockchain, as a decentralized ledger technology, has some determined characteristics, such as (i) immutability, (ii) transparency; (iii) permanency, and (iv) security [21] [1].

It is essential to indicate, in this part of this paper, that there is not just one Blockchain. Satoshi's creation was the Bitcoin system, but there are other Blockchains applicable to other types of transactions. For instance, as mentioned, the NFT solutions are based on Ethereum Blockchains, as we will discuss henceforward. There are public and permissioned Blockchain based on its openness. In this sense, Bitcoin

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and Ethereum are public Blockchains— everyone can read, write, and mine depending on CPU power (in the case of PoW).

A public Blockchain, as commonly used on NFT solutions, has four advantages defended by the specialized works of literature in comparison with permissioned Blockchain [11]:

a) **Transparency.** All nodes (computers) involved in the Blockchain have access to all to transactions carried out.

b) **Information preservation.** As the Public Blockchain is decentralized, it is challenging to destroy the information maintained in each node.

c) **Tamper-resistance**. Because each transaction's validity depends on the validation of the preceding transaction, it becomes increasingly difficult, and eventually almost impossible, to tamper with a public blockchain as the number of transactions grows.

d) **High fraud cost**. The costs associated with PoW, particularly in terms of CPU power, make fraudulent activities economically unviable, making it an unwise decision to attempt to defraud the system.

Furthermore, it is important to note that Smart Contracts and Blockchain are not the same technology: a Blockchain can operate without Smart Contracts, and, maybe more importantly, Smart Contracts do not need a Blockchain in order to function. However, there is a common thread among these technologies, namely Ethereum, the network where almost all NFTs are created on a daily basis.

4. THE POINT OF CONNECTION – ETHEREUM

Smart contracts on a Blockchain are strongly connected to the history of Ethereum. Back in 2011 or 2012, a few years after Satoshi's famous publication, several new cryptoassets were presented, reportedly trying to correct some flaw in the Bitcoin system. In 2013, Vitalik Buterin, a seventeen-year-old boy looking at the potential of smart contracts, released a white paper where he proposed a new Blockchain called Ethereum [3].

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The Ethereum Blockchain has supported Smart Contracts as a priority. Buterin does not focus his Blockchain on a cryptocurrency, besides his creation of the cryptocurrency Ether, but on several types of decentralized applications, such as the NFT solutions. This network is the Ethereum Virtual Machine (EVM).

In the Ethereum system, all NFT solutions are based on Blockchain and Smart Contracts. The details of most NFT are determined by a technical standard, the ERC-721 (ERC-721 Non-Fungible Token Standard, 2018). This document establishes the required metadata of the NFT and the executable functions needed in the NFT Smart Contracts used on Ethereum.

5. NFT

From the beginning, NFT emerged from the gaming community [24] and the visual arts. As mentioned in this paper, NFTs are blockchain-based assets and represent ownership of exclusive items [29].

NFT has some important differences compared with traditional cryptoassets such as Ether [25]. Ether is a standard asset where all units are equivalent and indistinguishable from one another. In other words, one Ether is never more valuable than another Ether. On the other hand, NFTs are unique and non-interchangeable, possessing a non-fungible characteristic. By utilizing NFTs in smart contracts, the creator of the NFT can easily demonstrate the existence of digital assets such as images, videos, and even event tickets.

Moreover, the inventor, utilizing Blockchain and Smart Contracts, may earn a fee for the success of this creation in the market. Outstandingly in the entrepreneurship area, NFT is appointed as one of the most prominent disruptive technologies by researchers.

By introducing the idea of digital scarcity, NFTs are able to expand the use cases of blockchain technology, particularly by providing a new form of ownership that adds significant value to digital assets [5].

NFT solutions are a type of decentralized application [3], and, as such, they offer the benefits discussed in the previous section, particularly in terms of Public Blockchains. The chart below summarises the most important proprieties of NFT.

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NFT characteristic	Details
Verifiability	The proof of ownership of an NFT resides in a Public Blockchain, allowing everyone to check all information about it.
Transparent Execution	Once the NFT is traded by a Public Blockchain, the activities, including purchasing and selling, are always accessible.
Availability	The system that allows one to buy or sell an NFT operates 24/7, with no interruptions.
Tamper-resistance	The use of public blockchains in NFT solutions provides a high degree of security and transparency, making it more difficult for fraudulent activity to occur.
Usability	The trading of NFT solutions is generally very user-friendly in comparison with others cryptoassets transactions.

The scope and purposes of NFTs are now extremely varied [8] [2]. However, it is possible to indicate categories of NFT solutions that are more widespread than others.

a) **Games.** NFT has its origins in gaming enthusiasts. For instance, there are crypto games such as CrytpoKitties and Axie Infinity using this kind of asset. A very interesting mechanism in this games is called "breeding". The users are able to raise and spend much time breeding new offspring. As well, the users can be able to buy a rare virtual pet and sell it for a high price. Another important function of NFT is to create a history of the usage of a game item as a skin. The ownership history of an NFT has the potential to increase its value, making it a potentially lucrative investment.

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b) Virtual Events. Generally, events depend on a trusted third party. In these situations, there is a possibility of, for instance, buying fraudulent event tickets, which will be canceled, causing real concerns for the owner. "NFT-based ticket" represents an event ticket in a Blockchain and is able to ensure access to a culture or sports event, for example. Once the NFT-based ticket is exclusive, there is no possibility of the ticket buyer resell the ticket after it is sold.

c) Digital Collectibles. Digital collectibles are the foundation of the entire NFT concept. Some examples of NFT solutions in digital collectibles are (i) historical moments images; (ii) virtual videos; (iii) trading cards; and even (iv) wines.

d) Metaverse. Metaverse is a term used to describe a collective virtual shared space, typically created using advanced technologies like virtual reality (VR) and augmented reality (AR). It is a hypothetical concept that describes a fully immersive and interactive digital universe where people can interact with each other and with digital objects and environments in a seamless way. The NFT solutions could be implemented and traded in the metaverse in many ways, such as to furnish a metaverse home or to give a unique skin to an avatar.

e) Music Industry. The principal function of NFT solutions in the music industry is to ensure intellectual property. This usage is able to minimize litigation about this theme — something frequent in this market.

f) Art Industry. NFT solutions are able to increase the value of an asset, ensuring its exclusivity, scarcity, and uniqueness. In this manner, NFT creates a new spectrum of possibilities for artists. Historically, the usage of NFT solutions represents a total paradigm change in the art industry.

g) Loyalty Points and Rewards. In order to incentivize and foster the consumption of their products, companies are issuing NFTs that can be redeemed for discounts and other special buying conditions. The unique feeling provided by owning an NFT can incentivize higher quantities and more expensive purchases.

These characteristics and usages of NFT solutions are determined by the specialized literature. There are notable studies regarding the NFT area, such as the (i) research of land pricing in Decentraland

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[30] [8], (ii) research of a structural model of valuation for CryptoKitties [13]; (iii) research of the CryptoPunks, a popular NFT collection, using hedonic models [14]; research regarding fan tokens [23]; (v) research of the data from all of the NFT transactions on OpenSea up to 2021 [19]; (vi) research about how NFT will transform the way businesses operate and is already reaching a disruptive impact in markets such as sports, escrow, law, digital collectibles, crypto, and gaming and it has the inherent force to extend to real state, financial markets, and the entire digital world in the future [6]; (vii) research that argues that while NFT has the force to support several new ways of digital ownership and creative sponsorship, the market activity has so far been dominated by speculative transactions. If it cannot be further improved and corrected, it faces the risk of failure [5]; and (vii) research regarding the art sector, which is very important to NFT solutions, which has found that the emerge of NFT has strongly changed the resale market [31].

6. BRAZILIAN CRYPTOASSETS LAW

Since 2015, with the presentation of a bill on the subject in the Brazilian National Congress, the regulation of cryptoassets has been considerably discussed in the Brazilian jurisdiction. Some of the biggest concerns expressed by lawmakers were (i) money laundering; (ii) money smuggling; and (iii) consumer rights violations through the usage of cryptoassets.

Issues related to money laundering with cryptoassets are part of an intense international agenda oriented by FATF. In June 2013 and June 2015, respectively, the organization published the first Risk-Based Approach (RBA) guidelines applicable to the crypto asset market, namely: (i) Guidance for a Risk-Based Approach - Prepaid Cards, Mobile Payments, and Internet-Based Payment Services, and (ii) Guidance for a Risk-Based Approach - Virtual Currencies. At that time, FATF pointed out the importance of economic agents paying attention to the possibility that cryptoassets could serve illicit practices.

In October 2018, FATF released a statement called Regulation of virtual assets, which addressed updates to its Recommendations and Glossary. Additionally, on June 30, 2022, the intergovernmental organization published the document Targeted Update on Implementation of FATF's Standards on VAs and VASPs, which deals with the implementation of FATF's Recommendations related to cryptoassets in various jurisdictions around the world, based on the FATF Guidance for a Risk-Based Approach to Virtual Assets and Virtual Asset Service Providers - a guide published in 2019 and updated in 2021.

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More recently, in November 2022, the bankruptcy of FTX, one of the largest exchanges in the world, caught the attention of Brazilian lawmakers, who expedited the approval of the Brazilian Cryptoassets Law.

Brazilian Cryptoassets Law establishes fundamental concepts regarding the legal framework applicable to NFT solutions in the Brazilian jurisdiction.

Firstly, it is necessary to note that the Brazilian Cryptoasset Law does not use the term *cryptoasset*. In fact, the law determines what is (i) a *virtual asset* and (ii) a *virtual asset service provider*, which is aligned with the Recommendations and Guidelines of the Financial Action Task Force (FATF), the global money laundering and terrorist financing prevention watchdog.

However, the definition of virtual assets utilized by the Brazilian Cryptoasset Law is similar to the cryptoasset definition. In a recent paper published by the Financial Stability Board called Regulation, Supervision, and Oversight of "Global Stablecoin" Arrangements for Innovation, cryptoassets are defined as "a type of private digital asset that depends primarily on cryptography and distributed ledger or similar technology" [10].

Indeed, in documents issued by the most important authorities on financial regulation and supervision, such as the Bank For Internacional Settlements, the term cryptoasset is elected instead of virtual asset. The term cryptoasset can express one of the most common connection points between assets like Bitcoin, Ether, and NFTs: the usage of cryptography.

Under the terms of the Article 3 of the Brazilian Cryptoassets Law, virtual assets are digital representations of value that can be traded or transferred via electronic means and used for making payments or investments, except for (i) Brazilian and foreign currencies; (ii) electronic currency, under the terms of Law No. 12,865 of October 9, 2013 — the electronic representation of the Brazilian currency; (iii) instruments that provide their holders with access to specific products or services or any benefits thereof, such as loyalty program points and rewards; and (iv) representations of assets whose issuance, recording, negotiation, or liquidation is provided for in laws or regulations, such as securities or financial assets.

Throughout this definition, made via exclusion, it is possible to point out the first assumption about the applicability of the Brazilian Cryptoasset Law on NFT matters: if an NFT only provides access to

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specific products or services, or any benefits associated with them, without a purpose of investment or making payments, it will not be considered a cryptoasset (or a virtual asset).

This hypothesis is not the most common on NFT solutions. As previously mentioned in this paper, NFT solutions are generally open to token ownership transfer through negotiation , including with the purpose of investment.

On the other hand, there are examples of NFT solutions that are focused on granting benefits. For instance, consider an NFT solution for a book, where ownership of the NFT grants the owner access to a special version of the book. However, the NFT does not allow the owner to sell it to someone else. In this specific case, there is no usage as an investment or payment purpose of the NFT solutions, so it will not be classified as a cryptoasset (virtual asset) by the Brazilian Cryptoassets Law.

Another vital concept in the Brazilian Cryptoassets Law is related to the *virtual asset service provider*, the companies that deal with cryptoassets. Thus, Article 5 of the Brazilian Cryptoassets establishes that a virtual assets service provider is defined as a legal entity that performs at least one of the following virtual asset services on behalf of third parties: (i) exchanges of virtual assets and Brazilian or foreign currency; (ii) exchanges of one or more virtual assets; (iii) virtual assets transfers; (iv) custody or administration of virtual assets, or instruments that allow control over virtual assets; or (v) financial services and services related to the offer of virtual assets by an issuer or the disposal of virtual assets.

Considering the text of the Brazilian Cryptoasset Law, there is a second assumption regarding NFT solutions: taking into consideration the chance that an NFT does not fit in the cryptoasset (or virtual asset) definition, it is possible that a legal entity provider of NFT solutions is not considered a virtual asset service provider, pursuant to the law

Notwithstanding, as mentioned, the most common NFT solutions are based on the possibility of free negotiation and, consequently, usage as an investment or a way of making payments. For instance, it is possible to offer an NFT for an NBA video that gains value depending on the performance of the basketball player. In this scenario, the legal entity that deals with NFT solutions will be considered a virtual asset provider under the terms of Article 5 of the Brazilian Cryptoasset Law.

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The difference between NFT solutions that are considered cryptoassets (or virtual assets) and those that are not, which focuses on the usage of the asset as an investment or payment method, is essential mainly because of the legal treatment by legal entities.

In fact, there are three items of concern for legal entities that are considered virtual asset providers: (i) they will be regulated by the Central Bank of Brazil and will face a degree of regulatory requirements similar to those applied to Brazilian financial institutions; (ii) they will need to submit an authorization request and provide information on risk assessment parameters and market knowledge; and (iii) they will have a legal obligation to report suspicious activities related to money laundering to the Brazilian Financial Intelligence Unit (COAF). However, these legal entities will not be subject to some of the legal obligations of the Brazilian Consumer Defense Code due to the material impossibility of compliance, as expressed in Article 13 of the Brazilian Cryptoasset Law.

For example, the Brazilian Consumer Defense Code states in its Article 49 that consumers have the right to cancel a contract within seven days of signing or receiving a product or service if it was contracted outside of a commercial establishment, such as through a phone call or house visit (referred to as the "right of regret"). However, if an NFT solution is used as an investment, this right cannot be guaranteed due to the inevitable price volatility of the asset.

The virtual asset service provider also needs to ensure that their services are compliant with the following principles : (i) free enterprise and free competition; (ii) good governance practices, transparent operations, and a risk-based approach; (iii) information security and personal data protection; (iv) consumer and user protection; (v) the protection of popular savings and investments; (vi) efficient transactions; and (vii) the prevention of money laundering, terrorism financing and the proliferation of weapons of mass destruction, aligned with international standards.

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In order to summarize what was explained in this topic, it is possible to utilize the chart below.

Legal Obligation	**Legal entity provider of NFT solution classified as a cryptoasset (investment or payment purpose)**	**Legal entity provider of NFT solution not classified as a cryptoasset**
Submitting a prior authorization request in order to function (Article 2 from the Brazilian Cryptoasset Law)	Shall comply with the law	Shall not comply with the law
Complying with the Central Bank of Brazil Regulation (Article 7 from the Brazilian Cryptoassets Law)	Shall comply with the law	Shall not comply with the law
Following principles of virtual assets services (Article 4 from the Brazilian Cryptoassets Law)	Shall comply with the law	Shall not comply with the law
Ensuring the right of regret (Article 49 from the Brazilian Defence Consumer Code)	Shall not comply with the law	Shall comply with the law

7. CONCLUSIONS

The first objective of this research was to provide an overview of the technology involving NFT, notably Smart Contracts, Blockchain, and Ethereum.

Thus, it can be noted that Smart Contracts, whose concept was created in 1996, focus on creating a kind of contract that has self-executing clauses. An operation by a Smart Contract, such as that of an NFT solution, has a high level of security since, once the condition established in the contract is achieved, the predetermined activity will be executed. In the case of NFT, which is usually transacted via

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cryptocurrencies, the Smart Contract allows a certain amount of cryptocurrency in a wallet to be locked to ensure payment of the amount required to obtain ownership of the NFT.

Still, in an effort to solidly understand the NFT solution, we proceed to discuss Blockchain technology. One relevant point highlighted by the research was that, although related, Blockchain technology and Smart Contracts are different and independent.

The development of Blockchain dates back, as we studied, to the year 2008 and the Bitcoin project coined by the pseudonym Satoshi Nakamoto. Blockchain technology deals with two important problems for the security of transactions involving NFT solutions, which are the double-spending problem and the Byzantine problem. Other attempts to establish new currencies outside the state failed to overcome these issues.

At the end of this cognitive foundation construction for the study of NFT and its regulation in the Brazilian jurisdiction, we understand that the Ethereum system is responsible for connecting Blockchain and Smart Contracts technologies as we know them. In 2013, Buterin significantly expanded the scope of the project presented by Satoshi Nakamoto by including not only forms of money but also other assets, such as NFTs, that could be transacted on a Blockchain.

In a specific study of NFT solutions, we extracted the necessary understanding of the benefits involved in these tokens. It was also possible to gain clarity on the various use cases involving NFT, demonstrating that, in many cases, NFT can be used as an investment or payment method.

Understanding the most common ways of using NFT solutions enabled us, in the last chapter of this paper, to clarify the incidence of the Brazilian Cryptoassets Law on these assets. It was observed that NFT solutions could be considered cryptoassets (or virtual assets). When NFT solutions are used as an investment or payment method, their value can appreciate or depreciate, as with a token representing an NBA video based on the player's performance.

The understanding that NFT solutions may be cryptoassets for the purposes of the Brazilian Cryptoassets Law assisted in the main purpose of this work: to evaluate the impacts of the law on NFT solutions in the Brazilian jurisdiction.

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Therefore, it was found that if a legal entity is considered a virtual asset service provider - for example, conducting operations with certain NFT solutions - it will need to observe a series of precautions, specifically the need to (i) submit a prior authorization request; (ii) comply with general rules issued by the Central Bank of Brazil, (iii) observe principles for the provision of services involving virtual assets.

For companies that operate in the Brazilian jurisdiction with NFT solutions but do not fit the virtual asset service provider profile, attention must be paid to consumer rights, notably the right of regret. In cases where NFT solutions are not cryptocurrencies, without the natural possibility of volatility, the exercise of the right of regret may be demanded by the consumer.

The categorization of NFT solutions as cryptoassets, given their complexity, must always be made based on the specific case, evaluating the specifics of the business model presented.

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