

On the Present and Future of Digital Collections in Chinese Museums

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Abstract. With the development of blockchain technology and non-fungible token (NFT), digital collections have ushered in a golden age. In the field of cultural and museums, the digital collection has also been given a new mission, i.e., to migrate cultural relics from offline places to online digital platforms, thus broadening the application areas and ways of offline collection. However, in the actual implementation, it presents a multifaceted ecology of pros and cons. Beginning from the current situation of displaying and utilizing digital collections, this paper comprehensively discusses the opportunities and risks faced by digital collections in terms of venue breakout, market-based valuation, cultural and tourism integration, illegal finance, digital banditry, and property rights based on the application cases of digital collections in museums, and provides an outlook on the future model of museum digital collection ecology.

1 Introduction

The digital collection market is mushrooming in recent years. Essentially, digital collections are the commercial use of non-fungible token (NFT) for digital rights. A NFT is a unique digital identifier that cannot be copied, substituted, or subdivided, that is recorded in a blockchain, and that is used to certify authenticity and ownership [1]. NFT can be associated with a specific digital or physical asset and may confer the right to license the use of that asset for a specific purpose [2]. But NFT is not the work itself; it is a unique metadata file containing the token. When NFT is applied to digital rights trading, it creates what is called a digital collection.

The digital collection is thus an encrypted art based on NFT. It is detached from a specific spatial location and is not bound to a specific time trail; it is a way of existence of real-world physical entities [3]. However, unlike physical entities, digital collectibles undergo temporal migration and are decoupled from real time and space, becoming a kind of work that can both circulate in an orderly manner and achieve digital immortality with the help of blockchain technology, a digital twin of physical entities mapped in the digital world. Specifically, it is a unique, scarce, indivisible, irreproducible, and tamper-evident token that is confirmed on the blockchain.

Recently, NFTs associated with museum collections have received attention [4]. The digital collections developed by museums not only have the general characteristics of digital collections, but also naturally have artistic beauty and collector's value [5], [6]. Therefore, once put into the market, they soon become commodities that can be circulated and traded, becoming masterpieces in the history of digital encrypted art. This

paper is to explore the landing ecology of museum digital collections. In the latter, if not specifically stated, the term museum refers to Chinese museums, including state-owned and non-state-owned museums, etc.

2 Evolvability of Digital Collections in Chinese Museums

Digital collections developed by museums represent an emerging art that will feature prominently in the digital world of the future. Anticipating and observing in advance how digital collections work and their potential opportunities in the museum field is a prerequisite for gaining insight into future trends in museum digital collections.

2.1 Rescuing the exhibition rate crisis

The advent of the digital age has broadened the areas and ways in which museum collections can be used. With the spread of the Internet and mobile devices, museum digital collections take on a new mission: to bring Chinese national treasures that lie dormant in the depths of offline (or physical) venues to online display platforms. In this way, these collections will gain a new lease of life.

The low rate of exhibition of physical collections is a common problem for most museums. Jixiang Shan, who is the former president of the National Palace Museum, has mentioned that the Palace exhibits less than one percent of its collections each year. The Museums building digital platforms with third parties is an effective initiative to solve the problem. In the process of building the online platform, the museum needs to unite

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multiple platforms to sort out and manage the collection digitally in a traceable manner. This is equivalent to creating an "exhibition" database of collections which can open around the clock. In this way, the audience can "visit" the online collections 24 hours a day easily. In addition, the platform can be equipped with intelligent information pushing technology. It will acquire data on the interaction between users and collections to extract information on viewers' preferences in an easy kind of way. After this, the platform can personalize the display interface of the digital collection to efficiently match the audience's needs. This not only further reduces the cost of audience time, but also efficiently leverages the educational and sharing nature of museums. In this context, museums can increase the exhibition rate of online collections and revitalize the resources of collections in the physical world.

In addition, the development of digital collections can also revitalize the culture behind the physical collections, and promote the dissemination of traditional culture. A good example is the digital collection developed by the Xianyang Museum titled "Immortal Riding a Horse" (IRH). This exquisite jade piece consists of three parts: the galloping horse, the feathered man, and the pedal. The carver used a variety of techniques including round carving, perspective carving and relief carving, making this work representative of the highest level of Han Dynasty jade. On May 12, 2022, Hi Metaverse, a Chinese metaverse platform, opened a sales channel for the digital collection of IRH. The product sold out as soon as it was launched. Surprisingly, the collection has received a lot of attention for its sculptural craftsmanship and romantic style. The knight carved on the jade wears a scarf on his head and is full of a relaxed demeanor, signifying the romantic interest of the Han dynasty in aspiring for longevity and a dashing approach to wellness. This coincides with modern people's interest in recuperation and praying for health. As a result, terms such as "Immortal Riding a Horse" and "romantic legacy" became internet buzzwords on Sina Weibo, with millions of discussions. It is thus clear that the development of excellent museum digital collections can convey the physical collections and the cultural core behind them in a modern way, allowing traditional cultural symbols to ride on the digital express and gain a more lasting vitality. This is a useful practice to promote the creative transformation and innovative development of Chinese excellent traditional culture.

The exploration of digital collection development for museums has been effective. Using new technologies and methods, it allows visitors, especially younger ones, to be directly confronted with museum collections. Facing the general trend of information and digital development, museums should take digital collections seriously and understand the new industry of digital culture development. On this basis, Chinese museums can make innovations in the way of publicity and education to occupy the high ground of cultural dissemination, education and development. This helps put the wings of technology on quality collections and allows excellent cultural content to spread faster, more effectively and more widely.

2.2 Creating conditions for market valuation

Therefore, the sale of museum digital collections on the NFT trading platform is actually a sale of a part of the ownership and control represented by the physical collection, which not only does not damage the form of the collection itself and is conducive to the conservation of cultural relics, but also can enrich the digital economy model and provide multiple channels for the marketization of cultural and museum collections. Finally, it can facilitate the revaluation and scientific grading of cultural relics.

In the artwork value assessment system, there exists a method of comprehensively assessing the price (or value) of an artwork with the help of a reference - specifically, when the artwork is not directly accessible to the market, the price (or value) of the reference can be used as the basis for assessment. A reference is an exclusive object that forms the market value or price in an open and transparent economic activity, and is generally divided into three types: one is of the same type as the artwork being evaluated, two is the same type of artwork created by the same person during the same period, and three is an artwork that is at the same era and level as the artwork's creator. After obtaining the reference, the market performance of the reference can provide a relatively accurate and scientific reference for the artwork itself under the premise of fully respecting the economic laws, and use it as a basis to make a legal, independent and open assessment conclusion.

As mentioned earlier, a museum digital collection is a twin of a physical collection mapped out in the digital world. It is openly sold on trading platforms and has a determined market value (or price), which can be considered a better reference in the artwork value assessment system. Moreover, in terms of collection appreciation and appraisal, most Chinese collections do not have access to effective appraisal opportunities due to laws that prohibit state-owned institutions and experts with authoritative appraisal capabilities from entering the market, resulting in the collection's own economic value not being effectively brought into play. Therefore, the inclusion of digital collections in the form of value references in museum collection assessment systems is a promising exploration.

Taking the Ancient Pottery Civilization Museum as an example, the series of digital collections of 3D blind boxes launched by its joint Digital Collection China (DCC) is worthy of attention. As the leading digital collection platform in China, DCC has deeply explored the culture of Han Dynasty's eaves tile and launched a digital collection with the famous collection "Four Gods Eaves Tile" as the theme. The product opened for sale and was snapped up by users, reflecting its notable market performance. This phenomenal event also focused the attention of the heritage evaluation community, and the heritage trading market ushered in a round of "tile fever", which provided an opportunity to re-examine the economic value and market potential of physical collectibles.

In general, digital collections and derivatives developed or endorsed by museums can provide new

opportunities for collection identification and valuation, and build online access channels for the marketization of cultural relics. This helps to deeply explore the heritage resources in the collection and activate the economic value of the collection.

2.3 Accelerating the integration of "culture + tourism"

We believe that taking cultural hotspots and tourism consumption hotspots as entry points, museums develop excellent digital collections that are multifaceted and integrated, exquisite and interesting, interactive, and in line with Chinese cultural aesthetic standards, and realize rights and circulation under market mechanisms, which can create a new system of digital transactions for cultural and tourism integration [7]. This system includes all kinds of NFT vitality, user sensitivity, and blockchain capital hotspots [8]. By focusing on big data, information sharing, cross-border creativity and integrated media communication, and using market mechanisms to develop scenario services in the field of "cultural relics + others", we can better meet the needs and new expectations of the general public for spiritual life, while deeply exploring the economic value of different forms of cultural tourism combinations.

One of the best practices is Sichuan Province's "Things in Life" series. The developer accurately grasped the sold digital collection activity, blockchain funding hotspots and audience passion, combined the relics of the Sanxingdui Museum with Sichuan rare animal elements, and released six digital collections including "Sanxingdui Bronze Mask + Giant Panda", "Sanxingdui Bronze Bird + Red-Billed Hornbill", and "Sanxingdui Bronze Large Standing Figure + Crested Ibis". The 6,000 copies of the digital collection were sold out immediately after the launch, which became a successful case of the new system of digital trading in the integration of culture and tourism. Through the wonderful combination of national treasures and animals, the event combines Sichuan's most distinctive tourism resources with the most cutting-edge cultural consumption methods. While creating "pop-ups", it also promotes offline tourism, achieving a multi-dimensional breakthrough in cultural tourism integration and fostering a new cultural tourism integration industry and cultural tourism consumption model.

On the one hand, digital collections have freed the traditional cultural tourism form from the dependence on production factors. The use of digital technology to promote the outward shift of the boundaries of cultural industries is an effective means to promote the value of cultural industries and commercial value "alive", providing a new vision and new ideas for the development of traditional tourism industries. On the other hand, the digital collection itself is also a kind of tourism product integrated with cultural content, which can more fully mobilize the characteristic resources of museums, thus empowering offline urban tourism and forming long-term feedbacks.

3 Challenges of Digital Collections in Chinese Museums

In recent years, digital collections in museums have experienced a spurt of development from scratch, from simple to complex, and from crude to fine. According to statistics, as of July 2022, the number of digital collections developed by Chinese museums has exceeded thousands. However, with this trend, there are also great pitfalls.

3.1 Increasing the risk of illegal financial activities

The development of museum digital collections was originally intended to maximize the development of cultural and creative industries and to deeply activate the vitality of the cultural heritage resources in the collections. However, unlike most consumers who simply appreciate the artistic value of a collection, some avid consumers purchase digital collectibles based on their ability to increase in value in the short term as the sole measure of their value and place their secondary trading attributes at the center, which often leads to the evolution of the financialization and securitization of digital collections. Worse, it turns the digital collection platform into a channel for illegal fundraising, money laundering, and financial speculation. According to statistics, from January 2019 to July 2022, the number of domestic digital collection platforms in China has reached 998, of which 301 have opened secondary trading markets, accounting for about 30%; and 181 platforms have achieved liquidity by linking to OTC trading platforms. All this, inevitably, facilitates undesirable financial activities.

Some organizations and institutions have also tried to change or curb this trend. For example, in April 2022, NIFA (National Internet Finance Association of China) and other associations jointly issued an initiative on preventing NFT-related financial risks, to resolutely curb the tendency of financialization and securitization of NFT; the famous digital collection platform NFT China introduced an anti-money laundering system with a view to conducting business in compliance with relevant Chinese laws and regulations; and in July 2022, the National Press and Publication Administration's Science, Technology and Standards Integrated Key Laboratory Blockchain Copyright Application Center issued the "Digital Collection Application Reference" to regulate the transaction behaviour related to digital collections. However, under the dual constraints of imperfection of relevant laws and regulations and uncertainty of future policies, these initiatives have had little effect.

3.2 Digital hacking and counterfeits

Technically speaking, digital collections originate from the blockchain, which is essentially a string of code in a digital world. It does not exactly represent the collection itself, but rather the ownership credentials of the collection's digital twin. Consumers can use this code to

verify the data and content of a digital collection, and to track and verify it through relevant technology. Unlike physical collections, the rights, identity and access to digital collections are determined by this code, which is clearly unreliable. Up to now, there are more than 2,500 complaints related to "digital collections" on the Black Cat Complaint Platform alone. Consumers' complaints mainly focus on problems such as data loss of digital collections and theft of purchased collections. The security problem of digital collections is obvious.

On the one hand, since digital collections are traded through smart contracts, digital hackers can use loopholes to invade and distribute attacks on blockchain systems and steal users' digital collections; on the other hand, digital bandits can also avoid the heavy protection of blockchain technology and directly target consumers by luring users to authorize a certain smart contract through phishing websites and then steal users' digital collections.

Unlike digital collections in other fields, museum digital collections are one-to-one twin replicas of physical collections that are often valuable and have not previously been made public. The massive theft of data by digital thieves adds another layer of risk to museum collections, namely the increase in counterfeiting. Once digital thieves collaborate with unscrupulous individuals to obtain data on valuable cultural relics, a large number of illicit replicas may appear on the market, jeopardizing the safety of cultural relics.

3.3 Disputes over intellectual property rights

The process of developing a digital collection by a museum entrusted to a third-party platform inevitably involves intellectual property rights. Prior to development, museums are required to issue licenses to the third parties (hereinafter referred to as digital collection licenses). In this process, the museum grants the use of image data, etc., for which it has intellectual property rights, to the licensee in the form of a contract; the licensee engages in business activities in accordance with the contract and pays the corresponding fees to the licensor. Typically, the default licensing entity in the market is the museum; however, in actual licensing of digital collections, it is often more complex.

Cultural relics, as vestiges of human social activity, often have passed their term of protection and there is generally no risk of infringement of the owner's intellectual property rights. So, the object under discussion here belongs to non-heritage collections. The intellectual property owner of a non-heritage collection is not a museum, which means that the physical and intellectual property rights of the collection are separated, and thus the subject of the digital collection license is more complex. If a museum is to develop a digital collection, it must first contact the owner of the intellectual property rights and obtain permission, otherwise it risks infringement. Therefore, distinguishing the subject of ownership of the collection's intellectual property rights is a prerequisite for the legal development of digital collections.

However, such claims are also controversial. Some scholars believe that Article 22 of China's Copyright Law has a protection policy for museums: libraries, archives, memorial halls, museums, and art galleries that reproduce works in their collections for the purpose of displaying or preserving versions are fair use, and do not require permission from or payment to the copyright owner. From this article, we can indeed see that the state protects museums from liability for reproduction, but only if it is "necessary for display or preservation of the version". However, in the case of digital collection development, it is often difficult to define whether this premise has been met. For example, museum A digitizes a non-heritage collection that is still under conservation and receives significant revenue from platform B. In this case, A seems to infringe on the legal rights of the intellectual property owner of the collection. But whether it can apply Article 22 and be "exempted" from it is open to question. Because Museum A profits from the digital collection, its purpose is no longer simply "for display or preservation purposes," and there is a risk of infringement of the intellectual property.

As digital collections are new products, the relevant laws and regulations have not been completed and perfected, so there is still no consensus on the above issues. Although a number of NPC deputies and CPPCC members submitted relevant proposals and motions during the Two Sessions in 2022, including the promotion of legislation on digital asset identification, trading and privacy protection, etc., it is still a long way from the concrete implementation of the policy. It is certain that the risk of infringement will still accompany the brutal growth of digital collections in China in the coming years. Therefore, in the new era of comprehensive rule of law, museums and their partners, both as intellectual property owners and licensees, should always pay attention to changes in national policies and develop digital collections in the cultural market in a prudent and legal manner.

4 Prospective of Digital Collections in Chinese Museums

Despite the mixed reviews of digital collection in society, it is foreseeable that digital collection will still be promising in the future digital economy. Therefore, abandoning interference, and developing & investing in digital collections on the basis of transparently assessing the pros and cons of digital collections, is a prerequisite for building the future ecology of digital collections. Out of consideration for the special nature of museum collections, the author believes that the future model of museum digital collections should operate on the coordination and cooperation of four fulcrums: government, museum, platform, and market, of which policy and technology are key.

First of all, the digital collection system in the cultural and museum fields should be a multiverse supported by the government: with the technical support of blockchain, the government and museums lend the right to develop the collections; the platform develops

the digital collections and puts them on the market for sale. The prerequisite and key to the smooth operation of this process is for the government to establish a comprehensive and authoritative top-level design system for digital collections, including both policy and technical aspects. At the policy level, the government should study and formulate a development plan for the digital collection industry, and establish industrial standards, norms and systems. It is also necessary to improve the laws and regulations on digital collections and clarify the red lines and forbidden areas of the industry, so as to build an independent, controllable, legal and sustainable digital collection system. This will help avoid short-term speculation and ineffective competition, allowing the digital collection industry to gradually move toward regulation. At the technical level, the government should gather talents, funds and technologies to focus on tackling technical difficulties such as blockchain and interaction algorithms. It is also necessary to explore the smart contract approach to protect the safety of digital collection users. On the premise that the country holds the key core technology, it can seize the new high ground of digital economy by sending the basic underlying technology down to the platform through the interface. By creating a digital cultural complex with culture and collections as the core content, and continuously discovering high-quality digital collections with artistic value and collection value, a digital collection universe of "cultural and museums + tourism + blockchain" can eventually be built.

Overall, museum digital collections are a product of combining historical art and contemporary technology, and are a major innovation in the field of digital copyright. It is believed that with the improvement of relevant market supervision policies, a benign self-regulatory atmosphere of creation and innovation will be gradually formed in the digital cultural and creative industry, and digital collections will definitely usher in high-quality development.

5 Conclusions

This paper examines the actual ecology of digital collections implementation in Chinese museums. Based on the pros and cons analysis method, this paper objectively assesses the current status of development and investment in digital collections in Chinese museums, starting from application cases and usage scenarios. In addition, it comprehensively discusses the opportunities and risks faced by digital collections from various aspects such as venue breakout, market-based valuation, cultural and tourism integration, illegal finance, digital banditry, and property rights. On this basis, a future model for the digital collectionization of museums is proposed, which provides a useful reference for the high-quality development of digital collections in Chinese museums.

Since museum digital collections are still in a period of rapid development in China, many cases are still in the process of change and evolution without a clear conclusion. Therefore, this paper also has some

limitations and needs to be updated with the development of the times.

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