

The Construction of the New ecology of Digital Art from the Metaverse Perspective Based on Grounded Theory

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Abstract: The arrival of the metaverse opens up new possibilities for digital art. Digital art established in the technological world has been pushed to the forefront, and its own generation logic and social environment have undergone new changes. Based on grounded theory, the text information related to digital art in the metaverse perspective is coded and analyzed, and the profound transformation of digital art ecology in the metaverse era is explored by theoretical research. Through the mining and analysis of the internal logic and development trend of digital art from multiple angles, a new ecological model is constructed. This study provides a theoretical and methodological reference for future related research to promote the theoretical research and practical construction of digital art.

Key words: Metaverse; digital art; new ecosystem; ecological construction; Grounded Theory

From the proposal of the concept of metaverse in 1992 to the rapid development in 2021, metaverse has become a new Internet application and social form integrating a variety of new technologies.^[1] Under the background of the hot discussion of the metaverse, the creative thinking and content expression of digital art present a pluralintegration situation. And accelerate the upgrade evolution, and then gave birth to more new art concepts and digital art forms. It presents a new turn in the aesthetic taste, emotional experience and communication path. New technologies continue to expand the "boundary" of art and inject new vitality into the art ecology.

The metaverse is not only considered the next revolution of the Internet, but also a new digital phenomenon and application scenario that integrates digital technology and culture and art.^[2] British scholar Chris Skinner believes in his research that the metaverse is not only a technological innovation, but also a digital

revolution that drives human society into a new stage of development. It can be seen that the formation and development of the metaverse is not a simple industrial revolution, but a human revolution.^[3] Some domestic scholars believe that it is not only the comprehensive integration, connection and reorganization of Internet related technologies, but also the ultimate digital medium that integrates and fuses all digital technologies in the present and future.^[4] At the same time, the metaverse is inextricably linked with digital art, and can open a broader development channel for digital art. The emergence of the metaverse has attracted the attention of digital art workers at home and abroad, and different forms of practice have been carried out for it, but it shows the lack of theoretical research. At present, the digital art industry is facing great development and reform in the meta-cosmic environment. The external ecological environment of its digital art is undergoing changes, and its internal ecological factors are also undergoing changes. Specifically, the creation, dissemination, audience and form of digital art have undergone profound changes in the meta-cosmic environment, forming a new digital art ecology from the meta-cosmic perspective. The driving process of the meta-universe is graphically demonstrated (see Figure 1). Therefore, how the digital art industry responds to the new era environment from the meta-cosmic perspective is a question that digital art workers in the new era need to think about. Based on the grounded theory, this paper summarizes the production, creation and dissemination forms of digital art in the meta-universe at this stage, sorts out the possibilities and potentials of the current development of digital art, as well as the limitations and challenges it faces, reconstructs the value and significance of the meta-universe of digital art, and explores the construction of the structural model of the new ecology of digital art in the meta-universe era. It provides theoretical reference for digital art researchers and workers.

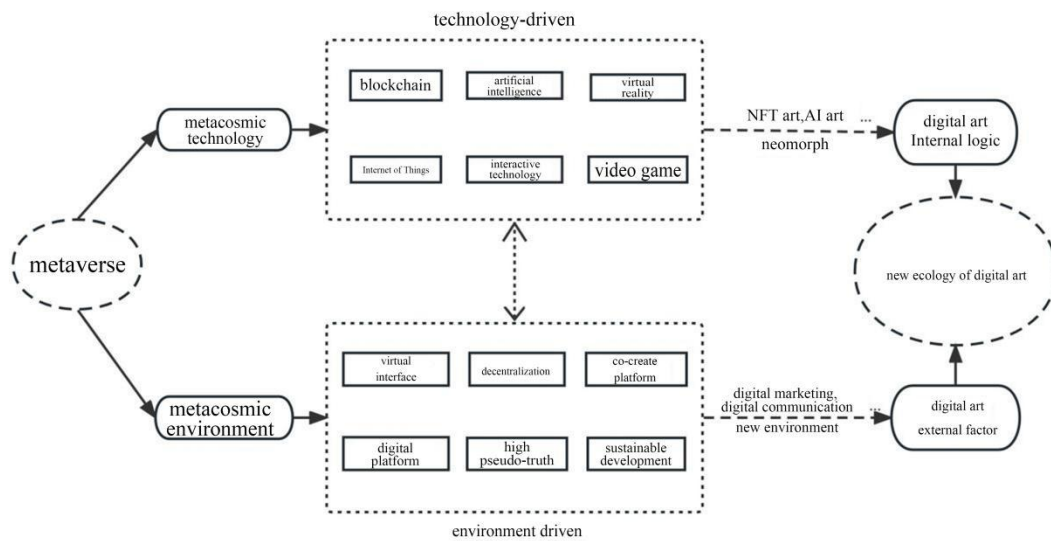


Figure 1 Model of the Metaverse Driven Process

I、Literature Review

1. The Origin of Digital Art -- the Involvement of Digital Media

Before the advent of the meta-universe era, as a new art form, many art researchers have conducted a series of studies and experiments on digital art. In the development process of digital art, it has had many different names, including “computer art”, “electronic art”, “digital art”, etc., but the current digital technology and digital media can not be summarized by the word computer, which can be traced back to its own media materiality. “Digital art” is an art form with certain aesthetic value that uses digital technology to carry out creative activities.^[5]

According to the current research, scholars generally believe that digital art is always in a dynamic state of change, and its formation and development make art more technical, while technology becomes increasingly artistic.^[6] First, Zhang Gengyun explores the cultural characteristics of digital art in depth from the post-modern perspective, and finds that it has the characteristics of anti-purity, anti-essence, anti-centralization, anti-grand narration, and depth of resolution. Second, from the social perspective, digital art has the characteristics of pluralism, complexness and decentralization.^[7] Liao Zhongxiang discusses the relationship

between digital media and art from the aspects of science and technology to art, and puts forward that art under digital media is the “fresh vitality” and “difficult challenge” of new things.^[8] Third, Li Wei examines the media characteristics of digital art from the perspective of artistic perception. Its multi-media characteristics make it no longer the same, linear space-time structure, but a virtual existence beyond time and space.^[9] Fourth, Huang Mingfen believes that network technology has created the activity space of digital art, and the network has become a new medium and created the possibility of sharing art resources in an unprecedented scope, promoting the transformation of digital art.^[10]

2. The Extension of Digital Art in the Metaverse Age, the Evolution of Digital Technology

After the concept of metacomes was put forward and gradually matured, digital art has a new development and research direction. Digital art based on metacomes digital technology presents aesthetic characteristics and digital content in different ways. In the context of the continuous progress of digital technology, digital art is bound to continue to divide and integrate. From a theoretical point of view, the current scholars' research on digital art in the context of the meta-universe can be roughly divided into three dimensions. First, the research on ontology characteristics, among which, the discussion on digital art extends to the category of “technological intervention”, especially the strong participation of immersive art in the meta-universe era enables the audience to actively construct the virtual art scene.^[11] Jiang Ling found that the metaverse environment has created good conditions for the dissemination and practice of digital art. Paying attention to the process and real-time virtual participation of digital art enhances the interaction between aesthetic subjects and objects, so that the boundary between artists and ordinary people is no longer clearly separated.^[12] Xian Huisheng believes that NFT art in digital art poses an existential challenge to the traditional concept of “true character”. NFT art is a digital art supported by NFT technology, and its key lies not in encryption but in art.^[13] Second, the emergence of NFT technology has further

changed the development environment of digital art and provided fertile soil for the prosperity of digital art.^[14] At the same time, NFT technology has solved the copyright problem of digital art and will provide protection for the sound art market.^[15] Belk et al. believe that the disappearance of transaction barriers in the digital art market makes more and more participants actively or passively carry out art creation activities.^[16] Third, There are still technical barriers and motivation disputes in digital art under the meta-cosmic medium. From an aesthetic perspective, Xie Xuefang views NFT art as the essence of participatory art, and believes that the development of the meta-universe will create good conditions for the extension of NFT art and related ecological chains, but it is also accompanied by severe governance and regulatory challenges.^[17] In his research, Wang Xiaowei carried out an in-depth analysis of the NFT boom from two dimensions of technology and economy, and pointed out that the rise of the NFT boom made people's speculative willingness continue to increase, which led to the risk of bubbles. Whether it is the rise of meta-cosmic NFT art or the hot collection of digital art, it is essentially a triumph of technology and a carnival of commerce.^[18] Zhang Zhiping et al. found that the emergence of artificial intelligence art has promoted profound changes in art communication and improved the efficiency of digital art generation. However, the application of artificial intelligence technology has also led to problems such as "algorithm dark box", knowledge infringement and algorithm barriers in art communication. All types of subjects should cooperate closely, use a high level of supply to eliminate algorithmic barriers, use blockchain technology to provide stronger protection for intellectual property rights, and find a new way suitable for the dissemination of artificial intelligence digital art.^[19]

To sum up, under the influence of the rapid development of digital media in the meta-universe era, a large number of digital art practices and communication have broken the shackling of traditional understanding, and many unprecedented new landscapes and trends have emerged, causing a series of new problems. As a result, the relevant research on digital art began to form a system, but few scholars have discussed the digital art that has entered the meta-universe era. At present, the

research on meta-digital art mainly focuses on the development of ecological chain and digital governance, legal copyright and art production, and lacks the analysis and interpretation of digital art from the perspective of art ontology, art ecology and meta-universe. At the same time, most of the research is due to necessity, and relevant discussions lack the necessary theoretical basis to support. There is no clear grasp of the overall trend of digital art in the meta-universe, which, to a certain extent, cannot help the development and innovation of digital art in the new ecological environment now and in the future. How to promote the innovation of digital art and how to promote the development of artistic ecology have become the theoretical propositions that digital art needs to be studied urgently in the meta-universe era. In the context of the meta-universe era, this study uses the grounded theory to conduct exploratory research on the ecosystem and ecological structure of the current meta-universe digital art, which on the one hand helps to enrich and develop the theory of art ecosystem, and on the other hand aims to point out the direction for the development of digital art in the meta-universe era.

II、Research design, category refinement and model construction

1. Research Method

In qualitative research, grounded theory has been widely used by virtue of its scientific and reliable advantages. This theory belongs to a top-down research method with problem-orientation and solutionality as its two most significant features, and is most suitable for qualitative analysis of new social phenomena and facts.^[20] The problem studied in this paper is the new ecology of digital art from the perspective of meta-universe. The relevant research of meta-universe digital art is still at a relatively shallow level, and has not yet formed a theoretical system with high maturity and perfection, which has high research value. In the context of the accelerating development of the meta-universe, digital art involves more and more

content and spreads more and more widely. The ecological pattern of digital art in the past has been completely broken, and ecological demands also need to be adjusted to cope with more uncertainties. It is urgent to use rooted theories to build relevant theoretical systems. Therefore, this paper adopts the method of grounded theory to gradually encode the documents, policies, reports, interviews and other texts about digital art after the concept of meta-universe was proposed. The specific operation process is shown in Figure 2.

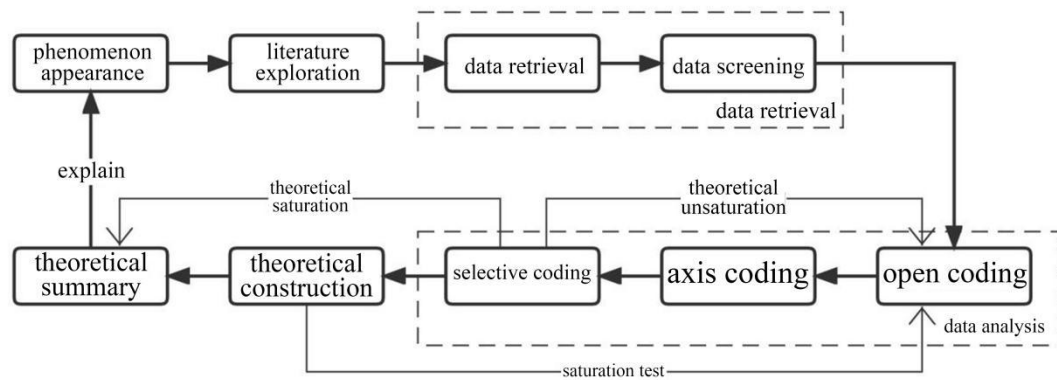


Figure 2 Research Path of Grounded Theory

2. Data Collection

Research reports, policy documents, journal papers and other text materials on meta-digital art in recent years were collected, and semi-structured interviews were conducted on the basis of literature reading. The specific interview focus and interviewee information were shown in Table 1. A total of 80 texts were collected, including 12 policy texts, 20 research reports, 40 journal papers and 8 interview materials. The data collection is shown in Table 2. Since the digital art of the meta-universe is still a new research field, there are few related literatures. Search in the database with “Metaverse Digital Art”, and summarize and sort out the obtained literature based on the title, abstract and content differences, and identify and extract the data text that can effectively establish the theoretical model in these literatures. Through the above steps, a total of 33 literatures are obtained, and an open coding material library is established. After completing the literature screening steps, these

materials are intensively read, classified, summarized and encoded. In the process of coding, the principle of theoretical saturation is always used as a guide, that is, when the text data cannot summarize new concepts, it can be considered to have reached theoretical saturation.

Table 1 Core Contents and Personnel of the Survey Interview

| Number | Identity | Main Interview Content | Number of Interviews | Total Interview Time |
|--------|----------------------|--|----------------------|----------------------|
| 1 | digital artist | the development trend of digital art, the impact of the metaverse on digital art, the living environment of digital art in the metaverse, new technologies for digital art, new forms of digital art in the metaverse, etc | 5 | 10.5 |
| 2 | metaverse architect | the concept of metaverse, the structure and development of the metaverse, the drive of the metaverse, digital technology in the metaverse, the formation and influence of nft, etc | 2 | 3 |
| 3 | digital art audience | characteristics of digital art, digital art experience, the changing characteristics of consumer behavioral preferences of digital art, the new experience of digital art in the original universe, etc | 5 | 10.5 |
| 4 | digital art scholar | research direction of digital art, new features of digital art under the meta-universe, the impact and problems brought by nft art, the impact and dilemma of artificial intelligence art, the relationship between meta-universe and digital art. | 2 | 3 |
| 5 | digital art student | the new direction of digital art brought by the meta-universe, the research direction of digital art, etc. | 2 | 3 |
| | Total | | 16 | 30 |

Table 2 Text Types and Sources

| Text Type | Source | Main Content | Quantity of Data |
|-----------|------------------------------------|--|------------------|
| Industry | government documents, domestic and | meta-universe, digital art industry planning | 12 |

| | | | |
|---------------------|---|---|----|
| Information | foreign comparison | and government guidance documents | |
| | industry research reports, news reports | meta-universe digital art industry investment report, analysis report | 20 |
| Document Literature | business publication | books published by digital arts | 3 |
| | journal article | HowNet, Science Direct, Wiley Online Library | 40 |
| Interview Data | field research | metacosmic mechanism | 5 |
| | interview | digital art workers, university research institutions and meta-universe industry institutions | 8 |

3. The Concept and Category of Open Coding Extraction

Open coding refers to coding, labeling, logging in to the original data, and summarizing the initial concept and refining the category from the original data.^[20] In this paper, we use the Nvivo12 tool to process and read the obtained text data closely. First, based on the differences in text content, policies, documents, reports, interviews and other texts are divided into different categories and coded. The original representative statements associated with the meta-universe digital art are extracted to establish free nodes, and a total of 68 nodes and 432 original statements are obtained. Second, the initial concept is refined, and the nodes obtained from the initial coding are repeatedly compared, analyzed and integrated. 63 initial concepts were obtained. Taking “market trend” as an example, it comes from the statement that “Crypto art has become a force that cannot be ignored in the mainstream art trading market, the NFT art ecology has gradually taken shape, and the generation of artworks on the chain and integration into the blockchain ecology will become an important trend in the future”. Third, category is a deeper refinement of concept, which comes from the integration of several consistent concepts. For example, “new field”, “soil provision”, “development environment upgrade”, “ecological and practical changes” are summarized into the category of “development environment”, and 16 initial categories are finally obtained (see Table 3). Due to space constraints, only part of the conceptual coding is shown.

Table 3 Open Coding and Category Refinement

| Category | Initial Conceptual Coding | Source Extract |
|-----------------------------|--|---|
| F1 Art Form... | F11 NFT Art | NFT is a new form of digital art development. It is a new architecture integrating existing information technologies such as blockchain, encryption and F1 art, rather than a revolutionary technological innovation. |
| | F12 Artificial Intelligence Art | The fusion of digital art and artificial intelligence technology has produced a new digital art form, artificial intelligence art. |
| F2 Artistic Dissemination.. | F21 Breaking the Pattern | Digital art only exists as a kind of "digital" art work, and the emergence of encrypted art has broken the traditional mode of art creation, collection, viewing and trading. |
| | F22 Circulation and Storage | The metaverse makes the circulation and storage of digital art more convenient and safe, and the empowerment of technology makes the discourse power of art begin to decline. An art pattern that is life-oriented, experiential and created by all people is taking shape. |
| F3 Art Market... | F31 Market Trends | Crypto art has become a force that cannot be ignored in the mainstream art trading market. FT art ecology has gradually taken shape, and generating artworks on the chain and integrating them into the blockchain ecology will become an important trend in the future. |
| | F32 Ensure A Sound Art Market | The application of NFT in digital art has attracted numerous attention, and a large number of comments believe that NFT technology solves the copyright problem of digital art and will provide a guarantee for the sound art market. |
| F4 Artistic Creation... | F41 Breaking Through the Medium of Reality | With the development and maturity of NFT technology, digital art works will break through the real medium in the virtual world, and obtain the opportunity for the real medium to be exhibited in the virtual metaverse world, presenting the aesthetic creation in program coding. |
| | F42 Changes in Creative Methods | The creation method of encrypted art in the metaverse will undergo new changes, mainly reflected in the autonomy and interactivity of creation and innovation will be further improved. |
| F5 Development Demand... | F51NFT Stolen Casting Epidemic | Although some online communities of digital art have developed technical tools to intelligencemonitor and block the automatic casting of NFTS without consent and notify authors in time, they still cannot change the epidemic of NFT theft in the metaverse, especially in the open market operation model. |

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|--------------------------------|-------------------------------------|---|
| | F52 NFT Potential Risks | Digital art does adopt a large number of popular elements and forms, but it not only lacks the anti-culture risk temperament of the Pop period, but also hides the risk of being manipulated by the market and “regressive” because of the support of NFT. |
| F6 Digital Survival... | F61 Alienation of Man | The fundamental reason for the decentralization of metaverse art lies in the alienation of digital art from human beings. In the metaverse society, “human beings become more and more media and become alienated from themselves.” |
| | F62 Rich Possibilities | The combination of digital art and the metaverse provides rich possibilities for its own establishment and development. |
| F7 Development environment... | F71 New Field | The metaverse is full of imagination and productivity, and also opens a new field for artistic practice based on the survival experience of the metaverse. |
| | F72 Providing the Soil | Simply because digital art is created by electronic information technology, it has the natural advantage of being transformed into encrypted art. It is “easy to encrypt” art, so it is easier to embrace NFTS and follow the wave of encrypted art. Crypto art, which stems from blockchain technology, provides fertile ground for digital art to flourish. |
| F8 Social Impact | F81 New Opportunities | With the advent of the era of digital technology and the development of virtual perception media, we have witnessed a new chapter in the history of art. Digital art in the metaverse era has brought new opportunities for the art industry. |
| | F82 Public Welfare Value | Many non-professional creators in remote areas, such as children and people with disabilities, can use digital creation tools to create digital art works with regional characteristics, stories and emotions. It is then converted into digital collections and distributed through charitable organizations and institutions to create new fundraising opportunities and spread topics. |
| F9 Breaking Through Bottleneck | F91 Solution of Pain Points | The technology of NFT solves many pain points of traditional art and digital art, and solves the collection value and ownership problems of digital art. |
| | F92 Transformation of Relationships | In the sharing economy of the metaverse blockchain world, and even in the transformation of the whole production relationship by Web3.0, the relationship between artists, artists and institutions, and artists and collectors have also undergone fundamental changes in actual transformation |
| F10 | F101 Grasping the | NFT art’s exploration of art forms and technologies makes |

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| Industrial Planning | Opportunity | digital art stride forward to the metaverse, and the opportunity to build the metaverse needs us to actively grasp. |
| | F102 Construction of space | Art practice in the metaverse should pay more attention to the construction of the imaginary world and focus on the spiritual space rather than the reproduction of the physical world. |
| F11 Transformative Innovation | F111 Change of Identity | Compared with traditional art, the most representative identity change of crypto art can be summarized as iteration and socialization. |
| | F112 Innovation of Form | At present, the metaverse itself does not have a clear, reliable and mature development mode. In the process of digital art's application in the metaverse in the future, its creation, exhibition, trading and other behaviors will be innovated. |
| F12 Space Turning | F121 Immersive Exhibition | Gallery Week joined with the Metaverse Digital Art platform to launch an immersive exhibition themed on the metaverse, combining art and technology in a creative way. |
| | F122 Meta Universe Graduation Ceremony | This year's graduation season, the “metaverse” graduation ceremony held by the School of Animation and Digital Arts at the Communication University of China was a hot search. |
| F13 Development and Co-creation | F131 Cultural Tourism Industry Development | Hanshan Art Museum in Suzhou held the art exhibition “Double Body: My Universe”, which is regarded as the first digital art exploration exhibition under the metaverse ecology of art museum level in China. |
| | F132 Clothing Development | “Fashion metaverse” has opened up a new way for the digital artistic expression of fashion and the innovation of the market industry. |
| F14 Property Rights Protection | F141 Ownership of Copyright | Digital Art Design Before the popularization of the metaverse, it was difficult to determine the copyright of digital art created by digital artists, |
| | F142 Open Source Space | The combination of digital art creation and NFT technology based on blockchain technology not only translates art creation into virtual space, but also protects the intellectual property rights and economic gains of creators. Therefore, the metaverse opens up an open source, freely communicated, and sustainable art space. |
| F15 Artistic Trend | F151 Overall Trend | Digital art is indeed diversified and decentralized, which is in line with the trend of contemporary art, but this is the overall trend of art, rather than the unique value of a digital art work, and diversification does not assign value to a particular art work. |
| | F152 Multi-threaded | I believe that crypto art has opened up a new space, digital |

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| | Development | art has become a multi-thread development trend, he is no longer the main thread of art history, but to the continuous growth of parallel universes. |
| F16 Artistic Characteristics | F161 Interactivity | From the online literature in the PC era, to the long and short videos in the mobile network era, and then to the emerging “metaverse” art, “interactivity” is the common feature of all kinds of digital art, and the participation of the audience is gradually enhanced. This feature reaches its peak in “metaverse” art, which means that the “metaverse” is incubating a kind of digital art with a high degree of participation. |
| | F162 Euristic Provocativeness | The value of digital art in the metaverse comes from new inspirations, imagination and creativity, making the impossible possible, and I have always believed that every successful work of art is a kind of miracle. |

4. Main Categories Established by Axial Coding

The main goal of spindle coding is to present the internal logic between different categories and promote the collaborative development of main categories and sub-categories.^[21] This paper studies the new ecology of digital art from the meta-cosmic perspective, divides categories based on the internal logic differences of categories at the conceptual level, and obtains four main categories, which are explained in detail in Table 4.

Table 4 Spindle Coding Analysis

| Principal category | Corresponding category | Categorical connotation |
|---------------------|------------------------|---|
| Z1 Internal Ecology | F1 Art Form | Digital art has developed a new form from the perspective of the meta-universe, which is full of the characteristics of the meta-universe, such as crypto art, artificial intelligence art, virtual reality art, etc. |
| | F2 Art Communication | The meta-universe has accelerated the digitization of art, making digital art break through the traditional structure, and its communication mode has also changed, becoming more diversified and convenient, and its communication environment and audience have also been changed and affected. |
| | F4 Art Creation | New changes have taken place in the way of digital art creation, breaking through the limitations of realistic media, |

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|----------------------|--|---------------------------------|---|
| | | | and further improving the interactivity, innovation, collaboration, synchronicity and autonomy of its creation. |
| | | F16 Art Features | “Meta-universe” digital art is generally digital, interactive, participatory, inspiring, imaginative and creative. |
| Z2 External Ecology | | F3 Art Market | The art market has been revolutionized, the integrity of the art market has been guaranteed, art is no longer non-utilitarian, and the copyright issue of digital art has been resolved. |
| | | F7 Development Environment | The meta-universe provides a new soil and environment for the development and prosperity of digital art, accelerating the development of artistic ecology and artistic innovation. |
| | | F6 Digital Survival | The physical world continues to migrate to the digital world, in addition to the digitalization of human life and the digitalization of working methods, the survival of digital art is also more abundant. |
| | | F8 Social Impact | Digital art in the meta-cosmic era can produce many positive social impacts, such as cultural export, economic growth, industry development, public welfare communication, etc. |
| Z3 Ecological Appeal | | F5 Development Demands | Digital art is faced with many new challenges, such as lack of criticism, slow practice, lack of interoperability, rampant theft, hype drawbacks, different from the public aesthetic, etc., which need innovative solutions. |
| | | F9 Break Through Bottleneck | The meta-universe has accelerated the breakthrough of the bottleneck of the development of digital art, and innovatively solved some pain points, such as the art ownership problem, the artist relationship problem, and the digital copyright problem. |
| | | F10 Industrial Planning | The digital art industry should grasp the opportunities of the new era, encourage artistic creation, use digital advantages for scientific planning and industrial investment, and promote the innovative development of the global digital ecosystem. |
| | | F14 Property Rights Protection | The blockchain technology in the meta-universe determines the copyright ownership of digital art, which protects the intellectual property rights and economic benefits of the creators to a certain extent, but also pays attention to the problem of nft theft. |
| Z4 Ecological Trend | | F13 Development and Co-creation | Multi-industry and digital art coordinated development, such as cultural tourism industry, clothing industry, automobile industry, service trade industry, etc. |
| | | F11 Transformational Innovation | In the process of the future application of digital art in the meta-universe, its creation, exhibition, trading, identity, market, and communication will all be innovated. |
| | | F12 Space Turning | Digital art has an endless stream of online and offline space communication and creation methods, and the meta-universe avoids the unitization of digital art and the absolutization of |

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| | | de-virtual to real, enhancing the closeness of spatial connection. |
| | F15 Artistic Trend | The new trend of digital art has the characteristics of multi-threaded development, construction, real-time virtual participation, etc., more in the exploration of the boundaries of art, the combination of art and technology, to produce more possibilities. |

5. Selective Coding to Complete the Definition of Core Categories

Selective coding refers to clarifying a core category through in-depth analysis of the categories that have been formed, effectively linking different categories together, and integrating most of the research results into the same broad and complex theoretical scope. The first step is to clarify the story line of the data. This paper takes the new ecology of digital art in the meta-universe as the core category. Around the core category, the “story arc” structure is as follows: the internal ecology is the internal driving force of the new ecology of digital art in the meta-universe perspective. The external ecology is the realistic condition of the new ecology of digital art from the meta-cosmic perspective. Ecological appeal is the innovative requirement of the new ecology of digital art from the meta-cosmic perspective. Ecological trend is the innovative direction of the new ecology of digital art from the meta-cosmic perspective.

6. Theoretical Saturation Test

In order to test the theoretical saturation of the structural model of the new ecology of digital art from the perspective of the burst meta-universe, this paper extracts two samples from various documents listed in Table 2 according to the random principle, inputs them into the Nvivo tool, and re-performs open coding, axial coding and selective coding based on the steps listed above. Through analysis, it can be seen that no new concepts, categories, and the relationship between different categories have not changed. In addition, we also consulted three experts and scholars with high visibility and influence in the field of competence, and got their recognition, which means that the theoretical saturation level of the theoretical

model listed in Figure 3 meets the relevant requirements.

III、 Interpretation of the New Ecological Model of Digital Art from the Meta-cosmic Perspective

1. The Structural Model of the New Ecology of Digital Art from the Meta-cosmic Perspective

By encoding the literature materials related to digital art after the maturity of the meta-universe system, the complete “story arc” centered on the “new ecology of meta-universe digital art” is sorted out, and the structural model of the new ecology of digital art from the perspective of the meta-universe is constructed (see Figure 3).

Art form, art communication, art creation and art characteristics constitute the internal ecology of the new digital art ecosystem. The art market, development environment, digital existence and social influence constitute the external ecology of the new digital art ecosystem. They complement each other, influence each other and evolve symbiotically, and each element interacts organically, forming a new ecosystem together with ecological demands and ecological trends. Among them, industrial planning, breaking through bottlenecks, development needs, and property rights protection constitute ecological demands. Artistic trends, co-creation of development, innovative changes and spatial shifts constitute ecological trends. Each dimension of the model will be elaborated in detail below.

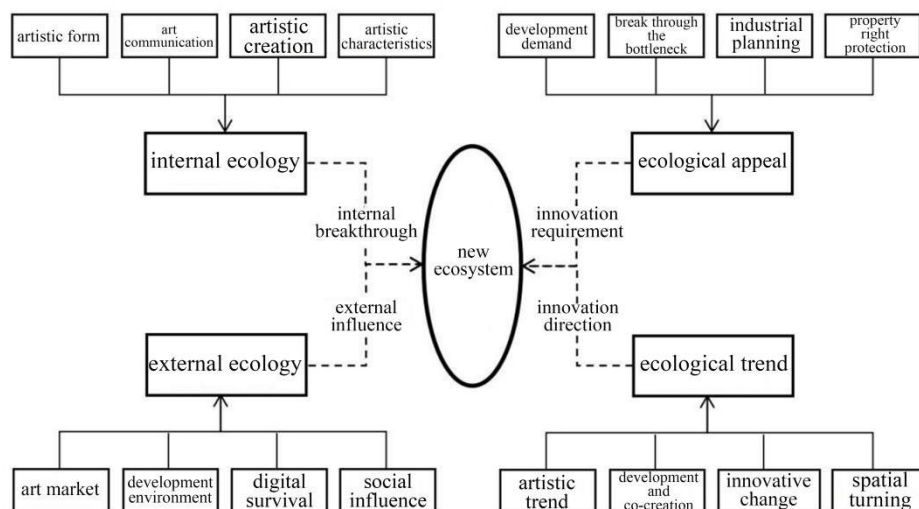


Figure 3 New Ecological Structure Model of Digital art from the Perspective of Metaverse

2. The Constitution and Dimensional Connotation of the New Ecology of Digital Art in the Metaverse

(1) Internal Ecology: Internal Breakthrough

Internal ecology is the core of digital art ecology and the generative logic of art itself. It is composed of several subsystems including art form, art communication, art creation and art characteristics. Digital technology in the meta-universe era has reached a stage of development that is sufficient to provide new possibilities for the creation and experience of digital art. From the perspective of digital technology as a medium, the form of digital art has undergone a new change. Through repeated exploration, digital artists and art workers continue to create a variety of new art forms, which are based on the product of meta-universe digital technology. Whether it is creation, text, or appreciation, they all rely on the development of digital technology and are full of meta-universe characteristics, such as NFT art, artificial intelligence art, virtual reality art, etc.

Not only the change of art form, but also the innovation of art communication and art creation. Since the 1930s, Horkheimer, Adorno and other scholars have realized that television and film will affect the artistic development of human society, and even believe that it is possible to produce a “total art work” that integrates various art forms.^[22] Today, although there is no one art form that can be called “total art”, the boundaries between different art forms are gradually disappearing in the context of the continuous development of the meta-universe. The meta-universe has accelerated the digitization of art, making digital art break through the traditional structure. At the same time, its communication mode has also changed to be more diversified and convenient. For example, it is encrypted and registered in the form of token on the blockchain, and carries out circulation and transactions. With the emergence of AI painting, everyone can participate in art creation, and art communication is carried out in interaction, and interactivity and immediacy have

become important characteristics of digital art communication in the meta-universe.

The transformation of art form also has a profound impact on the characteristics of digital art, especially the emergence of NFT art has made a great change in the characteristics of digital art. Benjamin has proposed that the production of reproduction technology will cause the loss of artistic “halo”. However, under the influence of meta-cosmic NFT technology, digital art makes use of “the evolution of ordinary things” to make artworks regain their authenticity and uniqueness. Digital art is not about using its own uniqueness to form the history of a work. Their history is the history of continuous flow in cyberspace, a new experience brought about by large-scale reproduction. So digital art emphasizes the desire for eternal flow and dynamics. At the same time, in another wave of technological development, the way of his creation has undergone new changes, and has broken through the limitations of realistic media. Its creation of interactive, innovative, collaborative, synchronic, autonomy has been further improved.

The universality of art reflects the deep spiritual needs of human beings. As long as the fundamental characteristics of human nature do not change, art will provide a steady flow of power for it.^[23] Human beings will always need art, and art will not disappear because of the meta-cosmic age of media change. It will be combined with technology to become a new art of design. “Art of life” is not only the integration of art and life, but also the change of art forms, art media, art communication, value trend, art characteristics and so on.

(2) External Ecology: External Influence

As an open, dynamic and integral organic cultural ecosystem, the new ecology of digital art has its specific internal ecological environment, and its development is bound to be influenced by the external ecological environment. Its external ecology is composed of art market, development environment, digital survival and social influence, and each element influences each other and co-exists and co-prospers.

Art production in any era will be restricted by the development environment and social background, and change with the change of social conditions. In the

historical process of the development of digital art, changes in the inclusive or formal nature of digital art are triggered by changes in one or more factors in the social environment, including political, economic, cultural, religious, etc. These external ecological changes promote or restrict the development of the internal ecology of digital art. At the same time, the changes of the internal ecology of digital art also affect the external ecology of digital art imperceptibly. In the meta-cosmic perspective, when the creation of art is separated from the physical world, the boundary of art and the sense of boundary between the virtual and the real no longer exist, which also reflects the “imagination of new media technology” proposed by Martin Liszt.^[24] Under the influence of this power, the elements originally in a state of separation merge into a whole. Therefore, due to the characteristics of the age of the meta-universe, the physical world continues to migrate to the digital world. In addition to the digital survival of human beings such as the digitalization of human life and the digitalization of working methods, the survival of digital art is also more abundant.

In the context of the meta-universe, policies and public opinion have been continuously strengthened, and governments have promulgated relevant policies to promote the development of the meta-universe digital art. The art development environment and art market mechanism have also undergone significant changes, and the meta-universe has provided a new soil and environment for the development and prosperity of digital art, accelerating the development of art ecology and art innovation. At the same time, the development of digital art has brought many positive social impacts, such as cultural export, economic growth, industry development, and public welfare communication.

In the era of the meta-universe, the digital art market is also facing challenges such as institutional inequality, blurred roles, and dispersed boundaries.^[25] From the perspective of industrial logic, artistic creation is actually a production activity. And production is bound to be affected by supply and demand. From the perspective of the current development of the art market, the formation and development of digital technology has transformed the paradigm of art intermediaries and transactions, and

stimulated a “new business structure supported by the interdependence between art, technology and business”.The copyright problem of digital art has been solved, but at the same time, the non-utilitarian nature of art has been completely rewritten.

(3) Ecological Appeal: Innovation Requirements

Digital art forms a new ecosystem driven by the meta-universe. When analyzing the various elements that constitute this new ecosystem, it is not only necessary to focus on the various elements of digital art creators, digital art internal environment, social and cultural environment and digital art connoisseurs, but also to integrate the various elements in the whole system. Attention should be paid not only to the connections between the individual elements, but also to the relationship between the elements and the overall system, but also to the connection between the system and other social systems around it. Nowadays, the systematic concept of the meta-universe is relatively lacking, and people have not formed a clear consensus on the form of the meta-universe. In the research, the paper carries out an in-depth analysis of the changes of digital art in the development of the meta-universe, analyzes and summarizes its internal and external contradictions, and puts forward the ecological demands of digital art. Its ecological demands include four aspects: development needs, breaking through bottlenecks, property rights protection and industrial planning.

Before the advent of the meta-cosmic age, the emerging mass media had already "demonstrated the fundamental significance and super control of technology over art". It has formed a new mechanism for the operation of a new type of “sexual reproduction” art production system.^[26] In terms of development needs, because of the super control of technology, digital art is facing many new challenges, such as lack of criticism, slow practice, lack of interoperability, rampant theft, hype drawbacks, different from the public aesthetic, and so on, which need to be innovatively solved. In terms of breaking through the bottleneck, at the same time, the meta-universe has accelerated the breakthrough of the development bottleneck of digital art, and innovatively solved some pain points, such as the art ownership

problem, the artist relationship problem, and the digital copyright problem. As far as the protection of property rights is concerned, blockchain technology in the meta-universe determines copyright ownership for digital art. To a certain extent, it protects the intellectual property rights and economic benefits of creators, and provides a new path for digital art creators to obtain due economic returns through their works. However, at present, there is no interoperability between the NFT of each meta-universe platform. When the digital art work it represents leaves the meta-universe in which it was created, many of its copyright license terms and conditions in the original market cannot actually be transplanted to the new meta-universe market at the same time. Therefore, new innovation requirements are put forward to provide guarantee for the sound art market. In the meta-universe art narrative, the meta-universe is regarded as a new frontier and a new market for digital art, especially VR art. In terms of industrial planning, NFT art's exploration of art forms and technologies enables digital art to move towards the meta-universe, and the opportunity to build a meta-universe industry needs to be actively grasped. The digital art industry should grasp the opportunities of the new era, encourage artistic creation, make use of digital advantages for scientific planning and industrial investment, and promote the innovative development of the global digital ecosystem.

(4) Ecological Trends: Directions for Innovation

The emergence of the meta-universe has changed the ecological environment of digital art. The change of digital art development background puts forward new requirements for digital art ecology. The transformative potential of digital art is beyond people's imagination. If digital art is placed in the entire ecosystem, the digital art ecology is not fixed, but mutual transformation and flow integration in different fields. The generation and evolution of the new ecology of digital art is a constantly changing dynamic process. The ecological trend is divided into four dimensions, namely, transformative innovation, artistic trend, development co-creation, and spatial shift. Manovich argues that technology has developed far faster than artists expected, gradually evolving into the largest art.^[27] The

development of metaverse digital art tries to break the boundary of artistic imagination, which is not only the ultimate imagination of technology, but also the “super metaphor” of the artistic transformation of The Times.

In order to deepen the development of digital art in the meta-universe and promote the virtuous cycle of art ecology, it is not only the development of digital technology, but also the transformative innovation driven by policies and people's needs. Transformative innovation is the most effective path for the ecological development and innovation of digital art. In the process of the future application of digital art in the meta-universe, its creation, exhibition, trading, identity, market, and communication will all be innovated. The development of meta-cosmic technology is not the encroachment of technology on art. The future should not become the subversion of humanity by science and technology, but should become a new opportunity for the development of art and a new challenge for theoretical reform. While artistic trends supported the innovative direction of ecology, the advent of the cloud universe further accelerated the process of what Featherstone called the “aestheticization of everyday life”,^[28] the boundary between art and everyday life disappeared. With the rapid development of mass media, both “visual mania” and “accumulation of scenes” have followed. “Social image proliferation” has changed People’ s Daily life, [29] and its media have made virtual images have a “real” influence. The digital transformation of art production mechanism has prompted a new development trend of digital art, reflecting the characteristics of multi-threaded development, constructivity, real-time virtual participation, etc.^[30] to explore the boundaries of art. At the same time, the demand of the government and enterprises for art is more inclined to scientific and technological elements, such as sound and electricity, machinery, Internet, artificial intelligence and so on. The art style with ideology and social reality as the theme changes, and the art trend with cyberpunk, virtual reality, futurism and interactive participation is established.

The changes in the digital art ecosystem have put forward new requirements for its dissemination and creation. The meta-universe makes digital art avoid the absolute of unity and de-virtual to real, and the boundary between art and technology

is blurred again. In order to comply with the innovative direction of ecological development, the development and co-creation of digital art expression and market industry innovation for different industries have opened up a new track. In the meta-universe era, the digital art industry will not exist apart from the overall industrial status quo, but will promote the coordinated development of multiple industries, such as the cultural travel industry (digital cultural travel), the clothing industry (virtual clothing), the automobile industry (virtual car), and the service trade industry (immersive experience). From the perspective of space turning, the advent of the meta-universe brings the two trends of space medialization and media spatialization into full play. The virtual platform developed on the basis of meta-universe digital technology not only changes the space, time and economic availability of traditional art exhibitions and art markets, but also changes the circulation direction of the supply loop, profoundly affecting the multiple value of digital art.

IV、Conclusion and Enlightenment

1. Research Conclusions

Based on the method of grounded theory, this paper makes a step-by-step coding and systematic analysis of the relevant text data about meta-universe digital art from 2020 to 2023, and draws the following conclusions.

(1) Grounded Theory Exploratory Research. Through the cycle of multiple steps such as open coding and selective coding, in general, this research uses the grounded theory to serve the construction effect of the new ecology of digital art under the meta-cosmic vision is ideal. Based on the grounded theory, the new ecological structure model of digital art under the meta-cosmic vision is built, as shown in Figure 3.1. Through the analysis of the new ecological characteristics, it is not difficult to find that the behavioral structure of the four dimensions analyzed by the grounded theory is very closely related, rather than isolated. The mutual mapping between various dimensions and categories can provide the direction for digital art to solve the developing problems in the future. At the

same time, this study fills the gap of digital art ecology research to a certain extent, and lays a certain theoretical support for subsequent empirical analysis.

- (2) **The Innovation and Grasp of Interdisciplinary Subjects.** The integration of character art and meta-universe technology has become a future development trend, which not only promotes the language innovation of digital art, but also finds a new direction for scientific and technological innovation. At present, under the catalyst of digital art meta-universe, new changes have been produced, including internal ecological changes and external ecological changes. The internal ecology reflects the cross-innovation of art and technology. External ecology reflects the integration and development of art, economy, culture and society, and puts forward innovative requirements and innovative directions for the future development of digital art, namely ecological appeals and ecological trends. These dimensions not only reflect the change of the ontological nature of digital art in the new environment, the production and consumption of digital art, the evaluation criteria of digital art, and the ecological relationship of the reality construction of digital art. At the same time, the dynamic development of the future digital art ecosystem has a certain degree of grasp.

2. Research Contribution

- (1) **Research Content innovation** Based on the relevant content of the rooted theory, the paper systematically summarizes the field of digital art. For the first time, the development status and trend of digital art at the present stage are expounded from the perspective of ecological view, so as to provide reference for future research and practice, so as to promote the virtuous cycle of digital art ecology.
- (2) **Research Theory Innovation** It constructs a new ecological model of digital art from the meta-cosmic perspective. At present, the research on digital art from the meta-cosmic perspective mainly focuses on the research of a specific dimension and focuses on the understanding of the new mode of existence of digital art. For the first time, this study abstracts a new ecological model of

digital art from the meta-cosmic perspective by summarizing and analyzing the existing practices and theories, and establishes a theoretical system for reference for the formation and development of the new ecology of digital art from the meta-cosmic perspective.

3. Research Deficiency and Prospect

The relevant data used in the research of this paper are all from the research results of previous scholars on digital art from the meta-cosmic perspective. Although the comprehensiveness and completeness of the data have been taken into account as much as possible in the coding process, the obtained data has been further verified and supplemented by interviews based on the principle of theoretical saturation. These materials are more or less focused and subjective to a certain extent. Therefore, it is necessary to further verify and supplement the structural model of the new ecology of digital art from the meta-cosmic perspective through more research and practice in the future. At the same time, the meta-universe is still in its infancy, and the research on relevant theories is still scarce at this stage. And the meta-universe digital art will be a major trend in the coming period. In order to ensure the long-term stable and healthy development of this new art ecology, it is still necessary to carry out more in-depth theoretical research on this topic.

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