A Preliminary Exploration of the Resonant Configuration between China' s Film Industry and Contemporary Emerging Information Technologies: Postprint

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Abstract

Faced with a volatile international situation and constraints on numerous Western chokepoint technologies—including core technologies such as chip research and development and contract manufacturing—Chinese society and research institutions across all sectors have united with a common purpose to jointly engage in R&D and production, generating tremendous collective momentum. This has concurrently propelled Huawei-led 5G deployment, big data and cloud computing capabilities championed by internet companies, and the advancement of blockchain technology. In this context, as China' s film industry encounters the integration and interaction of these forward-looking technologies, it is bound to exert a driving—or even revolutionary—impact on the existing industrial chain and industry ecosystem. As these technologies permeate every sector of the industrial chain, they will inevitably present an opportunity for thawing, recovery, and ultimately prosperity for China' s film industry, which is currently experiencing a "winter" period.

Full Text

A Brief Discussion on the Resonance Pattern Between China's Film Industry and Contemporary Forward-Looking Information Technologies

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Abstract: Faced with unpredictable international situations and Western restrictions on core technologies such as chip R&D and contract manufacturing,

Chinese society and research institutions have united with tremendous collaborative force in developing and producing these technologies. This has simultaneously driven the promotion of Huawei-led 5G, the big data and cloud computing capabilities led by internet companies, and the development of blockchain technology. Against this backdrop, the integration and collision of these forward-looking technologies with China' s film industry will inevitably exert propulsive and even revolutionary impacts on the existing industrial chain and industry ecology. As these technologies permeate every domain of the industrial chain, they will undoubtedly bring opportunities for thawing, recovery, and even prosperity to China' s film industry during its "winter."

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1. Implications and Reflections of 5G Development and Popularization for the Film Industry

The development and popularization of 5G technology will make film distribution and promotion more flexible, enabling more precise positioning and information push in terms of audience experience, reach, and diversification.

On December 20, 2020, the 2020 World Internet of Things Conference was held in Beijing. Shi Dinghuan, Chairman of the Conference Organizing Committee, former Counselor of the State Council, and former Secretary-General of the Ministry of Science and Technology, introduced in his keynote report that the current global IoT output value is approximately 15 billion US dollars, with China being the country with the most IoT application practices and innovation development worldwide. China' s IoT output value accounts for about 1/4 of the global total, partly because China has completed over 700,000 5G base stations [1]. Outside China, particularly in Europe, there is great attention to the digital economy, but support for the secure transmission of basic networks is severely insufficient. The Chinese government has provided tremendous support to telecom operators, with spectrum license fees much lower than in other countries, treating 5G as infrastructure for the digital economy. This has played a significant role in promoting China' s data applications and industrial transformation and upgrading, bringing opportunities to every link of China' s film industry chain, from production to distribution to cinemas [2].

1.1 Positive Impact on the Production End

The so-called 5G refers to the fifth-generation mobile communication, characterized by high bandwidth, low latency, and wide connectivity. Under 5G network speeds, the bandwidth is nearly 100 times greater than 4G. This has brought transformative changes to pre-production filming, digital cameras, and post-production equipment. Previously, connections were made through wired means, but in the future, wireless connections and on-site data transmission through 5G will greatly enhance the convenience and work efficiency of cinematographers and DITs (Digital Imaging Technicians), while also reducing the cost of using array-based data transmission equipment.

The speed of 5G data transmission has greatly promoted round-the-clock, global, distributed, and cross-regional collaborative cooperation. Images from the shooting site can be transmitted in real-time via 5G networks to remote directors, post-production teams, and special effects technical directors. CG programmers thousands of miles away can render special effects for existing footage and communicate corrections and adjustments with directors simultaneously. Film review can be conducted remotely through mobile terminals, subverting the existing sequential and irreversible industrial workflow of "shoot first, produce later" and improving real-time performance and work efficiency. The application of 5G can even provide intelligent composition and lighting suggestions for cinematographers regarding issues such as focusing, metering, and color temperature correction.

1.2 Intelligent Feedback for Film Distribution

In terms of film transmission, 5G' s high speed and low latency make it possible to deliver film copies not through specialized distribution companies' offline transportation, but through directional transmission to screening venues.

1.3 Upgrade of Viewing Methods at the Exhibition End

5G can be combined with IoT technology and artificial intelligence to create a new ecology for film exhibition, facilitating diversified new models of film screening, stimulating new film consumption, extending the film life cycle, and further realizing intelligent and unattended cinema projection.

Another epoch-making application of 5G at the exhibition end is VR technology. It is estimated that by 2020, the global virtual reality industry will exceed 200 billion yuan, including 160 billion yuan for the VR market and 45 billion yuan for the AR market [3]. The Ministry of Industry and Information Technology' s "Guiding Opinions on Accelerating the Development of the Virtual Reality Industry" proposes that by 2025, China' s overall strength in the virtual reality industry should rank among the world' s top. In the future, more offline entertainment industries, cinemas, and theme parks will provide paid VR projects. Just as *Avatar* opened the global 3D viewing craze while allowing the United States to firmly control the development of global 3D technology, in China'

s post-pandemic era and against the backdrop of dual-circulation development, firmly grasping the discourse power of core 5G technology and 正视 (squarely facing) the positive experience VR game development brings to film exhibition will enable innovation-driven strategies to complement each other, making China' s film VR technology a pioneer in world film technology.

Compared with traditional viewing experiences, VR enables users to better immerse themselves in virtual environments, with higher participation in audio-visual enjoyment—a disruption that traditional video portal websites cannot match [4].

1.4 Problems Arising in China' s Film Industry Development in the Post-Pandemic Era

Throughout history, while technological development has liberated tremendous productive forces, the emergence of secondary problems also requires our prudent consideration and control [5]. Driven by 5G technology, "making movies" appears more convenient, and more film elements can be presented through visuals, weakening the role and position of filmmakers such as directors, actors, and producers. Some may even exit the historical stage, making film production no longer the monopoly of a few and causing tremendous changes to the identity and discourse power of traditional filmmakers.

The interconnectivity of all things and the surplus of film terminals have brought huge impacts to cinema projection terminals. Simultaneously, the redundancy of film production capacity has caused audiences to develop aesthetic fatigue from dazzling and bizarre film visuals, while also allowing vulgar and attention-seeking film products to enter the mainstream, which runs counter to the healthy development of the film industry.

In summary, while facing the benefits 5G technology brings to the film industry, we must also strengthen our understanding of this double-edged sword. We need to establish organizational training mechanisms for relevant personnel and conduct systematic and objective evaluations and research on the established industrial ecosystem from multiple dimensions of industry, academia, and research.

2. Big Data

In March 2020, the National Development and Reform Commission, the Central Propaganda Department of the Communist Party of China, and other ministries jointly issued the "Implementation Opinions on Promoting Consumption Expansion and Quality Improvement to Accelerate the Formation of a Strong Domestic Market," proposing to "accelerate the construction of new-generation information infrastructure, accelerate the construction and commercial pace of 5G networks and other information infrastructure, and accelerate the development of new information products such as ultra-high-definition video, virtual reality, and wearable devices" [6]. 5G technology has become an important area

for the Party and national development. Riding the spring breeze of reform and development, new applications and new business forms in the film market will inevitably be reshaped.

2.1 Market-Oriented Precise Content Production

In the e-commerce field, big data applications run through every link of the industrial chain. The key way to cultivate user stickiness on platforms like Douyin and Kuaishou relies on big data and cloud computing to regularly and directionally deliver content based on the needs and habits of massive users under algorithmic support. The same applies to film production. The selection of actors based on audience and market response, the design of plot directions according to audience psychological preferences, and the timing of plot points are all derived from big data [7]. A well-known successful case is the rapid popularity of *House of Cards*. According to Netflix, the company has 27 million subscribers in the U.S. alone. Users generate over 30 million behavioral events on Netflix, with subscribers providing 4 million ratings and 3 million search requests daily. It is precisely through big data' s all-round and multi-level catering to audiences that such success was achieved in film script creation [8].

China' s film industry has already engaged in strong alliances with multiple internet companies, while some internet companies such as BAT have specifically ventured into the film and television industry, actively participating in the construction of the film and television industrial chain. Relying on the vast user base of the internet, inherent financial capital, and strong capital operations, they can accurately depict user portraits in theatrical films and online movies, utilize their advanced technological advantages to enhance the market adaptability of film and television works during production and distribution, and conduct comprehensive big data incubation in every link from IP selection at the source of film creation to cinema management and the development of derivative markets.

2.2 Targeted Distribution Based on Precise User Profiles

Beyond the production field, big data applications can also carve out a place in China' s post-pandemic film industry. In the distribution field, the role of big data is equally evident. As a mass cultural product, film naturally faces diverse aesthetic tastes during its industrialization process, making it difficult to please everyone. The audiences targeted in promotion and distribution naturally exist in fragmented forms. The traditional film distribution's reliance on full-coverage strategies has become increasingly inadequate. Film distribution is shifting from traditional holiday and prime-time slot purchasing to precise delivery. The O2O operation model utilizing big data is about to take the stage and will play a lasting role. By adjusting online and offline promotion strategies through real-time audience interaction and big data analysis technology, Google, for example, can use the frequency of users' internet searches to predict box office performance, basically forecasting the first-week box office of relevant films one

month in advance with undeniable precision and scope. Similarly, China's major internet companies led by BAT, as well as social platforms, can provide detailed and reliable situation analysis for film distribution decisions through their user stickiness and precise tracking of user searches [9].

Indeed, while deeply integrating big data with the film industry, we must also strengthen top-level design and institutional mechanisms in this field, with the government playing a guiding and promoting role. Internet listed companies cannot blindly acquire conceptual companies lacking long-term competitiveness merely for short-term market value management requirements. Alibaba spent 6.2 billion yuan to control Culture China and invested in film companies such as Huayi Brothers and Enlight Media; Tencent established Penguin Film and Tencent Pictures for this purpose. However, from the current situation, this appears more as a blind posture, with unsatisfactory returns. This demonstrates that compared with other industries, the film industry has its uniqueness, and film projects and industry operations have their own development laws. Internet companies need to focus on combining art and market while accumulating capital, understand the laws of film production and distribution, and build an entertainment ecosystem based on the artistic and aesthetic value of film works, opening it to the whole society through big data architecture [10].

Faced with profound changes unseen in a century, Hollywood majors are promoting industrial digitization. If China' s film industry' s big data digital transformation is not put on the agenda, the gap with the world' s leading film digitalization standards will widen. As a "chokepoint" technology, China' s film industry similarly needs to achieve sustainable development through top-down digital transformation. Meanwhile, China ranks first in the world in terms of screen count, having shifted from screen-driven to content-driven growth. How to stimulate consumers' viewing experiences and tap into the potential high-quality content increment and derivative value-added products in the Chinese market has become particularly important.

The new way of thinking brought by big data transformation has greatly extended China' s film derivative market and the creativity of the film industry.

3. Re-examining the Film Industry Chain Through Blockchain Technology

In 2019, a buzzword remains popular to this day: "blockchain technology." In January 2019, the Cyberspace Administration of China issued Office Order No. 3, the "Regulations on the Management of Blockchain Information Services," with the Party Central Committee providing policy guidance for the implementation of blockchain-related finance and industry. The emergence of blockchain technology might better be described as providing a truly global way of thinking and technical algorithms that breaks geographical restrictions. This decentralized concept is also the core idea that enables blockchain technology to cause changes in social organizational structures and shake economic foundations [11].

3.1 Decentralization Principle for Author Protection

Beyond the core principle of decentralization, blockchain utilizes consensus algorithms to update and generate data and cryptography to make public information more transparent and secure. It is precisely this unique encryption method that greatly protects the copyright of public information. Previously, in the film industry, screenwriters' creative ideas were stolen, and attempts to seek legal solutions were abandoned due to time consumption and cumbersome procedures. This largely dampened the enthusiasm and attitude of film creators and led to an industry atmosphere of opportunism and quick success in this intellectually and creatively intensive industry. Therefore, the emergence and industry adoption of blockchain is clearly necessary. When works and names are encrypted and packaged into the blockchain with a timestamp, the copyright of your work becomes unchangeable thereafter. Laborers need not worry about their intellectual property being infringed upon, which can greatly improve creative motivation and enthusiasm, laying a stable foundation for the sustainable development of the film industry at its source [12].

3.2 Adherence to Data Truthfulness Principle

Blockchain also has a guiding effect on audiences at the film reception end. Blockchain' s function of protecting node privacy and its high transparency and traceability make film box office information and content feedback highly transparent and traceable, forming a truly reliable dissemination of box office performance, word-of-mouth, and content evaluation [13]. This can, to a certain extent, eliminate the unfair promotion and audience inducement by "water armies" and "brain-dead fan" circle members regarding films. It can truthfully convey real box office data and market orientation to society, forming authentic word-of-mouth. It can conduct accurate and objective counts of dissemination impact without the phenomenon of centralized platforms faking word-of-mouth or brushing reviews, allowing the artistic inspiration of original creators and the market value of original works to receive genuine feedback.

3.3 Governance Uncertainty in the Chinese Social Context

While blockchain technology brings industry development, the problems that emerge still need to be addressed. In its early stages, blockchain technology still has fundamental issues exposed. For example: Is it possible for hackers to tamper with blocks? Can software and hardware facilities that meet the massive computing requirements of blockchain keep up? How can blockchain technology' s profit model monetize through low-cost services? Will bubbles appear in this sector as capital pursues compound interest and speculative factors, as in other popular industries? The government and relevant departments need to establish adequate talent training mechanisms, actively develop risk early warning mechanisms, actively guide the breaking of traditional film and television copyright barriers, and enable the entire industrial chain to transition and develop

steadily and healthily under a supervised, harmonious blockchain mechanism [14].

In adapting to the underlying logic of China's film industry in the post-pandemic era, the application of information technologies such as 5G, big data, and blockchain has supported the film industry, gradually breaking down the boundaries between content, distribution, and theater operations, presenting an integrated trend. While Western countries are mired in the pandemic and geopolitical instability has pressed pause on world economic development, China is bound to form a multi-form production, multi-channel distribution, and multi-terminal exhibition full-matrix industrial model guided by scientific and information technology. On the one hand, this forward-looking layout of virtual reality ensures the gap between China's film and television industry and Hollywood's advanced film and television technology is reduced. On the other hand, it promotes the original innovative development of China' s independent technological innovation, especially the deep integration of core technology industries with the film industry.

The government should simultaneously establish industry-academia-research talent training mechanisms with universities and enterprises, improve relevant laws and industry norms to actively respond to the possibilities and challenges after the emergence of new information technologies, adapt measures to local conditions, implement policies rationally, and integrate the new film industry ecosystem into the overall national strategy for building a strong film industry.

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Note: Figure translations are in progress. See original paper for figures.