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The development of Chinese science-fiction films from the perspective of industrialization

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Abstract

The film industry includes a chain composed of the machinery industry, the production industry and the derivative industry. Its evolution reflects the development of Chinese science fiction (sci-fi) films in the past century. Since the information revolution, marked by computer use, the film industry has undergone changes in digitalization, networking and intelligentization, and Chinese sci-fi films have taken on a new look. Sci-fi films have the duality of being industrial products and spiritual products. Therefore, Chinese sci-fi films have not only evolved with the evolution of the film industry but also highlight the importance of industrialization, reveal the side effects of industrialization and predict new industrial trends through their creativity, thus having rich connotations and value.

Keywords

Chinese film, film industry, science-fiction film

1. Introduction

A global film industry started at the end of the nineteenth century when inventors and enthusiasts in France and the United States set up companies to manufacture film equipment, shoot films and build screening sites. China's film industry began at the beginning of the twentieth century, and its development was realized under the influence of foreign films (especially Hollywood films) and the efforts of localization. There was a gap of about 30 years between the first Chinese science-fiction (sci-fi) film and the first foreign sci-fi film. However, after a hundred years of development, China's film industry has made gratifying achievements. The gap in quantity and quality between Chinese sci-fi films and those from foreign countries has been shortened, and high-quality films such as *The Wandering Earth* (2019) and its sequel (2023) have emerged. From the perspective of industrialization, Chinese sci-fi films were born on the basis of industrialization, were transformed with upgrades in industrialization, and reflect the historical process of industrialization through artistic creativity. In the context of building the industrial foundation, innovation in China's film industry is reflected in the development of relevant machinery, production and derivative industries from scratch. In the context of industrial upgrading,

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innovation in China's film industry is reflected in the transformation to digitalization, networking and intelligentization. In transcending industrialization, innovation in China's film industry is reflected in the presentation of relevant historical processes, practical problems and future trends.

2. Chinese sci-fi films and the building of the industrial foundation

'Industrialization' refers to the development process in which industrial activities take a leading position in a specific country or regional economic system. Britain became industrialized during the first industrial revolution (marked by the steam engine), which began in the 1760s, and Britain was followed by France and the United States. In the 1860s, Germany, Japan, Russia and Italy seised the opportunity of the second industrial revolution to join the ranks of industrialized countries. As capitalist powers, these countries plundered the world using strength accumulated via industrialization. In China, the ruling class of the Qing Dynasty wanted to use Western military equipment, machine production and science and technology to achieve the goal of self-rescue. However, their Westernization Movement from the 1860s to the 1890s ended in failure, and China gradually became a semi-colonial and semi-feudal society. Nevertheless, the national industry gradually grew in this context, as demonstrated by the establishment of the Jiangnan General Machinery Manufacturing Administration in 1865.

Globally, sci-fi films came out at the end of the nineteenth century as artistic achievements brought about by industrialization. By contrast, Chinese sci-fi films were born in the early twentieth century as the result of local industrialization, and their development and innovation can be examined from the perspective of relevant machinery, production and derivative industries.

2.1 The development of Chinese sci-fi films from the perspective of the machinery industry

Precision machinery manufacturing and photochemical technology have led the way for the film industry. At the end of the nineteenth century, inventors from France, the United States and the United Kingdom competed to develop movie cameras. The Lumière brothers (Auguste Lumière and Louis Lumière), Thomas Alva Edison and others successfully marketed their cameras to other countries and gradually expanded the film market. Against that background, China's film-machinery industry started in Shanghai, Peiping (Beijing), Harbin and Tianjin, and the earliest practitioners were concentrated in small factories that were engaged in maintenance and copying tasks (Qu, 2006). In 1932, the Sino–Western Film Company was established in Shanghai. It was the first film-machinery enterprise in China. In 1942, it produced the first set of 35-mm projectors under the brand *Biaozhun*. In 1947, the Shanghai Venus Company successfully trial-produced the first Venus 35-mm film camera, which was then used to shoot feature films (Hua, 1995).

To form a complete industrial chain in the film-machinery industry, it is necessary to establish enterprises that manufacture photographic parts, projection parts and amplifying and recording parts. It is also necessary to have supporting factories that produce electric lights, cosmetics, photographic materials, chemicals and optical glass, and to have construction companies that build film-shooting sets and cinemas. Luo Jingyu (1941) proposed to establish a film industry system as early as in 1941. However, due to historical conditions, that goal was achieved only after the founding of the People's Republic of China. In 1953, the Government Council (now the State Council) issued the *Decision on Strengthening Film Production* and the *Decision on the Establishment of a Film Screening Network and a Film Industry* (Liu, 2005).

In the second half of the twentieth century, China made significant progress in the development of film machinery and independently produced projectors, cameras, film processors, tape recorders and lamps. However, sci-fi films require different screening conditions, and high-end equipment needed to be imported. For example, in 1985, Shanghai Daguang Cinema introduced Dolby optical stereo sound reproduction equipment to screen the American stereo film *Superman* (1978). In February 1994, Beijing Jiulong Amusement Park introduced American dynamic movie equipment and built China's first dynamic movie theatre, the 'Tetler Science Fiction Adventure Palace' (Hua, 1995).

2.2 The development of Chinese sci-fi films from the perspective of the production industry

The film-production industry is the backbone of the film industry. The world's earliest production industry was conceived by film inventors at the end of the nineteenth century. In the United States, Thomas Edison established the world's first film-production studio (Black Maria) in 1893 in West Orange, New Jersey. In France, Léon Gaumont established the Gaumont Film Company in Paris in 1895. In China, the production industry originated from overseas-funded enterprises, such as the Asia Film & Theatre Company, which was founded in 1909 and had investors from the United States. Since then, private film-production enterprises, such as the Xinmin Company (established in 1913), Star Film Company (established in 1922), Tianyi Film Company (established in 1925), Happy Film Company (established in 1925), Lianhua Film Company (established in 1928) and Xinhua Film Company (established in 1934), have emerged.

Sci-fi films originated from experiments carried out by inventors, such as the Lumiere brothers' sci-fi comedy *The Mechanical Butcher* (*La Charcuterie mécanique*, 1895). A transformation from sci-fi comedies to sci-fi feature films was achieved by the French dramatist Georges Méliès with the milestone *A Trip to the Moon* (*Le Voyage dans la Lune*, 1902) produced by his Star Film Company (Manufacture de films pour cinématographe). The earliest sci-fi comedy in China was *Invisible Clothes*, which was shot by Happy Film Company in 1925. The film innovated by using 'black technology' to create humour (Huang, 2021). The earliest sci-fi feature film was *Visiting Shanghai after Sixty Years*, which was produced by Xinhua Film Company in 1938. The innovation of the film was its vision of the future.

The birth of China's private film-production industry coincided with the rise and fall of European and American forces in the global film industry. Pathé, the largest French film company, focused its business on shooting newsreels (rather than feature films), while other companies failed to become major players. By contrast, Hollywood in the United States became the site of film studios in 1911 and gradually exerted influence on the global film industry. China's private film industry learned from major Hollywood studios and gradually established a relatively complete production and distribution system. Hollywood business models (such as the star system) were also adopted by China's private film industry.

In the 1950s, when the socialist transformation was occurring domestically and the Cold War was occurring internationally, China's film-production industry parted from Hollywood and gradually established a system in which state-owned film studios implemented the planned economy and presented the mainstream ideology. In that context, sci-fi films such as the *Ballad of the Ming Tombs Reservoir* (1958) by the Beijing Film Studio and *The Little Sun* (1963) by the Shanghai Science and Education Film Studio were released. The innovation in these films was the use of revolutionary romanticism.

Globally, due to the influence of the third industrial revolution, Hollywood took the lead in entering the blockbuster era. The American sci-fi film *Star Wars* (1977) is a landmark work. At the beginning of the reform and opening up policy, China produced several sci-fi films, such as *The Dead Light on the Coral Island* (1980). Although these films have national characteristics in their conception, there was a large gap between them and Western blockbusters in terms of investment scale, technical level and total box office value. With the deepening of the reform and opening up policy, China gradually absorbed and digested the experience of Hollywood and narrowed the gap. Since 2002, domestic blockbusters have appeared in succession in China, including *Hero*, a martial-arts film directed by Zhang Yimou. In the field of sci-fi films, *The Wandering Earth* (2019) and its sequel (*The Wandering Earth II*, 2023) are examples of industrial blockbusters. Blockbuster production was made possible under specific historical conditions: at the end of the twentieth century, China gradually relaxed restrictions on the film-production industry, which meant that a large number of private enterprises and investors were able to emerge in this field. Additionally, China's state-owned film studios strengthened through collectivization and became leaders in the field.

Co-production is an important form of innovation in Chinese sci-fi films. Hong Kong has accumulated valuable experience in this regard. For example, Shaw Brothers (Hong Kong) Limited is committed to promoting film industrialization and building the 'Southeast Asia Film Kingdom' by drawing on the system of Hollywood's major studios. It has made many sci-fi co-productions, such as *The Mighty Peking Man* (1977) produced jointly with Japan's Shochiku Co. Ltd. However, Shaw Brothers later suffered a setback from investing in Hollywood sci-fi films and closed in 2011. *The Mermaid* (2016), co-produced by Hong Kong and the mainland, is a successful example. It was directed by Stephen Chow and achieved total box-office revenue of 3.392 billion yuan in the mainland.

The basic characteristics of industrialization can be summarized as scale, specialization and standardization. Therefore, making film series is also an important way to realize film industrialization, because it helps to form a stable process. China's sci-fi films such as *Animen* (2010–2012), *Seer Movie* (2011–2017) and *Virtual Love* (2016–2017) have made attempts in this regard.

2.3 The development of Chinese sci-fi films from the perspective of the derivative industry

The film-derivative industry is mainly composed of movie-related construction, clothing, toy and printing industries. It involves the construction of photo studios, cinemas and theme parks and the production of related light industrial products and publications. Western manufacturers have accumulated rich experience in this field. For example, Disney, Universal Pictures and Paramount Pictures have all focused on developing the film-derivative industry through intellectual property (IP) transformation, attracting film fans to hotels, parks or cinemas and promoting a combination of culture and tourism. Disney even entered the cruise industry, attracting tourists by installing advanced audiovisual equipment in guest rooms, providing on-demand services and showing high-quality films.

China lacks glamorous sci-fi films, so there are many difficulties in building film theme parks. For example, the Taiwan-funded Froebel Science Fiction Park (opened from 1996 to 1998) in Wujiang, Suzhou, Jiangsu Province suffered setbacks (Chen, 1998). Wuhan Wanda Film Paradise (opened from 2014 to 2016) was once regarded as a part of Wanda Group's grand film industry, but it proved difficult to operate after only two years. At present, popular film theme parks in China are mainly introduced from abroad, such as Hong Kong Disneyland (opened in 2005), Shanghai Disneyland Resort (opened in 2016), the Lion Gate Cinema Indoor Theme Park (opened in 2019) and Beijing Universal Resort (opened in 2021). These theme parks have provided important experience for the development of film derivatives in the context of industrial integration, such as the two-way empowerment of film IP and live entertainment and a seamless connection between upstream links with films and downstream links with derivatives (Wang, 2022). With the improvement in the overall quality of China's sci-fi films and the emergence of representative works, the potential of the film-derivative industry is expected to improve. For example, handicrafts derived from *The Wandering Earth* are favoured by the public. Of course, film derivatives are products of people's spiritual needs (Ding, 2023). Such products have a value independent of the film and meet the conditions to realize the transformation from 'flow' products to spiritual products.

In the industrial chain, the film-machinery industry, film-production industry and film-derivative industry are interdependent, and the development of one is likely to promote the others. For example, film theme parks have created a demand for special film production. At the end of the twentieth century, Beijing Jidi Film Technology Development Co. Ltd produced the first domestic dynamic film, *The Thrilling Car*, which was released in 1993 in Zhongshan Science Fiction Park, Guangdong Province. This is an example of the interaction between the film-derivative industry and the film-production industry to promote innovation. Zhongshan Jinma Technology Entertainment Equipment Co. Ltd has obtained a number of patents related to film theme parks, such as for 'an amusement facility for watching movies' (2011) and 'a new amusement device for watching movies' (2019). These patents are examples of the interaction between the film-derivative industry and the film-machinery industry to promote innovation. From the perspective of innovation, the machinery, production and derivative industries complement each other. Innovation in these industries is driven by social

needs. Only when there is stable and vigorous social demand can there be stable and reliable investment, efficient and high-quality output, and a sound and beneficial industrial ecology.

In general, China's film-machinery industry is highly ranked in some fields (such as full-colour LED displays). China's film-production industry has contributed to top-grossing Chinese films, and China's film-derivative industry has grown from scratch. However, compared with other types of films, sci-fi films are generally 'niche', and the market for such films still requires development.

3. China's sci-fi films and the upgrading of industrialization

Historically, the industrial revolution and the information revolution promoted each other. The film industry developed at the end of the nineteenth century following the first industrial revolution (electric power was necessary), matured at the beginning of the twentieth century following the second industrial revolution (characterized by batch replication through production lines), realized full optimization and automation of production in the 1970s following the third industrial revolution, and moved towards distributed, intelligent and customized development in the twenty-first century following the fourth industrial revolution. The third and fourth industrial revolutions are closely related to the fifth: the information revolution (marked by computer use). In the middle of the twentieth century, the information revolution promoted the digitalization, networking and intelligentization of traditional industries and created new types of business that are usually classified as the service industry or the tertiary industry, such as information transmission, computer services and software services. The upgrading of industrialization has promoted the transformation of Chinese sci-fi films.

3.1 Industrial digitalization and Chinese sci-fi films

'Digitalization' refers to the process of converting information into a digital, electronic, computer-readable format. The digital electronic computer was developed to meet military needs and later became an important driver of the transformation of the national economy through its conversion from military to civilian use. Industrial digitalization has different meanings for different countries in industrial development stages, but it may include the automation of the production process, the informatization of process management and the intelligentization of product interactions. In manufacturing, digitalization refers to the specific application of 'big data' in the industrial field (Cai, 2015). In engineering, it focuses on the integration of modern digital technology, industrial technology and engineering methods to solve three major problems: how to get data, how to connect data, and how to use data (Mao, 2020).

From the perspectives of scale, specialization and standardization, industrial upgrading brought about by digitalization is mainly reflected in the following aspects: (1) Digital products can be copied many times without distortion, so they can be produced on a large scale. This is conducive to the development of the film industry. (2) Digital tools are mainly developed by programmers. As a result, the film industry is increasingly dependent on the software industry and on software updates. (3) The digital economy takes data resources as the key production factor and has its own operational rules. In this context, the National Bureau of Statistics (2021) issued the *Statistical Classification of the Digital Economy and its Core Industries* as the unified standard for digital economic accounting in China. It provides an important reference for understanding the positioning of the film industry in the digital era. Some scholars have summarized the characteristics of the current digital filming and production process as controllable risk, controllable planning, controllable quality, controllable efficiency and controllable teams (Zhang et al., 2017).

Digitalization has had a profound impact on China's film industry:

(1) For the film-machinery industry, due to the introduction of digital electronic computers, film production has become an important part of the information industry. Digitalization has effectively promoted the transformation of China's traditional film companies and the rise of new film businesses. For example, the China Film Group has built a large-scale digital production base, and a number of software companies and cultural communication

companies have become a new force in the film industry. The movie machine is no longer purely hardware-based but is a new system with an interactive, friendly interface and continuous performance improvements via software upgrades.

(2) The film-production industry has also experienced great changes. Computer software and hardware and various embedded devices have become important tools for film creators; computer animation has become an important part of special effects; computer graphics contribute to spectacular narration in sci-fi films; and digital virtual characters have erased the boundary between real and animated films. Digitalization enriches the types of sci-fi films and adds new varieties, such as virtual-reality films, engine films and database films. The virtual-reality version of *Artificial Intelligence: Fuxi Awakens* (2016) is an example. Digitalization has also changed the process of film production and created conditions for real-time interactive rehearsals. The LED virtual shooting technology moves post-production to the forefront, greatly reducing the production costs for sci-fi films. Related concept films include *The Unknown Planet* (2021) produced by Beijing Dawa Youying Technology Co. Ltd. The sci-fi short film *Birthday* produced by Hangzhou Bocai Media Co. Ltd won the 'Best Visual Effect Narrative Short Film' award at the 14th Spark Animation Festival held in Vancouver, Canada, in 2022.

(3) In the film-derivative industry, digitalization has promoted the transformation of traditional cinemas and the construction of new cinemas. From 2002 to 2012, the digitalization of China's cinemas experienced three stages: experiments with government support, explorations of marketization, and maturity and large-scale construction (Liu, 2012). Thus, China basically completed the digitization of cinemas, ensuring the screening of various sci-fi digital blockbusters. The CINITY cinema system independently developed by China was officially released by Huaxia Film Distribution Co. Ltd in August 2019. It integrates 4K, 3D, high brightness, high frame rate, high dynamic range, wide colour gamut and immersive sound and can show sci-fi blockbusters such as *Gemini Man* (2019).

In the digital era, building a film-industry system with independent IP rights has become a challenging issue. The digitalization of China's film-machinery industry occurred during the Ninth Five-Year Plan period (1996–2000). At that time, traditional analogue technology was being replaced by digital technology, and conventional management began to change to computer management. However, the core technologies behind digital film were in the hands of Western manufacturers. For example, Digital Cinema Initiatives in Hollywood took the lead in releasing the *Digital Cinema System Specification* (2005), and the Society of Motion Picture and Television Engineers also successively issued relevant documents. Since then, Chinese authorities have issued technical requirements for digital films. Relevant enterprises, research institutions and inventors have also obtained patents in the field of digital film equipment, but the development of software in the film industry has lagged. In this regard, digitalization has widened the gap between the Chinese and the Western film industries. Recently, the Chinese film industry jointly wrote the white papers *China's Digital Film Production Standard* (2020) and *China's Digital Film Production Guidelines* (2022), which covered technologies such as editing, virtual production, cloud production, visual effects, sound, colour mixing and master production. These documents provide a basis for training digital imaging talent.

3.2 Industrial networking and Chinese sci-fi films

Industrial networking includes at least the following three conditions. First, use internet technology to establish an intranet to support internal business processing and information exchange. Second, use internet technology to establish an extranet to support data transmission and information exchange. Third, use the internet or another public network to build information links with the vast number of network users. Industrial networking means not only interconnection in the physical sense but also changes in economic models and thinking. From the perspectives of scale, specialization and standardization, industrial upgrades brought about by networking manifest as: (1) the expanding scope of industrial activities with the expansion of network services,

(2) improvements in the accuracy of industrial information with improvements in network integration, and (3) innovation in industrial collaboration with innovation in network business.

The production, circulation and consumption modes of the film industry underwent major changes following the introduction of the internet. First, film production was organized through the internet: workshops in different geographical locations could conveniently collaborate online. Second, film circulation was realized through the internet: digital films could be transmitted online across time and space. Third, film consumption can rely on the internet: the audience can freely request a broadcast that is not limited by schedule. Because of the role of the internet, film production, film circulation and film consumption are linked. The roles of producers, disseminators and viewers can change relatively freely, and user-generated content shows exponential growth. Content providers can meet the needs of audiences through recommendation algorithms and maximize their own interests.

Before the popularization of internet applications, China's sci-fi films were mainly shown in cinemas. Although China has been building television stations since the 1950s, television films started being produced later, and there were few sci-fi television films. Under such conditions, the networking of the film industry brought the following changes in Chinese sci-fi films:

(1) Many films with the characteristics of pure online publishing emerged. Such films may be produced by internet companies alone (or in cooperation with other companies) or by other film producers and released via the internet or temporarily moved from offline distribution to online distribution due to special circumstances (such as an epidemic). Generally, we use the term 'big online movie' to differentiate from 'micro movie' and 'cinema movie'. Such movies have an excellent production level, a complete story structure, a short production cycle and low investment requirements, and they have become the dominant type of Chinese sci-fi film since 2014 (Huang, 2018a).

(2) Interactive films with online game integration emerged. Such films take advantage of the internet as an interactive medium and are committed to promoting the participation of network users (not only watching but also playing). They may exist on a game platform or as new forms of movies with multiple perspectives, paths and/or screens. Examples include *Big Bee* (2020) and *When I Wake up* (2020).

(3) Cloud viewing based on social media is emerging. On the one hand, websites such as iQIYI have built an online film-trading platform named 'Cloud Cinema', which aims to lead the ecological upgrading of film network distribution. On the other hand, enterprises such as Heguan Image Culture Media Co. Ltd imitate the viewing process of offline cinemas and organize audiences to collectively 'watch movies in the cloud' in real time through live broadcasts, WeChat groups and other channels (for new movies, not only old, on-demand movies). In 2020, the 'Science Fiction Matrix Series' of cloud viewing set a record with nearly 100,000 people present (Yang, 2020b).

3.3 Industrial intelligentization and Chinese sci-fi films

Industrial intelligentization refers to the introduction of artificial intelligence (AI) into industrial systems, thus achieving comprehensive perception, real-time interconnection, autonomous learning, dynamic prediction, scientific decision-making and collaborative control with the help of sensors, the 'internet of things', cloud computing, big data, robots, intelligent equipment and other technologies. From the perspectives of scale, specialization and standardization, industrial upgrading brought about by intelligentization is manifested by (1) efficient collaboration between departments within a production organization or even within an industrial system, (2) strong support from data science and knowledge engineering with deep learning ability, and (3) meeting the needs of customized and flexible production through data modelling and other methods and solving various personalized scenarios.

China raised AI to a national strategy in 2017, and the State Council issued the *Next Generation Artificial Intelligence Development Plan* to implement the strategy. The plan involves topics directly related to industrialization, such as industrial robots, industrial internet and key industrial software (State Council, 2017). Intelligentization has had a

profound impact on the film industry. This can be understood from the following aspects: (1) An entire movie can be produced by using virtual actors, virtual sets and virtual locations in a computer (Qi, 2003). Not only that, but digital film format conversion, cross-media narration, global collaborative distribution and cinema line screening management are expected to be intelligentized. (2) AI programmes can continuously improve the level of film creation, film management and film appreciation through in-depth learning, thus improving the operational efficiency of the film industry. (3) The film industry will shift from a human-intensive paradigm to an intelligent-technology-intensive paradigm, and film products will shift from one-way communication with audience groups to interactive game-based narration in the metaverse.

In practice, China has many film patents involving AI, including for film dubbing, audio watermarking, film animation, high-definition digital products, mobile devices, appearance design and film projectors. For example, Hangzhou Yunphant Network Technology Co. Ltd developed 'an intelligent film industry service system based on blockchain and multi-chain technology integration' in 2018 to process data according to the requirements of industry competition. Wiseweb Technology Group Co. Ltd developed 'group intelligence-based film error correction methods and equipment' in 2020, which can help to find errors in movies.

Industrial intelligentization has also raised many theoretical issues for sci-fi film research. For example, can AI become the main body of sci-fi film production and affect the formulation and implementation of production plans by relevant enterprises? Can AI understand (or appreciate) sci-fi films produced by humans and realize the social value of these films as consumers? Will AI influence the release of human sci-fi films and affect the dissemination of these films? In what sense will intelligentization promote innovation in film production and improve the production efficiency of sci-fi films? In what sense will intelligentization change the creative orientation of the film industry and filter the contents of sci-fi films? In what sense will intelligentization become an attribute of film-industry products and endow sci-fi films with new functions (such as automatically adjusting the perspective, plot and style according to user preferences)? How do humans enter the metaverse as avatars and interact with various agents originating from sci-fi scenes? How will industrial intelligentization change the overall pattern of global sci-fi film production? Can interaction (or even integration) between intelligent agents and humans lead to new film-industry aesthetics and new sci-fi film evaluation criteria? If we focus on Chinese sci-fi movies, new topics may also arise, such as the intelligent use of Chinese resources, the intelligent construction of Chinese landscapes, the intelligent positioning of Chinese images, the intelligent extraction of Chinese elements and the intelligent appreciation of Chinese characteristics (Huang, 2018b).

Upgrading is an inherent requirement of industrialization because industrialization is not simply a historical movement in which machines make machines but also involves the realistic needs of national economic development, a vision of the future guided by societal ideals, and fierce industrial competition. From the perspective of values, upgrades usually mean reduced human burden, improved production efficiency, enriched product types, more wealth and an expanded development space, which also means that relevant enterprises have the conditions necessary to win in competition. However, upgrading may also mean eliminating old social roles, organizations and models, and may lead to greater risks, higher costs and more conflicts. The digitalization, networking and intelligentization of industry mentioned above, while leading human society into a new information era, also bring worries about the triumph of AI over human intelligence and the coming of a singularity. This anxiety is vividly expressed in sci-fi films and will be analysed below.

4. Chinese sci-fi films and the transcendence of industrialization

Sci-fi films are not only industrial products but also spiritual products. As industrial products, sci-fi films emerged on the condition of industrialization, and their forms changed with the process of industrialization. Without industrial technology, the prosperity of sci-fi films is unimaginable. As spiritual products, sci-fi films use science and technology as the basis for creativity in space and time, presenting the past, present and future. Industrialization is necessary for the mass production of sci-fi films

and for strong market competition. Industrialization is also an important theme and source of artistic sentiment. Therefore, Chinese sci-fi films not only reflect industrialization as a historical movement and a realistic trend, but imagine industrialization in the future, highlight its importance, reveal its side effects and predict a new era of industrialization.

4.1 The importance of industrialization highlighted by sci-fi films

Industrialization is not only a process of reforming technologies and improving production efficiency on the basis of industrial revitalization, but also a process of continuous self-improvement in the industry itself. In 1958, during the Great Leap Forward, many films reflecting technological innovation in industrial and agricultural production appeared. They were based on real life and were full of optimism and romanticism. Some of them focused on automation. For example, *Twenty Days of Change and Life* depicted how the Qianjin Model Manufacturing Factory realized semi-mechanization in a very short time and made efforts towards complete automation. *The Third Test* reflected the process of enamel automation by Huafeng Enamel Factory, and *Heat Wave Pentium* showed the automation of sock weaving by Dacheng Sock Factory. Although these films imagined technological innovation, they were classified as drama films because the envisaged new technology was relatively close to reality. However, technological innovation in sci-fi works usually requires surpassing the existing technological level. For example, the cosmic migration and interstellar war described in the animated films *Animen* (2010) and *Animen II* (2012) are based on the developed aerospace industry.

The creativity of sci-fi films is mainly reflected in crisis narration. Therefore, the film producers pay special attention to the role of industrialization in resolving a crisis. For example, in *The Wandering Earth* (2019) and its sequel (2023), humans build space stations, underground cities, planetary engines and steering engines to cope with ecological crises. The short film *Star Folding* (2019) envisages that, after the destruction of the Earth, mankind will use asteroids to build new settlements. In these films, industrialization provides the basis for humans to save people from extinction.

Role innovation is a prominent feature of industrialization. Industrialization means not only the unprecedented development of productive forces but also changes in production relationships. In an agricultural society, the contradiction between the landlord and the farmer dominates, while in an industrial society, the contradiction between the capitalist and the worker dominates. Capitalists can be classified into entrepreneurs, businessmen and bankers by their investment orientations, and into big capitalists and small owners by investment scale and other factors. Workers can be differentiated according to technical level, type of work and occupational status, resulting in skilled and unskilled workers, industrial and non-industrial workers, and regular and contract workers. Scientific and technological personnel have an important position in an industrial society, and specific positions may be white-collar, blue-collar or grey-collar. Relationships between such characters provide a variety of entry points in the conception of sci-fi films. For example, *The Synthetic Man* (1988) combines a migrant worker with a businessman by using brain transplantation technology. In the film, Wang Jiapei, a farmer, is killed in a car accident, and his brain is transplanted into the head of Wu Hao, the general manager of Huaxia Trading Company, who was suffering from a brain tumour. Wang then took over Wu's position and used his power to recruit villagers to work in cities. *Dislocation* (1987) imagines the combination of a scientific researcher's administrative affairs and robot development. In the film, Zhao Shuxin, an engineer, is troubled by endless meetings when he becomes a director, so he creates a robot substitute.

Industrialization does not occur at the same time or rate in all parts of the world. Thus, the gap in comprehensive strength between different countries may expand due to industrialization, and international political patterns may also change due to industrialization. China's sci-fi films combine these principles and cross-era imagination. For example, *Kungfu Traveler I* (2017), which is set during the Sino-French War in the late Qing Dynasty, describes how Western colonists invaded China by virtue of having a strong industrial civilization, how the Chinese people fought back, and how a robot that came from the future contributed to that fight.

4.2 Side effects of industrialization revealed by sci-fi films

Sci-fi film directors usually do not think that industrialization is a panacea for all problems. For example, in *Please Call Me the Savior* (2017), although humans have built factories capable of producing powerful mechanized fighters, they are still defeated in a fight against aliens who have come to punish humans for polluting the environment; the only way out is for humans to manage the environment better. In the sci-fi context, the paradox of the value of industrialization has been exaggerated. Humans can produce various products directly to meet their own needs through industrialization and efficient production. For example, in *Transcendent* (2018), humans mass produce 'mirror men' and send them to engage in mining on different stars. In *One in 3.6 million* (2021), humans make 3.6 million bionic robots to fight pests in 2051. Humans can also transform agriculture and develop the service industry through industrialization with the help of advanced equipment. For example, *China Captain* (2021) describes a cosmopolitan star-making factory based on a 'fan economy'. However, in these films, the narrative focus was not so much the advantages of industrialization but the disadvantages of industrialization; for example, the motivation for production was unethical, the production process was alienated, and the production results backfired. The 'mirror men' fled, the bionic robots lost control, and the star factory opened a heroic war, all of which caused dramatic conflicts in the films.

Industrialization reflects human initiative and passivity. Humans promoted themselves from the animal world by using tools to make tools. After entering the industrial era, humans have relied on machines to accelerate the development of society, expand material wealth and put their own brand on the natural world, creating what geologists call the 'Anthropocene'. Nevertheless, industrialization has not only consumed a large amount of non-renewable energy but also caused the extinction of many species and irreparably damaged the natural environment.

China's sci-fi films reveal the side effects of industrialization in the following ways.

First, industrialization may endanger humans. For example, in *Kiss of Poison* (1992), a couple who work in a chemical plant pass on toxic substances in their bodies to their child, so the child can kill people simply by a kiss. *The Beauty Girl Crisis* (2017) takes the dissimilation of pharmaceutical industry products as its theme (beauty drugs breed deadly viruses). *The Glass* (2020) takes the alienation of glass industry products as its theme (hiding the truth for mankind). *Reboot of Jungle Girls* (2020) is about factory production accidents such as workshop explosions.

Second, industrialization may cause species variation. For example, the highly toxic beetles in *Armor Hero Emperor* (2010) are caused by pollution from the Shenmu Chemical Plant.

Third, industrialization may destroy the natural environment. Many sci-fi films are set in abandoned factory buildings, such as *Mecca Beauty* (2018), *We are Werewolves* (2021), *Last Sunrise* (2019), *The Night of the Black Hole* (2018), *Black Brain* (2020), and the Sino-American co-production *Abduction* (2019). The reason for this may be that the cost of shooting fistfights, gunfights and explosions there is relatively low. Such films are objectively related to the environmental problems caused by industrialization. *Alien Boyfriend* (2016) describes aliens meeting in an abandoned factory. In *The Battle of the Mutant Planet* (2017), an abandoned factory is transformed into a base by aliens. In *Crazy Alien* (2017), aliens engage in biochemical experiments in an abandoned factory, resulting in the serial disappearance of earthlings. These films link industrial ruins with alien invasion and show a sense of distress.

4.3 New trends in industrialization depicted in sci-fi films

In China, industrial modernization is an integral part of social modernization. Because of this, *Ballad of the Ming Tombs Reservoir* (1958) envisions a modernized future: the water conservancy construction site would become a paradise for the coordinated development of industry and agriculture in 20 years. Moreover, with a strong industrial system, China would have started the exploration of Mars. The future, as imagined in the film, is obviously linked to the grand vision of socialism and national rejuvenation.

Of course, in reality, industrialization is not smooth, and industrialization in the sci-fi context is

full of contradictions. Different films have different focuses and ideological tendencies. For example, *Aunt Li's Pocket Watch* (1987) focuses on the concept of time in industrial management. *Lethal Combat / Techno Warriors 2* (1999) focuses on peer competition in the computer industry. *Mother Android II* (2013) deals with the relationship between the electric-power industry and human life. *Super Maid* (2016) deals with the relationship between the current software industry and future world turmoil. *Prime Angel* (2019) focuses on the intergenerational inheritance of a family virtual-reality company.

In imagining new trends in industrialization, the following characteristics are prominent.

First, 'black technology' is a production precondition. For example, *The Final Test* (1987) describes the Fourth Universe Development Mine managed by robots disguised as real people, *Bad Boy Dak Gung* (2000) describes a Japanese gene factory that produces human clones in Hong Kong, and *On Line* (2015) creates a virtual game factory that makes players linger and forget to return. These films do not eulogize black technologies as social engines for the benefit of mankind, but reveal various problems that go against human ethics, such as forced labour, illegally copying human beings and poaching players' time.

Second, pursue benefits by producing new products. Product innovation is the essence of industrialization. It not only means meeting the inherent basic needs of human beings with new technologies, new processes and new equipment, but also means stimulating new needs formed by human consumption. A focus of sci-fi films is on protecting product innovation while preventing a loss of control over innovations. For example, the protagonist of *Heroic Detective* (2013) fights the evil Kuang Tian Group to stop it from developing brainwave controllers. The plot of *Super Robot Girl* (2015) centres on preventing manufacturers from turning 140 million 'lover' robots serving men into killers.

Third, achieve sustainable development by cultivating new talent. Such people should have the enthusiasm to explore the new world. For example, in the animation *Digital Hero* (2011), a group of middle-school students successfully assembled a small robot and won the municipal secondary school group championship. In *The Solitary Theory* (2012), Liu Shu, a poor family member, was determined to explore new scientific theories. His mother supported him in publishing a book with the compensation she received from her employer when the factory closed. In *The Autobots* (2015), Ka Ka, a gifted teenager, and his assistant Ding Ding, improved the smart car system. Such talented characters should also put the common interest above all and fight against mercenary tendencies. For example, in *Into the Brain* (2013), the NHC company controlled its customers through the drugs it produced. Pharmaceutical engineer Wen Guang recognized that harm through his personal experience and fought against it. In *Nirvana* (2018), Yang Man, the virtual human transmission agent, fought the villain Shen Jin to foil the clone's attempt to rule the world.

Whether they highlight the importance of industrialization, reveal the side effects of industrialization, or look forward to a new era of industrialization, China's sci-fi films show a tendency to transcend the limitations of reality through imagination. The artistic techniques used in these films can be summarized as follows: (1) Highlight the seriousness of the crisis in the film, so as to emphasize the extraordinary role that industrial technology can play in the solution. (2) Take science and technology as the first productive force and take scientific and technological inventions as the precursor to industrialization, so that the dialectical view of seeing science and technology as a double-edged sword can be deepened to a dialectical view about the value of industrialization. (3) Look into the future society on the basis of current technology, show the possible changes caused by industrialization, and guide the audience to reflect on industrialization.

5. Conclusion

This study has examined the relationship between China's sci-fi films and industrialization. The impact of industrialization on sci-fi films has been discussed in the macro context, and the development space that film industrialization has opened for sci-fi films has been analysed. In addition, the role of sci-fi films in reflecting and transcending industrialization has been discussed. Some scholars have noted that 'film industrialization is the only way for China to

move from a player in the film industry to a leader in film production' (Hou, 2020).

The industrialization process of Chinese films has undergone major transformations: from completely copying the Soviet model, to marketization and globalization after the reform and opening up policy, then to subversive changes in the structure of the film industry in the era of AI (Chen, 2021). At present, although Chinese films have unique advantages in the global film market, there are still problems with an imperfect industrial chain and a low degree of marketization (Hou, 2020). We must also build a film-industrialization system with Chinese aesthetic characteristics (Zhang, 2019) and consciously take on the important task of telling the story of China in film language (Jia and Qi, 2020), which is compatible with the dual attributes of sci-fi films as industrial products and spiritual products. The development strategy for China's sci-fi films can be understood from five aspects: the Chinese presentation of audiovisual details, the classic narration of a Chinese story, the three-dimensional expression of the common values of all humankind, refined production management, and the specialized division of labour and cooperation (Yang, 2020a).

This paper holds that the relationship between sci-fi films and industrialization should be understood dialectically. On the one hand, as industrial products, sci-fi films have evolved with the industrialization of film: the methods used to present a film depend on the technical means provided by the film industry, the mode of film transmission depends on the distribution network created by the film industry, and reproduction of a film depends on the economic benefits of the film industry. On the other hand, as spiritual products, sci-fi films transcend the reality of film industrialization: their themes are vast and far beyond the scope of industrialization; reflections on industrialization are rich and diverse and are not limited to the industrialization of film; and, even if the themes and reflections are reduced to the industrialization of film, it is possible to create abnormal but coherent ideas from the perspectives of 'dystopia' and the 'future has come'. Sci-fi films not only realize their economic value through the manufacture and sale of film machinery, films and derivatives, but also realize their social value by defining the future and guiding the audience to think forward. Sci-fi films create a demand for new inventions, new technologies, new equipment and new platforms through spectacular audiovisual narration, but they also compensate for the disadvantages of industrialization through reflection.

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