

RESEARCH ARTICLE



Deepening media convergence with 5G: The logic of sustainable development of China's broadcasting network

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Abstract

Objectives: Based on the fact that 5G license issuance will greatly enhance the trend of ecological integration between China's Broadcasting Network and other networks, this paper studies how to effectively extend the inherent tension of media convergence to construct the logic of sustainable development. **Methods:** By comparing and analyzing IPTV data of digital TV and telecom operators and OTT data of Internet companies in the field of broadcasting network in China, this paper puts China's Broadcasting Network in the latest trends and frontier tendency to conduct rethinking, and put forward the suggestion that the sustainable development capacity of China's Broadcast Network should be reshaped in the whole chain covering contents, platforms, technologies and terminals. **Findings:** The diversified combination of mobile communication technology and the iterative application of media convergence have broken the channel monopoly of China's Broadcasting Network, bringing the obvious trend of mobile, video-based and high-definition information communication. Based on this, we can extend to the following imagination: the accelerating integration of China's Broadcasting Network will, in turn, promote the deep integration of media, thus increasingly presenting a multi-dimensional mirror image of reshaping the future ecological landscape of China's radio, film and television. **Improvements:** All such factors as the goal of being beyond the industry and realizing the goal of improving the efficiency of social public services, the systematic planning in the practical field of China's Broadcasting Network to carry 5G license, and the accelerating superposition of ultra HD video technology and mobile interactive television network is pushing the internal logic of the future sustainable development of China's Broadcasting Network to make constant adjustments.

Keywords: Media convergence; China's Broadcasting Network; "One Network for the Whole Country"; sustainable development

1 Introduction

Backtracking from the general perspective of the political, economic and cultural logic, Cable TV (CATV), which started to be broadcast in the United States in 1949, has a history of 70 years. Since the Second World War, especially after the second oil crisis, the development of mass consumption society reached its peak in the 1980s, during which television media played a very important role. At the same time, electronic computer, electronic media long-distance communication and “model integration” of communication technology, which emerged successively, have contributed to the trend of digital transmission of radio and television signals in the global scope in the 1990s.⁽¹⁾ In China, after 30 years of infrastructure construction, cable TV has become a starting point to promote the development of national cultural undertakings. Since the state introduced the policy of “convergence of three networks”, respectively broadcast network, telecommunication network and Internet, three emerging industries represented by broadband network and video technology, respectively IPTV, an important broadband business of China Telecom, OTT, the fundamental platform of new internet audiovisual media, as well as video websites, has been comprehensively engaged from the perspectives of technology, channels, contents and terminals, which has officially broken the monopoly of cable TV in China.

At present, China’s cable TV network is accelerating its transformation from “one network for the whole province” to “one network for the whole country”. China Broadcasting Network Co., Ltd. (hereinafter referred to as “China Broadcasting Network”) was officially established on October 12, 2020. In addition, according to the 2018 National Time Use Survey Communique by the National Bureau of Statistics, Chinese residents watched TV for an average of 100 minutes in 2018, indicating that they still relied heavily on TV to kill time. It is not difficult to see that television has always been an important terminal of entertainment consumption, and an important part of People’s daily leisure. Based on this, only by viewing the future of media in the process of interaction between information technology and society, having historical imagination and acting along with the trend, can China Broadcasting Network, which has stepped on the historical stage again as the fourth largest 5G communication operator in China, be revitalized. Therefore, this paper focuses on this question: based on the trend that the accelerating 5G construction of China Broadcasting Network will greatly enhance the ecological integration of broadcasting network and other networks, how should we deepen the internal tension of media convergence and construct the logic of sustainable development, so as to form a new starting line for promoting the upgraded development of China’s Broadcasting Network?

2 The media logic of broadcasting network changing social life

Television was seen as an opportunity to broaden the horizons of ordinary Americans, which could help learn about humanity’s greatest achievements, to be excited about them, to learn more, and to realize their full potential. In the process from appearance to becoming the most popular media, TV has undoubtedly brought great help to people, but at the same time, it has also caused people to have dependence, resulting in the phenomenon of “sofa potato”. According to Gerbner and his colleagues, television facilitates the “cultivation” and “accumulation” of main ideas. On this basis, people are systematically exposed to selective opinions about various aspects of social life, opinions that tend to form their corresponding beliefs and values⁽²⁾. In *Understanding Media: The Extension of Man*, McLuhan argued that television influenced “tribalized” views and that people’s identity was acquired through the organized information of the mass media. The top three things that developed countries do most are working, sleeping and watching TV. Despite that a lot of evidence has proven that watching too much TV leads to unhappiness, nothing has changed.⁽³⁾ Many people tend to adopt an attitude of “taking it as it comes”, a good example of which is the lag effect when watching TV.⁽⁴⁾ Television is a medium with the attributes of public, sharing and family. Especially in the oriental society with profound traditional family concepts, it will occupy an important position in the media market for a long time.

2.1 Broadcasting network in the wave of media convergence

From the perspective of history, traditional TV involves the eyes and ears in the transmission and reception of information, while network-originated media has increased the transmission and reception process from hand and mouth to information, which has enriched the communication and reception effect of media. With the acceleration of the transmission of television signals by communication satellites into the practical stage, the technology system of cable TV made rapid breakthroughs in this period, and more and more computer scientists and engineering scholars began to study the technical factors of media convergence. For example, in 1977, American scholars Faber and Barran put forward the idea of “convergence of two major systems of computing and communication”, which first expressed a prediction of the future trend of media convergence. After that, the research on television mostly focuses on the relationship between media, technology and communication. In The

Technologies of Freedom (1983), Pool noted that the development of new media technology, especially the development of digital electronic technology, is the cause of the convergence of historically distinct forms of communication, which is a process of "blurring the boundaries between media". Alvin Toffler confirmed this view and predicted the future of media in this way: "The new media will be definitely different from the previous media. They will no longer be independent individuals but are interconnected and integrated with each other, feeding each other with materials, images and symbols".⁽⁵⁾ Coincidentally, with the comprehensive rise of the electronic media era, the advertising slogan of a Chinese TV channel named CCTV film channel, "turn on TV and watch movies", has also become a beneficial exploration of the transformation of life entertainment mode brought by the broadcasting network in the periodic practice of media convergence.

At present, many different emerging media coexist with many "old" media, and none of them has disappeared.⁽⁶⁾ In McLuhan's view, another meaning of the sentence that media are information is: media transform their content. He warned that a movie or play shown on television would not have the same influence on the viewers as it would have in a cinema or theater.⁽⁷⁾ According to the clear definition in his theory of hot and cold media, TV is a cold medium with low definition, which requires people to deeply participate in it and also leaves space for people to re-create; however, movies are hot media, because they provide clear enough information, they deprive people of the space for recreation. In this regard, Levinson proposed the solution of "compensatory media" by enumerating the realistic metaphor that windows and curtains have continuously combined to produce blinds in the evolution.⁽⁸⁾ Finding a balanced state in media convergence has become the key to constantly shaping the sustainable development ability of today's broadcasting networks.

2.2 The inevitability of the sustainable development of broadcasting networks

Taking video websites as a reference, this paper observed a set of data based on authoritative market surveys: According to a recent analysis by eMarketer, more than one in five American households is expected to "cut the TV cable" by 2021; TV watching among Chinese families are also not optimistic, according to the Report on the Development of Chinese Cable TV Industry in the second Quarter of 2019, the market share of cable TV in (mainland) China had dropped to 49.02% in the first half of 2019; According to a report by the Motion Picture Association of America, the number of subscriptions to streaming video services worldwide had surpassed cable TV for the first time in 2018; Netflix and other streaming media giants continue to promote the development of video transmission into the mainstream through technological innovation, and are favored by the market and deeply rooted in people's hearts in terms of content and technology; according to the latest statistics from Eastmoney.com, by the end of June 2019, Alibaba and Tencent Holdings were the top two companies in China's top 500 enterprises, IQIYI was the only video website with a market value of more than 100 billion yuan, and it ranks 78 places higher than the previous year; according to the Report on the Development of China's TV Drama Industry in 2019, 113 TV series were on TV in 2018, less than 30 percent of the 382 new TV series in the whole year; in addition, TV dramas have been decreasing year by year in the past three years, and it has become a normal market for network dramas on video websites to squeeze the share of star dramas on radio and television. Based on the above data facts, it can be seen that video websites have significant characteristics of the network economy. In sharp contrast, the sustainable development ability of broadcasting networks in terms of input-output efficiency is in urgent need to be reconstructed.

In view of the above research, we must realize that before entering the Internet era, broadcasting media occupied the dominant position in the communication market for a long time, with its unique anti-cyclical and monopolistic extremely bargaining level, and abundant cash flow. However, the emergence of streaming media video service completely broke this traditional pattern of media. Similarly, with the help of 5G Radio and Television license with first-mover advantage, under the premise of radio and television network leading the integrated broadcast control platform, media convergence will give new communication functions and effects to both old and new media, and promote the integration and upgrading of broadcasting media and emerging media. In the release of the digital dividend brought by the new round of 5G technology energizing smart manufacturing, the large TV screen is increasingly becoming the next entry point to compete for traffic, rising again as an important terminal to activate the network ecology of a broadcasting network, which is expected to exert an influence on the in-depth advancement of media convergence.

3 Methodology

By applying a qualitative research approach, this paper uses historical review, literature analysis, and classical media theory to select China's broadcasting network for a holistic analysis through structured data collected from the National Cable TV Special Statistics 2015-2017 from the State Administration of Radio and Television of China, as well as official research reports published by China Broadcasting Network Co. Ltd from 2013-2018. The data are used to form an accurate analysis and generalization of the convergence of 5G technology and China's broadcasting network.

4 Longitudinal analysis on the practical evolution of the broadcasting network in China

4.1 Business extension of the broadcasting network

In December 2014, in order to open up the film distribution market beyond movie theaters, more than 30 cable TV networks in China jointly established the China Television Theater Alliance. In June 2015, Alibaba, China Film Group, Gehua Cable and other companies jointly established China Television Theater Operation Company. In March 2019, China Broadcasting established strategic cooperation with Alibaba to jointly promote the deep integration of cable TV networks and the Internet. Based on the general trend of "one network for the whole country", the introduction of TV theaters in China and the strategic transformation of the future digital broadcasting network are conducive to improving the market competitiveness of cable TV, which is expected to become a new entrance to promote the construction of all-media in the future.

According to the latest analysis by Nielsen Online, the main channels for urban residents to watch movies are cinemas, live TV and online video. In recent years, coinciding with the expansion of the middle-income group and the overall transformation of the consumption structure, the principal social contradiction in (mainland) China at this stage has shifted to the contradiction between the people's ever-growing needs for a better life and unbalanced and inadequate development. Based on this, the creation of TV theater is at the right time. It not only meets people's diversified entertainment needs but also extends the value chain of the film and television industry while further expanding the playing channels of film and television, providing an effective solution for improving the industrial efficiency of the broadcasting network. On the one hand, in the context of the convergence of new and old media, with the emergence of TV theaters with the background of radio and television, television and film are expected to achieve mutual benefit and win-win situation; on the other hand, the prevalence of video websites has been a strong impact on the development of the traditional television industry, but it has also promoted the broadcasting network to accelerate its reform of convergence to a considerable extent.

At present, the broadcasting network is divided geographically, but the integration of the network is expected to achieve the interconnection of the broadcasting network, and improve the overall advantage of resources and users of the broadcasting network. On November 25, 2016, the Publicity Department of the CPC Central Committee, the Ministry of Finance, and the State Administration of Press, Publication, Radio, Film and Television jointly issued the Opinions on Accelerating the Integrated Development of National Cable Television Network. It requires that by the end of the 13th Five-Year Plan, the integration of broadcasting networks throughout the country will be basically completed, and the target of "one network for the whole country" will be realized, that by 2020, digital radio and television will be basically provided for all families, covering both urban and rural areas. In this way, after the integration of provincial broadcasting networks into the platform of "one network for the whole country", the number of broadcasting network users can reach hundreds of millions of scale. In addition, the superposition factor of the slow growth of mobile Internet traffic will enable the broadcasting network to compete against video websites with hundreds of millions of users for high-quality film and television works, so as to improve user stickiness and cultivate new profit growth points by developing into a high-quality content platform, which is expected to open a new journey of high-quality development for China's broadcasting ecology.

4.2 Correlation analysis of industrial data

In this paper, digital TV, IPTV of Telecommunication operator and OTT of Internet companies are selected as the main research objects. The statistical dimensions of OTT users include license holders, content producers and TV box providers, which intersect with each other in a complex way. For the convenience of comparison and analysis, data of OTT users mainly came from China Broadcasting Network Co., Ltd., and mainly compared DVB of Radio & Television, IPTV of Telecom and OTT. Data in this paper are from the National Radio and Television Administration, Ministry of Industry and Information Technology, China Broadcasting Network Co., Ltd., etc. At the same time, through the comparison between digital TV of radio and television, IPTV of telecom operators and OTT data of Internet companies, this paper finds out the development trend of the industry and explores the development potential and trend of the industry. On that basis, through the comparison of data structures of industrial development, this paper seeks the market path suitable for industrial development and explores the industrial development trend through the data comparison over the years.

Cable TV has experienced a rapid growth period with an average annual growth rate of over 10% from 2005 to 2012 and a balanced development period with an average annual growth rate of 5% from 2013 to 2015. Since 2016, cable TV has entered a negative growth period and is facing the challenge of transformation and upgrading. As can be seen from Table 1, the number of premium subscribers of cable TV decreased year by year, and the revenue of viewing maintenance fees decreased, but the revenue from value-added services, mainly TV viewing, paid channels and video-on-demand, increased year by year. Faced with

the impact of video websites, it's obvious that the revenue of paid channels would decline, but the video-on-demand business including TV theaters has stable growth and a large space for development.

Table 1. Operation of cable TV throughout the country

	2015	2016	2017
Cable TV subscribers (100 million)	1.73	1.68	1.39
Cable TV viewing maintenance fee income (100 million)	471	461	414
Income from value-added businesses (100 million)	89	97	100
Income from paid digital channels (100 million)	64	68	66
Income from television time shifting watching (100 million)	5.6	6.6	6.2
Income from videos on demand (100 million)	11.5	14.5	15.8
Operation revenue (100 million)	876	908	895

(Data source: Special Statistics of Cable TV throughout the country from 2015 to 2017 by National Radio and Television Administration)

Table 2. Cable TV subscribers over the years throughout the country

	2013	2014	2015	2016	2017	2018
Cable TV users (100 million)	2.27	2.37	2.51	2.52	2.45	2.23
OTT TV users (100 million)	0.13	0.3	0.45	0.73	1.1	1.64
IPTV users (100 million)	0.28	0.34	0.46	0.87	1.2	1.55
Live satellite users (100 million)	0.32	0.45	0.7	1.07	1.29	1.4

(Data source: China Broadcasting Network Co. Ltd.)

Table 3. Market share of China's cable TV industry

	2016	2017	2018
Share of cable TV watching (%)	59.6	54.8	49.9
Share of OTT TV watching (%)	17.3	24.6	36.7
Share of IPTV watching (%)	20	27.3	34.7
Share of live satellite watching (%)	25.3	28.9	30.9

(Data source: China broadcasting network Co. Ltd.)

Further analysis of [Tables 2](#) and [3](#) shows that OTT and IPTV's users and viewing share are increasing year by year, while the viewing share of cable TV became lower than 50% for the first time in 2018. The competition is obvious, but it cannot be ignored that cable TV still has the largest number of TV users. This is not only the most favorable user resource for broadcasting networks at present, but also an important breakthrough point for enhancing platform thinking, focusing on the demand side, invigorating the existing user stock, enhancing content supply-side innovation with media integration, activating the incremental user market, and realizing lane change and overtaking in industry applications.

5 The multi-dimensional mirror image of the future ecological prospect of china broadcasting network

Some research suggests that the network is an open ecosystem that can expand indefinitely and that all nodes can connect as long as they share information. A network-based industrial structure is a highly dynamic and open system. Since the actual technological shape of the system is still uncertain, whoever can control its initial stage can play a decisive role in the future, thus gaining a structural competitive edge.⁽⁹⁾ As mentioned above, there is a tendency to understand the key to promoting the reform and development of the radio and television industry, namely, to focus on the future development and long-term value of the broadcasting network,⁽¹⁰⁾ which is reflected in deepening the media convergence with 5G. Exploring the ecology of the broadcasting network as the goal of sustainable development requires enough attention and scientific reaction, and gathering the multi-dimensional mirror image of the prospect of China's broadcasting network through the whole-chain restructuring of contents, platforms, technologies and terminals.

5.1 The focus lens of content: Diverse categories of audiovisual products

Since entering the era of mobile Internet, the production and distribution of content has been reconstructed based on demand and consumption, which has created a great market space for information consumption. Users' content preferences are known to ebb and flow in short periods of time. According to a study on consumers by Microsoft, attention to news dropped from 12 seconds to 8 between 2000 and 2013, and the decreasing trend is continuing. From the perspective of consumption type, especially entertainment consumption has become the core area of the increasingly intensified competition between stations and the Internet in recent years. At present, film distribution in (mainland) China is mainly shared by cinemas, online channels and TV theaters, and the film market basically depends on the box office revenue of traditional theaters. In North America, the box office revenue of films in cinemas accounts for less than 40% of the overall film market, which relies more on the communication channels other than traditional cinema lines. In contrast, (mainland) China has a huge space and potential for post-film market development.

At the same time, under the continuous impact of video streaming on the film industry, the user market of film content will be increasingly segmented. High-quality films have become a scarce commodity in the market of audio-visual content. With the gradual formation of the ecology of paid audiovisual content, free online audiovisual resources are gradually decreasing, and the market supply of high-quality audiovisual content is obviously insufficient. Generally speaking, relying on its accumulated rich film and television resources, TV theaters, as a content integration party specially customized for the broadcasting network, mainly focus on a large number of shelf-like system of films and television dramas. In particular, it should strengthen the cooperation with film content providers, which is also an important point to enrich the content supply of the broadcasting network ecology and improve the user stickiness.

5.2 The polygon lens of platform: Raising value-added services

In the context of the fourth industrial revolution, we are in a social stage where production and consumption are increasingly integrated, and the broadcasting network is at a critical moment of paradigm shift driven by the trend of platformization. As a communication platform covering users' living circle and segmented demands, TV theaters not only provide audio-visual content, but also provide value-added services with strong interaction, such as information service, video socializing, interactive games, online shopping, online education, distant medical service, life payment, security monitoring, community life, smart transportation, etc. They integrate PC with work attributes, mobile phone with social attributes and TV with entertainment attributes, integrate personalized services driven by 5G radio and television, build a multi-screen integrated digital home service central system, and connect with future smart city infrastructure system in real-time. Their functions are no longer limited by the segmentation caused by industry, region and other factors. Instead, it starts to have more and more correlation and fusion, which creates a big space for innovation in the cross-border zone. Their spillover effect will rapidly penetrate into the field of social livelihood benefits, and form an all-media digital life platform, thus truly meeting the needs of users in their real life.

It is worth noting that the statistics of China Broadcasting Network Co., Ltd. show that the rate of digitization of cable TV has exceeded 80% since 2015, rising year by year and is expected to exceed 90%. In 2018, the number of HDTV users exceeded 100 million. The continuous release of these analytical data has sent a clear signal that the digitization of the broadcasting network is accelerating. In 2019, the Outline of Digital Rural Development Strategy was released, aiming to comprehensively improve the coverage of digital China construction, further narrow the digital gap between urban and rural areas, and stimulate the vitality of information consumption in the sinking market, whose importance has clearly been raised to the height of the national strategy.

5.3 Wide-angle lens of technology: Iterated big-screen experience

TV technology has experienced the change and evolution of mechanical TV, electronic TV, black-and-white TV, color TV, LCD TV, 3D TV, 4K ULTRA HD TV and other forms. Now, information technology represented by the Internet is driving the profound reform and development of TV industry. From PC in the fixed network era to smartphone in the mobile network era, they will continue to evolve towards VR/AR intelligence in the future. In the long run, far from being technologically replaced, TV will have the advantage of mature experience in the integrated manufacturing of screen technology and smart chip research and development in the future. Communication history has proved again and again that the audio-visual technology revolution is an important manifestation of the development of the broadcasting industry. In 1958, Tianjin Radio Factory produced "Beijing" brand black-and-white TV sets, since then, TV sets in (mainland) China developed from traditional ray tube TV to flat-panel LCD TV. With the advent of digital and HD TV, price does not seem to hinder people's pursuit of high-quality cultural life. Better technologies and cost-effectiveness have also become a key piece in the competition on the TV market. According to Intel's 5G Entertainment Economy Report, video consumption will account for 90% of the high-speed

multiplying of average 5G monthly traffic in the next decade. The opening of 5G commercial networks in South Korea, the United States and (mainland) China will provide better network basic conditions and application environment for UHD video applications. The most tangible effect is that we are now on a par with the world's leading countries in terms of the size of the market for ULTRA HD video TV production. According to the analysis and prediction of Strategy Analytics, there will be more than 600 million households with UHD TVs by 2023.

In the past half-century, technological breakthroughs and their diffusion and application in single fields are the main ways of releasing technology dividends. At present, technological innovation in single fields is still intuitive and important. Judging from the latest trend of technological breakthroughs and policy deployment, (mainland) China's UHD video industry follows the overall path of "4K first, 8K taken into consideration" in terms of technology reserve and application potential. It plans to acquire the accurate profile of users through the construction of broadcasting cloud data center, so as to improve the production efficiency and communication effect after the integration of broadcasting network. At the present stage, "5G+ UHD" has been first applied in the field of live broadcasting of major events and sports events in China. It can break through the technical bottlenecks in the processing, production and transmission of VR video, and drive the profound changes in the transmission, distribution, coding application and other aspects of high bit rate video transmission in radio and television networks. In a hierarchical, personalized market environment, improving the ability of UHD video technology to guarantee control, equipment operation, product supply and other links, cutting users according to consumption ability and consumption pain points, aiming at target consumers to further release the user experience of large TV screens, will bring new development opportunities for the ecological restoration of digital competitiveness of the broadcasting network.

5.4 Teleconverter of terminals: Integrated mobile scenarios

The gradual formation of mobile touch-screen media habits of users in (mainland) China has promoted the mobile development of the consumption-side of terminal digital devices, and the mobile degree of users' life, entertainment, study, work and other scenarios has been improved. In the past decade, the number of Internet users and Internet penetration rate in (mainland) China have been on the rise, with the former rising from 384 million in 2009 to 829 million in 2018 and the latter rising from 28.9 % in 2009 to 59.6 % in 2018. In the evolution of the media environment, it took 38 years for radio to reach 50 million users, 15 years for TV, and only five years for the Internet, and it continues to grow. According to data from the Ministry of Industry and Information Technology (MIIT) in the first quarter of 2019, the number of 4G users has exceeded that of mobile phone users by three-quarters. After years of user accumulation, with the rapid development of mobile Internet in (mainland) China, the proportion of mobile phone users has reached 98.6%, and Internet addiction has become a common social phenomenon. Therefore, the consumer terminals, as an important link of the mobile communication network, has become a competitive place for user traffic entry, and this trend is becoming increasingly obvious. Based on this, making good use of the first-mover advantage of 5G broadcasting license and combining with the broadcasting network's own 700MHz golden frequency band resources, meeting users' demands for more frequent switching between different touch-screen media scenarios and accelerating the construction of mobile interactive broadcasting networks, has become the inevitable way to expand the mobile transmission path of the broadcasting network ecology and make up the shortboard of the development of communication power.

6 Conclusion

It should be mentioned that the whole-chain reshaping of the broadcasting network ecology in content, platform, technology and terminal discussed above has deep media convergence motivations. Under the appearance of market competition with broadband network and video technology as the main business forms, the content sharing of cross-boundary cooperation and the development of digital home platform can undoubtedly reduce the cost of content integration and communication service of China's broadcasting network, which is also the prime mover that caused the industry to establish TV theaters. All such factors as the goal of being beyond the industry and realizing the goal of improving the efficiency of social public services, the systematic planning in the practical field of China's Broadcasting Network to carry 5G license, and the accelerating superposition of ultra HD video technology and mobile interactive television network is pushing the internal logic of the future sustainable development of China's Broadcasting Network to make constant adjustments.

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