Research on the Composition, Functions, and Value of China's Short Video Industry Innovation Ecosystem (Postprint)

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Abstract

[Purpose / Significance] Exploring organic integration pathways between the short-video industry and innovation ecosystem theory is of great significance for the innovative and sustainable development of the future short-video industry. [Method /Process] Through literature analysis, network survey, and case analysis methods, and based on a review of relevant research achievements, this study conducts an in-depth exploration of the composition and functions of China' s short-video industry innovation ecosystem, and finally performs a value analysis of this innovation ecosystem by integrating the Douyin platform. [Results / Conclusion] China' s short-video industry innovation ecosystem is composed of the innovation subject layer, innovation application layer, and innovation environment layer. Each layer possesses its own unique innovation functions, and they mutually promote and interact with each other, maintaining dynamic equilibrium, with significant application value.

Full Text

The Rise of China' s Short Video Industry

According to the 47th "Statistical Report on Internet Development in China" released by the China Internet Network Information Center (CNNIC) on February 3, 2021, China' s short video user base reached 873 million by December 2020, accounting for 88.3% of all internet users [1]. Since 2016, short video platforms represented by Douyin and Kuaishou have gradually captured public attention, and short video works characterized by pan-entertainment, contextualization, and strong storytelling have quickly gained widespread user favor. The proliferation of short video content and the explosive growth of users have propelled the rapid development of the short video industry, ushering China into the era of short videos.

As a "new generation" industry with continuously rising prominence, the short video industry' s influence has extended to advertising, e-commerce, education, entertainment, public services, and numerous other sectors, giving rise to a broader short video industry ecosystem. On May 19, 2016, the State Council issued the "National Innovation-Driven Development Strategy Outline," which explicitly stated that innovation is the primary driver of development and that industries must integrate institutional, technological, managerial, and business model innovation to achieve high-quality development [2]. Currently, China' s short video industry still faces challenges including a shortage of high-quality original content, unclear innovation development pathways, insufficient application value, the "Matthew effect" of traffic concentration, and imperfect regulatory mechanisms. Consequently, the industry urgently needs to enhance its innovation capacity, promote industrial upgrading and transformation, and foster sustainable and healthy development.

In recent years, ecological theory has been gradually integrated and applied by scholars from various fields to study innovation development pathways in different domains using the internal operating mechanisms of ecosystems. Short video industry innovation is similarly a systematic engineering project, where various industries in the system co-evolve and develop while interacting and influencing each other. The short video industry innovation ecosystem is more complex than general industrial innovation ecosystems, primarily manifested in its more diverse innovation subjects, more complex innovation application ecological chains, and broader scope of innovation environments. Therefore, the short video industry innovation ecosystem involves richer innovation elements. An in-depth analysis of the internal composition and functions of the short video industry innovation ecosystem and the revelation of its value manifestation are of great significance for improving the existing research system of the short video industry and guiding the practical work of innovation development in China' s short video industry.

Literature Review

Foreign scholars began researching the integration of innovation ecosystems and industrial development relatively early. R. A. Frosch et al. [3] compared multi-dimensional characteristics between industrial ecosystems and natural ecosystems, thereby pointing out future development directions for industrial ecosystems. F. Malerba [4] noted that industrial innovation systems should include three aspects: products, product development, and product production and sales. A. Persaud [5] believed that enterprises could rely on the connectivity of industrial innovation ecosystems to enhance interaction frequency among innovation subjects and provide opportunities for related enterprises to share technical knowledge with each other. A. Ron [6] analyzed the basic risks of industrial innovation ecosystems, mainly including dependency risk, integration risk, and project risk. A. Gawer [7] argued that in the information age, industrial innovation ecosystems refer to the collection of innovative products, services,

and technologies that can achieve fundamental industrial support utility. As the theory of industrial innovation ecosystems gradually matured, many foreign scholars have applied it to innovation exploration in different industries, such as manufacturing [8], semiconductor [9], healthcare [10], and service industries [11].

Domestic scholars' exploration of industrial innovation ecosystems started slightly later, building upon foreign theoretical research. Their research has primarily focused on practical application levels. Li Lei et al. [12] constructed an innovation ecosystem model for China' s new energy vehicle industry based on analyzing the development status of new energy vehicle industries in developed countries. Zhang Zhidong et al. [13] constructed an innovation system model for Anhui Province' s animation industry based on industrial innovation system theory. Lv Rongsheng et al. [14] pointed out that China should adopt measures such as developing energy-saving information service platforms to promote the coupled operation of energy-saving industry innovation ecosystems. Liu Hongyu et al. [15] constructed a cloud computing industry cluster innovation ecosystem model from multiple dimensions including the subject layer, knowledge layer, and institutional layer. Shen Lei et al. [16] identified future research directions for creative industry innovation ecosystems after reviewing relevant literature. Guan Xuelin et al. [17] proposed improvement suggestions for boosting collaborative symbiosis in innovation ecosystems by analyzing the community subsystems and operational mechanisms of health industry innovation ecosystems. Zhang Yan et al. [18] constructed a logistics industry innovation ecosystem model in the 5G era based on system dynamics theory and simulated future development trends of the logistics industry under various conditions.

Research on the short video industry has primarily focused on the domestic domain. Qu Xusheng et al. [19] analyzed potential problems in the development of MCN (Multi-Channel Network) production forms in the short video industry and proposed targeted suggestions and countermeasures. Yu Songming et al. [20] analyzed the development status of the short video industry using Douyin as an example and examined existing problems from three aspects: content, platform, and advertising. Chen Jiayi [21] used SCP (structure-conduct-performance) theory to analyze the competitive strategies of China' s short video platforms using Douyin and Kuaishou as examples and proposed corresponding opinions and suggestions. Ao Peng [22] analyzed the prominent characteristics of three links in China' s current short video industry chain—content production, distribution, and profit models—from the perspective of historical development and actual business formats. Bi Datian et al. [23] explored the scene-based service logic, processes, and functions of the short video industry from the perspective of scene theory and proposed value orientations and creation pathways for achieving scene-based services in the short video industry.

Currently, no scholars have conducted targeted research on the short video industry innovation ecosystem. Accordingly, based on reviewing relevant research

findings at home and abroad, this paper attempts to analyze the composition, function, and value of China' s short video industry innovation ecosystem, hoping to provide theoretical reference and practical guidance for comprehensively promoting high-quality and innovative development of the short video industry.

Theoretical Framework for the Short Video Industry Innovation Ecosystem

Innovation Ecosystem Theory

The theoretical foundation for constructing the short video industry innovation ecosystem originates from ecology and innovation studies. The term "ecology" was first defined in 1866 by the renowned German zoologist E. H. P. A. Haeckel as "the science studying the interrelationships between animals and their organic and inorganic environments," since when ecological research has received continuous attention and gradually developed into a systematic science [24]. The concept of "ecosystem" was explicitly proposed in 1935 by the famous British ecologist A. G. Tansley, who believed that ecosystems are physical systems composed of complex organism elements and a series of environmental elements [25]. Within ecosystems, biological communities and environmental factors engage in corresponding energy cycles, material exchanges, and information transmission, making ecosystems the basic functional units of ecology [26].

The concept of "innovation ecosystem" was first proposed by J. F. Moore in 1993, who believed that innovation ecosystems include an enterprise organization and its operators and target users, while the core competitiveness of enterprises would be influenced by the evolutionary stage of the enterprise innovation ecosystem [27]. The subjects of innovation ecosystems rely on technological and business model innovation, and through sharing relevant information and knowledge within the system, they co-evolve to generate new development potential, thereby promoting the development of innovative services or products to meet consumers' diversified demands [28].

Innovation ecosystems possess many characteristics of natural ecosystems, such as cooperation, competition, balance, dynamics, diversity, and regionality. A complete innovation ecosystem also has strong vitality, and its cutting-edge development consciousness and innovative product market ecological chain enable it to survive unpredictable market and technological transformation periods in a dynamic balance state while deriving certain conditions to enhance adaptability [29]. In today' s innovation-driven development context, competition among market industries has gradually transformed into competition among innovation ecosystems. The short video industry pursues knowledge-era information networking, development dynamics, data spatialization, and innovation ecosystem orientation that converge on the same goal. Therefore, strengthening the construction of the short video industry innovation ecosystem and developing a high-value, recyclable, and sustainable innovative industrial ecological model has gradually become an inevitable choice for the high-quality development of

the short video industry.

Knowledge Production Mode 3

"Knowledge production mode" mainly includes components such as knowledge production subjects, purposes, and processes. In the early 19th century, Mode 1, which centered on universities and advocated the unity of university teaching and scientific research, was called "knowledge logic"[30]. By the late 20th century, knowledge production subjects had expanded from universities to government and industry, leading to the emergence of Mode 2 and the university-government-industry "triple helix" innovation model, which placed greater emphasis on the application aspect of knowledge production [31]. With the rapid development of internet information technology, Mode 2 could not adapt to the era' s demand for mass innovation, thus Mode 3 was born. Mode 3 improved and optimized upon Mode 1 and Mode 2, advocating university-government-industry-public "quadruple helix"collaborative innovation to establish complementary knowledge clusters and innovation networks [32]. The public generally refers to user groups oriented toward media and culture. As innovation drivers in Mode 3, they create external conditions for new knowledge output through the emergence of innovative thinking. Compared with the knowledge logic of Mode 1 and the application logic of Mode 2, Mode 3 emphasizes social interest logic, balancing the interests of different social groups through multi-dimensional knowledge production to achieve a dynamic balance [33].

The current short video industry emphasizes "fan economy" and focuses on traffic operation and human nature activation. Therefore, the short video industry innovation ecosystem should attach importance to users' diversified needs. With the development of the knowledge economy era, knowledge production has transitioned from Mode 1 and Mode 2 to Mode 3, and the university-government-industry-public "quadruple helix" innovation model evolved from Mode 3 happens to align with the innovation subjects of the short video industry innovation ecosystem. Thus, Mode 3 can serve as an important basis for constructing the short video industry innovation ecosystem.

Composition of the Short Video Industry Innovation Ecosystem

Based on innovation ecosystem theory and Knowledge Production Mode 3, this paper explains the composition of the short video industry innovation ecosystem from three layers: the innovation subject layer that produces innovative knowledge products, the innovation application layer that promotes subject output of innovation achievements, and the innovation environment layer that safeguards ecological dynamic balance. The specific framework of the short video industry innovation ecosystem composition is shown in Figure 1 [Figure 1: see original paper].

Functions of the Short Video Industry Innovation Ecosystem

Innovation Subject Layer

In the short video industry innovation ecosystem, innovation subjects refer to groups and communities with certain short video innovation thinking and capabilities, mainly including university communities, government communities, enterprise communities, and user communities. The main function of the innovation subject layer is to produce various short video products through different community characteristics to obtain a certain user traffic foundation. Through short video innovation platforms and sharing networks that integrate group wisdom, the innovation source of China' s short video industry can be fully stimulated, enabling group innovation wisdom to emerge.

University Communities: Online Cultural Education As a platform for cultivating talent for society, universities' cultural education work has always been emphasized by multiple parties. At the National Conference on Ideological and Political Work in Colleges and Universities, General Secretary Xi Jinping mentioned that universities should make education work "come alive" through new media and new channels, promoting the full integration of the traditional advantages of ideological and political work with new technologies to enhance attractiveness and contemporary relevance [34]. As a new media favored by contemporary college students, short videos have been popular among student groups since their launch, while also providing innovative channels for universities to carry out online cultural education. Universities'online cultural education forms have evolved from "text" education in the static webpage era to "text + image" education in the social network era, and then to "short video + text + image" education in the current short video era. The organic integration of traditional "readability" expression and novel "visualization" expression not only promotes effective knowledge transmission but also satisfies the knowledge and information needs of university student groups [35]. As an important expression method for current university teachers and students, short videos have established more effective emotional connection bridges between universities and teachers/students, as well as between universities and society.

Government Communities: "Political Energy"Dissemination The 19th National Congress report pointed out that the government should be oriented toward public needs, broaden service channel choices and coverage, and improve the overall service level to meet people' s growing information and service demands. Today, short video works created by various levels of government agencies and public institutions in China have gradually become new channels and windows for effective communication with the public [36]. Through government affairs short videos, the government can effectively shape government image, promote government affairs openness, correctly guide public opinion, and achieve government-citizen interaction, making their innovation develop-

ment value and significance cannot be underestimated [37]. For the currently vibrant government affairs short video media, the Chinese government should encourage innovation and actively build top-level designs with policy supply and institutional support, incorporating interesting and practical popular science knowledge into innovative government affairs short video works, capturing emotional and authentic storytelling scenes, and appearing with a public-friendly image to gain user recognition and attention. Meanwhile, different government units can combine their own personalized characteristics, utilize differentiated advantages for content focus, thereby creating "hit" government affairs short video works and promoting "political energy" dissemination [38].

Enterprise Communities: Brand Marketing and Promotion Brand marketing is an important marketing strategy for enterprises to obtain consumer markets and shape good corporate image. With advantages including significant communication effects, low marketing costs, strong target user specificity, and good interaction effects, short video new media occupies a key position in enterprises' brand marketing and promotion work. In traditional media environments, the reach rate of marketing information was the primary concern for enterprises, which often used repetitive single-message marketing to strengthen consumers' brand memory, thereby cultivating public brand cognition imperceptibly. In today' s media convergence environment, the public' s information sources have changed, and enterprises must consider not only information reach rates but also new media audiences' preferred brand marketing methods, types, and channels, while reducing the time cost of users' brand cognition, identification, and purchase decision-making. Short video marketing is an emerging marketing form that integrates audio, video, images, and text. By combining brand marketing information and innovating their own brand short video products, enterprises can efficiently cater to social trends, capture social hotspots, and systematically provide consumers with high-value quality short video content to quickly obtain consumer brand cognition [39]. Enterprises charge the short video industry through short video brand marketing, while the short video industry also empowers enterprises' brand marketing and promotion with its own advantages. The organic integration of the two has become an inevitable trend.

User Communities: Emergence of Mass Wisdom Short video users play multiple roles in the short video industry innovation ecosystem. They are consumers, disseminators, and producers of short video products. User groups are both the innovation value orientation and the innovation source of the short video industry.

In the early development stage of short videos, video types mainly focused on life and functional categories, with decentralized product characteristics. Short video content mostly adopted the UGC (User Generated Content) model, with main forms including daily life recording and quality item sharing. When short video platforms established a certain user base, video content evolved from the UGC model to the UGC+PGC (Professionally Generated Content) model.

Platforms preset various forms of semi-finished short video content, allowing vast numbers of users to supplement with innovation and jointly produce large quantities of popular short video works in different fields, expanding coverage to multiple markets such as beauty, film and television, gaming, and music markets. Users' purposes for producing short videos have gradually tended toward self-presentation, appearance beautification, and online social networking, broadening their innovation ecological niche [40].

Innovation Application Layer

In the short video industry innovation ecosystem, innovation application refers to the new application ecological chains extended by other industry institutions relying on short video platforms, mainly including resource chains based on panoramic platforms, service chains based on public service institutions, traffic chains based on the MCN model, and commercial chains based on business economic organizations. The operation of the innovation application layer is based on the user traffic brought by the innovation subject layer, gradually forming industry application ecological chains centered on short video platforms by integrating development patterns across multiple industries. These chains possess functions of resource integration, service improvement, traffic optimization, and commercial monetization.

Resource Chain Based on Panoramic Platforms Panoramic platforms refer to mainstream mobile internet platform channels, currently mainly including various APPs and mini-programs. In today' s internet information era, short video user needs have certain diversity and potentiality, mainly including social sharing needs, public opinion attention needs, knowledge acquisition needs, and entertainment audio-visual needs. Different needs have exclusive platforms providing targeted resources, such as social communication platforms for social sharing needs (e.g., WeChat, QQ), news and information platforms for public opinion attention needs (e.g., Toutiao, Tencent News, Weibo), Q&A and strategy platforms for knowledge acquisition needs (e.g., Zhihu, Xiaohongshu), and pan-entertainment platforms for entertainment audio-visual needs (e.g., iQiyi, NetEase Cloud Music, Ximalaya). By watching various short videos, users' internal needs are stimulated multi-dimensionally, while panoramic platform layout can achieve efficient user ecological guidance, construct systematic short video industry resource chains, and satisfy users' multi-level needs using platform resources that better fit user habits and enable efficient use.

Service Chain Based on Public Service Institutions Public services generally refer to a series of actions performed by government departments, state-owned enterprises and institutions, and intermediary agencies to handle affairs or provide assistance according to the needs of legal persons, citizens, or other organizations [41]. Public service institutions mainly include public health institutions, social welfare institutions, public cultural service institutions, and educational institutions. With its huge traffic pool of users across different age

groups, short video new media can effectively reduce China' s public service transaction costs, improve the overall level of public services, and perfect the service chains of public service institutions. Based on this, most public service institutions have settled on short video platforms and actively carried out public service work in the new media environment. For example, public cultural service institutions carry out reading promotion work through short video platforms, encouraging readers to enter libraries or cultural centers to acquire knowledge; medical institutions carry out health knowledge services through short video platforms to help the public improve their health conditions; social security institutions carry out social security information popularization work through short video platforms to guide users to correctly exercise their social rights. Relying on short video new media to empower traditional public services and enable them to conduct integrated innovation to build online-offline systematic closed-loop service chains is of great significance for improving the public welfare of the short video industry innovation ecosystem.

Traffic Chain Based on the MCN Model The MCN model originated from the Multi-Channel Network of foreign platforms like YouTube. In the domestic context, the MCN model in the short video industry refers to conducting specialized organizational operations for content production, IP incubation, and other work processes by signing economic contracts with internet celebrities to achieve scale traffic effects [42]. Based on high-quality professionally generated content from platform influencers, with support from multi-party capital and services from big data, intellectual property, legal, and financial institutions, they conduct marketing and sales of physical industries to audience users and gain recognition and attention from new users. The multiple iterations of influencers and short video platforms have enabled influencer economy to penetrate physical industries, gradually forming a complete industrial system. The operation of MCN-related institutions mainly follows the process of "identifying potential influencers—signing contracts—content operation—incubating accounts —attracting traffic—client docking—product listing," which optimizes the user traffic guidance chain of short video platforms and contributes to enhancing the core competitiveness of the short video industry innovation ecosystem.

Commercial Chain Based on Business Cooperation In recent years, as the demographic dividend of short video users has peaked, the strategic focus of the short video industry has gradually shifted from increasing user traffic to increasing commercial profits. Relying on its deep user traffic foundation established in the early stage and multiple advantages of short videos themselves, the short video industry has gained substantial business cooperation intentions from numerous enterprise institutions, while also witnessing the emergence of various innovative cooperation channels. First, the most common innovative channel for short video business cooperation is currently advertising placement, including both hard advertising placement based on single short videos and soft advertising placement integrated into popular short video content. The latter

can particularly achieve better innovative marketing effects in high-quality video content, making it enjoyable for most audience users. Second is the live broadcast revenue of key opinion leaders (KOLs). The revenue of KOL live broadcast models mainly comes from live broadcast rewards and live commerce, which respectively address the entertainment audio-visual needs and shopping needs of live broadcast viewers. Driven by the high efficiency of short video live commerce, short video platforms actively explore strategic cooperation with major e-commerce enterprises, such as leading companies like Taobao, JD.com, Suning.com, and Pinduoduo, while continuously developing their own e-commerce platforms [43]. Additionally, China' s short video industry should pay attention to the development and utilization of overseas markets, actively building international short video service networks to further improve and extend the commercial chain of the short video industry innovation ecosystem.

Innovation Environment Layer

In the short video industry innovation ecosystem, the innovation environment refers to the specific environment where innovation subjects and applications are located, mainly including policy environment, social environment, technical environment, and industry environment. The main function of the innovation environment is to optimize the decision-making behaviors of innovation subjects and applications, while the behaviors of innovation subjects and applications in turn promote the formation of the innovation environment. The more stable and complete the innovation environment, the more vibrant the innovation activities will be, and the stronger the innovation support will be.

Policy Environment Safeguarding Healthy Development of the Short Video Industry Since the 19th National Congress, with the rapid development of the short video industry, occasional non-compliant phenomena have inevitably emerged. Therefore, China' s government departments have introduced multiple policy safeguards and rectification measures targeting the governance of the short video industry development environment. In April 2018, relevant regulatory authorities launched special rectification campaigns on short videos and other internet industries, imposing administrative penalties on multiple non-compliant self-media accounts and conducting interviews and rectifications with several short video enterprises [44]. In January 2019, the China Netcasting Services Association successively released the "Management Specifications for Online Short Video Platforms" and "Detailed Rules for Content Review Standards of Online Short Videos," which stated that the short video industry should implement pre-broadcast content review [45]. In October 2020, the Fifth Plenary Session of the 19th CPC Central Committee outlined the economic and social development goals for the "14th Five-Year Plan" period and the 2035 long-range objectives, making important deployments for building a cultural power and a cyber power. In November 2020, the State Administration for Market Regulation issued the "Guiding Opinions on Strengthening the Supervision of Online Live Marketing Activities," which 压实 the legal responsibilities of rel-

evant subjects, strictly regulated online live marketing behaviors, and legally investigated marketing violations [46]. Under the active control and in-depth rectification of national regulatory authorities, the healthy development of the short video industry has been significantly safeguarded.

Social Environment Guiding In-Depth Development of the Short Video Industry Behind the current thriving short video industry lie various social needs. First is the self-presentation need. The self-presentation form based on short video platforms highlights greater flexibility and freedom attributes. Convenient creation methods and precise user push can effectively enhance ordinary creators' self-expression effects. Second is the emotional resonance need. In today' s fast-paced era, people inevitably accumulate certain negative emotions, so most short video users have varying degrees of resonance needs. High-quality short video works can more easily trigger audience emotional resonance and help them release pressure by relying on their storytelling scene reproduction. Third is the audio-visual entertainment need. Short videos with short duration but strong content 趣味性 particularly align with current people' s fragmented time management trends, allowing people to freely use the pan-entertainment attributes of short videos to enrich their fragmented time. Finally is the connection need between users and society. Under the liquidity characteristics of current social situations, short videos connect people with similar situational encounters in an immersive form, which can alleviate some users' loneliness and anxiety and has certain soothing effects [47]. Driven by various social needs, a hierarchically rich social environment has formed, and it is precisely under the guidance of such a social environment that the short video industry can develop in depth.

Technical Environment Supporting Innovative Development of the Short Video Industry In the communication process, operators' innovative technology development has a tremendous driving effect on the information industry. In recent years, the high-quality construction of industrial internet and the vigorous development of innovative technologies such as 5G, Internet of Things, big data, new-generation artificial intelligence, cloud computing, and blockchain have laid a technical foundation for the innovative development of the short video industry. Updated and optimized information flow algorithms have also made short video dissemination more precise, made short video marketing more effective, and provided conditions for the short video industry to transform from high-speed development to high-quality development [48]. The low power consumption, low latency, ubiquitous network, and high-speed characteristics of 5G technology can support the short video industry to innovate immersive scenes and ultra-high-definition quality experiences. The extensive combination of Internet of Things and short videos can enable innovation in scenario application fields such as smart home, mobile healthcare, and vehicle networking. New-generation artificial intelligence innovations such as intelligent content production, intelligent customer service marketing, and AI-implanted

advertising can also empower the development of the short video industry. With continuous emergence and support of new technologies and new sciences, the innovative development of the short video industry will embrace infinite possibilities.

Industry Environment Driving High-Speed Development of the Short Video Industry According to QuestMobile' s "2020 China Mobile Internet Annual Report (Part 2)" released in February 2021 [49], as of December 2020, the short video industry' s monthly active user scale reached 872 million, with average monthly usage time per capita reaching 42.6 hours. The "two superpowers with many strong players" industry pattern led by Douyin and Kuaishou continues. Meanwhile, with the rapid growth of short video platform live broadcast traffic, short video live broadcasting has further boosted the development of the short video industry, enhancing user stickiness and becoming a key fulcrum for short video platforms to enter e-commerce and complete systematic ecological layout. By September 2020, the proportion of users watching live broadcasts on Kuaishou and Douyin platforms had reached 80%, and the live e-commerce purchase closed loop had basically formed [50]. It can be seen that the phenomenon of recording life and entertainment consumption through short videos has become increasingly common, and the short video industry has gradually become embedded in people' s daily lives. Short video platforms have seized opportunities in time, fully integrated various resources upstream and downstream of the short video industry chain, improved their industrial chain and ecosystem, and enabled the short video industry to develop at high speed.

Value Analysis of the Short Video Industry Innovation Ecosystem: A Douyin Platform Case Study

Douyin is a music creative short video social software for all age groups under ByteDance, incubated by Toutiao and officially launched in September 2016. To date, after more than four years of high-speed development, Douyin has become a leading short video platform, firmly occupying the industry' s top traffic. Its value manifestation in the short video industry innovation ecosystem has become increasingly prominent, making it typically representative and referential. Based on the three different levels of the short video industry innovation ecosystem composition elements mentioned above, this paper will analyze the value manifestation of the Douyin platform from three aspects: subjects, applications, and environment.

Diversifying Ecological Types of Short Video Industry Innovation Subjects

According to the "2020 Douyin Data Report" released by Douyin on January 5, 2021, Douyin' s daily active users exceeded 600 million, with average daily video searches surpassing 400 million [51]. Douyin' s initial product positioning was a music video platform for "recording a beautiful life." Many users

are enthusiastic about using Douyin to capture daily moments to achieve the sharing value of life recording. Some of these high-quality short video products have been recommended as popular short videos because they are deeply loved by users, reflecting that ordinary users can achieve creative value through the emergence of group wisdom. According to the 47th "Statistical Report on Internet Development in China" released by CNNIC, as of December 2020, governments at all levels had opened 26,098 government affairs Douyin accounts [1]. Government departments using short video new media to carry out various tasks have become an innovative trend in the era of media convergence, with popular government affairs Douyin accounts such as "Siping Police Affairs" and "Office of the Spokesperson of the Ministry of Foreign Affairs" each having tens of millions of followers. Meanwhile, governments at all levels actively carry out government affairs publicity work through Douyin to achieve government-citizen interaction, reflecting the government affairs information service value of the Douyin platform. According to the "2020 Douyin College Student Data Report" released by Douyin on January 26, 2021, as of December 31, 2020, Douyin's college student user scale had exceeded 26 million, with universities opening a total of 799 university Douyin accounts [52]. University Douyin accounts provide high-quality diversified innovative videos and live broadcast content for teachers and students by constructing a three-dimensional and rich short video content ecosystem, helping them acquire knowledge, appreciate art, broaden horizons, and explore the world, thereby realizing the educational value of the Douyin platform. At the 2020 Douyin Enterprise Account Ecology Conference held on November 3, 2020, the official announcement revealed that the number of Douyin enterprise accounts had exceeded 5 million [53]. Douyin enterprise accounts conduct operational innovation by improving basic services, enhancing business capabilities, and promoting enterprise brand marketing at different levels to improve the overall level of enterprise services and enhance enterprise brand influence.

Currently, innovation subjects such as ordinary users, government Douyin accounts, university Douyin accounts, and enterprise Douyin accounts produce large quantities of high-quality short video products from different creative perspectives, collectively laying the foundation for the formation of the Douyin short video industry innovation ecosystem.

Enriching the Ecological Boundaries of Short Video Industry Innovation Applications

With its huge user base and multi-industry cooperative ecology, the Douyin platform has an extremely broad range of innovative applications and has achieved remarkable development results. In terms of panoramic platform layout, in addition to platforms also under ByteDance such as Toutiao, Xigua Video, Pipixia, Duoshan, Jianying, and Faceu, Douyin also actively connects with WeChat, QQ, Weibo, Taobao, JD.com, Pinduoduo, Zhihu, Xiaohongshu, and other platforms, integrating multi-platform resources to improve its own user guidance work to

effectively satisfy users' diversified needs. In terms of social public services, the Douyin platform actively participates in China' s public service construction. For example, in April 2020, to promote the resumption of work and production for Hubei enterprises under the pandemic and help Hubei' s economic recovery, Douyin joined hands with hundreds of media outlets nationwide to participate in the "Hubei Recovery Plan," providing online services for Hubei people and people across the country through its own platform resource advantages [54]. In addition to providing anti-epidemic services, the Douyin platform has also cooperated with multiple social public service institutions to carry out humanistic care, charity, cultural protection, science education, environmental protection, and other tasks, which is of great significance for improving its own industrial service chain and promoting the enhancement of social public service levels. For example, Douyin' s "Mengzhi Plan" support policy encourages users to create systematic youth knowledge content and invited international Hans Christian Andersen Award winner Cao Wenxuan, Beijing Jiaotong University associate professor Chen Zheng, famous host Li Xiaomeng, and English teacher Lai Shixiong as mentor teams to guide creators in content creation.

In terms of MCN model development, the Douyin platform has clear MCN institution entry conditions and application procedures. Entry conditions mainly include MCN institutions signing contracts with at least 5 influencers, with total followers of signed influencers not less than 10,000. The application process mainly includes "apply for entry—invite influencers—influencers accept—entry successful." Douyin platform' s MCN operation model has currently achieved goals such as diversified monetization and traffic empowerment, making outstanding contributions to the platform' s further traffic monetization work. In terms of business cooperation, the Douyin platform has designed creative short video marketing solutions for different industries; actively improved the KOL live broadcast economic ecological layout, and obtained payment licenses through acquisitions to enter the payment field and achieve e-commerce business ecological closed loop; actively explored strategic cooperation with major e-commerce enterprises, such as leading companies including Taobao, JD.com, Suning.com, and Pinduoduo, while continuously developing its own e-commerce platform [43]; conducted strategic cooperation with multiple institutions, including the "2020 Douyin Wonderful Night" event [55] and becoming the exclusive red envelope interaction partner of CCTV Spring Festival Gala in 2021 [56]; and emphasized international cooperation by launching the overseas version of Douyin, TikTok, quickly occupying overseas markets and actively building an international business ecological network.

Forming Ecological Safeguards for the Short Video Industry Innovation Environment

With the continuous improvement of China' s short video industry development environment, as a leading enterprise, the Douyin platform will also burst forth with continuous innovation development momentum through policy and

technical safeguards in a trend-positive diversified environment. First, real-time supervision of the Douyin platform by relevant departments such as the National Copyright Administration and the State Administration for Market Regulation, as well as the media convergence development strategic environment in recent years, have effectively safeguarded the healthy development of the Douyin short video industry. The social atmosphere that is keen on "recording a beautiful life" guides ordinary Douyin users to create short videos. Second, Douyin platform' s various client SDKs (Software Development Kits), various native and open APIs (Application Programming Interfaces), and self-developed Douyin mini-programs, multi-dimensional science and technology are supporting the innovative development of the Douyin platform. Additionally, the current industry pattern of "two superpowers with many strong players" led by Douyin and Kuaishou enables the Douyin platform to occupy top-level traffic while also promoting a competitive environment for mutual innovation to drive each other' s high-speed industrial development. This dynamic balance is gradually improving the overall quality of the short video industry while also giving the short video industry innovation ecosystem a significant value orientation.

Conclusion

The short video industry has grown explosively under the current digital information era background, and its influence on most industries is increasing day by day. For China' s short video industry, its development stage has gradually transformed from a rapid development stage pursuing user traffic foundation to a high-quality development stage pursuing quality industrial ecology. Based on clarifying relevant theories such as ecological theory and innovation theory, analyzing the current research status at home and abroad, and combining the quadruple helix system in Knowledge Production Mode 3, this paper explored the composition of China' s short video industry innovation ecosystem, conducted in-depth analysis of the internal functions of the ecosystem, and finally conducted value analysis of the short video industry innovation ecosystem through the Douyin short video platform. This research still has some limitations: the research on the composition framework of China' s short video industry innovation ecosystem is not deep enough; the analysis of value manifestation only involves leading enterprise platforms and has certain limitations. It is hoped that scholars in related fields can further explore China' s short video industry innovation development pathways targeting the above limitations to promote high-quality and innovative development of the short video industry.

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