Research Frontier and Hot Spots Analysis of Digital Music Industry

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Abstract
As product of the integration of Internet and traditional music industry, digital music industry has developed rapidly in recent years, and it has received widespread attention from the whole society. To promote the stable development of the digital music industry and promote the upgrading and innovation of the industry, it is of far-reaching significance to study its development history and put me on the path of development and evolution. In this paper，we selected the articles published on China National Knowledge Infrastructure (CNKI) from 2005 to 2021, and we used scientific knowledge atlas to sort out and summarize the existing literature research. Moreover, CiteSpace software was also used to analyse the evolution process of keywords, and then the actual situation was also taken in account. Finally, the development trends and hot areas of the digital music industry are predicted to promote the sustainable development of digital music scientific research and industry.
Keywords:*Digital music industry, CiteSpace, Cluster analysis, Atlas of scientific knowledge, Research hotspots.*

I. INTRODUCTION

In recent years, the digital music industry has flourished as a typical representative of the integration of cultural industry and digital technology, and has gradually become an important pillar of my country's digital music content industry. In 2019, the scale of China's digital music industry reached 66.4 billion yuan, a year-on-year growth of 8.4%; the number of digital music users had 607 million, a year-on-year growth of 9.2%, and the penetration rate of online music users reached 71.1%. Compared with the traditional music industry, the digital music industry is a digital economic development model that uses digital technology to store, disseminate and sell music. Business models such as user payment, copyright operation, advertising revenue, and telecom music value-added are the main revenue sources of the digital music industry. Digital technology has provided a steady driving force in the development of the digital music industry, and has become a new driving force and new growth point to promote the development of my country's music industry.

In addition, the digital music industry also faces many challenges. The "long tail effect" of my country's digital music industry is significant, and the competition for top digital music products is fierce. At the same time, the industrial development is also facing with the problems of controversial copyright operation, loopholes in content supervision, imperfect operation mechanism and unclear distribution of benefits. In view of the current industrial development dilemma, it is particularly important to accurately describe the research overview and development trend of the digital music industry, and to accurately grasp the consensus and cutting-edge issues facing the current industrial development.

II. LITERATURE REVIEW

In recent years, issues related to the digital music industry have attracted widespread attention in the academic circle, and researches mainly focus on industrial development, copyright protection, business models, and market influencing factors and so on. The digital music industry is an overall activity and process of value creation, which consists of content providers, service providers and consumers based on the requirements of division of labor and supply and demand within the industry (Huang et al. 2017). In the Internet era, unauthorized sharing has become a key factor restricting knowledge providers from continuing to output high-quality content (Liu et al. 2021). Paying attention to copyright, optimizing the structure, and diversifying services can speed up the development and improvement of my country's online music payment service

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market(Tong et al. 2014). In addition, Dewan studies the social impact of digital music communities and discusses and designs marketing strategies for digital music communities (Dewan et al. 2017).

At present, more and more scholars use knowledge graphs to visualize the distribution, research hot spots and development process of music industry-related research fields. For example, through the quantitative research on the algorithm literature in the domestic music field in the past 30 years, the development and evolution trend of domestic music algorithms are revealed (Zhao et al. 2021). By analysing the characteristics of the panoramic map and the inherent laws of the literature, the general limitations of the traditional music industry and the future research directions are discussed (Li and Hu 2018). Although the above literatures use knowledge graphs to conduct bibliometric analysis on the music field, they do not involve the development of the digital music industry. The literature review in the field of digital music industry needs to be studied urgently and provides directions for the current industry development.

To sum up, research on the digital music industry has gradually emerged, but the pervasive, framework and comparative literature on the research of the digital music industry itself is relatively scarce. This research is based on the digital music industry, introduces the relevant knowledge of scientometrics, sorts and summarizes the existing literature research through the scientific knowledge map, grasps its connotation and basic theory, analyses the development and evolution path of the digital music industry, and predicts the development trend and hot spots of the digital music industry field to promote the sustainable development of the digital music industry.

III. THE OVERVIEW AND RELATED ANALYSIS OF DIGITAL MUSIC INDUSTRY RESEARCH

This paper uses the professional bibliometric analysis tool CiteSpace, adopts basic statistical analysis, institutional co-occurrence analysis, keyword clustering analysis and other quantitative methods, combined with the inductive analysis of literature samples, sorts out the development status and research hot spots of the domestic digital music industry, and predicts future development trends.

3.1 The Distribution and Trend of The Number Of Documents

This article uses the relevant literature of China National Knowledge Infrastructure (CNKI) from 2005 to 2021 as the data source, and searches with the theme and keywords of "digital music industry". From 2005 to 2020, CNKI collected 345 documents related to the digital music industry. The statistical results are shown in Table 1.

Table 1: The annual number of papers published on CNKI's "Digital Music Industry".

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Count	4	22	22	15	20	21	14	11	27	22	26	23	33	31	25	29	30(预)

As can be seen from Table 1, 2005 is the starting year of related research on the digital music industry. On the one hand, iResearch's market consulting report shows that in 2005, the digital music industry was still in the early stage of development and the market size was small. Online music operators were mainly divided into search engines, professional music websites and P2P. On the other hand, as a new emerging industry, domestic scholars hold a wait-and-see attitude in this field, so theoretical research is relatively lagging behind.

In 2006 and 2007, the number of related studies increased rapidly, with an annual publication volume of 22.According to the survey, between 2005 and 2008, China's digital music industry experienced its first transformation - the original accumulation of music library resources, the simple player has begun to be eliminated by the market, and the new model of player and music library has become the mainstream development direction , and each music platform began to build a preliminary music library. This also led to the in-depth study of related research. At this time, relevant scholars began to study the operation rules of the digital music industry and predict the development prospects of the industry.

In 2012, the number of core journals published in CNKI was only 11, which is also a low point since its development in 2005. It is speculated that the lack of technological innovation in the digital music industry has led to a decline in research enthusiasm. Since 2013, it has shown a gradual upward trend, and in 2017, the number of published articles reached a peak of 33 articles.

In order to clarify the related research of the digital music industry and its development and evolution path more clearly, and to understand its related research hot spots, further statistical research on the research hot spots in related fields is carried out below.

3.2 Research hot spot analysis

The digital music industry value chain includes upstream content providers, midstream platform operators, downstream service support providers and end users. The analysis of the digital music industry value chain and its overall structure is shown in Figure 1.
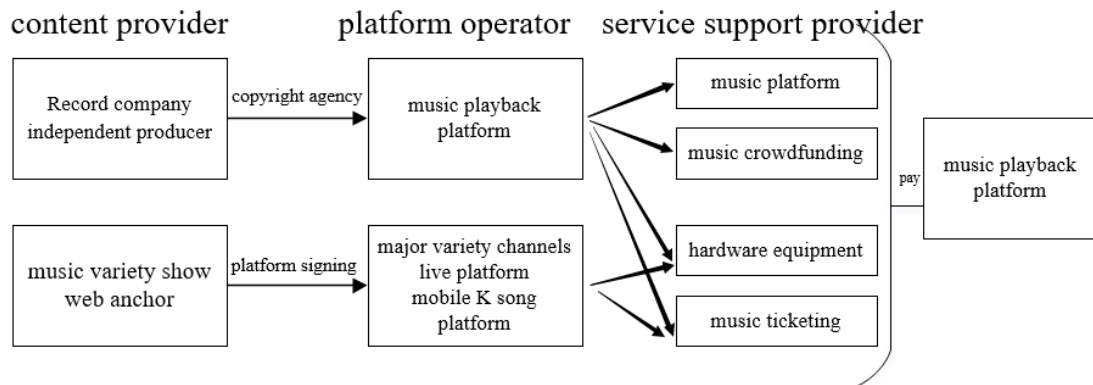
Figure1: Domestic digital music industry value chain

As can be seen from Figure 1, upstream content providers are mainly responsible for the research and development of music products, and are also the actual owners of copyright resources and album content. The main content providers include record companies, independent music producers, some music variety shows and network anchors. Midstream platform operators, namely digital music platforms, provide upstream and downstream enterprises in the value chain with an Internet channel for the circulation of music products, and provide copyright agency and commercial services for upstream enterprise products, and put them on major platforms through product packaging and design, as well as publicity and promotion, which in turn creates music content for third-party users. At the same time, the major variety channels, live broadcast platforms and mobile karaoke platforms in the midstream have formed a fan platform economy by launching music variety shows and signing online anchors to realize their value. The service support providers downstream of the value chain are engaged in content integration and terminal construction, and ultimately deliver music content to users through different channels (music platforms, music crowdfunding, hardware equipment and music ticketing).

According to the value chain structure of the digital music industry, this paper collects literature related to the digital music industry, generates a keyword co-citation map through data analysis software, identifies its keywords, and finally draws its development and evolution path. This paper uses the data analysis and visualization software CiteSpace to analyse the data of 363 valid literatures collected. The selected time span is one year, and a total of 207 keywords are extracted. The keywords of the target literature are classified and sorted, and 12 core keywords are obtained, as shown in Table 2.

Table 2: Digital music industry research hot spot information data.

COUNT	CENTRALITY	YEAR	KEYWORDS
137	0.93	2005	digital music
63	0.36	2006	music industry
25	0.16	2008	music copyright
25	0.08	2008	copyright protection
24	0.04	2006	business model
15	0.03	2006	online music
14	0.07	2008	profit model
14	0.07	2007	wireless music
13	0.06	2005	industrial chain
13	0.04	2007	copyright
10	0.08	2015	music platform
10	0.04	2006	record industry

In order to study the digital music industry and its content distribution, CiteSpace is used to visualize the extracted keyword information, and the corresponding keyword co-citation map is generated. Determine the key nodes according to the number of network connections in the chart and the size of the node, so as to get: "Digital Music" is the largest node. In addition, the nodes of "music industry", "music copyright", "copyright protection", "business model" and "online music" are also very obvious, and there are many nodes connected, which together reflect the content and applications involved in the digital music industry.

The development of the digital music industry is considered from the time dimension analysis below. In order to understand the key time nodes of the development of the digital music industry and find the emergence time of each keyword in its development process, this paper uses related software to summarize the

emergence time of the extracted core keywords, and forms a time zone distribution map of digital music industry research hot spots.

The focus of early digital music industry research was on "digital music" and "industry chain", mainly in 2005.By 2006, digital music industry studies including "business model", "online music", "music industry" and "recording industry" began to emerge, showing the rapid development of the digital music industry. From 2007 to 2008, with the development of the digital music industry, the problem of digital music copyright protection began to emerge, and the problems of online piracy and plagiarism became more and more serious, so the legal use and protection of digital music copyright became a topic of concern. It is also the direction that the digital music industry has been striving to develop so far. In addition, we can find that the development of the digital music industry did not emerge in other forms from 2010 to 2014. Until 2015, driven by the Internet model, the music platform, a communication medium, successfully entered the market and got rid of the shackles of the traditional music industry, which made music creation and promotion methods more flexible and diverse. The "2015 China Music Industry Development Report" pointed out that various new business models such as "Internet + music creation", "Internet + music performance" and "Internet + music education" are in full swing within the industry. These new business models will provide multiple possibilities for the development of the digital music industry.

3.3 Cluster analysis

In order to further study the development process and commonality of the digital music industry, the following cluster analysis of keywords is shown in Figure 2.
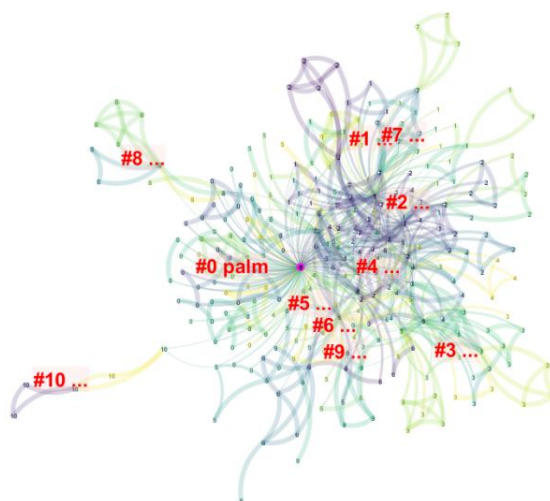

Figure 2:Digital music industry keyword clustering map

Figure 2 contains a total of 350 nodes and 839 connections, among which 11 clusters labeled 0-10 are displayed in a concentrated manner, and the clustering module value (Q value) is 0.6849, indicating that the clustering structure is significant, and the average cluster contour value (S value) is 0.9225, indicating that the clustering is convincing. According to the keyword clustering formed by the map, we can summarize these 11 clusters: Cluster #0 and Cluster #2 highlight that digital music and wireless music are the dissemination forms of the digital music industry. Cluster #1 and Cluster #9 show that the development of the digital music industry has always been the direction of people's attention. Cluster #3 mainly focuses on the research on business models in the digital music industry. Clusters #4 and #5 indicate that a major problem facing the development of the digital music industry is copyright. Cluster #6, Cluster #7, Cluster #8, and Cluster #10 show that the development of the digital music industry can drive the development of other products, which in turn shows that the research on the digital music industry is diversified. The above analysis shows that the development of the digital music industry is multi-dimensional and in line with the actual situation, and experts and scholars can also provide valuable opinions and suggestions for the development of the digital music industry through their research.

IV. Conclusion and Outlook

With the development of the digital music industry, related research has grown from nothing to more, showing a vigorous momentum of development. This paper takes the digital music industry as the research topic, uses scientometrics and knowledge graphs to analyse the dynamic evolution characteristics and trends of topic hot spots, and summarizes the extracted keyword emergence times by keyword clustering and analysis software

in the time dimension, so as to discover themes changes in research hot spots. By sorting out the changes in the research focus and framework structure of the digital music industry in the past 15 years, it provides useful inspiration for the development of the digital music industry in the future.

First, with the development of digital technology and the "Internet +" model, traditional music forms have become lonely, and the rise of the digital music industry has become the focus of attention in the new era. Profound changes have taken place in its living environment, communication methods and audiences. According to the time zone distribution map, we can see that since 2005, digital music has become an important way of music dissemination. It is the change in the way of communication that gave birth to the digital music industry chain, which led to the rapid development of the music industry, the recording industry, and online music, and the successful transition of the traditional music industry to the digital music industry. With the further development and regulation of the digital music industry, its business model has begun to emerge. In addition, the promotion of 3G from 2007 to 2008 and the rapid development of mobile communications have undoubtedly built a good platform for the development of mobile music. At this time, many experts and scholars have conducted research on the profit model of platforms and industries. For example, in Tencent session, blog, and online game platforms, digital music is a value-added service. Among them, the core part of the digital music industry, that is, the midstream of the value chain, its profit model is mainly divided into three modules: online advertising, music download fees + digital record purchases, and online and offline performance income. We found that due to the formation of the profit model, copyright issues also appeared around 2008. Among the 12 core keywords extracted, keywords involving copyright accounted for a quarter, indicating that many experts and scholars have been devoted to the exploration and research of this issue, hoping to give reasonable opinions and suggestions. Up to now, the research interest of experts and scholars is still dominated by "digital music", "music industry" and "business model".

Second, the copyright issue is still a major problem facing the development of the digital music industry. From the research literature of experts and scholars in the past, we can find that music copyright and copyright protection have always been hotly discussed topics. Low cost of infringement, high cost of rights protection, and lax law enforcement are the root causes of digital music infringement incidents. However, in recent years, the state has also stepped up supervision in this regard. In 2015, the state issued "Several Opinions on Vigorously Promoting the Development of my country's Music Industry", which proposed ten major tasks, including promoting the standardization of the music industry, building a large-scale professional music platform, and promoting international exchanges and cooperation. In May 2017, the General Office of the Central Committee of the Communist Party of China and the State Council issued the "Outline", which once again emphasized "strengthening copyright protection". In November 2019, the General Office of the Central Committee of the Communist Party of China and the State Council issued the "Opinions on Strengthening Intellectual Property Protection", which clearly proposed to strengthen the enforcement of intellectual property rights in the cultural market, and to carry out in-depth political actions to regulate the digital music, online performance and online animation markets. These all show the country's firm determination to crack down on piracy, and also prompt the digital music industry to develop in a better and more benign direction.

In the future, the entire digital music industry chain will develop in a comprehensive and standardized manner. At the upstream level, strengthen the relationship with content producers and copyright owners, and jointly promote the construction of the music copyright system and related achievement output system. A variety of new business models emerged in the downstream, expanding sales channels and forming a multi-payment mechanism. There are also some limitations in the research process of this paper. For example, in research selection, only CNKI database was selected. In the future research, the scope of research options will be further expanded to provide some reference and reference for the development of digital music industry.

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