The Impact of Metaverse Technology on the Development of Music Industry:
A Case Study of Music Industry Development in China and Japan

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Abstract: According to Bloomberg Intelligence, a U.S. market research and consulting firm, the global metaverse technology market scale is expected to reach $783.3 billion by 2024. While metaverse technologies provide alternative space for the consumption and enjoyment of spiritual culture under the new epidemic situation, it also brings people an immersive and interactive emotional and psychological experience that is far beyond what the real world can provide. In this context, it is essential to explore new ideas and paths for the development of China's music industry. This study uses a regional comparative approach to analyze and compare the utilisation of metaverse technologies within the music industries in China and Japan, and by using questionnaire to collect metaverse music consumers' attitude towards relevant technologies, it aims to interpret some existing problems in the development of Chinese music industry in the context of globalization. Finally, the paper explores new ideas and paths for the development of metaverse music industry from three aspects: loyal consumer groups, full-spectrum music genres, and high-quality internet infrastructure and services.

1 INTRODUCTION

Human society is now in the transition from web 2.0 to web 3.0, which is a shift from smartphones to extended reality (XR), from "cloud" to AI technology, and from the emphasis on interactivity to decentralized and balanced distribution of value. All of the tendencies will eventually integrate into "Metaverse," an information space that combines all of these elements. Wang, Zhou, Wan and Ning (2022) point out that metaverse is a comprehensive and integrated application of existing IT technologies, and it is a new stage in the development of information technology. The development and application of technologies such as 3DCG, Internet of Things, and blockchain are what realize and support metaverse, which has inspiring prospect in the upgrading of music industry. In the report "The Top Ten Trends in

the Development of China's Music Industry in 2020" by the Music Industry Promotion Working Committee of the China Audio and Digital Association (2022), it also clearly states that "artificial intelligence, virtual reality and other technologies will be better integrated with the music industry, bringing more immersive all-round multi-latitude artistic enjoyment to music consumers".

This study uses the knowledge related to metaverse to explore its intersection with music industry. Also, it seeks to compare the respective development status, characteristics and existing problems of music industries in China and Japan by collecting user feedback through questionnaire and analyzing results with Loyalty Loop theory. Finally, it aims to provide insights for the solution of existing problems and the exploration of new development paths of music industry under the metaverse perspective.

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2 THE "NEW" MUSIC INDUSTRY UNDER THE BACKGROUND OF METAVERSE

2.1 Metaverse: Definition and Development

The term "metaverse" was first introduced as a science fictional concept. The widely acknowledged etymology of metaverse is the parallel world of virtual reality depicted by science fiction author Neal Stevenson in his novel *Snow Crash* in 1992 (Stephenson 1992). Nevertheless, when considering the standard of "a parallel virtual world", the embryo of metaverse had emerged prior to the novel. The 1986 computer game *Habitat* was the pioneer of introducing "avatars" (avatars) and was considered as one of the earliest attempts to build a large commercial virtual community (Robinett 1994). Both *Snow Crash* and *Habitat* embody one of the most central features of the metaverse - the construction of virtual worlds. Therefore, van der Merwe (2021) uses Foucault's term "heterotopia" to argue that the metaverse is, as Foucault suggests, an imagined, "utopian-like" place that links different spaces (virtual and real) and provides a place for people to live in and fulfill their expectations.

Metaverse evolve in line with the advancement of computer technology. According to Park and Kim (2022), there are three new features of today's metaverse compared to when the concept was first created. First, the rapid development of artificial intelligence technologies, such as deep learning and generative models, has created a more immersive and natural experience environment and reduced the processing time and complexity required to run a metaverse; second, with the development of Internet technology, metaverse has moved from limited single-device control to decentralized multipoint access, breaking the boundaries of time, space, and devices; third, the metaverse system nowadays allows users to interact with real life through virtual currency, allowing users to closely connect with reality and continue their lives in multiple social aspects (fashion, games, education, office, and so on). The commercial potential of metaverse is naturally spilling out in the context of the growing maturity and everydayness of relevant technologies. According to Bloomberg Intelligence (2022), the overall metaverse market, consisting of social media advertising, gaming hardware/software, and virtual performances, will grow at an annual rate of 13.1% from 2020 and reach $783.3 billion by 2024 (see Fig.1).
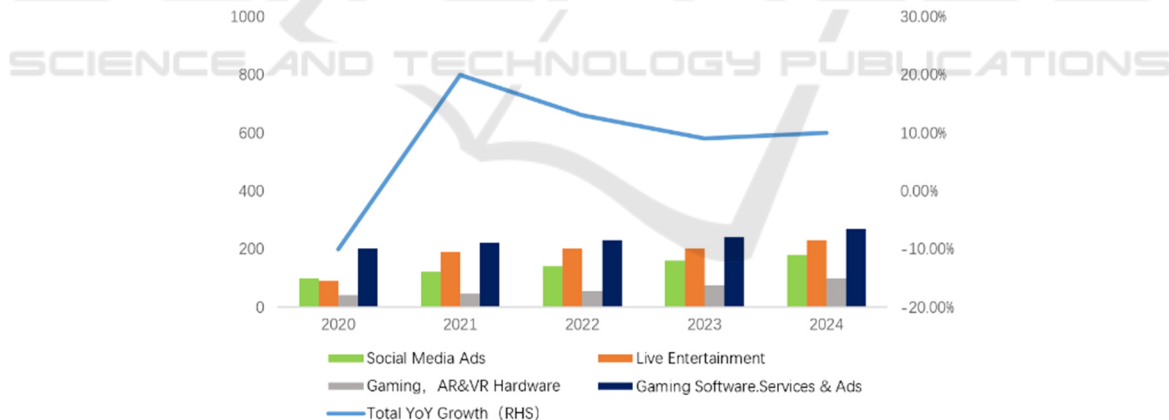

Figure 1. Metaverse market size statistics. Source: Bloomberg Intelligence (2022). Adapted by the authors.

As Bloomberg Intelligence suggests, the application of metaverse is no longer restricted to video gaming but has expanded to a wider range of scenarios. Ball (2022) identifies seven features of metaverse: (1) persistency (it does not restart, pause, or end); (2) simultaneity (self-completing activities designed in advance occur simultaneously with real life); (3) without restriction (anyone can participate in specific events with their online avatar); (4) containing economic value (individuals and companies can create, hold, invest, and sell activities, and they can get paid for their work by meeting other users' needs); (5) extensiveness (it is an experience that balances the digital and real worlds, private and public networks, and open and closed platforms); (6) interoperability (even across platforms, individuals can freely use their online avatars and items); and (7) user contribution (produced and operated by a wide range of contributors, including individual users, corporate users, and intentional groups). These seven

characteristics are important benchmarks of the metaverse business model and are equally applicable in music industry.

2.2 Metaverse and the Music Industry: Technology and Implications

The development of music industry is driven by consumption, and the premise of consumption is production (creation). The traditional model of music creation and consumption, or in other words, "production and interpretation by creators - consumption by consumers", will gradually grow into a more diversified and integrated development model under the background of the application of metaverse technology. As mentioned above, metaverse technology has seven characteristics - persistency, simultaneity, being free from restrictions, containing economic value, extensiveness, interoperability, and user contribution. This means that these technologies help to build a platform for music creators and consumers to conduct uninterrupted, simultaneous, and unrestricted activities. The act of information transfer between music creators and consumers, and between consumers, plays a key role in driving the growth of music economy, and the long-term profitability of music industry can be achieved by strengthening the mutual contributions between them. In addition, creators and consumers create network avatars through technologies like immersive interactions, 5G, and VR to meet the demand for highly immersive music production and consumption. Relying on the arithmetic technologies of metaverse and session management, it is possible to satisfy long-time, persistent interaction about music between creators and consumers and within consumer groups. Eventually, the use of metaverse enriches the connotation of feedback, information transfer, support, and re-creation behavior, realizing a social network of "music for all" and allowing people to enjoy digital music experiences anytime and anywhere.

Metaverse technologies make it possible to build self-generating complete music ecosystems. One example is VibeShare (Yamazaki & Shirai 2021), an interactive live performance system developed by Japanese VR developer Gree VR Studio Laboratory. This system uses a common web server as a hub that organically connects performers with the audience. As shown in Fig. 2, by tapping on a mobile application, audiences can easily respond to the scene with actions like clapping, sending emojis, cheering, and so on, and performers can then receive the audience's reactions first. Performers can also wear a special haptic device, so whenever audiences send a specific expression, performers can feel it in real time, greatly enhancing the immersive experience of both performance and viewing.
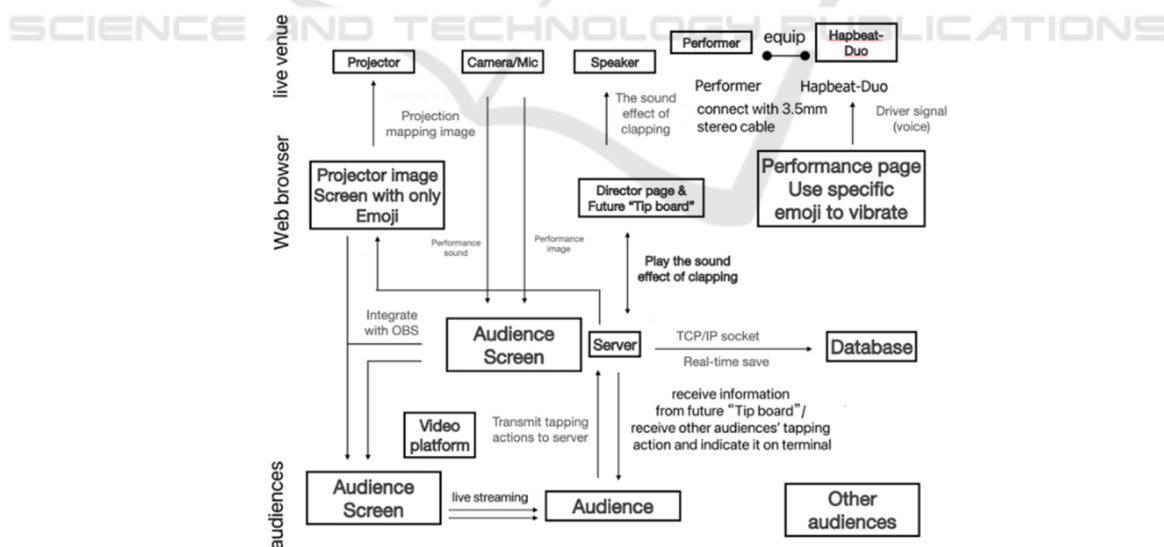

Figure 2. VibeShare system at a glance. Image from Yamazaki & Shirai (2021); translated and adapted by the authors.

In the practice of applying metaverse in music industry, the cases of China and Japan are noteworthy. As two countries with rapidly developing information technology, the music markets in China and Japan have quickly begun the attempt to engage with metaverse. How has metaverse been used in each of these two markets? What are the successes and potential problems of

each market, and what are the implications for the development of China's metaverse music industry? These questions will be addressed in this article later.

3 METHODOLOGY: QUESTIONNAIRE AND LOYALTY LOOP THEORY

To evaluate the efficacy of metaverse technologies in both Chinese and Japanese markets, the following part will then pay attention to the response of consumers in the two nations, examining whether they are attracted by and devoted to the use of these new way of music consumption, as well as what metaverse functions appeal to them most. The model of Loyalty Loop, proposed by David Edelman (2010), is used here for interpreting the journey that metaverse music consumers take when engaging with relevant products. As shown by Fig. 3, Edelman argues that a consumer, when making a purchasing decision, may take six actions: consider, evaluate, buy, and enjoy, advocate, and bond (Edelman 2010). Once the consumer has established robust bond with the product in the process, he or she may enter a new loop of loyalty, in which the consumer will only keeping the circle of buying, enjoying and advocating (Edelman 2010). In this article, we seek to explore how the utilization of metaverse music technologies may (or may not) drive consumers into loyalty loop by conducting survey activities in order to collect consumers' opinions of metaverse music. We aim to reveal whether these technologies are appealing, and based on the analysis, some implications for the better use of metaverse in music industry may be drawn.
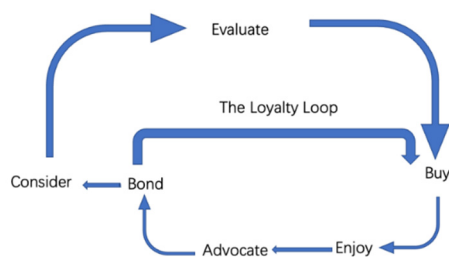

Figure 3. The loyalty Loop model by Edelman (2010). Adapted by the authors.

The Loyalty Loop model was applied in the questionnaire design process. Based on some key issues in metaverse music industry, we proposed 16 questions about the participation of virtual music live events, which is a significant type of metaverse music consumption, and we aim to use these questions to reflect different parts of the loyalty loop. A total of 112 results were collected, which included participants from both China and Japan. In the questionnaire, these consumers of metaverse music indicated their consuming habits and preferences for specific functions, which can reveal the features of both Chinese and Japanese metaverse music markets. We also conducted brief interviews with some participants for the purpose of exploring more in-depth implications of our data.

4 COMPARING THE APPLICATION OF METAVERSE TECHNOLOGY IN THE DEVELOPMENT OF MUSIC INDUSTRIES IN CHINA AND JAPAN

This section will conduct a comparative analysis of the questionnaire results, explaining the differences between answers given by Chinese and Japanese participants. The first finding, illustrated in table 1, is about the frequency of virtual music performance participation across different age groups. Japanese participants come from a wider age range, while Chinese counterparts are predominantly under 30. This suggests that the loyalty for virtual music is more common in Japanese society, which attracts enthusiasts from all ages, while this is not the case in China.

Table 1. The frequency of participation based on age group.

Age	Region	Frequency of participation			
		Once	Twice	Thrice	Four times and above
Below 20	China	19	5	2	2
	Japan	1	0	1	4
21-30	China	18	13	6	1
	Japan	4	1	5	6
30-45	China	1	2	0	0
	Japan	0	4	3	5
Above 45	China	0	0	0	0
	Japan	2	4	1	2
Proportion	China	55.07%	28.99%	11.59%	4.35%
	Japan	16.28%	20.93%	23.26%	39.53%

The second finding is related to the platforms for virtual music performance participation. As shown in table 2, the platforms Japanese participants use are much more diversified than the ones Chinese counterparts use. While Chinese users mainly participate on their domestic platforms, Japanese participants show some significant interests to the music events on foreign platforms like Bilibili. According to the interview with one of our participants, Japanese virtual music audiences may download platform applications simply for watching the live events held on these platforms, while

Chinese audiences tend to stick to a specific platform and occasionally watch virtual live performances on it once they notice them (see also Zhou & Deng 2015). Such a difference is further discovered in the question about the reason for using specific platforms for virtual music events, which can be seen in table 3. More Japanese participants choose a certain platform because it has the show they are interested in. This indicates that Japanese participants are more motivated by attending a specific show and thus are loyal to the music events they follow, while the participation of Chinese counterparts are more motivated by their consuming habits on certain platforms.

Table 2. The use of platforms for virtual music events.

Region	Platform				
	QQ Music	Netease Cloud Music	Tencent Video	Bilibili	Douyin
China	47.80%	47.80%	17.40%	72.50%	34.80%
Japan	16.30%	18.60%	25.60%	60.50%	51.20%
	Wechat	Youtube	Niconico	Twitch	
China	15.90%	18.80%	8.70%	5.80%	
Japan	7.00%	81.40%	79.10%	69.80%	
Average number of platforms a consumer use					
China	2.695				
Japan	4.095				

Table 3. The reasons for using certain platforms

Region	Reasons for using this platform			
	Being a long-term member of the platform	Attending one specific event	Seeing relevant information on social media	Influenced by the recommendation from friends
China	68.10%	62.30%	22.20%	17.40%
Japan	67.40%	72.10%	72.10%	62.80%

Another finding seen in table 3 is that the proportion of Japanese participants affected by social media and recommendations are predominantly higher than that of Chinese users, which suggests that Japanese participants are much more enthusiastic for sharing virtual performances to others. Table 4 is a clearer indication of such a will of sharing.

Table 4. The will of sharing.

Region	The will of sharing	
	Yes	No
China	65.20%	34.80%
Japan	81.40%	18.60%

The next finding involves the music genres that virtual music performance audiences are interested in. It is obvious from table 5 that the popular music genres in Japanese virtual music market are much more diverse than the ones in Chinese market.

Table 5. Music genres that participants engage.

Region	Music genre					
	Pop	Rock&Roll	Electronic	Folk	DJ Dance	Game/movie/TV drama soundtrack
China	73.90%	24.60%	27.50%	23.20%	13.00%	43.50%
Japan	67.40%	81.40%	74.40%	30.20%	46.50%	62.80%

The last finding is about the problems that participants of both countries wish to solve. As shown in table 6, the overarching concern for Chinese users is internet speed of virtual performances, which impacts the video quality of these events. For Japanese users, there is no specific area that needs particular improvement. Also, the overall satisfaction level for virtual music performance is higher in Japan.

Table 6. The opinions about improvement.

Region	Places for improvement					Overall satisfaction level for virtual music performance (in general)
	Internet speed & video quality	Personalized service	The functions for blocking disliked users	Gamification of music performance	More derivative products	
China	69.60%	59.40%	46.40%	34.80%	36.20%	79.13%
Japan	20.90%	25.60%	25.60%	16.30%	14.00%	89.30%

5 IMPLICATION AND CONCLUSION

The comparative analysis of Japanese and Chinese audiences' attitudes towards virtual music live events can provide some important insights for the status of metaverse music in both countries. First, metaverse music in Japan is more mature than the one in China. Japan owns a full-spectrum metaverse music market that covers a broad age range of consumers, and they manifest high demand for metaverse music as they are likely to attend events more than once. Using the theory of Loyalty Loop to explain, more Japanese consumers with diversified demographic backgrounds form solid bonds with the products they consume, and thus manifest more loyalty to these products.

The maturity of Japanese metaverse music industry is further supported by the data about Japanese music market. According to the 2022 Global Music Report released by the International Federation of the Phonographic Industry (IFPI) (2022), Japan still maintains its position as the second largest music market in the world, and even under the extremely severe situation of the COVID-19 pandemic, the size of Japanese music market still expanded by 9.3% compared to the one in previous year. According to a survey report by the Ministry of Economy, Trade and Industry of Japan (2020), the physical music market continues to shrink in both the world and Japanese domestic markets, while the digital music market is on continuous expansion. From 2014 to the present, the ratio of digital music to the total market in Japan is higher than the world average. By 2023, such a size difference will reach 6%, that is, the world market

digital music scale accounted for 29% of the overall amount, while the counterpart of Japanese domestic market will reach 35%. The overall expanding status of Japanese digital music market is the basis for the music industry construction in metaverse perspective.

In comparison, Chinese metaverse music market is still in a relatively nascent stage. From the findings of this article, the consumption of metaverse music in China is largely occasional activities based on audiences' reliance for certain platforms. As a result, they have not become the loyal consumers like their Japanese counterparts. In response, Chinese metaverse industry participants should pay more attention on how to enhance users' bonds to their products instead of platforms.

The next implication is the highly established promotion system in Japan powered by both Japanese metaverse music industry and their consumers. The strong will of sharing shown by our Japanese participants indicates that they have formed the habit of spreading the metaverse music they love, which is a key part of loyalty loop. The collective mouth-to-mouth sharing behavior, as well as the marketing campaigns conducted by relevant businesses, are the driving force of metaverse music in Japan (see Hwang & Lee 2022). Again, such a system of sharing is not fully formed in China, which requires more efforts from the domestic metaverse music industry.

Another key implication, which is related to the highly diversified music genres of virtual music performances, is that Japanese metaverse music is supported by its globally renowned music industry. The success of existing music products provides abundant, mature and stable technical testing grounds for metaverse technologies. Taking the example of the Japanese cultural phenomenon "virtual idol", it is a group of virtual characters born from Japanese otaku culture and based on information technology, which has sparked a global frenzy upon their emergence (Lu et al. 2021). In the context of the popularity of Internet technology, especially 5G technology, it has become the norm for virtual idols to rely on online platforms to conduct live music performances, and thus these performance activities have become the best destinations for metaverse practices. For instance, a popular virtual idol "Virtual Girl Nem" (バーチャル美少女ねむ) released her seventh original song, "Meta Birthday", on August 30th, 2022. One of the promotional activities around the single was a singing contest to select participants for the 3D online performance of "Meta Birthday" from Nem's fans. Participants were given a character image that resembled Nem's look and had their own avatar in this performance, as shown in Fig. 4 (Virtual

Girl Nem 2022). The concept of metaverse has strengthened the popularity of these globally beloved virtual idols, and the preexisting influence of virtual idol culture has also in turn increased the acceptance of metaverse and its related technologies among consumers. As a result, the bond between certain music genre and its consumers is further enhanced, and such a bond exists within almost every genre in the market, contributing to a comprehensive metaverse music market system that allows all types of music to survive and thrive.

Figure 4, Promotional image of Virtual Girl Nem "Meta Birthday" campaign (Virtual Girl Nem 2022)

For the situation in China, the support from the general music industry is still far from being adequate. First, the fields of music industry development are still relatively limited. For instance, although the overall size of China's digital music market remains high, the film, game, and animation music industries have not made new breakthroughs from the previous year, basically remaining at a scale of 700 million yuan (Yinyuexiansheng 2022). This indicates that the development of film and game works in China is still limited to the products themselves, while the deeper exploration and marketing of their derivative products (e.g., music) is relatively missing. When the market just worships the most popular products, it becomes difficult for music producers of some niche genres to survive in China. Second, there is still a need for more highly recognizable metaverse products that have a national and even global impact. One author of this article, Zhichao Zhang, had an interview with the chairman of TryHard Japan, a leading music culture company in Japan. He mentioned that "China has never had a world-class, or at least East Asia-wide, leader and 'mastermind' to lead the way of music industry, so people are just blindly following the market trend." Against this backdrop, accusations of the current domestic metaverse boom are highly visible, mainly focusing

on blind following, as well as the lack of continuity and long-term planning (Kejihu 2022).

The last implication is that the infrastructure and service for metaverse music should be improved in order to attract more consumers. In table 6, one finding is that Chinese participants tend to complain about the internet speed of virtual events. It is curious to see that while China has been featured by its rapidly developing internet infrastructure (China Internet Network Information Center 2022), internet speed and video quality has become an issue in Chinese metaverse music market. This might be because the industry pays less focus on providing and maintaining more stable service for their consumers, which eventually undermines the popularity of their products, as reflected by the lower satisfaction level for virtual performances in China. Robust technical support is the prerequisite for a complete music ecosystem (as shown in the earlier case of VibeShare), which is another significant boost of metaverse music industry. Therefore, it becomes essential for Chinese industrial participants to improve the overall quality of metaverse infrastructure.

In summary, by making comparison between the user feedbacks from Japanese and Chinese metaverse music markets, this article is able to provide some insights about the characteristics of metaverse music industries of both countries. For Japan, the use of metaverse in domestic music industry demonstrates its advantages as a major cultural and technological power, which are evident in the vast user base of metaverse music that manifest high level of loyalty, as well as the systemized production, distribution and promotion process of the industry. In contrast, metaverse music in China is still in its early stage. Despite the rapid speed of development, there is still much room for improving the depth and breadth of Chinese music industry, which is crucial for the formation of loyal consumer groups. The case of metaverse practice in Chinese and Japanese music industries shows that having a long-term plan and a clear understanding of both music products and consumer groups are the key to success in a rapidly developing and changing technology field like metaverse.

Future studies may address some other aspects of metaverse music industry, such as copyright protection. In the case of Japan and China, there are also some significant insights for discussion. Japan has established a comprehensive set of relevant legal regulations. In comparison, the absence of systematic music copyright brokerage and management is still a major concern in Chinese metaverse music market. The enhancement of legal framework and other areas is necessary for building up a healthy metaverse music market, which calls for more in-depth understandings in relevant academic fields.

FUNDING

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