Valuation Analysis of Metaverse Industry

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Abstract. Since the beginning of 2022, share prices have been affected by volatility with the downturn in the market, and the Internet companies are at an important point of reform simultaneously, of which metaverse is the main direction. The meta-universe concept has been thrust into the limelight and has received widespread attention, with domestic and international companies beginning to lay out their transformations. Based on data collection and literature retrieving, we will discuss the future development prospects and potential of the metaverse from the development stage of the metaverse industry, the drivers of the metaverse industry, the business model and valuation of the metaverse industry. According to analysis, the market value of the metaverse will continue to climb as technology advances and the times reform. Although the metaverse is now in the development stage, we are extremely optimistic about its future development prospects and market value. These results shed light on guiding further exploration of the metaverse.

Keywords: Metaverse; Extended reality (XR); cloud computing; Business model.

1. Introduction

In the 1992 science fiction book Snow Crash, which describes a large virtual reality environment where individuals compete with one another to advance their status using virtual bodies, the word "metaverse" first appeared. The Metaverse (Metaverse) is a digital living environment with a new social structure that uses cutting-edge technologies including extended reality (XR), blockchain, cloud computing, and digital twins for linking and producing. It is a virtual world that maps and interacts with the actual world. Although the metaverse is still in its infancy from the standpoint of businesses, and its underlying technologies and application scenarios are still far from the developed forms of the future, this also means that there is a ton of space for growth in the metaverse-related industries [1]. As a result, digital technology startups should plan ahead or even contribute to the metaverse track if they want to get the opportunity to bend the curve away from the market-dominating digital technology giants with many benefits.

The metaverse creates an immersive experience using extended reality technology, a mirror image of the real world using digital twin technology, an economic system using blockchain technology, closely integrates the real and virtual worlds in terms of their social, economic, and identity systems, and enables each user to create and edit content [2]. The fusion of physical reality with digital virtual creates an open virtual world for immersive experiences such as gaming, shopping and socialising, allowing users to have continuous social opportunities, low latency user communication experiences and interconnected networks in immersive environments, whether for gaming, socialising or shopping. The metaverse industry is increasingly used in a wide range of applications, from gaming and entertainment to virtual social networking and future applications in industrial, medical and educational scenarios, and is inseparable from our lives [3].

PwC expects the metaverse-related economy to see significant growth, with the market size expected to reach US$1.5 trillion by 2030 [4]. Moreover, there are many related industry chains to focus on. According to Gao, the NFT (non-homogenised token) has played a very important role in the explosion of the meta-universe concept, and the recent repeated high prices fetched by several crypto artworks are proof of the investment value of this art market [5]. At the moment, this is the

power behind the infrastructure first mover and voice in the blockchain and digital currency world, hoping to "centralise and institutionalise" in practice by ostensibly decentralising. In addition, the metaverse is also a crucial area of social governance. China should accelerate the research and demonstration of metaverse and actively try to develop the technology and industry under the premise of safety and control, while cautiously dealing with problems that may be brought about [6].

The valuation study of the metaverse industry is an issue that cannot be ignored in this historical context of rapid high-tech development and the opportunity of the advent of the metaverse boom. We will focus on the understanding the metaverse industry, in terms of the development stage of the metaverse industry, the driving factors of the metaverse industry, the business model and valuation of the metaverse industry, and investment recommendations.

2. Stages of development of the metaverse industry

In the long run, there are still several different directions needed to make the metaverse perfect. First, is to improve the user social media experience. For the social experience, humans have gone from the first letters, phone calls, mobile apps to the possible future 3D Avatar social, and by constantly improving the web technology, we will also probably achieve a more realistic way of socialising. Next is the engine technology, the metaverse needs enough content for people to consume, and enough content means that engine technology is as immediate as it needs to be, and we need to improve production tools and more good producers. Then, for the technologies needed for better immersion, such as the transition from flat screens to VR/AR to make virtual worlds more realistic; and further developments in internet technology to make latency lower and more stable or even to enable cloud gaming. The last is an economic system (e.g., the MMO games of the past) that meets the commercial needs of some users in addition to their entertainment needs, making the time consumed by everyone commercially valuable and filling the value of their digital lives.

2.1 Principles and component composition of the metaverse industry

With the rapid development of the PC Internet era, the discussion of the next phase of the Internet with its alien form is increasing. The metaverse is potentially the most popular choice for the next phase of the Internet. It creates a more realistic virtual world through AR & VR devices or more efficient software design, thus significantly enhancing the immersion and experience of the user.

XR is the point of connection between the virtual and the real in the metaverse. It is essentially the overlay or integration of computer text or images into the real world and the virtual environment through a computer. Besides, is a collective term for a variety of technologies, e.g., VR, AR and MR. VR is a common word for an engaging computer-mediated experience in which a person uses specialized human-computer interface equipment to see a synthetic (simulated) world. In such setting, it interacts with virtual items as if they were actual ones. Multiple people can interact and see each other in a shared synthetic environment, such as a battlefield [7]. AR is a new development in technology that creates an interactive, reality-driven experience. AR improves the output in real-time by using data produced by a computer. In contrast to VR, AR does not typically completely replace a real-world environment with a virtual one. In order to improve the end-user experience, augmented reality involves overlaying computer-generated visuals over real-world scenes [8]. The use of mixed reality advances the situation. Similar to augmented reality, MR superimposes digital media (e.g., animations, photos, audio, and video) ontop of the real world. Because MR develops virtual objects that may interact with the actual environment, it can be distinguished from augmented reality [9].

The VR/AR hardware industry has experienced many years of development, and the maturity of the hardware has seen a large increase under continuous iteration. The industry's first high point came in 2014 when Facebook bought Oculus for a huge sum of money. However, in 2017 the industry experienced a significant decline due to imperfections in hardware devices and content. In 2020, VR entered a recovery period, with the emergence of high-quality hardware such as Valve Index VR and Oculus Quest helping to fuel the industry's rise. In terms of the AR industry, Google introduced AR

to the public with the release of Google Glass in April 2012. Since 2018, the industry has shifted its focus to B-side applications, as the technical route of the AR industry is still unclear, and C-side products are expensive and have average user experience.

As one of the prominent representatives of the basic interactive unit of the metaverse, the virtual digital human was born and developed along with the integration of various media such as the Internet. The rapid rise of this industry will bring better technical support to the interaction between the metaverse and the physical world, and the virtual digital human can create their own digital image for people in the real world, mapping their imagination and soul which are limited by the real objective world. Four important stages that virtual digital people have gone through as the technology has evolved is shown in Fig. 1.

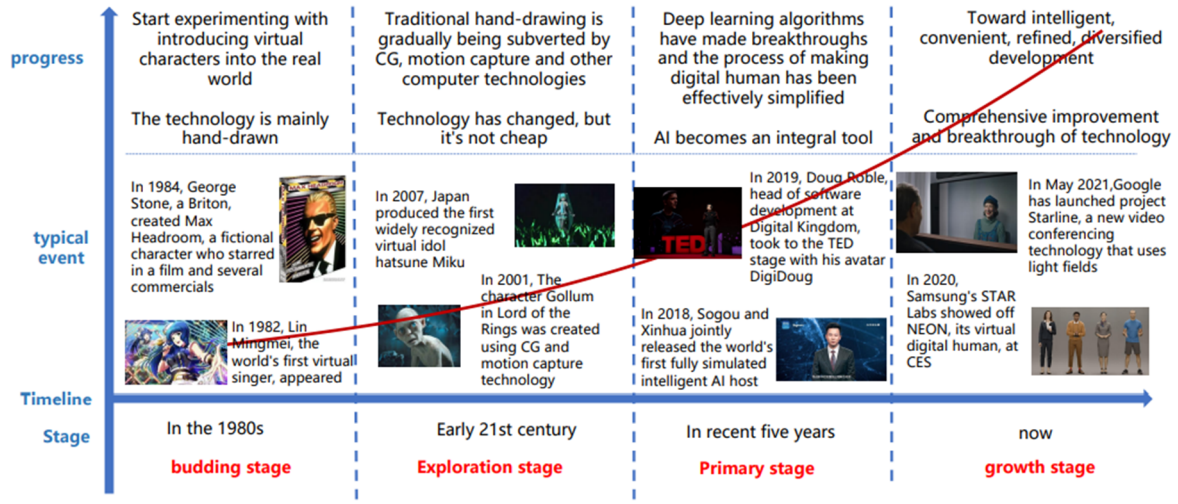


Fig. 1 Four important stages of development of the virtual digital person [10].

In the context of the meta-universe, domestic and international players are developing the virtual digital human market from multiple angles and aspects, with each country relying on its own resource advantages to make a comprehensive layout to further strengthen its competitive edge. Therefore, each country's metaverse development direction and layout have its own characteristics. With the vast market space of virtual digital human, the technology development and application fields continue to broaden, its commercial realization will further enter the fast lane in the future [11].

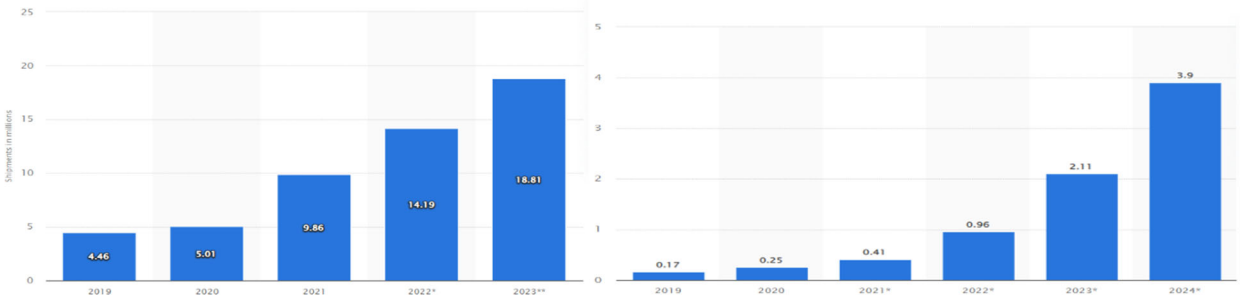


Fig. 2 Global VR headset(left panel) [12] and AR glasses (right panel) shipments [13].

Although metaverse social media may sound complex, its core can be summarized in three simple points: everyone can participate in the virtual world created, access this world anytime and anywhere, and generate most of the real-world social behaviors in this virtual world. In general, the construction of virtual subjects in metaverse social media has not only achieved an innovative breakthrough in methodology, but has also become more three-dimensional, diverse and dynamic in content form. The VR/AR industry has reached an inflection point, and the industry is entering a rapid growth phase. According to IDC data, global VR/AR headset shipments were 11.23 million units in 2021, up 92.1% year-on-year; global VR/AR shipments are expected to exceed 50 million units in 2026, with a CAGR of 35% during the period, and the industry has entered a rapid growth phase.

In this ecology, one also needs to be commodities, and with commodities comes value as well as value comes the need. With value, there needs to be an exchange based on value. The commodities in the metaverse world are virtual, digital commodities. The definition of its commodities, the measure of value, the way value is exchanged are all different from the real world.

In the metaverse, its economic system is constructed with the following four aspects, i.e., Digital Creation, Digital Assets, Digital Markets and Digital Currencies. Through digital creation, digital assets are formed, and through the property rights of digital assets, digital markets are established for the transfer of digital property rights transactions, and the transaction transfer process is carried out through digital currencies. In this way, based on the four core elements as above, a good sustainable meta-universe economic system can be constructed in its entirety.

2.2 Current development of domestic and international companies in the metaverse

In October 2021, metaverse gaming company Roblox went public on the New York Stock Exchange with a market cap of $30 billion (seen from Fig. 3). In July of the same year, the social platform Facebook changed its name to Meta and fully transformed its metaverse. Compared to foreign countries, the development of metaverse is still in its nascent stage in China. Traditional internet companies such as Tencent and Ali in the meta-universe industry have established digital collection distribution platforms Phantomcore and WhaleQuest products with simple functions, and these collections are not yet tradable properly. Roblox, the company mentioned above, has now been able to hold its own virtual music festival in the metaverse, with famous singers Lil NasX and Zara Larsson all performing their hits. Compared to Chinese metaverse projects that are mostly speculative, they have a huge number of participants and have managed to bring the metaverse out of the loop and into the public domain.

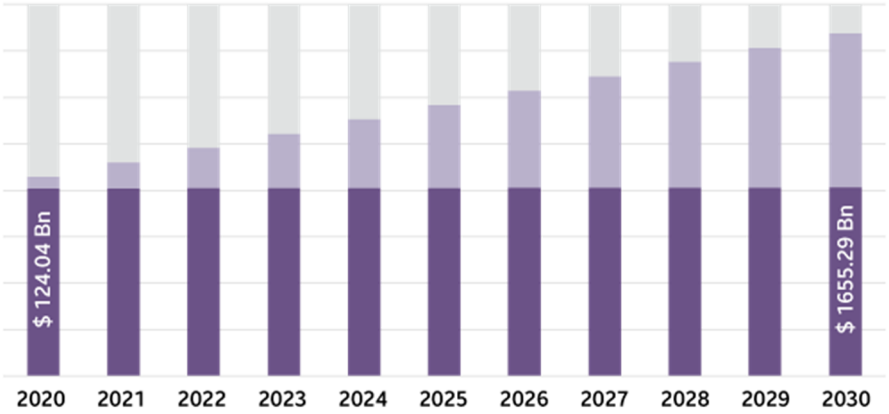


Fig. 3 North USD universe market share [14].

3. Drivers of the metaverse industry

3.1 Demand

The essential factors driving the rapid growth of the metaverse industry as an emerging market focus are the huge number of existing or potential user groups and the growing social needs of people. The number of Internet users worldwide has surpassed 4.66 billion by the end of 2021. China's Internet users have surpassed 1 billion, according to the 49th Statistical Report on the Development Status of the Internet in China published by the China Internet Network Information Center (CNNIC) in 2022. The Internet penetration rate reached 73%, and China had entered the era of the Internet user society [15]. In 2020, China's online games' overall user scale was 648 million people, and the growth rate was 2.01%. In the same year, China's online game market scale reached 340.59 billion yuan, with a year-on-year growth of 26.27%. According to the latest data released by Newzoo, an internationally renowned game market research company, the global game market size may reach a record-breaking

USD 203.1 billion in 2022, with a year-on-year growth of 5.4%. Meanwhile, the number of global players will also exceed the mark of 3 billion [16].

A broad user base provides the impetus for the construction of the metaverse. 2018 saw the total digital economy in China exceed 30 trillion yuan for the first time, accounting for more than 30% of GDP [17]. Only two years later, in 2020, the scale of China's digital economy will reach 39.2 trillion yuan, accounting for nearly 40% of GDP, and the growth rate of the digital economy will reach more than three times the growth rate of GDP [18]. In the Internet era based on "people's network", the development of technology has made it possible to meet people's higher requirements for social diversity and interactivity, and also made different forms of social media become the depression of value traffic. Users produce and share content on the Internet digitally, making each user a link between businesses, content platforms and consumer users, and promoting the formation of a powerfully attractive metaverse social form - virtual immersive social.

3.2 Policy

The rapid development of the metaverse industry cannot be achieved without the support of relevant policies. In 2021, the State Council stated in the "14th Five-Year Plan for Digital Economy Development" that it would promote the innovative development of "cloud life" services and the deep integration of multiple new technologies, hence metaverse technologies could be useful in social networking and shopping [15]. The Financial Technology Development Plan (2022-2025) states that the construction of diversified and smooth metaverse service channels will be promoted. Based on virtual reality technology and offline scenarios, physical outlets will be promoted to upgrade to smart outlets [19]. The requirements of resolutely resisting speculation and basing on the real economy are proposed in the Self-Regulation Convention of the Metaverse Industry (to be adopted at a plenary session) [20]. In addition, many provinces and cities have actively formulated policies to promote the development of the metaverse industry. The "Shanghai Action Plan for Cultivating New Tracks in the Meta-Universe (2022-2025)" clearly proposes to strengthen the layout of new tracks and help Shanghai become an international digital city. The metaverse eco-industry development plan of the Taihu Bay Science and Technology Innovation Zone released by Jiangsu Province points out that promoting deep and multi-disciplinary development and innovation of metaverse technology will be an important strategic guidance for the development.

In May 2021, Korea's Ministry of Science, Technology, Information and Communication established the Metaverse Alliance, a consortium of national companies and institutions. At the end of 2021, it set out a plan to turn Seoul into a meta-universe city.With the support of many policies, many meta-universe concept companies such as ZEPETO have emerged in Korea. While recognizing the positive role of the metaverse as a new thing, regulators in the U.S. suggested that the data security and privacy of users in the metaverse world should be protected by technical and legal means. In its "Report on the Future Possibilities and Issues of the Virtual Space Industry", the Japanese government has also expressed the view that the focus should be on preventing legal issues of "virtual space". These policy supports are the catalysts for the metaverse industry's incubation and the metaverse's legal compliance. Under the guidance of policies and regulations and industry self-regulation, the establishment of a benign development model is just around the corner, and the development of the whole industry will be a general trend [21].

4. Business models and valuation in the metaverse industry

4.1 Meta Corporation

Facebook claimed that it would become Meta in October 2021. The parent company's structure remained same despite the name change; nevertheless, Meta stated intentions to divide its operating subsidiaries' financial reporting into Family of Apps and Reality Labs. Facebook underlined the significance of the name change in order to include the company's growing suite of services and tools. The new moniker alludes to Meta's ambitious plan to create a "meta-universe," a novel type of social

network in an interactive virtual environment that links various people for gaming, employment, and leisure. Facebook is heralding a new age of social contact by changing its name to "Meta," made possible by metaverse technology and positioned to become the center of future online social interaction. This change in communication introduces a whole new business model (depicted in Fig. 4) based on a never-before-seen combination of the three components value creation, value proposition, and value capture [22].



Fig. 4 The business model and its components [23].

Table. 1. Presentation of Meta's financial data for 2019-2022 and a valuation forecast for 5 years.

	2019A	2020A	2021A	2022E	2023E	2024E	2025E	2026E
Operating income::	**70,697.0**	**85,965.0**	**117,929.0**	**173,355.0**	**284,324.0**	**395,293.0**	**506,262.0**	**617,231.0**
Year-on-year growth%:	N.A	21.6%	37.2%	47.0%	64.0%	39.0%	28.1%	21.9%
Operating costs(COGS):	46711	53294	71176	102279	114511.5	126744	138976.5	151209
% Operating revenue:	66.1%	62.0%	60.4%	59.0%	40.3%	32.1%	27.5%	24.5%
Gross profit:	**23,986.0**	**32,671.0**	**46,753.0**	**71,076.0**	**169,812.5**	**268,549.0**	**367,285.5**	**466,022.0**
Gross margin:	33.9%	38.0%	39.6%	41.0%	59.7%	67.9%	72.5%	75.5%
Operating profit (EBIT):	23986	32671	46753	71076	169812.5	268549	367285.5	466022
Operating Margin:	33.9%	38.0%	39.6%	41.0%	59.7%	67.9%	72.5%	75.5%
Interest expense/income:								
(+) Interest income and other gains:	826	509	531	530	500	470	440	410
Net interest expense:	**826.0**	**509.0**	**531.0**	**530.0**	**500.0**	**470.0**	**440.0**	**410.0**
Total profit:	**24,812.0**	**33,180.0**	**47,284.0**	**71,606.0**	**170,312.5**	**269,019.0**	**367,725.5**	**466,432.0**
(-) Income tax:	-6327	-4034	-7914	-9567	-10360.5	-11154	-11947.5	-12741
Net profit:	**18,485.0**	**29,146.0**	**39,370.0**	**62,039.0**	**159,952.0**	**257,865.0**	**355,778.0**	**453,691.0**
	26.1%	33.9%	33.4%	35.8%	56.3%	65.2%	70.3%	73.5%

It is believed that the new business model revolves around the Reality Lab. As the core division of Meta's metaverse, Reality Labs is an industry leader in the research and development of software and hardware, including dozens of VR eyes, with the aim of creating a realistic sense of presence that is comparable to human vision. For this part of the value proposition, Meta is dedicated to creating new user markets, new user relationships and new channels, and Reality Labs is dedicated to creating a more complete and robust user relationship with the power of technology, upgrading flat 2D images to 3D communication through VR and AR technology, and precisely enhancing the social attributes of the metaverse to achieve. It can also enhance the social attributes of the metaverse, achieve a comprehensive upgrade of Facebook, and broaden the user market and channels based on the original Family of Apps market. In the module of value capture, Reality Labs' annual business revenue has

been in the loss-making stage and has been increasing year by year, from a loss of 47% from 2019 to 2020 to 54% from 2020 to 2021, Reality Labs is also in the exploration stage in terms of value capture, and the appropriate model has not yet been determined [23].

Meta's Family of Apps, on the other hand, remains the company's main source of revenue. Since 2019, TikTok has reshaped the landscape with its short video strategy, pushing YouTube to Shorts and Meta to Reels. with TikTok reporting higher growth and ranking #1 among the most downloaded apps in 2021-2022. However, as seen in Fig. 4 Meta's Family Of Apps still ranks in the top five, especially in Google Play, Instagram and Facebook in first and second place respectively, and in fourth and fifth place in Apple's app store. The financial data presented in Table. 1 also shows that Family Of Apps revenue is still on an upward trend, rising from 38% year-on-year in 2020 to 45% year-on-year in 2021. This means that Meta's business model is more mature in terms of Family Of Apps, while Reality Labs is still in the exploratory stage of development, which shows that the metaverse industry is still in its early stages of development and still has a large gap with the mature form of the future. As shown in Table. 1, we provide a simple net profit analysis of Meta's financials for the past three years and a simple forecast for the next five years.

4.2 Microsoft Corporation

The Productivity and Business Processes Division of Microsoft Corporation includes products and services within the Productivity, Communications and Information Services portfolio, covering a wide range of devices and platforms. The division consists primarily of. Office Consumer includes Microsoft 365 Consumer subscriptions, Office on-premise licenses, and Office Consumer services like Skype, Outlook.com, and OneDrive. Office Business Division, including Office, Exchange, SharePoint, Microsoft Teams, Office 365 Security and Compliance, and Skype for Business. LinkedIn offers a variety of solutions, including as marketing, sales, learning, and talent solutions. Dynamics Business Solutions: Consists of on-premises ERP and CRM systems as well as Dynamics 365, a collection of sophisticated cloud-based applications for ERP, CRM, Customer Insights, Power Apps, and Power Automate [24].

Table. 2. Presentation of Microsoft's financial data for 2019-2022 and a valuation forecast for 5 years..

	2019A	2020A	2021A	2022E	2023E	2024E	2025E	2026E
Operating income:	125,843	143,015	168,088	283,832	399,576	515,320	631,064	746,808
Year-on-year growth%：	N.A	13.65%	17.53%	68.86%	40.78%	28.97%	22.46%	18.34%
Operating costs(COGS):	42,910	46,078	52,232	56,395	60,559	64,722	68,885	73,049
% Operating revenue：	34.10%	32.22%	31.07%	19.87%	15.16%	12.56%	10.92%	9.78%
Gross profit:	82,933	96,937	115,856	227,437	339,017	450,598	562,179	673,759
Gross margin：	65.90%	67.78%	68.93%	80.13%	84.84%	87.44%	89.08%	90.22%
Operating expenses:								
(+) Selling and general administration expenses:	-4,885	-5,111	-5,107	-5,256	-5,406	-5,555	-5,704	-5,854
（+） Research and Development	-16876.0	-19269.0	-20716.0	-22793.7	-24871.3	-26949.0	-29026.7	-31104.3
(+) Marketing and Sales	-18,213	-19,598	-20,117	-21,213	-22,310	-23,406	-24,502	-25,599
Total operating expenses:	-39974.0	-43978.0	-45940.0	-49263.3	-52586.7	-55910.0	-59233.3	-62556.7
（+） Other income	729	77	1,186	1,121	1,056	991	926	861
Operating profit (EBIT):	43688.0	53036.0	71102.0	179294.3	287486.7	395679.0	503871.3	612063.7
Operating Margin:	34.7%	37.1%	42.3%	63.2%	71.9%	76.8%	79.8%	82.0%
Interest expense/income:								
(-) Interest costs:	-4448	-8755	-9831	-13061	-16291	-19521	-22751	-25981
Net interest expense:	-4,448	-8,755	-9,831	-13,061	-16,291	-19,521	-22,751	-25,981
Total profit:	39,240	44,281	61,271	166,233	271,196	376,158	481,120	586,083
Net profit:	39240.0	44281.0	61271.0	166233.3	271195.7	376158.0	481120.3	586082.7
	31.2%	31.0%	36.5%	58.6%	67.9%	73.0%	76.2%	78.5%

While the so-called meta-universe system is still in the development phase, these major sources of business will be the main application scenarios for Microsoft on the B-side, just as in the case of the global epidemic, the online and offline office seems essential, and Microsoft's Teams software has introduced hundreds of new features over the past year, from a new facilitator model to a new inclusive meeting experience that makes it easy for everyone to become a full participant in a meeting, whether they join from home, the office, the boardroom or the factory floor. At the same time paving the way for the development of the Microsoft Meta Universe.

Microsoft Mesh was developed by Microsoft as a platform for writing and communication in which, through Holoportion (AR eyes), you can interact by projecting yourself as a realistic image in mixed reality, just as if you were there in person. This is built on a conferencing platform (e.g., Teams), and with the cloud data support of Azure. It enables a highly interactive meeting model across space, which will cover a huge amount of ground on the B-side and has excellent prospects for the future.

In the C-side, the Mesh platform for multiplayer synchronization and collaboration, Microsoft worked with Niantic to demonstrate a multiplayer AR demo based on "Pokemon Go" on HoloLens 2. "Pokemon Go" was originally a mobile LBS AR game, and with the technical support of Azure cloud services, Microsoft successfully demonstrated the effect of two people synchronizing with AR glasses to play the game. The problem is that AR as a computing platform may still be a distant concept for consumers, and it should take some time to open up the C-suite market. For Microsoft, this step-by-step transition is extremely robust, as Microsoft's revenue composition has been extremely stable in recent years, with marketing and research and development accounting for approximately 13% of revenue, laying a solid foundation for Microsoft's transition to the metaverse in the future. As shown in Table. 2, a simple net profit analysis is provided for Microsoft's financials for the past three years and a simple forecast for the next five years.

5. Summary of the industry and investment recommendations

As the metaverse industry is a future industry, there are many uncertainties and factors to consider, and the future outlook for the application model lacks precise direction. Some industry analysts have already estimated the potential value and market size of the metaverse, which could range from US$3 trillion to US$30 trillion when it is widely adopted. Optimistically, it could reach the US$80 trillion level. In terms of investment advice, the growth of metaverse companies is much greater than the economic value generated by the S&P 500, with Meta's EBITDA margin being around 36% compared to the S&P 500's 10% by last year's standards. Therefore, it is considered possible to invest selectively in Meta Universe companies or company stocks and bet on the growth potential of emerging markets.

6. Conclusion

In conclusion, this paper discusses the new industry of metaverse, the development of metaverse and some of its applications, and provides a preliminary understanding for newcomers who are not yet familiar with the industry. Some of the leading companies are also briefly discussed, and the prospects of the metaverse industry are still very much anticipated. The background of the meta-universe and the introduction of the industry are laid out in the whole article, and then the specific leading companies are sorted out and valued. Nevertheless, this is a point that all companies, and indeed the industry, will inevitably need to go through as they innovate, transform and upgrade, and the fall in share prices may also signal the possibility and hope that the metaverse industry will rise at any time.

Due to the limited data available, metaverse companies are also based on internet companies with a diverse and complex number of businesses. At the same time, metaverse is a future industry, and there are fewer references and financial data available, which has certain limitations and a greater impact on the valuation analysis, so there are more factors to consider and a certain degree of complexity. Owing to the light speed development of metaverse, it is now in a time period of light

speed development in the technology era, and an important time point for the transformation and upgrading of the technology industry. It is necessary and informative to let more people to understand the properties of the metaverse as an industry. Meanwhile, the metaverse industry will gradually move into our society in the future, (e.g., mobile phones and computers are popularly used), both in the B-side market and C-side market, the prospect and potential are especially huge. Overall, these results provide a guide to the operational composition of the metaverse and the business model.

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