

Research on China's AR/VR Industry Transformation Strategies in the Context of Domestic and Foreign Market Changes

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Abstract. In the past three years, Augmented Reality (AR) / Virtual Reality (VR) industry gradually emerges from concept into the market. Due to the technology and other various factors, the industry at the beginning of the molding is frustrated. Moreover the sudden COVID-19 outbreak in 2020 has brought new market changes at home and abroad. Based on this background, this paper analyzes the specific changes or difficulties faced by AR/VR industry under the new situation especially the attitude to the 5G, and on this basis puts forward feasible industrial transformation strategy. It is expected to provide new ideas and referential experiences for the industry research and development team, enterprises and academic researchers.

1 Introduction

After the hype of the “First Year of VR” in 2016 and the recovery in 2018, AR/VR industry has gradually formed with VR technology group and industrial chain, AR technology and concept group and industrial chain as the core. In fact, researchers and practitioners of this industry may feel and experience industrial changes at any time, and the investment and financing willingness of leading enterprises and institutions greatly determines the direction of global AR/VR industry. When this unknown industry is developing to the critical point of 2020, due to various aspects of subjective or objective factors, the changes hard to be ignored have taken place in the market at home and abroad. This series of changes had a profound impact on each mature or traditional or emerging industry. Especially for the AR/VR industry, whose trade barriers and boundaries are still fuzzy and whose basic research in enterprise is still in the phase of trial and error, the chain reaction with a wider range and greater influence could be predicted.

For domestic AR/VR industry researchers, industry practitioners and investment and financing researchers in related fields, a clear understanding and study of domestic and foreign AR/VR industry status quo and the current turning point has a significant guiding role for the next research and development, investment and financing. In the first half of 2020, the domestic and foreign markets are undergoing unprecedented changes in the market pattern, which has been in fact promoted the transformation of AR/VR industry. Therefore, the industrial logic formed by domestic AR/VR industry over the years is likely to be broken by changes in the market. In order not to repeat the serious failure 2016 VR industry, domestic relevant personnel should consider and layout AR/VR industry transformation strategy as early as possible against a series

of market changes in the first half of 2020.

2 Overview of AR/VR Industry

2.1 Overview of VR

VR refers to Virtual Reality technology [1]. In fact, as early as 1930, the concept of “Virtual Reality” was put forward, which was still an illusion at that time. Its concept has experienced germination period (1930~1960), research and development initial (1960~1990), technology accumulation period (1990~2012), initial stage of production period (2012~2015) and industrialization development period (since 2016) [2]. VR gradually expands from military market to the consumer market, gradually permeate more industries. The current domestic VR industry is at the early stage of industrialization development. After the first round of development in 2016 and two years of silence, VR industry has infiltrated every vertical industry, really going into the various application scenarios, and entered the opening and integration stage of content industry.

2.2 Overview of AR

AR refers to Augmented Reality technology. Compared with VR industry, the industrialization of AR is relatively slow. First year of industrialization for AR is generally recognized as 2019 [2]. With The launch of HoloLens2 by Microsoft as the key node, the AR industry ushered in a blowout explosion, which is still under the subsequent influence until now. Due to its close connection with VR industry, AR industry is often analyzed and studied together as AR/VR industry in the research and judgment of investors and researchers.

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3 Current situation and changing trend of AR/VR market at home and abroad

As the AR industry is in the start-up stage, AR/VR industry is still dominated by VR. According to Iresearch’s 2017 China VR Industry Research Report, the scale of domestic VR industry is expected to reach 79.02 billion Yuan in 2021 [3], becoming the main force in the world VR industry.

At present, the development of domestic VR industry quite relies on foreign enterprises in terms of technology, thus with high technical barriers. Domestic VR industry mainly focuses on the research and development of content platforms, distribution and targeted scene solutions, and is absolutely weak in equipment and technology research and development. VR offline experience store is the main application scene in the Consumer market at present. Throughout 2019, VR hardware experienced a tethered VR’s transition into Standalone HMD VR exploration process, the representative product of which is the Oculus Quest Link. It is a kind of head-mounted HMD by connecting wireless network to PC computer, which is free from the cable restraint and borrows computing power of PC devices, and is the convergence of tethered VR and Standalone HMD VR, laying a foundation for the further lightweight of VR equipment. Content production is still in the stage of accumulated trial and error, and has not entered the impulse stage; in terms of distribution platform, relevant large enterprises are building content ecology and already beginning to take shape, such as VIVEPORT.

3.1 Current situation and changing trend of AR/VR market abroad

3.1.1 The Dilemma of Insufficient Supply Chain Capacity: The hardware of AR/VR supply chain mainly includes chips, sensors, display devices, etc., and the software is divided into basic software and application software. Others include storage, chip, CMOS, lens industry chain, optical solutions, etc. It is not difficult to see that the types of supply chain required by AR/VR industry and the number of upstream and downstream industries involved are comparable to mobile phones. And that’s where the problem comes from.

With the onset of COVID-19 in the first half of 2020, the entire industry faces supply chain disruptions or insufficient capacity. For foreign enterprises with technology research and development capability and capital, such as Facebook, their supply chain is in other countries including China, South Korea and Southeast Asia. While mass production becomes difficult, the cost of hardware trial and error also keeps increasing, which brings some troubles to head companies of AR/VR industry. However, if what this dilemma brings to the head company is only trouble, then to foreign angel wheel and AB Wheel Company, it is a fatal blow. The equipment R&D iteration of AR/VR industry is at a critical stage, and the whole industry is not yet in the monopolistic atmosphere of head companies. The R&D of small and medium-sized teams is still highly feasible. However, the

supply chain breakdown directly leads to the shortage of capital flow of small and medium-sized teams, and even directly leads to team dissolution and project failure.

IDC Worldwide Quarterly AR and VR Headset Tracker (March 18, 2020) pointed out that insufficient supply chain capacity caused by COVID-19 is predicted to be directly responsible for the global drop in AR and VR headset during first half of 2020. Shipments are expected in the first quarter fell 10.5% year on year, in the second quarter fell 24.1%. At best, production capacity is expected to return by mid-year and rebound [4]. Furthermore the actual data also show that insufficient supply chain capacity does bring a dilemma to the sales of AR/VR industry, which derived from the contradiction between it and the demand for online use.

3.1.2 Surged Demand for Online Use: In the context of declining production capacity, the AR/VR industry, however, just happens to be facing a contradiction against it. COVID-19 is pressing the fast-forward button for the global technology and economic change: Users, who originally have a variety of alternatives, all crowded online. The Internet has become the only “wayout”, for all the requirements that were originally gathered offline have been put online and the online industry has been “forced” to quickly provide alternative solutions. The online VR conference is one of the typical examples: HTC V2EC Developer Conference was held on collaboration platform Engage of VR, more than 1,000 people participating in the conference using HTC Vive helmets; and IEEE VR 2020 was launched on VR platform of Mozilla.

3.1.3 IDC Worldwide Quarterly AR and VR Headset Tracker (March 18, 2020) shows the predicted data of the AR/VR market in the next five years as in Table 1. Data from the Cardboard Screenless Viewer indicate that users are increasingly turning from demand for low-priced adopters to that of powerful solutions, and the sales of AR Standalone HMD is expected to benefit from release of Hololens 2 in 2019. Tethered HMD is expected to grow by 400% this year on the basis of its original smaller industry scale. In 2020, VR Standalone HMD has become the most accessible device solution for consumers and will grow by 30.4%, accounting for 43.8% of all AR/VR headset shipments. The last generation of VR Tethered HMD as an advanced VR solution will still occupy 13.4% of the entire AR/VR HMD market.

Table1. AR/VR HEADSET SHIPMENTS, MARKET SHARE AND FIVE-YEAR CAGR BY PRODUCT, 2020 and 2024[4]

Product Category	Product	2020 Shipments (million dollars)	2020 Share %	2024 Shipments (million dollars)	2024 Share %	2020-2024 CAGR %
Augmented Reality (AR)	Screenless Viewer	0.03	0.49	0.03	0.03	-7.07
	Standalone HMD	0.41	5.82	24	31.28	176.39
	Tethered HMD	0.25	3.49	17.08	22.26	188.45
Virtual Reality (VR)	Screenless Viewer	0.39	5.55	0.1	0.13	-29.16
	Standalone HMD	3.09	43.76	25.25	32.92	69.06
	Tethered HMD	2.89	40.88	10.26	13.38	37.30

Total	7.06	100	76.71	100	81.54
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Behind the optimistic expectation is the unsustainable supply chain capacity. There is a huge contradiction between the demand stimulation of the online economy and the stability of the supply chain. In the overseas environment where COVID-19 is still rampant, it is doubtful whether IDC's research is still worth believing unconditionally.

3.2 Current situation and changing trend of AR/VR market at home

3.2.1 Excessive Expectations for 5G: In 2019, communication industry enterprises led by China Telecom Hyped related 5G concepts in order to reach the goal of rolling out 5G, particularly with 5G +VR concept spread most effectively. For the promotion of 5G concept, VR business scenario is broken down into strong interactive VR and the weak interaction VR. Correlative corporations try to accelerate the landing of 5G by means of bounding 5G to the application context of the strong interaction of VR.

However, it is worth noting that in terms of 5G +VR conceptual connection, 5G has been at the core, rather than VR business. And in 2020, the results also show that more clearly 5G industry benefited more from conceptual connection, especially for consumers' part, they can hardly enjoy any real advantage that 5G+VR proposed. On the other hand, for the business' part, VR medical treatment and VR education scene indeed get benefit from low latency and real-time advantage of 5G network. In the *5G+Cloud VR Research Report of 2020* Iresearch points out that 5G cloud applications to the Consumer end mainly include VR cloud games, VR fitness, VR social networking, VR live streaming, VR video and giant screen cinema, while the applications to the Business end mainly include enterprise training, education, VR house viewing and VR medical treatment. At the same time, the report points out that as the mainstream solution, the cloud VR solution based on 5G MEC will mature very late [5], which determines the application lag of the VR Consumers to 5G.

As a matter of fact, judging from the trend of AR/VR industry in China in the first half of 2020, both the Business and the Consumer still focus on 5G+VR, which leads to the distraction and waste of some resources.

3.2.2 Divergence of the Markets Brought by COVID-19: Since the outbreak of rampant COVID-19, domestic and foreign markets have presented different situations. The instability of foreign political and economic environment brings the uncertainty of demand; while on the contrary, The epidemic situation in China gradually stabilized and the online usage habits developed during the quarantine period further accelerates the divergence of domestic and foreign markets. The domestic market will become the core market of AR/VR industry for the next phase. Because of the outbreak of COVID-19 VR offline experience store mode for Consumers of VR industry is stricken, while for the Business side, there are more convenient offline or other terminals alternatives. This kind of business ecology is no longer applicable after this

market change. Therefore, domestic AR/VR industry and related enterprises should actively seek transformation strategies and solutions, hoping to seize this market opportunity to catch up with the technological gap with foreign countries and overtake in content and distribution.

4 Feasible Strategy analysis of domestic AR/VR industry transformation

4.1 Establishing and improving product line matrix

For domestic and foreign equipment research and development team, the first target is to establish and improve the product line matrix as soon as possible; especially it is particularly important for domestic teams. Because of the limitation of actual objective conditions, domestic teams may find it difficult to give consideration to both Tethered HMD and Standalone HMD. Moreover research and development of AR equipment also needs a lot of investment and resources. Therefore at this stage the task is to seek solutions for the hardware equipment which can be put into use in the most widely applied scenario in the current technical conditions, that is to say, to develop a product line matrix of peripheral streaming, tracking, and interactive devices with Tethered HMD and Standalone HMD as the core.

4.2 Accelerating the ecological construction of industry, education and research

Nowadays the technical barriers of AR/VR field abroad is already high, domestic AR/VR industry at present in the aspect of hardware research and development is facing great challenge, there being a clear gap with foreign countries. Especially the gap appears more obvious in release of Hololens 2 and launch of Apple Glass prototype. Presently the United States is moving to shift Chinese industrial chain suppliers, therefore AR/VR industry should unite domestic scientific research institutions and universities institutes so as to seek for ecological construction of industry, education and research for related technologies of VR and AR field. It is of the vital significance for AR/VR industry to seize this opportunity of condition change and catch up with foreign technology.

4.3 Creating featured application scenario solutions

Currently it is the primary problem for AR/VR industry to find Consumer-side application scenario that can substitute on the scale an offline experience shop of large space VR. In addition, as the whole AR/VR industry accepts Business-side order, it also needs to get cash flow from consumer side as soon as possible. Meanwhile different types of devices and platforms may devote to developing application scenarios they are apt at. For example, all the existing Tethered HMD is almost applied by the advanced users, including the heavy gamers, game developers and researchers. Therefore, it can focus on the

development of the surrounding peripherals and solutions of scientific research aspects as in the following example. VIVE's Pro Eye suite released in Cosmos in 2019 provides a convenient eye-tracking solution for Tethered HMD, which plays a great role in promoting scientific research in VR media. In contrast, Standalone HMDs are more suitable for more common consumers, so they are more likely to expand in content creation, adaptation and distribution channels.

5 Conclusion

The main market of AR/VR industry is still focused on VR, and most of the progress of AR comes from Hololens 2. At present, the world is paying close attention to watching what surprise Apple Glass will bring to the whole industry. This paper, based on the background in which industrial technology accumulation reached a new level from mid-2019 to early 2020, as well as market changes COVID-19 bring to the global politics and economy, gave an analysis of the concrete reality facing the AR/VR industry and put forward feasible transformation strategy, expecting to provide experience for the industry, academic researchers, the management and the development team.

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