A Study on Development Trends of Chinese Game Technology— Focusing on Virtual Reality

Seong Jeon[1], James Rwigema[1], Hyo-Rim Choi[1] and TaeYong Kim[1]*

[1] Graduate School of Advanced Imaging Science and Multimedia (GSAIM) Chung-And University / Seoul, Korea
*Corresponding Author (kimty@cau.ac.kr)

Abstract: Recently, a variety of games, including functional ones, have been released with new immersive experiences using virtual reality (VR). The rapid development of VR technology is affecting the Chinese cultural content market. In China, the cultural content industry is composed of many different fields including games. The game industry has been designated as the main cultural content in China. Large companies and Small Mediam enterprises(SMEs) are interested in the technologies used in VR. In this paper, we present trends in future VR technology through analysis of VR market data up to the present in China.

1. Introduction

With the development of computer graphics and virtual reality (VR) technology as well as head-mounted displays (HMDs), users can access realistic VR content at a low cost. This has attracted the attention of companies and content manufacturers toward the field of VR [1]. The popularity of VR has influenced the educational environment of China as well. Recently, the Chinese have been investing more in education with the revolution of the educational system; this in turn has influenced the development of the architecture and facilities of domestic schools. In the game market, VR games have been released continuously since games were first released on the Oculus online platform in 2013. Attention toward VR has been increasing in various fields and from that trend, it is apparent that number of applications of VR is growing. If we consider the interest of Chinese customers in VR, it clearly presents a great business opportunity and demonstrates the necessity of study to ensure the success of VR-related content. In this study, we aim to understand the game and functional game industries through analysis of markets and reported resources and prosperity of the domestic and international VR industries. Based on this, we propose cultural content related to VR and ways to increase the value of the industry by finding the best direction of development.

A. Purpose and Method of the Study

This study assesses the international competitiveness and ratio of the game industry and other industries applying Chinese VR by using iResearch of China, news, online resources, and Korea Creative Content Agency to analyze the status of VR use. Through the results of the analysis, we provide evidence that participation in VR is a new opportunity and propose a direction to enhance the quality of games using HMDs.

2. Related Work

Mixed reality (MR) displays the virtual environment as actual space through a 3D medium composed of dots, lines, and planes on the display screen.

VR is advanced technology that is partially included in information processing technology; its core technology is electronic, psychologic, computer graphic, and database technology. It is applied in various fields including education, leisure, art, tourism, architecture, film, design, military, and medicine [2].

Although the term "Virtual Reality" was coined by Jaron Lanier, the concepts or technologies comprising VR have been defined in various ways [3]. The experience of VR not only provides the participant with a situation that cannot be experienced in the real world but also allows for interaction with materialized medium through commands or controls in the virtual world using a device called a HMD [4]. The existing control device (a sensor that is handheld or worn) used in VR products and HMDs has the advantages of granting imagination, immersion, and interactivity to the user. According to research analysis, active market advancement of VR games was recommended based on the high probability of market preoccupancy and the proper genre for manufacturing was recommended based on opinions of professionals of the VR-content genre. For the strategic investment method for the activation of manufacturing by a terrestrial broadcasting system, they mention a strategic alliance with external companies for risk dispersion and the need for initial investment to secure manufacturing know-how [3].

3. Analysis of Chinese VR Market

The analysis in this study is composed of two commonly used techniques called PEST and SWOT.

PEST analysis is a model used to easily understand and analyze political, economic, social, and technological factors by concisely systemizing them; it provides the following results:

- Predicting the factors that can influence the industry or business;
- Determining the direction of the industry or business;
- Determining the factors that reflect the strategy and planning procedures.

This analysis is utilized in fields such as marketing product development, planning, and study reports. SWOT analysis is used to define strengths, weaknesses, opportunities, and threat factors through environmental analysis of the company. The purpose of this analysis is to understand the strengths and weaknesses of a company, to analyze the factors that might either be dangerous or beneficial to it, and to set the strategies for such an environment.

Problems addressed during this analysis are as follows:

- What are the PEST factors for VR businesses?
- What are the SWOT factors for VR businesses?
- What are content development methods in consideration of user evaluations?

A. Market Size

The market size of VR is illustrated by the statistics in Fig. 3-1; HMDs are set to become the next generation platform with a big influence on gaming technology.
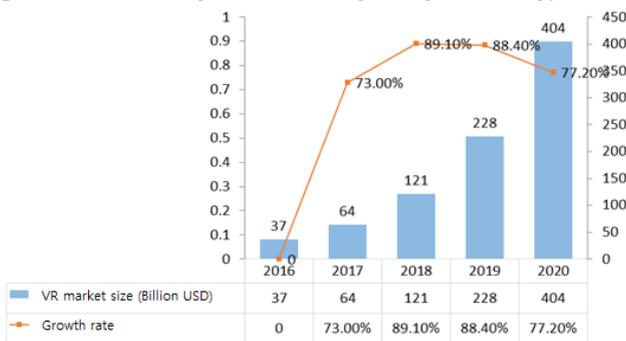

Fig. 1. **Analysis 2016 www.analysys.cn market size of VR** [5].

B. Market Size of VR

The gaming industry of China developed after the rise of the Family Computer (FC) in the Chinese market. As online game content has been gaining attention from Chinese users, games have occupied a place in Chinese pop culture for the past 10 years. The size of the Chinese gaming market has been increasing. As it has gained popularity, its economic value has greatly exceeded that of similar content such as comics, music, movies, or animation [6]. After the end of the ban on sales of game consoles, the game console industry is now fully open and international companies can sell, manufacture, and do business involving console products. Individuals and companies can now sell games on various platforms.

C. Business Types of VR

The VR industry has developed in four contexts: film making, game manufacturing, hardware, and one-person development.

VR content has been developed and manufactured in the four contexts mentioned above. China does not allow the production of adult content. According to Chinese policy, the sales and manufacture of adult content are illegal. VR content companies manufacture contents such as games or videos. Industrial applications are mostly related to the distribution industry, which distributes applications related to the military, medicine, and education. Online platforms have the role of directly selling games or videos without need for a separate distribution process [7].

D. Control Types and Technology of VR

Information-oriented society has led to the rise of interactive design with human and digital products that have permeated daily life. Following many hardware usages in game technology, a "Dream system" that uses brain wave control technology is under development. Whenever more convenient interaction technologies appear, the proportion of existing interaction methods becomes smaller. When users become accustomed to head HMDs, they will move on from a keyboard, mouse, or touch. Other interaction methods include VR using location tracking, voice recognition, and external input devices related to VR [8].

E. Research Results

As mentioned in the introduction to the research, the popular analysis models PEST and SWOT were used.

According to PEST, politically, the government of China supports the VR industry even though it is strict in the management of VR content, especially adulty content; yet, it is the most popular in the some countries (Japan, America). Economically, there has been a great increase in demand for games in the Chinese VR market as the economy of China has grown due to the increase in smartphone usage. Purchase of HMDs related to smartphone usage has been increasing. With regard to the social aspect, regardless of the increase in HMDs related to smartphones, the understanding of VR has been low. Active advertisement of improved VR equipment is therefore necessary to enhance national recognition. Finally, most VR-related technology and content manufacturing methods in China depend on foreign technology. Among the game engines used by content developers, 70.5% use unity and equipment for VR that are mostly foreign made.

According to the SWOT analysis, the main strength is that due to the development of technology, the VR industry is developing along with trends. Film making and game developing companies are actively participating to lead the VR market with great potential.

The main weaknesses are that VR games and content focus on 360-degree screens and that the use of

technologies such as location tracking or voice recognition is low. The problems include platform monopolies and content copyright problems. A major opportunity is the size of the VR market, which keeps increasing due to the open-door policy of the state department and the increase in national income. A firm that can gain control in the Chinese market can therefore expect huge profits. The main threat is major international companies that have focused attention on the VR market and are starting to invest. With the capital of major companies already in the market, it will be hard for the latecomers to profit even in the large Chinese market.

4. Proposal for Content Development Methods in Consideration of User Evaluations

First, it is advantageous to create content using tools for fast 3D object construction. VR is fundamentally composed of 3D objects, and the amount of time required to make models depends highly on the level of the designer. In particular, human bodies, complex landscapes, or robots require extensive time and costs to develop. By developing tools that can ease the effort required in making characters and modeling, more manufacturers will be able to participate in creating VR-related content and produce diverse results.

Second, by using products like the HTC vive, which uses a HMD and two controllers, most games can be played with an input function. Some content, however, requires additional equipment and thus more spending for a better experience. It is more desirable to enhance the quality of content through voice recognition or AI reinforcement than to develop content that requires detailed movements and expensive equipment.

5. Conclusion

China has an increasing market of VR and HMD buyers. VR will soon be applied to even more fields, and these changes present new business developments.

The results of PEST–SWOT analysis indicate that although there are many challenges in the business of the VR industry, considering its current market size and potential, active investment in and development of the Chinese VR market can be a new business opportunity. Furthermore, due to the popularization of VR, the future game industry will play a huge role in technology development and market growth. VR can also be applied to fields such as education, military, medicine, and art and to benefit various people such as the elderly or disabled. VR, through its extreme delivery power, is evaluated as a large application field for satisfying mental and sensory needs.

References

[1] L. Brascia and S. Elam, "How virtual reality could change moviegoing," CNN. http://www.cnn.com/2016/01/28/entertainment/virtual-reality-movies-sundance-film-festival-feat/

[2] A. Rae Earnshaw, Virtual reality systems. Academic press, 2014.

[3] B. H. Kim, 2016, "A study on business strategies of virtual reality," Master Thesis, Konkuk University, Seoul.

[4] Wikipedia, "Virtual reality," https://en.wikipedia.org/wiki/Virtual_reality.

[5] Analysis, "Market forecast of immersion virtual reality equipment in China," http://www.analysys.cn/view/report/detail.html?columnId=22&articleId=16674.

[6] Korea Creative Content Agency, "Chinese content market size and forecast (2010 ~ 2019)," 2016.

[7] iResearch, "China virtual reality (VR) industry research report 2016," 3 March 2016, http://report.iresearch.cn/report/201603/2542.shtml

[8] B. Kang, J. Kim and H. Kim, "A study on surgical education system using 3D virtual reality." Journal of the Digital Contents Society, 17 (4), 287-293, 2016.

Biographies

Seong Jeong was born in China in 1987. He received his B.S. degree in Computer Engineering from Kyungwon University in 2014. His research interests include game design and artificial intelligence. Currently, he is a full-time lecturer at the Game Technology and Application lab.

James Rwigema was born in Rwanda in 1983. He received his B.S. degree in Computer Engineering and Information Technology from the Kigali Institute of Science and Technology. He received his M.S. degree in Telecommunication Engineering from the National University of Rwanda. Currently, he is pursuing a Ph.D. degree in game engineering at Chung-Ang University. His research interests include gesture recognition and human emotion recognition.

Hyo-rim Choi was born in Korea in 1986. He received his B.S. degree in computer engineering from Kyung-il University in 2012. He received his M.S. degree in image engineering from Chung-Ang University in 2014. Currently, he is pursuing a Ph.D. degree in game engineering at Chung-Ang University. His research interests include gesture recognition and artificial intelligence.

Tea-yong Kim was born in Korea in 1960. He received his B.S. degree in electronic engineering from Hanyang University in 1986. He received his M.S degree in electronic communication engineering from Hanyang University in 1988. He received his Ph.D. degree in electronic calculation from Pohang University of Science & Technology in 1998. He is currently a full professor at Chung-Ang University. His research interests include digital imaging and artificial intelligence.