

Research on the Consumers Purchase Demand of VR Equipment in Chinese Market

Meimei Cao

College of Arts and Design
Beijing Forestry University
Beijing, 100083, P. R. China

Yi Feng*

College of Arts and Design
Beijing Forestry University
Beijing, 100083, P. R. China
fengyid@163.com
*Corresponding author

Abstract—This paper starts from consumers’ behavioral characteristics and rules, and conducts an empirical study on consumers’ cognition and purchase intention of VR devices by taking potential VR devices buyer as the research objects. Online questionnaire and field questionnaire are adopted. Through the analysis of the survey results, it is found that consumers have a general awareness of VR devices and are not willing to purchase them. Price, performance, comfort level and understanding level are the main factors restricting consumers from purchasing VR glasses. Suggestions for product innovation and development are put forward based on the research results.

Keywords—VR device; market survey; virtual reality industry; purchase demand

I. INDUSTRY OVERVIEW AND RESEARCH STATUS

A. VR devices and industry development status

VR stands for virtual reality, is the technology to provide users the simulated auditory, visual and other types of sensory experience within the computer-generated three-dimensional virtual environment. Current VR technology most commonly uses head mounted display and other auxiliary equipment like non-headgear devices and gloves [1]. The VR devices referred in this paper mainly indicate virtual reality glasses or goggles, virtual reality headsets and other head mounted displays. China began to put emphasize on the research and application of VR in the 1990s, deployed it firstly in the military field. 2016 has witnessed the dramatic development of VR industry, with VR entering the market.

In China, by 2016, the financing of VR equipment reached 1044.9 million Yuan. With the development of technology and equipment update, it is expected to reach 100 billion Yuan in the future [2].

In addition to technology and policy support, the key to develop the VR is to gear the product to the customers’ requirements [3]. In the current market, it is of guiding significance for the development of VR industry and product sales to grasp the characteristics and purchase intention of Chinese VR device consumers. The driving factors of VR innovation are shown in TABLE 1.

TABLE I. THE DRIVING FACTORS OF VR INNOVATION

Factors	Major Expressions
Technology	Monopoly issues and market characteristics
Market	Demanding simulation experience
Policy	Encourage the development of VR industry

B. Research status and literature review

The government plays the lead in the development of the VR field, with scholars participating in the pathway exploration. Domestically, the VR technology has been mainly applied to fields like game, film and television, experience museum, real estate, tourism, medicine, education, military and exhibition [1].

Lv Qin [4] and other scholars have discussed the technological development of China’s VR industry based on the analysis of the technical challenges of VR. Liu Jie [5] and others have proposed a new solution for improving VR application performance by studying 5G network for VR network solutions. Mao Yang [6] has discussed the application and development of VR technology in industrial design, based on which proposed the optimization feasibility of VR design method. Yu Mengli [7] and others have explored important predictors of user experience perception by testing VR devices and applications.

In order to analyze consumers’ cognition and purchase intention of VR devices, as well as the factors affecting consumers’ purchasing, a questionnaire survey was conducted on the theoretical basis.

II. STUDY PREPARATION AND QUESTIONNAIRE DESIGN

A. Preliminary research

In a bid to design a clear and detailed questionnaire, a research was launched in advance on the age, gender, position and income of 15 potential consumers.

In the terms of the VR device cognition, 15 respondents hold that it should include the specific content, the way to use and the places to use. 13 deemed that it should contain understanding level, where they get to know the VR device and the specific performance of the devices. 7 thought that brand and category should be included.

As for purchase intention, they have reached an agreement that it is necessary whether consumers are intended to buy the VR devices. Among the factors influencing the purchase, price,

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performance, comfort, quality, pre-purchase experience, and impacts on eyesight have been chosen by the 15 people. 8 respondents also selected the network stability, appearance, operability, use space limitation and immersion. 6 interviewees chose the brand, usage and operation interaction. The questionnaire was designed based on the results of this preliminary research.

B. Questionnaire design

With the potential consumers of VR devices as the research object of this paper, the questionnaire investigation is conducted on the cognition, purchase intention and influencing factors. The structure is as follows:

- Title: market research on the cognition and purchase intention of VR devices and the factors influencing the purchase
- Content: 7 items of potential consumers' cognition on VR devices; Purchase intention; 15 items influencing consumers' purchasing, 7 items influencing consumers' refusal to buy; 10 fields to advance in the future. Single and multiple choices are mixed.
- Background: gender, age, income and other basic information.

III. INVESTIGATION AND RESULTS

A. Sample data collection and data description

This questionnaire is mainly distributed online. A random field survey is conducted to fill in the online questionnaire. A total of 83 questionnaires are collected from the objects aging from 18 to 50.

Among potential consumers of VR devices, male accounts for 43.37% and female 56.63%. Age is one of the most important factors affecting the consumption of users, which affects the acceptance of products. In the questionnaire, 71.43% of potential consumers are aged between 18 and 25, 17.86% are between 31 and 40 years old, 7.14% are aged between 26 and 30, and 3.57% are aged between 41 and 50

Among the surveyed users, 43.37% have a monthly income of less than 2000 Yuan. 18.07% have a monthly income above 2001 Yuan yet below 5000 Yuan. 19.28% have a monthly income within the range from 5001 to 8000 Yuan. 9.64% earn from 8001 to 12,000 Yuan monthly. 3.61% have a monthly income of 12001-15,000 Yuan, and 6.02% have a monthly income of more than 15,000 Yuan.

B. Analysis of consumer cognition of VR devices

Most consumers have some understanding of VR devices. From the survey data, it is known that those who have participated in the virtual reality development account for 12.05%. 6.02% can tell from VIVE and Oculus. 31.33% have connected VR equipment to computer. 26.51% have played the all-in-one machine. 26.51% have connected VR device to the phone. Only 9.64% of the respondents have no idea about the VR devices.

According to the survey, 71.08% of consumers know about VR devices through the internet. 16.87% know from friends and relatives. 10.84% know about the devices because they

work in related industries. 48.19% get familiar with them from offline experience. 13.25% know little about them. It can be seen that consumers mainly know about VR devices through internet, and offline experience.

According to the survey, consumers think it is more important to understand the VR devices in terms of usage form, specific performance and usable scenarios. Use form accounts for 60.24%. Specific performance accounts for 66.27%. Usable scenario accounts for 67.64%. Device type accounts for 25.3%. Brand accounts for 10.84%.

C. Analysis of consumers' buying intention for VR devices

It is concluded from the survey that 33.73% of the consumers have the inclination to buy the VR devices, and 66.27% don't.

In the survey, it is found that those who have the intention to purchase aging from 18 to 25 years old account for the highest proportion (71.43%), those 26-30 years old account for 7.14%, those 31-40 years old account for 17.86%, and those 41-50 years old account for 3.57%.

The main factors that make people unwilling to buy are designed in multiple choices. Economic condition accounts for 58.18%, "little understanding with little experience" for 49.09%, "no interest in VR" for 10.91%, "impractical products with few prospects" for 1.82%, "no time to use" for 20%, "hard to play" for 3.64%, and "uncomfortable wearing" for 27.27%. See Fig. 1 for details. It can be seen that the main factors influencing consumers' refusal to purchase are the economic situation and the degree of understanding and experience.

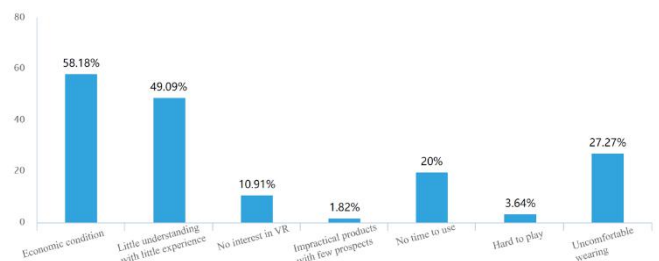


Fig. 1. The main factors that result in consumers refuse to buy VR devices

D. Analysis on the influencing factors of consumers' purchases of VR devices

In the research, the consumer can multiselect from 15 indicators. Seen from the result, the indicator of "performance" occupied 78.57% of the total, "price" 60.71%, "immersion" 60.71%, "comfort" 57.14%. "Try before buying" accounted for 50%, "influences on eyes" 46.43%, "convenient operation and interaction" 42.86%, and "the use of space limit" 39.29%. The "usage" accounted for 39.29%, "appearance" 32.14%, "network stability" 32.14%, "operability" 28.57%. "allow playing with others" accounted for 17.86%, "service life" 14.29%, "brand" 10.71%. It can be summarized that performance, price, immersion, comfort and experience are the main factors influencing consumers' purchase. See Fig. 2 for details.

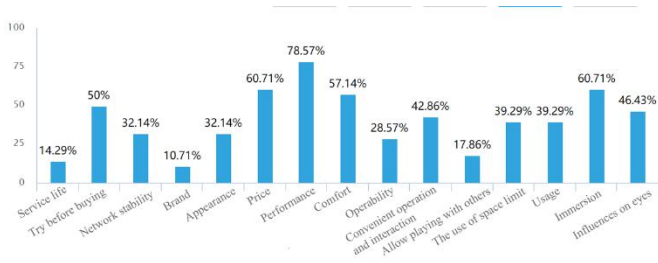


Fig. 2. The main factors determining consumers' purchase

E. Consumers' preference on the future development direction of VR devices

As for the VR application field, at most 5 items can be chosen at once from 9 items. The research demonstrated that "game" accounted for 92.86%, "design" 60.71%, "film and television" 60.71%, "education" 57.14%, "medical science" 46.43%, "exhibition" 39.28%, "tourism" 32.14%, "military" 25% and "sales" accounting for 3.57%. It illustrated that consumers are more inclined to use VR in games, design, film and television, and education.

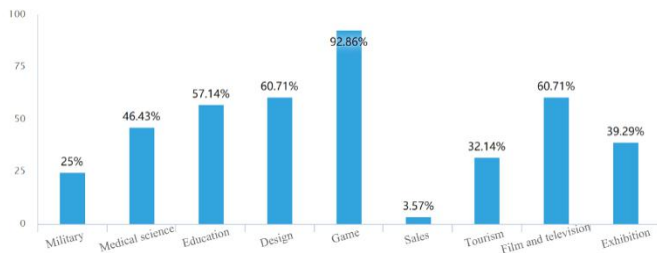


Fig. 3. Consumers' preference for VR devices application field

IV. SUGGESTIONS FOR CHINESE VR ENTERPRISES

A. Suggestions on products and services of VR enterprises

It is necessary to research and develop VR devices according to the industrial status, the culture, custom and hot industries of the region. For example, tourism-related products can be designed in places that are attractive for tourists. In addition, the VR products should comply with the national policy orientation and also be in line with consumer demand preferences.

As for the target consumers, it is recommended to aim the young people that age from 18 to 40, and are curious about new products. These groups of people are generally acceptable and affordable to these goods and have spare time to play with them. High-income groups are not recommended as a major consumer group, due to the fact that though they are affordable to the products, they do not have enough time to enjoy.

In terms of future expectations, consumers are inclined to use VR devices for leisure amusement and entertainment. The industry should develop different kinds of games, movies and other contents to attract ordinary consumers. In terms of education, medical treatment, design, tourism, exhibition and sales, we need to pay attention to the demand of other industries for VR devices and seek potential customers in an active manner.

With regard to specific product performance, the immersion, ease of operation, convenience of interactive operation, network stability, limit of use space and the ability to play with others depend on the innovation and development of VR technology, 5G network and interaction design. Common technological advances in related industries are needed to optimize the device experience, so as to attract consumers.

In terms of service, it is suggested that the enterprises engaged in VR should improve their attitude towards consumers and their after-sales service. After-sales service affects the customers' behavior to buy new products or to introduce to other potential users. Therefore, the good after-sales service must be ensured.

B. Suggestions on the publicity and promotion of VR enterprises

VR industry has a potential huge market. The survey found that consumer know little and inaccurate about VR devices mainly through online and offline experiences. They get to know VR devices from online data more than from the offline experience. Therefore, the limited experience on them fails to attract consumers who value the trying before buying. To sum up, enterprises should increase offline experience methods, devices, places and participation channels to meet consumers' experience needs and improve consumers' awareness of VR devices.

In terms of publicity, since the main consumer groups are young and middle-aged people who mainly obtain information through the Internet, it is more effective to search the browsing channels and content of this age group on the Internet and publicize according to on the focus of consumer groups.

In terms of sales promotion, it is suggested to organize offline experience for consumers to know about VR devices, invite stars or experts who are followed by a lot of consumers to conduct experience publicity, so as improve the public awareness of the VR products, and regularly push new devices and contents to existing customers.

C. Suggestions on price, channels and other aspects for VR enterprises

As consumers value performance and price, and pay attention to cost performance, the VR industry needs to adjust price and increase publicity to fuel its development. It is viable to develop products according to the common characteristics of people in different age groups, to cater to the needs and preferences of consumers.

In view of the fact that the target consumers consist of a large number of students who have weak purchasing power, it is necessary to expand the payment methods to promote the sales of VR equipment, such as installment payment which is suitable for those with the low purchasing power but strong interest in VR and may bring following purchasing. What's more, enterprises need to further expand online sales channels. It is obvious that consumers they prefer to know VR devices online and are accustomed to buying products online. In online sales, enterprises can offer appropriate discounts to attract young consumers.

Additionally, it is suggested that VR enterprises should actively negotiate with local museums, exhibition halls and other large public areas, and adopt VR equipment to design contents of exhibits and other items, so as to provide a variety of experiences for the public to understand and experience VR equipment in daily life.

V. CONCLUSION

Based on the characteristics and rules of consumer behavior, this paper investigated the consumers' perception and purchase intention of VR devices, and analyzed the factors that influence the purchase. Taking potential consumers of VR devices as the research object, this paper conducted an empirical study on consumers' cognition and purchase intention of VR devices, and adopted a consumer demand survey with the aid of online questionnaire and field questionnaire. It is found that customers are mainly affected by their economic status and the experience of the product when purchasing. Consumers care about the use form, performance and use scenario of VR devices, and they are inclined to apply VR devices in games, design, film and television and education. It is suggested that enterprises target consumers at young groups that are curious about new products, and develop VR products that are immersive, easy to operate and boast good interactive experience.

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