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# Analysis on the Application of VR based Immersion Interactive Fitness Game in Auxiliary Health Management

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***Abstract:*** With the rapid development of science and technology, virtual reality technology (VR) emerges as the times require. It has a strong sense of immersion, interaction and imagination, and can be applied in military, game, education and medical fields. The combination of VR technology and fitness solves the tediousness of traditional fitness, and enhances the interest of fitness and entertainment. At present, China Mobile health industry is in the market start-up stage. In 2015, the market size reached 4 billion 880 million yuan, an increase of 62% in the same year. At present, most of mobile health services only focus on the improvement of user experience, and do not touch the core of medical care. Mature business model has not yet formed. This paper analyzes the application of VR industry in the field of auxiliary health with VR fitness game as the guide.

***Keywords:*** *VR, Immersive, Interactive Fitness Games, Health Management, Human-Computer Interaction*

## I. INTRODUCTION

The experience of many developed countries and some developing countries has proved the economic effectiveness of health management based on community health service institutions. Community health service in our country integrates prevention, medical treatment, health care, rehabilitation, health education and family planning guidance. Its purpose is to provide community residents with economic, convenient, effective, comprehensive and continuous health services. Its service objects are not only patients, but also sub-health and healthy people. The service contents and objects of community health service institutions are closely related to health management. At the same time, the continuity and long-term characteristics of the implementation process of health management are also suitable for the steady development of community health service institutions. Combined with the characteristics and needs of community health services, health management can provide help and support in the following aspects: establishing health records, identifying and controlling health risk factors, and implementing health education. Provide guidance on health and medical needs, build a personal health information network platform, and facilitate patient information sharing between the community and designated hospitals.

The mobile health industry forms the mobile health service chain around the health service activities provided by users. Doctors and other professionals, medical institutions, drug sales and production and other resources bear the lifeblood of mobile health. Consultation, appointment and registration fields run through the market demand of mobile health. Medical e-commerce provides the basis for mobile health profits. On this basis, the supply of intelligent hardware and the participation of third-party service providers such as payment and insurance make the mobile health service chain mature day by day. This chain of value creation activities is the source of user value. In each link, users will weigh and compare their perceived gains and losses, and finally form the perceived value of users, resulting in the value chain of mobile health users. Therefore, the value chain of mobile health users is a whole of user perceived value based on the transaction process and relationship process of mobile health service chain.

It is not hard to see from the mobile health service chain that the value source of all activities comes from users. User value is the core part of the value-added of mobile health industry. User value chain and mobile health industry value chain are interdependent. Therefore, if the mobile health market wants to have excellent user value creation ability, on the one hand, it needs to integrate the value chain of relevant organizations in the whole industry service chain based on user value, on the other hand, it needs to evaluate the life cycle of the mobile health industry, so as to optimize and reconstruct the basic value chain of the industry.

## II. THE PROPOSED METHODOLOGY

**Development of VR Fitness Game.** At present, the VR product interaction mode of the three major companies in the market is also based on the above interaction mode. Sony's PS VR uses PS handle and PS move for operation; oculus VR supports Xbox handle and introduces touch and other relatively novel operation modes to let users operate with their fingers as much as possible; HTC vive's input scheme does not use traditional handle, but includes both hands and head into the positioning system through two positioning handles and one with positioning function The head display of the completes the input. Sony VR and oculus VR are cinematic sitting experience, while HTC vive is somatosensory standing experience. Through the above comparison, we can see that the design idea of HTC vive is to fully mobilize the user's arms, thighs and other more limb joints to participate in the control, which consumes a lot of physical strength and is more suitable for use as VR fitness equipment.

VR fitness bike system includes bike body, reed, resistance mechanism, fan mechanism, motor drive module, single chip microcomputer, computer and VR helmet display. The reed can measure the riding speed in real time, the resistance mechanism can provide the resistance sense in the riding process, and the fan mechanism can simulate the speed sense in the riding process. The motor drive module controls the resistance mechanism and fan mechanism by single chip microcomputer. The computer displays VR scenes, and the VR helmet display synchronously displays the computer VR scenes. The VR

fitness bike system achieves the same effect of actual riding and scene riding.

This technology gradually took shape in the 1980s, and was first applied to the military field. In recent years, VR has developed rapidly in live broadcast, aerospace and play fields, relying on the cloud computing, big data fusion, progress of sensor production level, and maturity of 4G and 5g technologies of mobile communication network. VR is an integrated technology realized by computer science, human-computer interaction, sensor technology and artificial intelligence. First of all, the computer image processing is used to make realistic visual, auditory and olfactory effects, which can simulate a realistic virtual space. Then let participants with the help of certain technological equipment, to achieve virtual and real interactive courage. When the user uses the device to move, the computer will carry out precise calculation through the returned signal, quickly match the 3D picture produced with the device's movement, and ensure the user's presence. In order to implement a complete set of VR technology, the following technologies are needed, including the following content: CG technology, computer simulation technology, artificial intelligence, sensor level, display equipment, network connection and other technologies. The brief expression is a high-end virtual imaging technology realized by computer-aided, which enables users to interact with the complex class data processed by computer. This is a major innovation in the field of science and technology for the traditional man-machine window operation.

In order to make better use of VR technology to develop sports fitness platform, we are developing relevant

When it comes to technology, developers need to focus on the following aspects:

(1) Functionality. In the process of development, developers need to consider the specific functionality of sports fitness platform. Using VR technology to develop the sports fitness platform needs to pay a lot of costs and consume a lot of human and material resources. Therefore, product functionality is the top priority. Make an assessment of the functionality of the product. When the product can provide real help to the bodybuilders, relevant personnel need to conduct market research and analysis according to the functional nature, and choose a reasonable development plan based on the research and analysis.

(2) Humanity. As a software for individual application, the functionality of the software is the most important aspect for the relevant personnel. When a product has a better human characteristics, can make users more convenient for application, it can have a higher degree of customer dependence, can be better promoted. In this respect, the humanity of products needs to be designed by special personnel. For example, VR platform of virtual accompanying sports and fitness is a good development direction. In the traditional fitness process, the fitness person is often a person for fitness, lack of communication with the surrounding people in the process of fitness, which leads to some people's fitness activities are difficult to continue. The fitness platform based on companionship can provide instant companionship for the fitness people, so that the fitness people have a better use experience.

(3) Innovation. As an application of computer technology, the innovation of application has always been the aspect that relevant personnel need to consider and focus on development. Fitness has a lot of different fitness content, fitness people can make a lot of choices in this process. This multiple choice also provides many innovative opportunities for the development of sports and fitness VR platform. In order to make the VR platform of sports and fitness more competitive in the market and provide users with more diversified services, the innovation of VR platform of sports and fitness is a very important aspect.

**Health Assessment Analysis.** Health assessment in health management: health assessment in health management includes three parts: health status assessment, health risk assessment and health follow-up assessment. Among them, health status assessment is the foundation, health risk assessment (HRA) is the core, and health follow-up assessment is the test of the first two and the effect of health management. The whole process of health assessment is guided by the health manager. The work of the health manager in the occupational function of "health risk assessment and analysis" includes risk identification, risk analysis, group risk assessment and group risk management.

At present, health assessment is widely used in physical examination center. Health status assessment is similar to nursing assessment. It collects the health information of assessment object through observation, conversation, self-assessment questionnaire, physical examination, etc., including health history, physical assessment, psychosocial assessment, laboratory examination, equipment examination, etc., so as to understand the assessment object To provide objective basis for the development of follow-up health management plan.

Health risk assessment and analysis refers to the occupational function of qualitative and quantitative assessment and Analysis on the health status of individuals or groups and the risk of future illness or death with various health risk assessment tools according to the health information collected by health monitoring.

According to who's definition of health, we can see the factors that affect health, that is, the risk of health is not single. According to the theory of multiple causes in modern medicine, the occurrence of diseases is influenced by heredity, environment, life style and so on. Therefore, how to identify risks, avoid risks, seek opportunities to create profits in risks, and maintain and promote health is of great significance. Health management is providing such a way.

At present, the widely used health risk assessment can be divided into clinical assessment, health process and result assessment, life style and health behavior assessment, public health monitoring and population health assessment according to different application fields. The complete assessment process generally includes three basic modules: data collection, risk calculation and assessment report. Health data are collected by self-assessment questionnaire survey, supplemented by general physical examination, laboratory examination and other means, including physiological and biochemical data, lifestyle data, personal or family health history, mental status data, attitude and knowledge data. The calculation of risk degree is based on the quantitative analysis, and the relationship model between risk and risk factors is obtained by using statistical probability theory. The evaluation result is the main content of the evaluation report.

In the new medical reform, it is proposed to increase the investment in the basic level health funds, but the specific amount of funds put into the health management project is still unknown. Therefore, how to determine the total amount, distribution and structure of health investment to maximize the realization of the goal of ensuring citizens' health is a key issue

to be considered. In the mode of health management combined with health insurance business, insurance companies have become purchasers of health management services, and the standards and payment methods of their purchase have not been established in China, and the fees for health management brought by different health management contents are different. This requires consultation between the health management company and the health insurance company to determine the final price and payment method.

**VR Assisted Fitness Management Mode.** As the evaluation part of service design and service transformation in the mobile health service life cycle, mobile health practice focuses on how mobile health technology can change the traditional medical service mode and how technology and service mode innovation can solve the problem that mobile health cannot reach the "core" of medical treatment. Mobile health technology evaluation includes two aspects: software and hardware. It focuses on how to transfer mobile health services through hardware and software.

The gain and loss of user perceived value is the key to the formation of end-user value. This evaluation dimension corresponds to the two stages of service transformation and operation in the mobile health service cycle. The evaluation focuses on perceived benefits, including safety and quality. In terms of security, confidentiality and authorization of product and service information are the focus of evaluation. In terms of quality, the model mainly evaluates whether the service can provide decision support for users (medical professionals, patients, etc.) to form a good self-management validity.

The mobile health assessment model combines the core model of information system assessment in the field of electronic health and the characteristics and actual situation of the domestic mobile health market, and associates the user value with each stage of the service life cycle of the mobile health industry for systematic assessment. Market participants can find the irrationality in the current service and design through the evaluation of various aspects of the model, promote the development and innovation of products and services, and finally create user value while realizing enterprise value-added. In addition, users can also evaluate the effectiveness of mobile health services and products according to each stage of the model to assist decision-making. It is worth mentioning that the model is based on the current domestic mobile health market environment. With the development of mobile health market, the content and focus of the evaluation will also change.

At present, VR fitness has many problems, such as expensive equipment, non comfort, low popularity, technology gap and so on. The high cost of VR helmet is one of the main obstacles of VR fitness. At present, VR helmets are cumbersome to wear. Some devices are prone to vertigo when wearing, and sweat can't volatilize in time after exercise, so the comfort brought by VR helmets is poor. Now there is a disposable headband for consumers to replace, but this is only a temporary solution. The fundamental solution lies in the simplification of VR helmet, which needs to be further improved in technology. At present, VR technology is still growing and developing, which requires more talents and capital investment. The main technical problems of VR technology are image recognition, data storage, screen refresh rate, screen resolution, delay and other hardware improvements.

The continuous adjustment of national macro policies provides a favorable objective environment for the development of VR technology and the mature evolution of VR industry. At the same time, fitness is also an important development direction of VR industry. I believe that capital investment of the country and market will bring more technology upgrades in the future.

VR fitness is conducive to creating a rich set of fitness users, with the characteristics of inclusiveness, immersion, social and security. At present, we should make good use of these characteristics to develop VR fitness services that include both indoor and outdoor sports vision, novel entertainment experience and traditional fitness projects, combination of collective social scene and personalized needs, combination of professional guidance and independent learning.

## CONCLUSION

Based on the investigation of the current VR fitness cognition and the analysis of VR products on the fitness mailbox platform, combined with the relevant literature, this paper combs the functions, advantages, problems and development strategies of VR technology in the field of fitness. As a subdivision of VR industry, VR fitness has a good prospect. For example, VR fitness bike solves the tediousness of traditional fitness and enhances the interest of fitness and entertainment, but VR fitness bike needs a sense of sports reality.

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