

A Brief Analysis and Exploration of the Smart Home Care Model

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Abstract

At present, the problem of China's population is becoming more and more serious, how to realize "the old, the old" has become an important research topic. Starting from the growing demand of health and elderly care, this paper analyzes the development situation of the smart home elderly care industry at home and abroad, further combines the deficiencies in the current construction process of smart elderly care system in China, and explores the smart home elderly care model suitable for China's national conditions.

Keywords

Aging population; Smart elderly care; Internet +; Intelligent system.

1. Introduction

At present, China has become one of the most serious population aging countries in the world. By the end of the year of 2019, China had reached 253.88 million, accounting for 18.1 percent of the population, according to the statistical communique of the National Bureau of Statistics. Among them, 176.03 million elderly people aged 65 and older have reached, accounting for 12.6% of the total population [1-2]. The aging of the population is bound to bring many social problems and challenges. Such a large number of elderly people all rely on nursing homes and other public facilities, which is unrealistic in terms of human, material and financial resources.

With the development of sensor network, the Internet, big data, cloud computing, artificial intelligence and other technologies, the smart home care model supported by technology has emerged at the historic moment. The model relying on emerging Internet resources and social forces, the community as the unit, with the elderly care information service platform as the core, integrate the online and offline resources, integrated the monitoring, rescue, medical, nursing, rehabilitation, entertainment function in one, improve the elderly care service efficiency, break the traditional single, closed elderly care mode, become a new way in the world to solve the problem of aging. Starting from the growing demand for health care, this paper summarizes the development situation of the smart home care industry at home and abroad, analyzes the deficiencies in the current construction process of smart care system in China, and explores the smart home care model suitable for China's national conditions.

2. Requirement analysis

The home care model refers to the social services of the elderly to provide the elderly with the family as the core, community and professional services. It is an extension of the traditional family elderly care model, and an important content for China to develop community services and establish a elderly care service system[3].

Developed countries mainly take core families as living units, and rarely have three generations living together. However, this phenomenon is very common in China. In China, the elderly tend to live at home, influenced on the one hand by the traditional Chinese filial piety culture; on the other hand, because the elderly prefer to retire in a familiar environment, once they reach a

strange environment, they will inevitably feel lonely and frustrated. However, the traditional home care model needs to spend a lot of manpower, material and financial resources, while young children shoulder family responsibility, economic pressure, need to work hard, unable to accompany the elderly in real time. In order to effectively make up for the lack of function of traditional home care, the smart home care industry has emerged at the historic moment. Smart home care is an elderly care model that makes full use of the new generation of information technologies such as the Internet of Things, big data, cloud computing and artificial intelligence, deeply excavates the needs of health and elderly care, efficiently connects health and elderly care resources, and provides personalized and precise elderly care services to the elderly. Smart home care industry is a collection of economic activities carried out around smart health care products and services. It is an emerging industrial form bred by the deep integration and application of the new generation of information technology on the basis of the traditional health and elderly care industry.

3. Research progress at home and abroad

The problem of population aging is becoming increasingly serious, and all countries are actively exploring ways to solve the aging problem. The concept of "smart care" was first proposed by the British Life Trust, and was derived from the basis of building a "smart city". Nowadays, smart elderly care has become a new way for all countries in the world to solve the problem of aging.

3.1. Foreign smart care research

Western countries have entered the aging society early and lasted for a long time. The research on elderly care problems has started early and the technology is relatively mature. The British Life Trust first put forward the concept of smart elderly care, which refers to the sensing network system and information platform for home-based elderly, communities and elderly care institutions, and on this basis, it provides real-time, fast, efficient, low-cost, Internet of Things, interconnected and intelligent elderly care services. In 2008, Courtney [4] investigated the elderly's willingness to live and living environment, which showed that the elderly prefer to live in the nursing community and hope to improve their quality of life and safety through nursing facilities.

For the research of smart home care system, there are more foreign research in this respect and relatively mature technology, focusing on the research of early warning system and telemedicine. Honor in the US, focusing on elderly care services, has developed an online market platform. The caregivers indicate their service type, qualification, skills and service time on the platform, and the elderly also indicate their personal information and service needs. Honor will match the nursing worker information with the needs of the elderly for service docking. The university of Maryland developed an information management system called Time Bank Manager(time management bank), volunteers provide free services for the elderly, and the service time into the time bank, when volunteers need relevant services, you can extract "time" to enjoy service, this kind of mutual elderly care is also many communities in our country imitate [5].The Etchemendy Research Group in Spain has specially developed a health management platform to improve the mental and psychological needs of the elderly. When the elderly has negative emotions, the system will accurately feel the psychological changes of the elderly, and timely evaluate the psychological status of the elderly, to provide one of the most suitable relaxation treatment for the elderly. Swedish Tass company developed a mobile health monitoring system based on Android system, also the mobile phone health monitoring software design, system through the wireless interface will mobile phone and wireless network, the sensor collected health data (blood pressure, blood lipid, heart rate, etc.) transmission to the mobile phone and do a good job of data analysis and health advice [6].

In order to keep the elderly or patients independent and enjoy 24 hours even without hospital admission, smart home and assistive devices were explored abroad in the 1990s. Tabar has explored the wireless sensor network for voice alarm when the elderly accidentally fell down [7]. Sarela uses wireless sensing technology, communication technology, signal processing technology to study the intelligent alarm system, used to monitor the abnormal behavior of the elderly [8]. Leijdekkers focuses on the hardware of telemedicine testing with the purpose of facilitating rehabilitation care for elderly and chronic patients [9]. Based on RF recognition and mobile technologies, Raad proposes mobile telemedicine solutions to monitor for the elderly through wearable devices [10].

As they age, memory decline and Alzheimer's disease have become common problems in the elderly group, coupled with the decline of various physical functions, the elderly always need to be tested, reminded and help. Scholars and research institutions around the country hope to solve this problem with the development of elderly care robots. The action-assisted robot developed by Takahashi research can assist the elderly in walking, moving, and going up and down stairs. The emotion regulation robot studied by Wada has the function of identifying the elderly's emotions and making corresponding counseling. Tanya Minyong's massage robot, equipped with a six-dimensional force sensor, can transmit information preparation to the upper position machine, and accurately control the massage intensity of [11].

3.2. Domestic smart care research

Most of the domestic research on intelligent care mode focuses on the category of system design, and the research on intelligent elderly care terminal equipment and intelligent elderly care services is still relatively scarce. At the same time, affected by local economic differences, the development level of smart elderly care model is obvious. Overall, the research is still in its infancy.

Research on smart elderly care model

Smart elderly care platform is the elderly care service mode produced under the background of deep aging and the joint action of technology development and the elderly care market demand. In recent years, the Internet of Things, cloud computing and big data have been becoming more and more widely used in smart elderly care platforms, providing safe, applicable, accurate and efficient services for the elderly. In 2015, Zhang Yuqiong [12] believed that the purpose of the smart elderly care platform is to use various resources to provide life care and spiritual comfort for disabled elderly and ensure the safety of disabled elderly, which is an important way for disabled elderly to maintain their family network and expand their social network. In 2017, Li li and other [13] think to build elderly care service platform based on big data, cloud computing and intelligence, by integrating all kinds of resources and all kinds of technology, establish a comprehensive elderly care database and monitoring center, effectively integrate, under the perspective of technology wisdom elderly care and the needs of the elderly, form and improve the information database, so as to solve the problem of elderly care service supply and demand imbalance. In 2019, Huang Xueqin [3] put forward the concept of "Internet + home care". With the help of Internet communication and other information technologies, it will effectively supplement the shortcomings of the traditional home care system and improve the quality of life of the elderly.

Smart elderly care service products

Intelligent care products are an indispensable part of smart elderly care services. From the initial fixed products to mobile products, to the later wearable products and contactless products, intelligent elderly care products are updated quickly and more and more "humanized", escorting the safety of the elderly. In 2019, the UWB positioning technology research based on TDOA passive measurement conducted by Deng Shufen [14] has achieved good results in the intelligent elderly care system. When the elderly need medical assistance or

get lost, they can accurately locate and prompt them to facilitate the timely search of caregivers. In 2020, Wang Qi [15] et al proposed human fall behavior recognition methods based on support vector machines. Can be the first time to remind the fall situation, timely treatment of the elderly. The elderly care system based on the STM32F4 master control chip designed by Yan Lihong[16] et al has well solved the problem of health status monitoring. The health monitoring system adopts the STM32F405RGT6 processor of the Italian semiconductor as the main control of the system and the SIM800C module as the long-distance control data chain. The terminal can receive the relevant monitoring parameters in the first time on the children's mobile phone. In 2020, Wang Zhao [17] et al carried on the visual and PAD model of emotional robot research, first used the face recognition algorithm and facial expression recognition algorithm of analysis of emotion, finally to let the robot simulation human make different emotional expression, reached the function of human-computer interaction, emotional communication, the emotional robot in the elderly group, also played a certain role in spiritual counseling.

Smart elderly care service content

The smart elderly care service mode breaks the traditional single and closed elderly care service mode, and integrates the elderly care service resources of families, communities, government, market and volunteer organizations. The elderly can book their own service needs directly through the elderly care service platform. Based on Maslow's demand level theory, the content of smart elderly care services can be divided from low level to high level, divided into life care, safety guarantee, spiritual comfort and social participation. China is still in the primary stage of the research and application of smart elderly care services. In 2020, the Ministry of Industry and Information Technology, the Ministry of Civil Affairs and the National Health Commission launched the Promotion Catalogue of Smart Health and Elderly Care Products and Services (2020 Edition). After the recommendation of local competent departments, expert evaluation and online publicity, 118 products and 120 services were finally listed in the promotion catalogue.

In 2015, the Internet of Things "Smart elderly care" project of Nanda Sute Technology Co., Ltd. was piloted in Gulou District, Nanjing. Using Internet of Things technology to inform the family through various sensors, so that the daily life of the elderly is in a remote monitoring state [18]. In September 2016, Beijing chaoyang district eight zhuang street in eight zhuang east, eight zhuang west, miles fort three communities for "wisdom endowment, medical combination" pilot, facing the community issued 350 smart watches, can monitor wearing blood pressure, blood oxygen, heart rate and other basic health data, with a key call for help, family dial and other simple operation function, to provide security for the elderly. Smart watches can also realize the "cloud synchronization" of monitoring data with relatives of the elderly and community health service centers through the mobile Internet[19]. In 2017, Manas County launched the "Internet+Elderly Care" smart service project, combining elderly care with green health care, nutrition and diet, entertainment and leisure and other industries. Through the "Internet + health and elderly care" online and offline ways, we will strive to improve the level of Manas health and elderly care service in Manas County.

4. Problems existing in the development of smart elderly care in China

China's smart elderly care began in 2012, has experienced the industrial bud, development period, and now has entered the golden period. Under the leadership of the government, as well as the rapid development of "Internet +" technology, various types of enterprises actively in the wisdom elderly care industry, to provide direct or indirect wisdom services, social organizations as a direct provider of public services, in the wisdom elderly care service plays a unique role in connecting government, enterprises and community elderly groups. The

government, enterprises and social organizations have become the three main bodies of the smart elderly care industry, as well as with the continuous improvement of China's smart elderly care system, four service types such as life care and health care have been formed, indicating that our smart elderly care industry has entered a golden period.

From the perspective of the development of the global elderly care industry, smart elderly care started early abroad, with large industrial scale, wide application of smart products and services, smart elderly care technology has been relatively mature, in the forefront of the world, and the health management smart system is widely used. However, China lacks intelligent products, service development and research, the intelligent facilities of relevant communities and institutions are not perfect, and there are still some problems and deficiencies in the smart elderly care industry.

The lack of effective national system and policy guarantee

At present, China's policy documents for the smart elderly care industry are mainly relatively macro advocacy and supportive policies, which create a good policy environment for the development of the smart pension industry to a certain extent, but the guiding role on the specific implementation is limited and lacks scientific and constructive opinions. As the smart elderly care industry has not yet established a complete system and standardized standard system, many smart elderly care enterprises lack guidance when providing relevant services, and the service level and service quality are uneven, which affects the development of the whole industry. In addition, with a large number of social capital entering the smart elderly care industry, the demand for market supervision in the industry is also getting higher and higher, so it is necessary to establish a perfect and standardized industry supervision system.

Information technology degree, intelligence is not enough

An important part of the smart elderly care service is that the terminal equipment monitors the health and living conditions of the elderly, and timely feeds it back to the remote service platform. The existing information technology has been able to collect and obtain these data more mature, but due to the late start of the smart elderly care industry, information technology is not mature enough in the integration and processing of relevant data, and the data collected data is difficult to be efficiently transformed into information, which increases the difficulty of related elderly care services and management. Therefore, the daily data mining and timely processing level of elderly care services needs to be improved.

Lack of humanized measures and spiritual care

At present, many wisdom elderly care terminal equipment and related products not from the elderly habits and preferences, often operate too complex, can not bring convenience for the elderly group, causing many elderly for this kind of wisdom elderly care terminal products resistance, refused to use, resulting in waste of resources and cannot achieve the ultimate goal of serving the elderly. In addition, although some smart elderly care services cover life assistance and health management for the elderly, they ignore the needs of the elderly in emotional communication and cultural entertainment, and have a low degree of humanization, so it is difficult to realize smart elderly care in the real sense.

Lack of unified standards and sharing platform

The development of smart elderly care industry is based on platform construction. The present situation of pension service in China is designed by a large number of departments and the relationship between departments is complex. Each department has its own platform system and lacks effective coordination and docking. Due to the differences in the industry standards of smart elderly care products and services of each manufacturer at this stage, the standards for platform access are also different. We need to accelerate the establishment of a unified industrial technical standards and service platform.

5. Response measures

Strengthen the institutional construction of the system of the smart pension industry, and unify the technical standards of the industry

To promote the development of the smart elderly care industry needs the system and policy guarantee. At the top-level design level, the government should actively promote the establishment of a smart elderly care system and industry standards. Specifically, the system construction of intelligent elderly care should be based on sound laws and regulations, and improve the coordination, management, evaluation and supervision mechanism of intelligent elderly care service resources; the construction of industrial technical standards is mainly to provide reference and normative standards for each link of intelligent elderly care industry, including technical equipment standards, access standards and service standards.

Strengthen the personalized and humanized level of elderly care services

We will promote personalized and humanized services, encourage enterprises and research institutions to do a good job in market research, actively meet the health needs for the elderly, develop and produce end products and service content suitable for the elderly, and improve the service level and quality of health and elderly care. At the same time, in the process of service platform construction, take full consideration of humanized and human factors, so that the elderly can communicate with families, communities, society and the elderly group with the help of the service platform.

Accelerate the application of big data and cloud computing technologies

In view of the problem of low information technology and intelligence, we will actively promote the application of big data and cloud computing technology in the old-age care service system. Cloud computing technology provides necessary computing power for massive data processing to help enterprises better respond to the needs of the elderly; big data technology enables the management and processing of massive data, which can help enterprises tap the real needs of the elderly from massive unstructured data.

Encourage innovative research and development of multiple subjects

The innovation of the smart elderly care industry depends on the joint participation of multiple subjects. First, local governments assume the responsibility to actively guide the innovation of various market entities, and create a good atmosphere for innovation and entrepreneurship in elderly care service industry through policies, systems and laws; secondly, third-party pension service enterprises should fully realize that in the relatively free environment, only continuous technology and management innovation can improve the quality of elderly care service, reduce service costs and achieve intelligent pension service in effect. In addition, scientific research institutions, social research institutions and groups should also actively assume the responsibility to provide support for the technological innovation of intelligent elderly care services, and make up for the limitations of enterprise single research and development by optimizing the technology.

6. Conclusion

Starting from the growing demand of health care, this paper introduces the development situation of the smart home care industry at home and abroad, analyzes the deficiencies in the current construction process of smart care system in China, and actively explores the smart home care model suitable for China's national conditions.

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