

Intelligent Elderly: A New Way for "Silver Age" People to Age at Home in the Community

Shiteng Pang

School of Public Administration, Shandong Technology and Business University, Shandong Yantai 264005

ABSTRACT

Accompanied by the rapid development of information technology, in the context of population aging, big data, artificial intelligence and other emerging elderly care technologies have emerged. Foreign research on aging is earlier, first put forward the concept of smart aging, and at present, foreign science and technology related to smart aging has been more mature. China's research and development of smart aging is still in the exploratory stage, but it is certain that community-based aging has become a new trend in aging. Based on the case study of L city, this paper deeply analyses the development of science and technology in the process of smart aging service and its combination with other aging resources. Through the study, it further analyses the problems existing in the development of science and technology in the senior care industry, and puts forward rationalization suggestions in this regard, so as to enable the elderly to obtain higher-quality services, and to promote science and technology in the senior care industry to play a maximum role.

KEYWORDS

smart ageing; community ageing at home; information service centre for the elderly

1 The emergence of the "silver hair" crisis

Data from the seventh population census show that in China, the number of people aged 60 and over has reached 260 million, of whom 190 million are aged 65 and over, accounting for more than 13.5 per cent of the total. Of the country's 31 provinces, 16 have more than 5 million people aged 65 and over. Among them, six provinces have an elderly population of more than 10 million. In some areas, the elderly population even exceeds 30 per cent of the total population. It is expected that by 2050, China's elderly population will increase to about 500 million people^[1]. In addition, according to the latest data released by the National Bureau of Statistics, in 2021, China's population will have a net growth of 480,000 people, and the natural growth rate of the population will only be 0.034 per cent. This series of data shows that China has now reached the stage of rapid development of population ageing, and the survival problems faced by the elderly as a group are constantly being magnified in the trend of ageing and urbanisation. Therefore, the expansion of the number of the elderly group to a large extent also needs the social renewal of the resources for the elderly and the support of the market for the elderly industry. In an aging society, the "silver hair crisis" has become a common focus of social concern. In response to the "silver hair crisis", the "Recommendations of the Central Committee of the Communist Party of China on the Formulation of the Thirteenth Five-Year Plan for the Development of the National Economy and Society" proposed to "build a multi-level senior care service system based on the home, supported by the community, and

supplemented by institutions".^[2] Compared with the Outline of the Twelfth Five-Year Plan, there has been a change in direction. Therefore, at the system level, elderly care is no longer supported by institutions, but by community-based home care.^[3] Instead, the starting point is community-based home care, which will accelerate the improvement of the quality and level of care for the elderly.

Elderly resources in community care provide an important support for ageing in place, while community care is also an important link in achieving socialised ageing^[4]. Therefore, community ageing at home has become an important platform for resource integration, sharing and distribution. In the process of the development of community-based home care, the following unavoidable problems have arisen: firstly, demand and supply are still not coordinated. When the demand for elderly care resources arises, timely supply cannot be achieved, the average elderly care resources are insufficient, and there is a waste of elderly care resources in some areas; secondly, the distribution of elderly care resources is not even in all areas and between urban and rural areas. Secondly, the distribution of elderly care resources is uneven across regions and between urban and rural areas. Community-based elderly care resources are more widely distributed in urban areas, but less so in rural areas, where elderly care resources are at a low level; furthermore, the quality of professionals is uneven, and the remuneration of elderly care staff is generally low. Therefore, how to find a community-based elderly care in the aging demographic changes, and how to further develop and expand the development of the community-based elderly care industry has become an urgent solution to the reality of the problem, with the development of science and technology wave, technology as the core of the new elderly care can provide a new solution to the idea.

2 The introduction and development of the concept of smart ageing

The concept of "smart ageing", which was first introduced by the Life Trust in the UK in 2012 and is also known as a "fully intelligent ageing system", is designed to enable older people to enjoy a high quality of life in the course of their daily lives without the constraints of time and space.^[5] The purpose of this concept is to enable the elderly to enjoy a high quality of life in their daily life without being bound by time and space. Different scholars have different understandings of this concept. Generally speaking, it can be summarised into three levels: from the perspective of the beneficiaries, it requires that the elderly not only know how to use smart electronic products, but also master smart wearable devices, etc., so as to become "modern elderly"; from the perspective of a family, it is necessary to equip a smart home, so that the elderly who live alone can live more securely through intelligent assistive devices and improve their sense of well-being. From the perspective of a family, a smart home should be equipped to enable the elderly living alone to live more safely through smart assistive devices and improve their sense of well-being; from the perspective of a community, the ultimate goal of smart elderly care is to improve the accessibility of home-based elderly care services and the sense of identity of the elderly residents.^[6] From a community perspective, the ultimate goal of smart elderly care is to improve the accessibility of home-based elderly care services and the identity of elderly residents.

3 Development of science and technology in the process of smart ageing

3.1 Robotics

Robotics makes full use of automated control technologies such as voice instructions, remote control and artificial intelligence technologies to communicate and interact with the elderly through pre-embedded programmes, and then through assistive means such as somatosensory interactions, remote monitoring and consultation, assistive devices, physical indicator testing and

other medication or non-pharmacological resources, to help reduce the burden of life on the elderly and further meet the needs of the elderly group in their old age.^[7] The elderly can be helped to reduce the burden of life and further satisfy the needs of the elderly groups. So far, foreign countries already have more mature robot technology. Italy has invented robots that can help the elderly complete basic household activities, such as changing bed sheets, cleaning the room and so on.^[8] The robot can help the elderly to complete basic household activities, such as changing bed sheets and cleaning the room. Compared with foreign countries, China's robotics industry started later. The country's first intelligent nursing home-Beijing PuLeYuan Love Nursing Home and the end of 2017 in Beijing officially operated, the elderly in the nursing home do not need to learn the complex operation, the nursing home equipped with robots is very easy to operate, through the voice to mobilise, control a variety of programs can meet their needs.^[9]

3.2 Telemedicine technology

Telemedicine is actually a product of the combination of modern medicine and Internet technology, which uses the Internet and a third-party platform for instant communication to enable medical institutions to obtain medical services as well as medical resources from the remote end by means of video calls and other means, which can efficiently solve patients' difficult and complicated diseases.^[10] The technology enables medical institutions to obtain medical services and medical resources from remote medical institutions by means of video calls, which can efficiently solve patients' problems. The Rogaland community in Shenzhen uses telemedicine technology to measure eight health indicators of the human body, and can create a health profile for each person, synchronising each measurement data to a cloud server. Users who set up personal files can access the data remotely at any time, and different users can be identified by fingerprints, which enables users to have historical test data as an important reference when diagnosing certain diseases in the future.^[11] In Germany, guardians are able to use modern technology to monitor the health of their patients. In Germany, guardians are able to use modern telemedicine technology to monitor the physical condition of the cared-for person in real time and transmit it to the hospital in real time via the Internet, and with the use of environmentally-assisted living systems, most of the facilities in the room can be controlled remotely. For example, hospital beds can be raised and lowered automatically and the height can be controlled remotely; under-bed blankets are equipped with sensors to alert the elderly at home if they fall.^[12] The blankets under the beds have sensors that can alert the elderly in the home if they fall.

3.3 Internet of Things - Artificial Intelligence Technologies

The Internet of Things (IoT) achieves interconnection through sensor detection, and then transmits, processes and controls the information through the network. Zhang Changhai proposed a smart elderly care programme based on IoT technology, in which the system uses wireless sensing technology to monitor the living and living of the elderly, and uploads information from the video-observed images to a database through area network technology, enabling users to view the monitored video. When an emergency situation arises, it is possible to be informed of the unexpected situation in time^[13] When an emergency arises, the user can be informed of the unexpected situation in time.

3.4 Current status of smart ageing applications

In our country, the traditional concept of old age for most people has been deeply rooted, the current elderly old age is more dependent on their children and the community, old age for the "

9073" type.^[14] The way of old age is "9073" type. Along with the advent of the era of big data, artificial intelligence and other emerging wisdom of the elderly also appear enthusiastically. On the one hand, they make the life of the elderly more convenient, on the other hand, the traditional concept of old age will also be challenged. Regarding this new way of smart ageing, China has been piloting it in many areas, and the main applications are as follows:

3.5 Intelligent Elderly Community

Community ageing combines the community and children in a natural way, so that the elderly can be cared for and looked after by their families without leaving their original living environment. The Yinji Garden community in Zhengzhou introduces the contents and methods of smart health services to the elderly and their families through community bulletin boards and other publicity methods. At the same time, it encourages students of related disciplines to give regular medical check-ups to the elderly and send them home safely.^[15] Xiamen's government is working to create a "smart health service" for the elderly. In Xiamen, the government is working to create a "one-minute" service system, setting up special numbers for elderly services in individual communities, which can be directly connected to community telephones, and can be accessed by dialling a special number, which interacts with information from hospitals and public security departments at all levels. When the elderly seek help, the information platform can systematically locate the location of the elderly, so that they can come to the door in time to check the condition of the elderly.^[16] The new way of elderly care is the smart elderly community. This new type of intelligent retirement community has built a "safety defence line" for the elderly in the community, so that the elderly in the community can fully enjoy the multi-dimensional services provided by the development of digital technology as well as the convenience brought about by the development of electronic information technology.

3.6 Smart Elderly Service Platform

In recent years, with the increasing demand for elderly care in China, smart elderly care service platforms have emerged in many cities. These platforms mainly include health monitoring and management systems, hazard alert systems and so on. The platform realises the sharing of online and offline resources, so that the needs of the elderly in terms of safety, life, emotion and entertainment can be met^[17]. Foshan, Guangdong Province, has integrated the needs of elderly services with technologies such as the Internet of Things, forming a comprehensive service platform for intelligent elderly care on the basis of terminal data collection. In terms of health management, the all-weather sensorless monitoring system enables the elderly to detect their physiological indicators even when they are lying in bed. The special mobile phone assistant for the elderly can handle the situation according to the help information when the elderly seek help in an emergency; in addition to these regular services, the platform also provides five major service systems, such as nursing aids, catering services and rehabilitation services.^[18] In addition to these regular services, the platform also provides five major service systems, including nursing aids, catering services and rehabilitation services. Shanghai's Smart Elderly Platform can also help the elderly understand the latest current affairs, launch intelligent elderly consultant services, and online lectures on elderly-related topics in various districts, as well as equipped with the relevant person in charge of the "Air Elderly Consultant".^[19] The platform is also equipped with a "senior advisor in the sky".

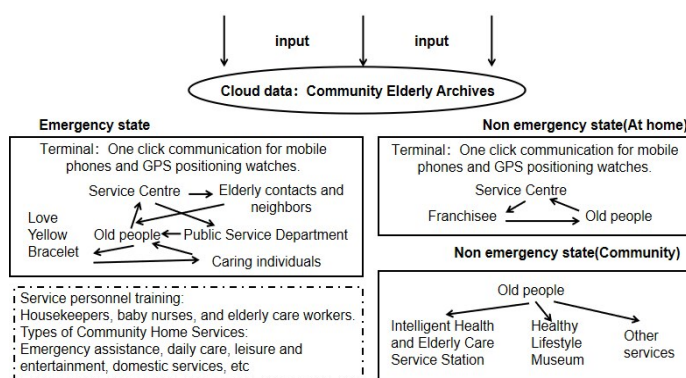
3.7 Home Smart Aging Products

Nowadays, smart products developed for aging can pay attention to the daily activities of the

elderly in real time through the Internet big data, sensors and other technologies, so as to ensure that the elderly can understand their own health status in a timely and accurate manner even when they are not accompanied by their children. Xiaomi has designed a smart blood pressure monitor that can compare the data between the two times before and after the measurement and display different colours according to the different levels of blood pressure values, reflecting the health of the elderly at a glance. The system can also transmit the results of the elderly measurement to their children in real time so that they know the health status of the elderly in time.^[20] The system can also transmit the measurement results of the elderly to their children in real time so that they know the health condition of the elderly in time.

4 Typical case

Established in 2012, the Elderly Information Service Centre in L City, Anhui Province, is a private non-enterprise unit approved by the Municipal Office for the Elderly and approved by the Municipal Civil Affairs Bureau, and also one of the first units in the country to pilot the construction of an information platform for elderly services. The centre is a typical case of integrating technology and old-age care for the elderly in Anhui Province, as well as a classic case of cloud-based functions and landing measures through a call platform. The main services of the city's information service centre for the elderly can be divided into emergency as well as non-emergency services, as shown in the following figure.



Explanation of the service contents of the Elderly Information Service Centre

The Elderly Information Service Centre collects the basic information and health-related data of the elderly in the community to form a database of elderly records. When the elderly encounter emergency or sudden situations in their lives, they can call for help through GPS positioning watches and mobile phones "One Touch", and after the information is transmitted to the headquarters of the service centre, the staff can contact the family members of the elderly in a timely manner according to the situation, and even notify the medical department to carry out first aid for the elderly. The "Push to Talk" mobile phone is the elderly information service centre and telecommunications companies to cooperate with the launch of the GPS positioning and emergency button electronic nanny mobile phone, while the service centre will also send special staff to the elderly daily medication system to remind the GPS watch has positioning, playback trajectory, a key to the alarm and other services. There are also love bracelets specially designed for elderly people suffering from Alzheimer's disease. If an elderly person gets lost outdoors, caring members of the community can contact his or her family through the love bracelet.

Elderly people in non-emergency situations can enjoy a wide range of services at home. Elderly

people can inform the service centre of specific services through their mobile phones or GPS watches, and the service centre, after learning of the needs of the elderly, will contact them to join in the provision of services of established items, including home management services, daily life care, certain medical services and spiritual comfort. This service platform closely integrates the needs of the elderly with the supply of services. When the elderly age in the community, this elderly care centre operates a healthy living hall for the elderly in the community through the elderly's call to the platform, supported by multiple franchisees, and the living hall includes a smart healthy elderly care service station and a love supermarket. The service station is a supporting facility especially provided by the smart elderly service, which provides full self-service medical check-up, and the human-computer interaction equipment is a full-touch colour LCD, which is capable of detecting blood pressure, blood glucose, blood oxygen, and many other items, so that the elderly can have a comprehensive understanding of their own health status. In the testing process can also be monitored to the real-time transmission of data for the elderly to establish a further update of the community health records of the elderly, in favour of a good job in the latter part of the management of health information.

Overall, the services provided by this service centre cover all aspects of community home care for the elderly, and through the rational use of community resources for the elderly, combining them with today's rising digital platforms and technological products, it provides the elderly in the community with better, more convenient and more reliable elderly services.

5 Problems in the development of smart ageing

From the perspective of the development of the L City Pension Information Service Centre, although the "Internet + Pension" this new type of pension can to a certain extent to promote the rational allocation of pension resources, and further integration of the community home care and innovation, but in the actual development process there are still a lot of problems.

Firstly, the question of whether technological products for the elderly that focus on the needs of the elderly can maximise their utility is an issue that must be considered in the development of intelligent ageing. The design of the L City Elderly Information Service Centre and technological products for the elderly starts with the needs of the elderly, and it is uncertain whether such needs can be accurately communicated. Elderly people have different physical health and different disabling conditions, in which case their acceptance of the use of technological products will also be different. Therefore, when an elderly person encounters a sudden or emergency situation, if he or she operates the technology terminal without being skilled in its use, the result may be counterproductive. At the same time, when designing as many service functions as possible, elderly technology products tend to expand the actual needs of the elderly, and this blind expansion of demand will make the technological content of the products to a large extent be wasted.

One of the limiting factors for the development of the scientific and technological pension industry is whether the marketisation of public functions can develop in a healthy and standardised manner. Pension resources are social resources in public functions, and in the process of "Internet + pension" and the development of science and technology, the pension industry and resources also gradually have a market-oriented distinction and development. Internet sharing and allocation of resources, resulting in a market-based pension industry and resources. This market-oriented development to a certain extent can indeed make the level and level of science and technology of the elderly market has improved, but in the process of its development how to adapt to the community needs to be further implemented.

There are still resource and financial barriers between technological elderly care and the family,

the community and the government, and other public sectors. At the present stage, the elderly information service centre in L city does not have enough information about the elderly, and the scope of service is limited to only a part of the elderly included in the government, and the funding is mainly based on market operation. The service centres do not have 100 per cent of the trust of families and communities. The information on the elderly obtained by public services such as hospitals and the basic information obtained by the government is blocked to the elderly service centres, which leads to the limitations of the development of scientific and technological elderly care.

At present, the mobility of talents is large, there is a lack of scientific and technological talents, and the mechanism for training professional talents has not yet been improved. Talent is the foundation of the community home care services, technology-based elderly care mainly intelligent elderly care approach can be multi-party service providers of professional talents gathered together, the demand for service centres and the level of the degree of talent is low. The main performance is: the service centre has a large demand for personnel, while the demand for professional service talents is relatively small, and the mobility of talents is large. At the same time, the remuneration system related to professional talents has not been fully formed, and the remuneration level of most professional talents is in the lower middle class. In the middle and late stages of technological aging, the daily maintenance and repair of professional technological equipment is a very important part of the smart aging service process. Therefore, how to invite and retain scientific and technological talents is also a problem that needs to be further considered in the process of smart elderly care and scientific and technological elderly care.

6 Insights and recommendations

Generally speaking, technological elderly care provides more convenient services for the elderly groups with its high-tech means, but the difficulties of multi-subject contact brought about by technological elderly care and the initial development of technological integration of elderly care will lead to the problems mentioned above. Based on the current problems of technological elderly care, we propose the following ways to further expand the development potential of technological elderly care.

First, while continuing to research the core of science and technology, we should pay attention to the collection of information on the user experience of the elderly and the differentiation of user objects. In the process of promoting the elderly with science and technology, it often results in excessive innovation of scientific and technological means and products while neglecting the user experience of the elderly groups in the actual application. For example, in the development process of the L City Elderly Information Service Centre, a variety of scientific and technological products have appeared, and it is less likely for the elderly to use two or more scientific and technological products at the same time, such as the "one-click" mobile phone and the GPS positioning mobile phone wristwatch, and the simultaneous use of these products also results in the inefficient use of the scientific and technological resources. Therefore, on the one hand, differentiated recommendations should be made through the different user groups targeted by the established technological products, and on the other hand, the technological products should be designed in a realistic manner with the actual situation and real needs of the elderly as the fundamental point, so as to make the real demand and supply match each other.

Secondly, market-based stimulation of the vitality of enterprises and organisations while focusing on the standardisation of scientific and technological procedures and methods. The opening up of the elderly care market is a key area of social governance reform, and is also a driving

force to further promote social organisations and business organisations to continuously upgrade their science and technology, so by placing elderly care resources in society and the market to expand the elderly care market, we can further promote the development of business organisations, and allow them to continue to create scientific and technological core strengths by being self-financing. In this process, the elderly market is related to the quality of life and health of the elderly group, so only the market is not enough to ensure the healthy operation of the elderly market, so it is necessary to give the standardisation of science and technology in all levels of the elderly. Specifically, standardisation should be carried out at the level of the quantity, use and feedback of the technology products owned by the elderly information service centre, the level of the suppliers of the technology products and the level of the financial support of the elderly information service centre, so as to ensure that the quality of the technology products themselves is qualified and the post-procedure of the use of the technology products is humane.

Thirdly, technological products and elderly services will be put into practice on the basis of community-based ageing in place. "Internet + elderly care" is an important part of technological elderly care, and the disadvantage of the Internet is often that the information is too virtual. Overall this technology driven elderly concept is in line with today's innovation-driven development of the overall trend, but this networked service is very easy to walk into only pay attention to the Internet information services and ignore the status quo of on-the-ground services. Internet service technology effectively combines the community and home two ways of old age, and as a basis for the elderly groups to put the service into practice. For example, the elderly health life hall to the community as a basic base for the elderly physical examination and recreation to provide a way, these life halls cover the community nearly 10,000 elderly people, only in 2014 its services for the elderly reached 100,000 times, of which free blood pressure for the elderly amounted to 10,000 times, more than the total number of elderly people in the urban area of the L city.^[21] These figures reflect the need for technological products to actually work for the benefit of the elderly, rather than relying solely on online platforms.

Fourthly, the construction of records on the elderly should be the centre of big data sharing between the Government and organizations. Since social organisations have limited capacity to collect records on the elderly, and still rely mainly on the government and public sector, such as hospitals, for the collection of information on the elderly, the government and public sector should appropriately liberalise the compartmentalisation of information, and realise comprehensive networking and informatisation. Social organisations can also provide the government with new policy directions and feedback on public opinion needs on the basis of continuously updated data. However, a very important technical and ethical issue arises in this process, namely the confidentiality of data. In the process of using information about the elderly, technical operators need to strictly protect the confidentiality of the medical and health status of the elderly and other information, the transmission of the information itself needs to be non-replicable and read-only, and the security of the information platform needs to be guaranteed in order to successfully realise the sharing of big data between the government and the organisations.

Fifthly, science and technology retirement can be integrated with funding and complementary resource advantages in various ways, such as purchasing services, commissioning, and public-private partnership PPP.^[22] Pension information service centres need to reach a consensus with the government to form a cooperative relationship, which can be achieved through the government's purchase of services to meet the government's needs to achieve the government's goals and thus obtain financial support. In short, organisations cannot do without the support and attention of the government in the process of their own development. Similarly, in the process of scientific and technological aging, it is necessary to increase the contact with suppliers and other business organisations. An important part of the elderly information service centre is the various suppliers

and service providers, so the organisation in the process of technological aging needs to fully understand the content of the service providers and to meet the needs of the elderly as the best supplier for cooperation in the elderly services. In short, the subjects involved in technological aging are very diverse, and the role of each subject is different but equally important.

Sixth, self-service and self-development by giving full play to the abilities of the elderly themselves. At the present stage, it is difficult to use high-tech personnel or nursing staff on a large scale in the elderly care industry, but through self-service, self-development and self-education of the elderly, in the process of interaction with their own wisdom to develop their own abilities, and then to serve the community and other elderly people in need of help on a voluntary basis by the elderly in good health. In this process, it should be noted that this kind of service for building and expanding the capacity of the elderly themselves must take the safety of the service provider as the top priority, so as to be able to maintain the healthy and coordinated development of community-based home care services.

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About the Author

Shiteng Pang(2000.5.20), School of Public Administration, Shandong Technology and Business University,Postgraduate, Research direction is social security.