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Survey Research on Smart Elderly Service in Some Rural Areas of Henan Province

Xiaojing Liu

Business School, Anyang Normal University, Anyang, China
Email: liuxiaojing2000_@126.com

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Abstract

Purpose/Significance: With the aging population problem becoming increasingly prominent, how to effectively improve the quality of life for rural elderly people has become a focus of social concern. Smart aging, as a new type of aging service, has the potential to provide solutions. However, the penetration rate and usage of smart aging services in rural areas are not ideal. Therefore, this study aims to explore the understanding and use of smart aging services among rural elderly people through field investigation, analyze their needs and influencing factors, and provide basis for policy formulation and service optimization. **Methods/Process**: This study adopts grounded theory, the theory of hierarchy of needs, and the theory of social support as theoretical perspectives, and combines interview method and questionnaire method to conduct a survey and data collection on elderly people in some rural areas of Henan Province. During the research process, in-depth interviews were conducted to explore the elderly's understanding and needs of smart aging services, and a questionnaire survey was conducted to quantify their understanding, usage, and hierarchy of needs. The sample covers multiple rural areas to ensure the representativeness and reliability of the data. **Results/Conclusion**: The study found that the understanding and use of smart aging services by rural elderly people are both low. Among various needs, emotional comfort and social needs are the most prominent, followed by daily living care and medical and health needs. The study also shows that economic factors and difficulties in using smart products are important factors affecting the elderly's use of smart aging services. In general, the popularization of smart aging services is closely related to the elderly's economic conditions and acceptance of technology. It is necessary to strengthen the top-level design of smart aging services, vigorously publicize the services provided by smart aging, develop smart aging products that meet the needs of the elderly population, and improve the degree of fit between smart aging services and the elderly to meet the diverse needs of elderly people for aging services.

Keywords

Smart Old-Age Care, Rural Old-Age Security, Service Demand, Degree of Fit

1. Introduction

In recent years, with the rapid development of Internet of Things (IoT), Big Data, Artificial Intelligence (AI) and other technologies, smart senior care services have gradually emerged globally. These technologies have been widely used in the health management, life care, and safety monitoring of the elderly, significantly improving the quality and efficiency of elderly services. A number of cities in China, such as Beijing, Shanghai and Guangzhou, have taken the lead in launching pilot smart elderly care services, effectively meeting the diversified needs of the urban elderly by constructing smart elderly care platforms, promoting smart wearable devices, and setting up telemedicine systems, among other measures. However, there is a big gap between the rural elderly and the urban elderly in terms of age structure, empty nest rate, health condition, economic income level and affordability of elderly services, etc., and the problem of smart elderly services is more serious than that of the urban elderly.

By the end of 2023, the total resident population of Anyang City was 5.376 million. Among them, the total number of elderly people over 60 years old is 1.064 million, accounting for 19.8% of the total population; the total number of elderly people aged 65 and above is 811,000, accounting for 15.1% of the total population (Anyang City Bureau of Statistics, 2024). This indicates that Anyang City has entered a moderately aging society, and the aging trend is accelerating. Focusing on the situation of smart aging services in rural Anyang, the project conducted a questionnaire survey on the smart aging needs of 218 elderly people over 60 years old in Yindu, Wenfeng, Long'an, and Beiguan districts of Anyang, including descriptive analysis of the basic characteristics of the elderly, their economic status, health, social support, knowledge of smart aging services, the degree of service demand, satisfaction, and choice status, and found that rural Elderly people have difficulties in accepting smart senior care services, low fit of smart senior care services, and lack of overall design of smart senior care services, and analyze the reasons for their dilemmas.

2. Development Status of Anyang Smart Elderly Service

2.1. Development of Anyang Smart Elderly Service Platform

The launch of Anyang intelligent senior care service platform symbolizes that the senior care service has stepped into a new era of intelligence. This platform realizes the integration of data and information at four levels: city, county (city) district, township (street) and village (community), and collects information through the data interaction interface with relevant departments such as public security,

human resources and social security, health and health, etc. It summarizes the basic data information on the elderly population in the city, as well as the elderly services and other relevant situations, and builds a basic information database on the elderly population with statistical analysis functions. The platform realizes the functions of information push, service retrieval, service reservation, online payment and pension map, etc., and provides more comprehensive and effective services to more than 1 million elderly people in the city. The implementation of the smart senior care service platform has made senior care services in Anyang City smarter and more convenient. Through the platform, the elderly can enjoy services including life care, meal service, cleaning and hygiene, information technology service, medical care, psychological support, visiting care, and round-the-clock emergency rescue support. In addition, the platform has popularized the construction of intelligent senior living facilities and provided support for the popularization of Internet of Things and remote intelligent security monitoring technology in senior living service institutions, which has achieved round-the-clock security and automatic duty, and reduced the risk of accidents for the elderly.

While bringing convenience to the rural elderly in Anyang City, the smart elderly service platform also faces certain problems and challenges. For example, the relatively low level of network coverage and informatization in rural areas may affect the promotion and effectiveness of smart elderly services. In addition, the acceptance of smart technology and the ability to use it varies greatly among the rural elderly, and further training and guidance is needed.

2.2. Policy Analysis on the Development of Smart Elderly Services at Three Levels

2.2.1. Policy Analysis on the Development of Intelligent Elderly Services at the National Level

Analysis of national-level policies on the development of smart elderly care services shows that smart elderly care services have become one of the most important national measures to address the challenges of aging (Table 1).

Table 1. Sorting table of smart pension documents at the national level.

No.	File	Time
1	The Twelfth Five-Year Plan for the Development of the Elderly in China	2011
2	Opinions on Promoting the Development of Elderly Services	2019
3	Opinions on Accelerating the Development of the Elderly Service Industry	2013
4	Several Opinions on Comprehensively Liberalizing the Market for Elderly Services and Improving the Quality of Elderly Services	2016
5	Implementation Program on Effectively Solving the Difficulties of the Elderly in Utilizing Smart Technologies	2020

Continued

6	The 14th Five-Year Plan for the Development of the National Aging Career and the Construction of the Elderly Care System Action Plan for the Development of Intelligent Healthy Elderly Industry (2021-2025)	2021
7	Opinions on Developing the Silver-Hair Economy and Enhancing the Well-being of the Elderly	2024
8	Opinions on Promoting High-Quality Development of Service Consumption	2024

2.2.2. Analysis of Henan Province's Policies on the Development of Smart Elderly Care Services

Henan Province and Anyang City have also issued a series of policy documents related to elderly services, such as the List of Basic Elderly Services in Anyang City, etc. Although these documents are not specifically targeted at smart elderly services, they may also contain content related to smart elderly services or put forward relevant requirements.

2.2.3. Analysis of Anyang's Policies on the Development of Smart Elderly Services (Table 2)

Table 2. Sorting table of smart pension documents in Henan Province.

No.	File	Time
1	Notice of the General Office of the People's Government of Henan Province on the Issuance of Several Policies and Industrial Layout Planning for the Program of Promoting the Transformation and Development of Healthy Pension Industry in Henan Province	2017
2	Notice of the Henan Provincial Department of Finance and Henan Provincial Department of Civil Affairs and Henan Provincial Department of Human Resources and Social Security on the Issuance of the Implementation Opinions on Financial Support for the Construction and Development of Pension Service System in Urban Communities	2019
3	Notice of the Henan Provincial Department of Finance and Henan Provincial Department of Civil Affairs on the Pilot Work of Building a Smart Pension Service Platform	2020
4	Opinions on Strengthening the Construction of Pension Service System	2021
5	Implementation Opinions of the People's Government of Henan Province on Accelerating the Development of the Senior Care Service Industry	2024

In addition, Anyang City has issued a series of policy documents related to elderly care services, such as the List of Basic Elderly Care Services in Anyang City, etc. Although these documents are not specifically targeted at smart elderly care services, they may also contain content related to smart elderly care services or put forward relevant requirements. Since policy documents may be updated or

adjusted over time, it is recommended to consult the latest policy documents for the most accurate information in practical applications (Table 3).

Table 3. Anyang City on smart pension documents sorting table.

No.	File	Time
1	Development Plan for the Pension Service System and Recreation Industry in Anyang City in the 14th Five-Year Plan	2022
2	Implementation Opinions of the Office of the People's Government of Anyang City on Promoting the Construction of Basic Pension Service System	2023
3	Implementation Opinions on Supporting the High-quality Development of Senior Care Services	2024.2
4	Implementation Plan for Elderly Meal Service in Anyang City	2024.4

3. Survey Design

3.1. Core Concept

The concept of "Intelligent Elderly" was first put forward by the Life Trust of the United Kingdom, and was initially also known as "intelligent older system", which refers to the use of Internet of Things (IoT) technology to monitor all kinds of information of the elderly at anytime, anywhere and in all directions, and to build a "nursing home without walls" so that the elderly can live a high-quality life at home. It refers to the monitoring of all kinds of information of the elderly through the Internet of Things and other technologies, breaking the inherent time and space constraints, and constructing a "nursing home without walls", so that the elderly can live a high-quality life at home in their twilight years. Scholar Zuo Meiyun believes that smart old age care is a service and management that provides all kinds of life support for the elderly through the Internet, social platforms, Internet of Things, cloud computing and other digital information technology (Zuo, 2014).

Intelligent pension service refers to, using the Internet, big data, cloud computing and other new information technologies, developing multiple types of intelligent hardware, intelligent products and informatization systems, effectively integrating multiple service resources such as medical care, life, education, spirituality, etc., and constantly updating the accuracy of the use of various types of sensors to provide the elderly with real-time monitoring of their daily body data, automatic uploading, classification and analysis, efficient research and judgment of the materialization of the Internet, Interconnected and digitalized intelligent services (Li & Bi, 2018).

Intelligent elderly services include three key elements: science and technology, elderly cognition and service mode. Modern information technology represented by the Internet, big data, Internet of Things, and artificial intelligence can solve

the problems of traditional senior care services from the three links of "demand-production-supply", improve the accuracy, specialization and intelligence of senior care services, and better meet the multi-level and diversified needs of hundreds of millions of elderly people (Figure 1).

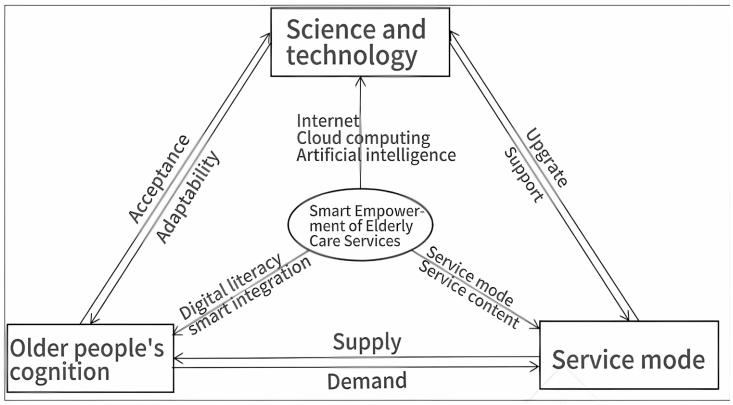

Figure 1. Driving elements of Wisdom-Enabled Elderly Services (Zhang, 2024).

In the wisdom-enabled senior care service, the service subject realizes information collection through big data, effectively integrates and consolidates all kinds of data, solves the problem of non-standardized and non-standardized information of senior care service, and opens up the data barriers between the elderly and the service subject. At the same time, the establishment of intelligent service platforms encourages the participation of various service subjects in senior care services, accurately matches various types of service resources, and changes "passive service" into "active service".

Most provinces, cities, and counties (districts) across the country have launched the construction of smart aging service systems, mainly through cooperative construction and purchasing services. Based on Internet of Things, cloud computing, and Internet technologies, they have established various smart aging service platforms using smart products as terminals, and used big data platforms for demand analysis to provide targeted services to the elderly. The government serves as a market regulator to ensure the healthy operation of the smart aging platform. Some local featured models, such as Beijing's "Beijing Tong—Aging and Disability Assistance Card" and "Beijing Tong e Personal APP," which provide a local payment platform integrating government subsidies, payment, and services for the elderly; Shanghai's "Shanghai Integrated Aging Service Platform," which provides a platform for gathering information on aging service facilities across the city; Guangzhou's "intelligent terminals + software platform + insurance + public welfare + online services + offline services" smart aging service system, which provides comprehensive assistance to the elderly; and Wuzhen, Hangzhou's "1 + 2 + 1" (personalized choices and customized services through interaction systems and intelligent care systems for the elderly + government comprehensive management

platform) smart aging model, which provides scientific and accurate service projects to the elderly through data feedback from elderly smart terminals (Zhang & Yan, 2019).

From the perspective of social function, scholars focused on the "possibility" and "feasibility" of smart elderly care service at the concept level and technical level. At the same time, they also paid attention to the difficulties faced by smart elderly care service in practice, and tried to explain the operating mechanism of smart elderly care service from the perspectives of national policies, market configuration and other aspects, so as to establish a practice paradigm that can be used for reference and replicated (Wen & Liu, 2023).

Qu & Guo (2017) and Tong & Wang (2016) innovated the development path of smart elderly care services and enriched the connotation of smart elderly care services from the perspectives of "Internet of things + big data" and "Internet + home care" respectively. Liu et al. (2017) believe that smart elderly care services have advantages that traditional elderly care services cannot achieve, such as strong timeliness and flexibility, sensing and predicting user behavior characteristics, thereby improving user experience and reducing labor burden. Zhou et al. (2024) combed through the research on digital technology enabling elderly care services.

Chen and Han (2018) believe that the shortcomings lie in the structural contradiction between the supply and demand of smart elderly care services and the lack of media literacy education for the elderly (Ding, 2012). Gu and Hu (2024) analyzed the development status of the community smart elderly care industry under the background of big data, pointed out the community smart elderly care service model of Shanghai Changning, Hangzhou West Lake and Taicang, Jiangsu, and proposed the sustainable development path of the community smart elderly care development model, aiming to provide theoretical reference for the development of the smart elderly care industry in the new era. Regarding the possible risks of smart elderly care services, Zhu & Tang (2020) believe that smart elderly care has ethical, legal, market and technical risks. Wang & He (2021) discussed the ethical risks of smart elderly care from the perspectives of personal safety, social responsibility, filial ethics and subject consciousness. Zhu (2023) believes that the digital dilemma in smart elderly care services refers to a series of social, economic, technical, ethical and other problems and challenges faced in the process of promoting the digitalization and intelligence of elderly care services. These dilemmas are mainly manifested as digital exclusion, resource mismatch, digital anxiety and digital addiction, algorithm opacity, data leakage and abuse, etc., which affect the quality, popularity and sustainable development of smart elderly care services.

3.2. Survey Objects and Methods

This topic is researched through questionnaires and interviews with some rural

elderly people in Anyang. The design of the survey questions is mainly divided into five aspects: First, the basic information, including the basic characteristics of the elderly, economic status, health status, mode of residence, social support, etc.; second, the cognitive situation of the life wisdom of the elderly service; third, the current situation and demand for elderly services; fourth, the specific needs and satisfaction evaluation of wisdom of elderly services; and fifth, the concerns and suggestions. This research cumulative distribution of questionnaires 240, recovered 218 valid questionnaires, effective recovery rate of 90.83%.

The object of the research was to randomly select 240 elderly people over 60 years of age from 8 administrative villages (Xiaozhai Village, Beigu Now, Xiaoguanzhuang, Twenty Mile Shop, Lipanliu, Jiajia Village, Tiantao Village, and Dongwangdu Village) in 4 districts, namely, Yindu, Wenfeng, Long'an, and Beiguan Districts of Anyang. Taking into account the special circumstances of the elderly such as low literacy level, weak comprehension ability, and visual impairment, and because the elderly in rural areas are not very good at filling out questionnaires, the survey process was conducted in an oral way, allowing the respondents to answer the questions orally, and then filling out the questionnaires instead of them as a means of collecting the data, and the collected data samples can reflect the current situation of the elderly wisdom elderly services to a certain extent (Table 4).

Table 4. Statistical table of basic information of survey respondents.

Sample Characteristics	Category	Number	Percentage
Gender	Male	119	54.59
	Female	99	45.41
Age	60 - 69	86	39.45
	70 - 79	95	43.58
	Above80	37	16.97
Residence Status	Living alone	22	10.09
	Living with spouse	95	43.58
	Living with children	83	38.07
	Living in other ways	18	8.26
Health Status	Very healthy	13	5.96
	Good	26	11.93
	Fair	26	11.93
	Poor	119	54.59
	Very poor	34	15.60

Continued

Monthly Income	Less than1000 yuan	34	15.60
	1001 - 3000 yuan	160	73.39
	3001 - 5000 yuan	16	7.34
	Above 5000 Yuan	8	3.67
Number of Children	0	17	7.8
	1	18	8.26
	2	156	71.56
	3 and above	27	12.39

Source of data: Analyzed by the research team based on the questionnaire data.

Among the 218 elderly people surveyed by questionnaire, the ratio of male to female elderly people was 1.2:1, with 119 male elderly people, accounting for 54.59% of the total sample, and 99 female elderly people, accounting for 45.41% of the total sample, with males slightly higher than females. In terms of age, there were 86 elderly people aged 60 - 69, accounting for 39.45% of the total sample; 95 elderly people aged 70 - 79, accounting for 43.58% of the total sample; and 37 elderly people aged 80 or above, accounting for 16.97% of the total sample, with middle-aged and senior elderly people predominating.

In terms of the health conditions of the elderly surveyed, about 17.9% of the elderly were in good health; 26 were in average health, accounting for 11.9% of the total sample; 119 were in poor health, accounting for 54.6% of the total sample; and 34 were in very poor health, accounting for 15.6% of the total sample, with more than 70% of the elderly in poor health.

The traditional family old-age pension occupies the mainstream position, with children providing living and spiritual support, and the attachment-type mentality to the traditional family, when one's spouse passes away, the elderly will choose to live or live with their children. In the survey, the proportion of elderly people living with their spouses was the largest, accounting for 43.58% of the total sample, with 95 elderly people; followed by those living with their children, with 83 elderly people, accounting for 38.07%; 22 elderly people living alone, accounting for 10.09%; and a relatively small proportion of elderly people choosing to live in other ways, with only 18 elderly people, accounting for 8.26%. With nearly 80% living with their children and spouses overall, the way families live in rural areas is closely related to old age, which is also related to the traditional concept of old age. The survey found that, in addition to living on their own, the largest proportion is living with their grandchildren, mainly to help their children to take care of their children, the elderly in addition to their own life also have to take care of the responsibility of caring for their grandchildren.

In terms of the monthly income of the elderly, the largest number of elderly with a monthly income of 1001 - 3000 yuan, 160, accounting for 73.39%. In terms of the number of children of the elderly, among the 218 elderly people surveyed

by the questionnaire, there are 18 elderly people who have only one child, accounting for 8.26%; the highest percentage of elderly people who have two children is 156, accounting for 71.56%, which is still relatively common in Anyang City; there are 27 elderly people who have three or more children, accounting for 12.39%, and 7.8% of elderly people who have no children. There are 17 elderly people, it is possible that the elderly are unmarried or there is a family without children.

4. Results

4.1. Cognitive Survey on Smart Elderly Service in Anyang Rural Area

4.1.1. Cognitive Survey on the Concept of "Smart Elderly"

Although the surveyed elderly use smart aging services and devices (e.g., smartphones) in their lives, they do not have a high level of understanding of the concept of "smart aging". In this survey of 218 elderly people, less than one-third of them said they understood the concept of "smart ageing", and some understood it as "intelligent ageing". In terms of the ways and channels through which the elderly learn about the concept, the main channels are the village committee and friends and relatives, followed by television and radio, which shows the importance of geographic and blood relations in rural elderly services. It is important to note that the lack of understanding of the concept of "smart aging" does not affect the use of products (e.g., smartphones) in real life.

4.1.2. Survey on the Utilization Ratio of Smart Elderly Equipment and Services

Children are busy with their work, spouses are also elderly, there is a lack of knowledge about smart aging, the research and use of smart products by the elderly living at home is at a low level, and the "digital divide" is relatively serious. According to the survey, among the 218 elderly people selected, 166 of them use smart aging equipment or related services, accounting for 76.15% of the total sample; 52 of them have not used smart aging equipment or services, accounting for 23.85% of the total sample (Figure 2).

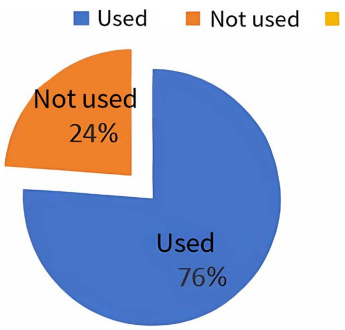

Figure 2. Proportion of use of smart elderly care equipment and services.

It should be noted that although the concept of "smart aging" is not understood,

it does not affect the application of products (e.g., smartphones) in real life.

4.1.3. Survey on the Specific Usage of Smart Aging Devices and Services

The different needs of the elderly can be seen from the smart elderly equipment they have used. Among the 218 elderly people surveyed, 104 elderly people have used smart wearable devices, accounting for 62.65% of the total sample; 86 elderly people have used the emergency call system, accounting for 51.81% of the total sample; 72 elderly people have used the telemedicine service, accounting for 43.37% of the total sample; 78 elderly people have used the smart home service, accounting for 43.37% of the total sample; 78 elderly people have used the smart home service. 78 elderly people have used smart home system, accounting for 46.99% of the total sample; 19 elderly people have used health management APP, accounting for 11.45% of the total sample; 81 elderly people have used other smart elderly equipment or services, accounting for 48.8% of the total sample. The details are shown in Figure 3 below.

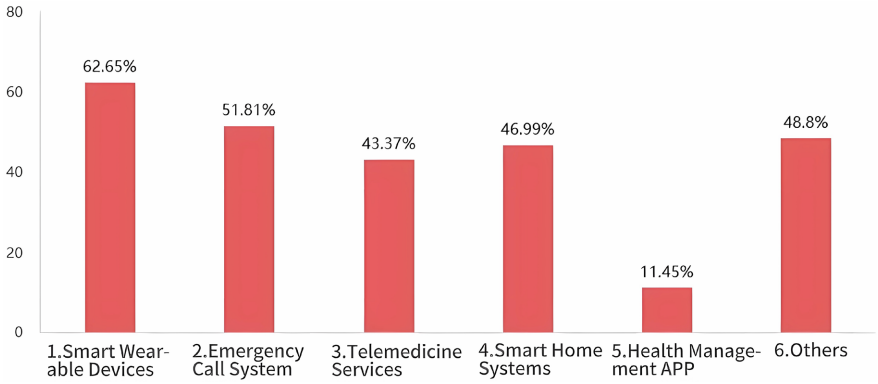

Figure 3. Specific use of smart aging equipment and services.

4.1.4. Satisfaction Survey on Smart Aging Equipment Services

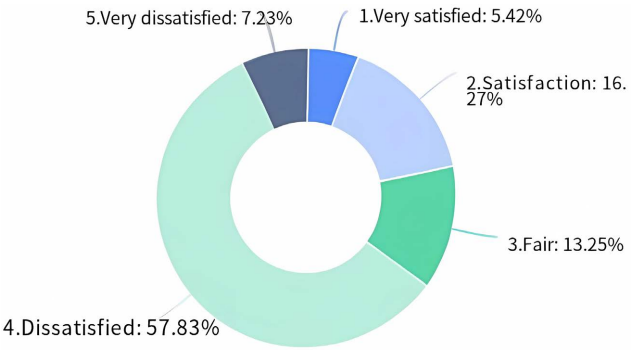

Figure 4. Satisfaction with the use of smart elderly equipment services.

The degree of satisfaction of the elderly with smart aging can, to a certain extent, directly reflect the quality of rural smart aging services in Anyang. In this survey, there are 166 valid questionnaires, of which 9 elderly people are very satisfied with the wisdom of the elderly service, accounting for 5.42% of the total sample; 27

elderly people are satisfied with the wisdom of the elderly service, accounting for 16.27% of the total sample; 22 elderly people are generally satisfied with the wisdom of the elderly, accounting for 13.25% of the total sample; and there are 109 elderly people who say that their satisfaction with the wisdom of the elderly service is lower. The details are shown in the following **Figure 4**.

With the continuous development of science and technology and society's increasing attention to the problem of old age, rural areas in Anyang are also actively exploring and practicing smart old age service models. These models aim to utilize modern information technology to improve the quality and efficiency of senior care services and meet the diversified senior care needs of the rural elderly.

Nangu now village in Yindu District has built a modern senior care service center relying on the neighborhood committee. The service center provides day care, rehabilitation care, cultural and recreational services, providing a comfortable and warm environment for the elderly in their old age. The community has organized a volunteer team consisting of party members, cadres and residents to provide caring services for the elderly. Volunteer services include accompanying and chatting, shopping for goods on behalf of the elderly, cleaning and so on. Such a model of ageing at home can preserve the familiar living environment of the elderly, so that they can enjoy ageing services in a familiar environment and reduce the discomfort brought about by changes in the environment.

A case of home-based elderly care smart service in Nangu now village:

Elderly B, 75 years old, female, widowed, living alone, relatively healthy, 2 daughters and 1 son, with a monthly income of 1800, which mainly comes from the alimony of her children. Both daughters and sons live in downtown Anyang. She is usually the only one at home. There is no problem with basic daily life such as cooking and laundry.

Usually communicates with her children mainly through phone calls and WeChat on her cell phone. The children also equipped them with devices such as smart bracelets and trained the elderly in their use. The smart devices can monitor the elderly's physical condition in real time and transmit the data to the cell phones of the children and village doctors, who can also remotely monitor and manage the elderly's health condition based on the data uploaded by the smart devices. Emergency call buttons are installed in the homes of the elderly, which are connected to the cell phones of the village doctors and volunteers. In case of an emergency, the elderly can simply press the button to get timely assistance, improving the safety of their lives. The use of intelligent equipment allows children to keep abreast of the elderly's situation, enhancing the connection and care between families. At the same time, the elderly make appointments for door-to-door haircuts, home appliance repairs and other services with the help of the village's elderly service center and the village committee and volunteers, which is convenient and quick. Volunteers also provide caring services for the elderly, such as accompanying and chatting, purchasing items on behalf of the elderly, and cleaning.

4.2. Survey on the Demand for Smart Elderly Services in Rural Anyang

When the rural elderly enter their old age, it causes a decline in body functions, which results in a variety of chronic diseases such as diabetes, heart disease, hypertension, high blood pressure, high blood fat, etc., and one of the main manifestations is the decline in the ability to take care of themselves. Therefore, in the demand for smart elderly care services for the elderly, the care of their daily lives is a very important element. In the Anyang rural smart old-age service model, the elderly can hope to enjoy precise care services with the help of intelligent equipment.

4.2.1. Main Difficulties Encountered by the Elderly in Daily Life

Due to their poor physical condition, the elderly are prone to encounter different kinds of difficulties in their daily life. From the 218 elderly people surveyed, 113 elderly people have difficulties in daily life care, accounting for 51.83% of the total sample; 99 elderly people have difficulties in receiving medical and health services, accounting for 45.41% of the total sample; 133 elderly people have difficulties in spiritual comfort and social activities, accounting for 61% of the total sample; 133 elderly people have difficulties in social activities, accounting for 61% of the total sample; and 133 elderly people have difficulties in spiritual comfort and social activities. The total number of elderly people in the sample is 51.83%; 99 elderly people have difficulties in receiving medical and health services, accounting for 45.41% of the total sample; 133 elderly people have difficulties in spiritual comfort and social activities, accounting for 61.01% of the total sample; 71 elderly people have difficulties in safety protection and emergency rescue, accounting for 32.57% of the total sample; 58 elderly people have difficulties in information counseling and enhancement, accounting for 26.61% of the total sample; and 79 elderly people have difficulties in other aspects, accounting for 36.24% of the total sample. The details are shown in Table 5 and Figure 5.

Elderly people generally show a tendency of natural deterioration of their physical functions, which prompts them to pay more attention to the management and maintenance of their personal health. To meet this challenge, the introduction of an electronic health record management system, which realizes the comprehensive digital recording and efficient management of the basic information of the elderly (including home address, past medical history and other key information), has become a key initiative. This change not only simplifies the information retrieval process, but also provides scientific and detailed data support for medical institutions to customize more accurate and comprehensive health guidance programs for the elderly. At the same time, the rapid development and popularization of telemedicine monitoring technology has opened a new chapter for the health management of the rural elderly. Through close cooperation with senior living organizations and professional medical institutions, front-end technologies such as smart wearable devices are widely used in the daily lives of the elderly, collecting

and transmitting their vital signs, health status and other important data to the cloud-based information platform in real time. With just a click of the mouse, doctors can cross the geographical limitations, comprehensively and timely grasp the health dynamics of each elderly person, and then quickly respond to provide personalized medical services and consultation, which greatly improves the efficiency and accessibility of medical services.

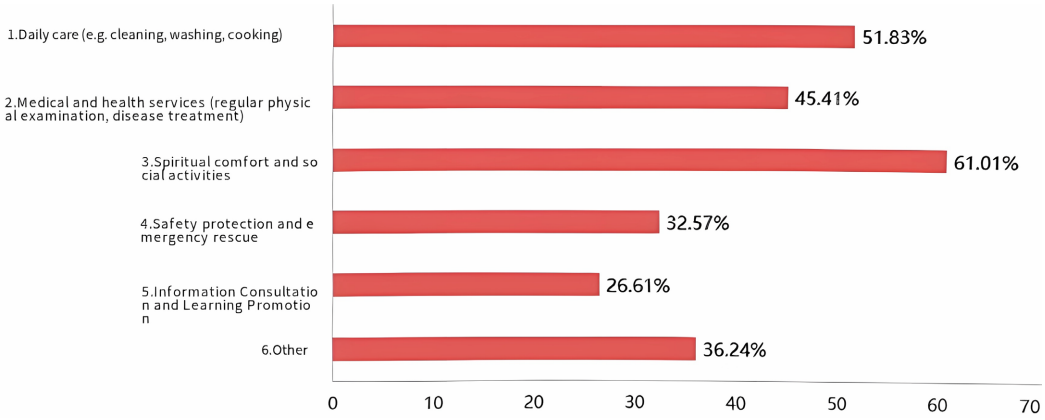

Figure 5. Main difficulties encountered in daily life.

Table 5. Distribution of daily life care needs (N = 113).

Daily Life Care	Number	Percentage
Cleaning/laundry	70	61.19
Cooking/feeding	90	79.65
Bathing/bathing	67	59.29
Hair cutting	13	11.50

In summary, the organic combination of electronic health record management and remote medical monitoring technology is gradually building a smart health management system covering rural areas and benefiting the elderly, adding peace of mind and security to their old age (Table 6).

Table 6. Distribution of medical and health service demand (N = 99).

Daily Life Care	Number	Percentage
Regular medical checkups	54	54.56
Health monitoring	90	90.91
Remote medical assistance services (e.g. prescription of medicines by Internet hospitals)	72	72.73

At the same time, the elderly can also communicate directly with doctors through the platform and request online diagnosis and treatment. When the elderly encounter emergencies such as accidental falls and home fires, they can notify their families, smart elderly service centers and hospitals through the health emergency

equipment for emergency assistance, thus preventing irreversible consequences. Therefore, the demand of the elderly for health management is gradually increasing in health management (Table 7).

Table 7. Distribution of demand for safety protection and emergency assistance (N = 71).

Safety Protection and Emergency Assistance	Number	Percentage
One-button call for help (e.g. fall alarm, bracelet)	69	97.18
Automatic positioning (electronic fence)	50	70.42

With the development of the times, people's material level generally improves, and the elderly also have a strong demand for humanistic care services. The older they get, the older they are, the more they always feel like reminiscing about the past, and online chatting allows them to share their happiest times at any time, and also gives them a kind of spiritual fulfillment without being lonely. In rural areas, although there is financial support from their children, the absence of their children all year round has caused the "left-behind elderly" to lack a sense of kinship. Generally speaking, for the elderly, a healthy and happy life does not only mean material security, but more importantly, spiritual fulfillment as well (Table 8).

Table 8. Distribution of needs for spiritual comfort and social activities (N = 133).

Spiritual Comfort and Social Activities	Number	Percentage
Companionship with relatives	121	90.98
Holiday sympathy	99	74.44
Psychological counseling	35	26.32

In the face of children's busy work schedules, the lack of opportunities for both spouses to learn more about smart ageing technology, and the obstacles faced by home-bound older people in learning how to use smart products, there is indeed a significant "digital divide" problem. This not only affects the elderly's enjoyment of the convenience brought about by technological advances, but also limits their integration into modern society and improvement of their quality of life (Table 9).

Table 9. Distribution of daily life care needs (N = 58).

Learning	Number	Percentage
Shopping	35	60.34
Recreation and education	40	68.97

4.2.2. Willingness to Try to Use Smart Elderly Products or Services to Improve Quality of Life

The attitude of the elderly towards smart senior care services is the most direct

factor in the development and recognition of smart senior care. Among the 218 elderly people who received the questionnaire, 14 of them have the attitude of "very willing to try" and try to use smart senior care products or services to improve their quality of life, accounting for 6.42% of the total sample. 6.42% of the total sample; 52 elderly people were "willing to try", accounting for 23.85% of the total sample; 16 elderly people were "hesitant", accounting for 7.34% of the total sample; 123 elderly people were "reluctant", accounting for 7.34% of the total sample; and 123 elderly people were "reluctant", accounting for 7.34% of the total sample. The attitude of 123 elderly people is "not too willing", accounting for 56.42% of the total sample; 13 elderly people are "not willing at all", accounting for 5.96% of the total sample. The specific situation is shown in Figure 6.

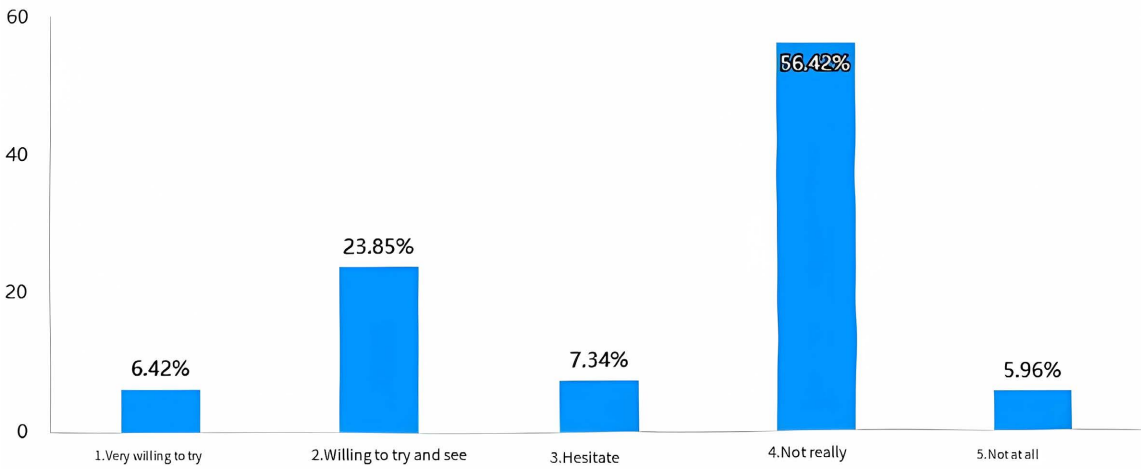

Figure 6. Willingness to use smart elderly products or services to improve quality of life.

4.2.3. Most Desired Smart Aging Services

If smart aging services can cover the villages of the elderly, what are the services they would prefer to obtain? In the survey on this question, there are 101 elderly people who would like to obtain remote medical consultation and diagnosis services, accounting for 46.33% of the total sample; 102 elderly people who would like to obtain smart wearable devices to detect their health, accounting for 46.79% of the total sample; 108 elderly people who would like to obtain emergency call and rescue services, accounting for 49.54% of the total sample; and the elderly people who would like to obtain smart home system The number of elderly people who want to get smart home system services is 78, accounting for 35.78% of the total sample; 68 elderly people want to get online entertainment and learning resources services, accounting for 31.19% of the total sample; 53 elderly people want to get shopping and meal delivery services, accounting for 24.31% of the total sample; 68 elderly people want to get social interaction platforms and psychological counseling services, accounting for 31.19% of the total sample; 31.19% want to get other services, accounting for 31.19% of the total sample. The number of elderly people who wish to receive social interaction platform and psychological counseling service is 68, accounting for 31.19% of the total sample; 31.19% wish

to receive other services. As shown in Figure 7.

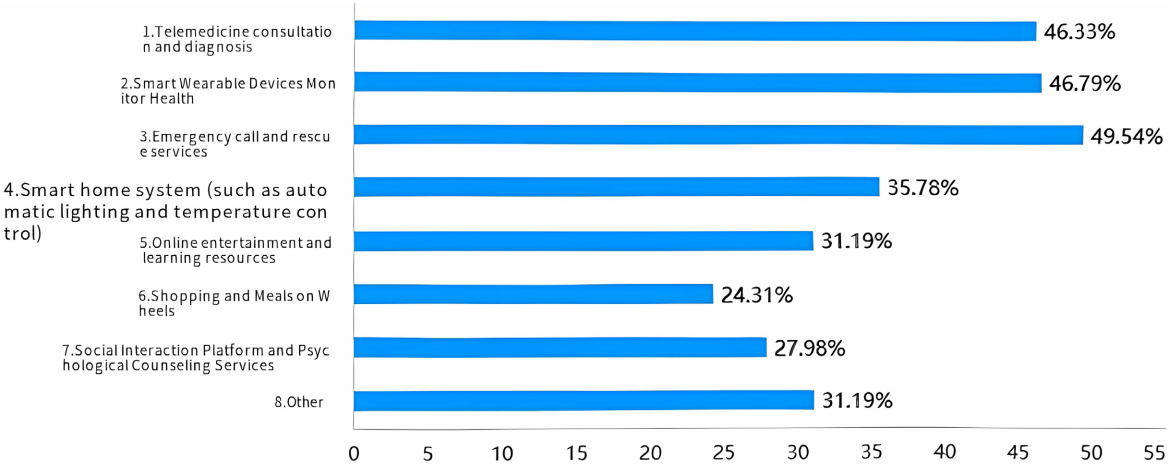

Figure 7. Most desired services.

4.2.4. Specific Smart Elderly Products of Interest

Through the visit survey, the content that the elderly are interested in using the smart aging products is also an important factor, a total of 218 elderly people were surveyed, of which 93 elderly people were interested in the health detection products, accounting for 42.66% of the total sample, 159 elderly people were interested in the safety and protection products, accounting for 72.94% of the total sample, and 162 elderly people were interested in the life assistance products, accounting for 74.31% of the total sample. 74.31% of the total number of samples; 66 elderly people are interested in emotional companion products, accounting for 30.28% of the total number of samples. The details are shown in Figure 8.

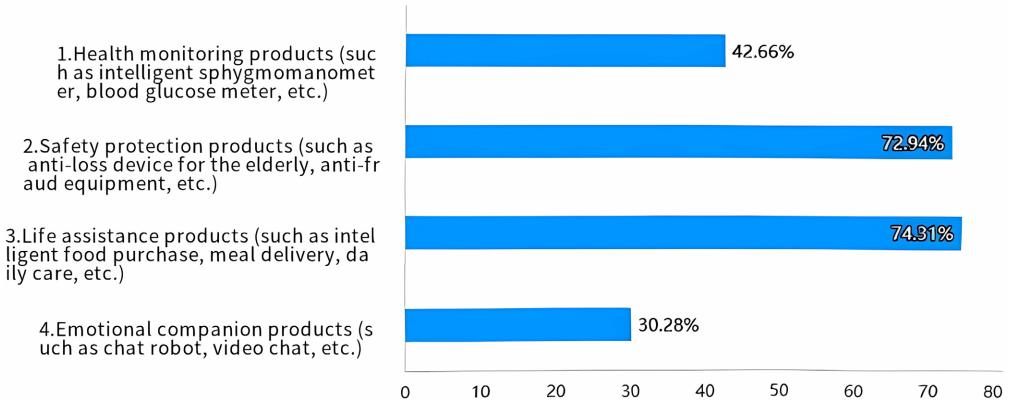

Figure 8. Interested elderly products.

In the process of investigating the living conditions and needs of the rural elderly, it can be seen that the vast majority of the elderly are in relatively poor health, coupled with the fact that due to the absence of their children, the elderly are often in need of care in their lives. Elderly people who live alone in rural areas by themselves also suffer from spiritual emptiness and crave for communication,

which also reflects the lack of family elderly care service provision.

4.3. Concerns and Suggestions

In the statistics on the performance of the elderly use of smart elderly equipment, most of the elderly hope that the smart elderly equipment "simple, good operation" of the elderly, accounting for 75.23%, indicating that most of the elderly are still willing to master simple. Elderly use of smart elderly products involved in their most worried about the problem, ranked first is "complex operation, will not be able to use", there are 147 elderly people worried about the existence of this problem, accounting for 67.43% of the total sample, there are 99 elderly people worried about the "cost is too high". There are 99 elderly people worrying about "high cost", accounting for 45.41% of the total sample, 111 elderly people worrying about "information security and privacy leakage", accounting for 50.92% of the total sample, and 112 elderly people worrying about "the quality of service cannot be guaranteed", accounting for 51.38% of the total sample, and the total number of elderly people worrying about the quality of service cannot be guaranteed. There are 112 elderly people worrying about "service quality cannot be guaranteed", accounting for 51.38% of the total sample, and 26.61% of the elderly people worrying about other issues (Figure 9).

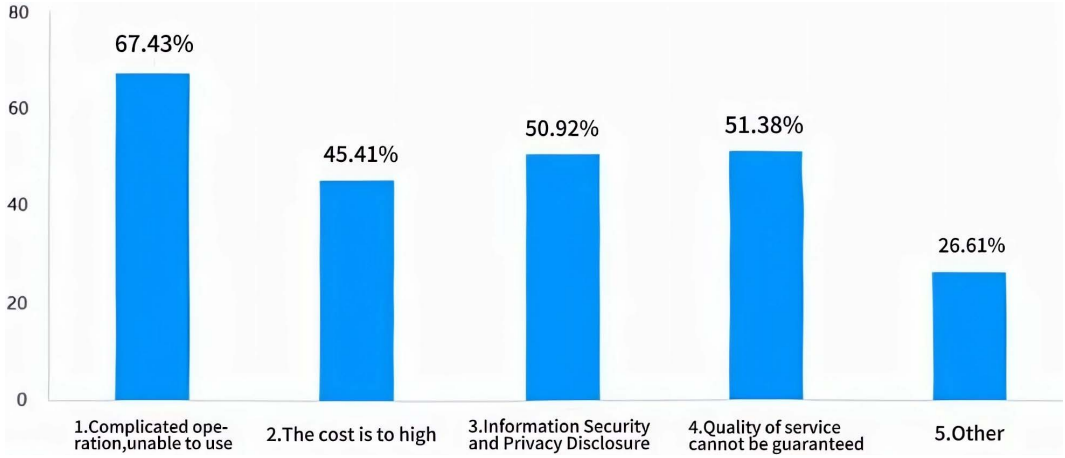

Figure 9. Concerns about using smart elderly care products.

Due to the decline in physical function, the ability of the elderly to accept new things decreases, and there are difficulties in the operation of intelligent senior care equipment, which requires training by specialists. 68.35% of the elderly have the need for training, which also shows that the elderly have a greater desire to use intelligent senior care products, and calls for the whole society to form a synergy of efforts to create a harmonious situation of intelligent senior care.

The survey data shows that the willingness of the 218 rural elderly interviewed to pay for the cost of smart elderly services shows a certain distributional feature. About one-quarter (24.77%) of the elderly indicated that they were willing to spend up to 2000 yuan per year to receive the service, which indicates that a

considerable portion of the elderly have more stringent considerations on cost control. Meanwhile, close to a quarter (23.85%) of the elderly were also willing to pay within the range of $1000 - $2000, showing a certain degree of ability to pay and expectation for higher quality services. It is worth noting that more than half of the elderly (51.38%) said they are willing to pay around $1000 per year for smart senior care services, reflecting the contradiction between their pursuit of high-quality senior care services and their ability to pay (Figure 10).

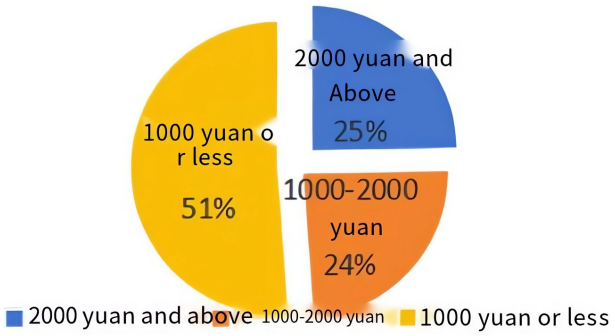

Figure 10. Price willing to pay for smart senior care services.

In the concerns about the use of smart elderly equipment for the elderly is mainly manifested in the use of obstacles caused by the decline of physical function, hope that simple and convenient mode of operation, to get a better experience, and at the same time have a more rigorous consideration of the cost control of the smart elderly service fees and payments. This also provides ideas for the optimization of smart elderly products.

5. Problems in the Development of Rural Smart Elderly Services in Anyang

Summarizing the existing smart senior care service models in rural Anyang to a certain extent meets the senior care needs of the rural elderly and improves the quality and efficiency of senior care services. However, these models also face some problems and challenges in the process of implementation, such as the stability of technical equipment, the professional quality of service personnel, and capital investment. In the future, it is necessary to further strengthen technological innovation, improve the service system, and increase capital investment to promote the continuous development and improvement of the Anyang rural smart pension service model. The dilemmas in the development of rural smart old-age care in Anyang are mainly reflected in the mismatch between supply and demand, structural imbalance, digital divide, cognitive bias, and market dilemmas under administrative dominance.

Mismatch between supply and demand, structural imbalance: with the rapid development of digital technology, the effective supply of smart elderly care products and services is insufficient, leading to the problems of mismatch between supply and demand and structural imbalance. This indicates that although

technological advances have brought new possibilities to the field of senior living, in actual application, smart senior living products and services often fail to meet the actual needs of the elderly, leading to structural deviations between supply and demand.

Digital divide: Older people face the problem of the "digital divide", which means that the threshold for the use of smart ageing products and services is high, and the potential for consumption has not yet been stimulated. This means that although some older people may be interested in new technologies, they are unable to fully utilize these services due to technical or operational difficulties, thus limiting the development of the smart aging industry.

Cognitive bias: There are cognitive biases in the perception of smart ageing, including exaggeration at the utility level, neglect of the needs of the population served, and misunderstanding at the conceptual level. This has led to over-idealized policy advocacy and social conceptualization, ignoring the plurality and complexity of the aging problem, as well as the specific needs of older people in different age groups. The current situation shows that most of the elderly are still focused on the application of smart products at the superficial level, such as smart phones and simple smart monitoring devices. Also due to historical factors such as economic level and geographical isolation, the cultural level of the elderly is generally low, and there are even many illiterates, and the existing smart elderly service platforms and smart devices are insufficiently age-appropriate. Elderly people using cell phones and other smart devices can only use simple functions, or rely on voice-assisted dialing, and more functions are not effectively utilized.

Market dilemma under administrative dominance: the development of smart aging presents a government-led model, leading to a blurred or even confusing boundary between the market and the government. This makes it difficult for the market to clarify its own role and positioning, and difficult to promote the development of the smart aging industry through the logic of market-oriented development.

To summarize, the dilemmas in the development of rural smart aging not only involve the problems of technology and service supply, but also include the problems of social cognition, administration and market demand. The solution to these dilemmas needs to be approached from multiple perspectives, including improving the quality and adaptability of services, strengthening technical training for the elderly, adjusting policy orientation, and promoting the healthy development of the market.

6. Innovative Strategies to Improve Smart Elderly Services in Anyang Rural Areas

6.1. Strengthen the Top-Level Design and Publicity of Smart Aging

According to the different modes of institutional care, mutual care, and home care, the near-term and medium- and long-term development goals of rural smart old-age care and the main tasks of each stage should be clearly defined. The

government should increase financial investment in rural smart aging services and set up a special fund to support the infrastructure construction, equipment purchase and personnel training of smart aging services. At the same time, it encourages social capital to participate in the development of smart senior care services, and provides financial support for smart senior care services through the government's purchase of services and the PPP model. Through thematic publicity, health lectures, product demonstrations and other forms, guide rural elderly people and their families to understand and use smart elderly care products. Enhance the digital skills of the elderly. Carry out digital skills training for the elderly to help them cross the "digital divide" and better enjoy the convenience of smart elderly services.

6.2. Enhance the Supply of Smart Elderly Products

Enrich the variety of products and develop intelligent products such as health management, elderly monitoring and rehabilitation aids for different types of elderly people. Popularize intelligent devices. Encourage and support the popularization and application of smart health monitoring devices, smart wearable devices, smart home devices, etc. in rural areas to help the elderly realize functions such as health management, emergency call and safety monitoring.

6.3. Enriching Service Contents

6.3.1. Expanding Life Care Services

In addition to providing basic life care services, services can be expanded, such as door-to-door haircutting, bathing assistance, shopping on behalf of the elderly, and other services to meet the daily life needs of the elderly. At the same time, intelligent equipment is utilized to provide more intimate services for the elderly.

6.3.2. Strengthening Medical Care Services

Establish rural elderly health records and utilize information technology means to realize real-time monitoring and management of elderly health information. Strengthen cooperation between rural medical and healthcare organizations and elderly service organizations, and provide regular medical checkups, disease prevention, rehabilitation care and other medical services for the elderly. At the same time, telemedicine services are being promoted so that the elderly can enjoy quality medical services at home.

6.3.3. Focusing on Spiritual and Cultural Needs

Carry out colorful cultural and recreational activities, such as square dances, opera performances, calligraphy and painting exhibitions, etc., to enrich the spiritual and cultural life of the elderly. Establish a psychological counseling service platform for the elderly to provide them with psychological comfort and emotional support. At the same time, the elderly are encouraged to participate in voluntary service activities to give full play to their residual heat and enhance their sense of social belonging.

To sum up, the innovation strategy of rural wisdom elderly service needs to start from many aspects, and comprehensively improve the wisdom level of rural elderly service by strengthening the top-level design, promoting the integration of medical and nursing resources, enhancing the supply of products, innovating the service mode and industry, strengthening the cultivation of talents and incentives, lowering the cost of use as well as strengthening the publicity and education measures.

6.4. Learn from Experience and Innovate Service Modes and Business Forms

Innovative intelligent senior care services: Promote the "Internet + senior care services" model, develop online health consultation, remote medical care, life care, senior education and other services suitable for the rural elderly, and meet the diversified needs of the elderly. Reference can be made to the "old-age purchasing" and "old-age labor" programs in the town of Ji, Jinzhong, Shanxi Province, the "points system" in the village of Xiangyang in the town of Yunzu, and the "medical and nursing care" program in the county of Pei, Xuzhou, Jiangsu Province. The "combination of medical care" Peixian model in Xuzhou, Jiangsu Province, and the "four-talking room" model in Fengxian District, Shanghai, have bridged the gap between the "demand gap" and the "utilization gap" in smart senior care services. The "demand gap" and the "utilization gap" are bridged.

Jinzhong Township, Shanxi Province: "Purchasing for the Elderly" and "Labor for the Elderly". By purchasing self-produced agricultural products from the elderly as ingredients for the post, it not only solves the operating costs of the post, but also increases the economic income of the elderly and reduces their financial burden and psychological concerns. Providing the elderly with suitable labor positions, such as handymen and public welfare positions, allows the elderly to gain a sense of accomplishment and economic income from their labor, realizing the double enhancement of self-worth and social value.

Xiangyang Village, Yunzhu Township: "Points system" exchange. Points are earned through participation in community activities (such as environmental protection and public welfare) and can be exchanged for goods in the Love Supermarket, which enhances the elderly's sense of participation and belonging. The elderly are encouraged to continue to give full play to their spare time and participate in community governance and services, realizing the transition from "being taken care of" to "self-service and service to others".

Peixian County, Xuzhou, Jiangsu Province: The Peixian model of combining medical care and nursing care. It integrates the resources of township medical and healthcare institutions and nursing service facilities, realizing integrated planning, adjacent construction, and integrated operation. It provides a full range of services such as care for the disabled, medical rehabilitation, meal assistance, visiting care, learning and recreation, etc. to meet the diversified needs of the elderly.

Fengxian District, Shanghai: the "four-chamber" model. To create a compre-

hensive service space for rural older persons that integrates dining, communication, learning and deliberation. It promotes interaction and communication between older persons and other members of the community and enhances community cohesion.

Promote the "self-sufficiency + community support" model of old-age care, and encourage rural communities to set up mechanisms for the internal circulation of agricultural products, while developing light manual labor positions suitable for the elderly. Establishing a comprehensive system for the purchase of agricultural products and remuneration for labor ensures fairness and transparency, and stimulates the participation of the elderly. Promote point system management in more rural areas, and design diversified ways of obtaining points and redemption mechanisms in accordance with local realities. Promote the "combination of medical and nursing" model of elderly services, and strengthen the deep integration of medical resources and elderly services. In rural areas, promote the construction of "four rooms" or similar multifunctional service spaces, so as to meet the diversified social and spiritual and cultural needs of the elderly.

7. Conclusion

With the continuous development of information technology, artificial intelligence and other science and technology, more and more elderly people are reluctant to use these "new devices", and have some difficulties in learning and using new technology products, which may cause them to fall into the "digital divide" and become a group left behind by the rapid development of the digital economy. They may fall into the "digital divide" and become a group left behind by the rapid development of the digital economy. Therefore, they need to spend more time to adapt to this new technology.

To summarize, the dilemmas in the development of rural smart old-age care not only involve the problems of technology and service supply, but also include the problems of social cognition, administration and market demand. The solution to these dilemmas needs to be approached from multiple perspectives, including improving the quality and adaptability of services, strengthening technical training for the elderly, adjusting policy orientation, and promoting the healthy development of the market.

There are still some limitations that need to be addressed in this study:

First, although the study broadly covers aspects such as demand and status quo, technology application and policy support, the analysis of specific technological innovations and practice cases still needs to be in-depth. Second, insufficient attention has been paid to the sustainable development of rural smart elderly services and the construction of long-term mechanisms, which limits the practical guiding value of the research to a certain extent.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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