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Smart Aging and the New Layout of the Elderly Industry

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Abstract. By utilizing technologies such as the Internet of Things (IoT), big data, and artificial intelligence (AI), smart aging not only addresses resource shortages and service quality disparities in elderly care but also drives the digital transformation and upgrading of the industry. This paper uses case analysis, interviews, and surveys to examine the current status and development trends in the smart aging industry. Policy support, funding, and tax incentives have provided essential safeguards for its stable growth. Smart aging has become a catalyst for social and economic development, fostering the growth of related enterprises and enhancing the efficiency of the industry value chain. We call on the government to continue providing policy support and guidance, encourage social participation and mutual assistance, and promote the sustainable development of the smart aging industry, ultimately establishing an ecosystem that seamlessly integrates technology with human-centered elderly care.

Keywords. Smart Aging, Digital Transformation, Innovative Aging Services, Elderly Care Industry

1. Introduction

By the end of 2023, China's elderly population aged 60 and above reached 297 million, or 21.1% of the total population, with 217 million aged 65 and above, accounting for 15.4% (See Figure 1 below). China now faces significant pressures from an aging society, impacting both the quality of life for the elderly and socio-economic stability. China's efforts to address these challenges, including promoting the silver economy and strengthening the old-age security system, provide valuable insights for the global community. These initiatives are progressively alleviating pressures on the elderly and offering Chinese solutions to aging issues faced by other developing nations.

The elderly care industry has become a key social issue in China, strongly supported by the government and integrated into the national strategy to address population aging. As a vital driver of economic and social progress, the industry's digital transformation is reshaping its structure and attracting significant attention. While domestic investment plays a central role, foreign capital is increasingly vital, reflecting China's economic openness and financial market development amid global aging trends. With growing demand for elderly care services, the pension finance sector

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has emerged as a crucial pillar of the system, drawing increased foreign interest. Advancements in digitalization and globalization are accelerating the development of intelligent elderly care, with foreign investment contributing to a more structured and sustainable industrial framework.

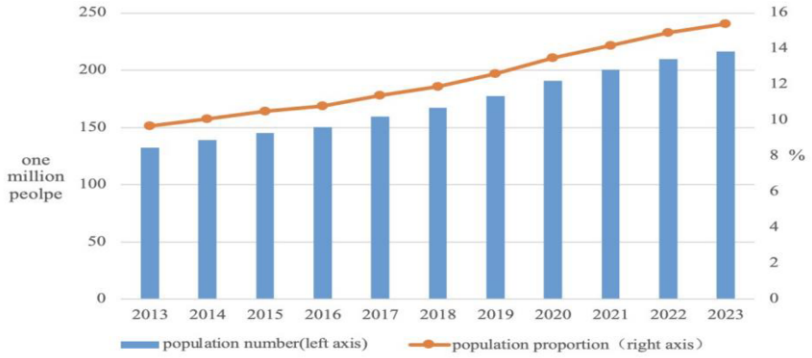

Fig.1 Elderly Population Aged 65 and Above: Numbers and Proportion (2013-2023)[2]

This paper focuses on the two most important aspects of the smart senior care industry, senior care services and senior care finance, and explores the impact of smart senior care on the new layout of the senior care industry from various aspects. Subsequently, it also puts forward corresponding policy recommendations, suggesting how to utilize smart aging to promote the development of China's aging service and aging finance business.

2. Related works

The academic discourse on digital elderly care highlights technology's transformative role in reshaping care practices, focusing on enabling technologies and evolving service models. Pu et al. (2024) highlighted the importance of technology suitability for aging populations and service collaboration in developing high-quality smart elderly care services. They emphasized that improving elderly life quality requires comprehensive policy reform and efficient resource allocation [1]. Yuan et al. (2024) identified risks in constructing smart elderly care systems, such as the value-driven technical approach and inadequate regulations. They recommended a multi-governance model to clarify responsibilities and strengthen policy support for industry development [2]. Huang et al. (2020) examined the role of policy tools in promoting industry growth, using the Policy Tools and Technology Pathways (P-TRM) model. They identified gaps between sector needs and current policies, offering strategic solutions [3]. Gao et al. (2020) analyzed the role of foreign investment in fostering an open framework and addressing elderly needs, emphasizing its importance in talent acquisition and government support to enhance China's smart elderly care industry [4].

Although many practical cases of smart old-age care have emerged all over the world, the core areas still need to be further explored. Our research is dedicated to an in-depth exploration of the diversified challenges faced by digital elderly care. After carefully analyzing the process of digital elderly care in China and conceiving a more

[2] The data is sourced from the National Bureau of Statistics. The data source for the following figure is the same.

practical plan on how foreign capital can enter China, we hope that digital elderly care can be more widely promoted in China and innovative measures can be implemented.

3. Digitizing the Senior Care Industry

3.1. Policy Package Released to Encourage Digital Senior Care Services

China's elderly population has surged during its period of modernization, with diverse groups—such as widows, orphans, the economically disadvantaged, and those with mobility issues—growing rapidly. This demographic shift, compounded by urbanization and challenges at the "three-phase" economic development stage, has intensified the aging issue, attracting widespread attention [5]. As the focus on intelligent elderly care grows, it is essential to evaluate the practical implementation of these systems, the evolution of related policies, and the challenges they face. Such assessments will provide insights to optimize policies, guide future aging initiatives, and strengthen China's elderly care system. Effective policy support is crucial for advancing the elderly care industry.

3.1.1 Policies to increase financial subsidies for digital pensions

The government reduces the operating costs of digital senior care service enterprises by setting up special funds and improves the financing efficiency of the digital senior care service industry by optimizing financial services. Capital investment is an important guarantee for the digital elderly service industry, and the investment of the government and social capital provides the necessary financial support for the digital elderly service industry and promotes the favorable development of the digital elderly service industry. Table 1 shows policies related to increasing financial subsidies for digital pensions.

Table 1. Policies related to increasing financial subsidies for digital pensions

Timing	Deal	Element
January 2024	Opinions of the General Office of the State Council on Developing the Economy to Promote the Well-being of Older Persons	Enhance fiscal and financial support. Use local government special bonds to fund eligible silver economy projects. Leverage special refinancing for inclusive elderly care and provide credit support.
December 2021	National Plan for the Development of the Aging Career and the Elderly Service System in the Fourteenth Five-Year Plan	Encourage financial institutions to develop savings, wealth management, insurance, trust, public fund-raising and other financial products for the elderly

3.1.2 Policies to encourage the application and innovation of digital ageing technology

Technology drives the development of digital elderly care services, with innovation being essential for progress. The government supports the application and innovation of new technologies in senior care. By leveraging intelligence, informatization, and other technologies, service efficiency and quality can be improved, while enhancing the smart capabilities of digital elderly care. Examples include smart wearables for monitoring health and providing personalized advice, and intelligent platforms offering online consultations and booking services for better access to

healthcare. Table 2 outlines policies encouraging the application and innovation of digital aging technologies.

Table 2. Relevant policies to encourage the application and innovation of digital aging technology

Timing	Formulation	Element
2024	Shanghai Action Program for Promoting Innovation and Development of Elderly Science and Technology	To promote the deep integration of "science and technology" and "old age" as the main line, to strengthen the key technology research and development as the main direction, to accelerate the application of emerging technology inheritance and integration of innovation as the path.
December 2023	Programme of Work for the Promotion of Quality Development of Ageing with Digital Technology	Deepening the high-quality development of digital technology for ageing in the field of industry and information technology

3.1.3 Policies to encourage the development of digital aged care talents

Policies to strengthen the training and recruitment of elderly care professionals include encouraging universities and vocational colleges to offer specialized courses. Policies supporting employment and entrepreneurship in elderly care aim to attract talent through various channels and promote cross-industry mobility. Enterprises are encouraged to enhance staff training, while the influx of international talent has revitalized the sector. Table 3 outlines policies fostering the development of digital elderly care professionals.

Table 3. Relevant policies to encourage the development of digital elderly care talents

Timing	Deal	Element
January 2024	Opinions on Strengthening the Elderly Service Talent Workforce	It is explicitly proposed to break the limitations of academic qualifications, age, status and geography, so as to recruit talents and cultivate talents in practice.

The implementation of the policy package has led to significant progress in the digitization of elderly services. Enhanced digital infrastructure has supported service intellectualization, while new technologies have improved efficiency and quality. The government plans further policy reforms, including tax incentives, subsidies, cross-sector collaboration, and the refinement of laws and standards. These measures will elevate the intelligence and quality of senior care services. As the market expands, more diverse and personalized products will emerge to meet the varied needs of the elderly, driving the growth of the service industry chain [6].

3.2. The development status of the digitalized elderly care service industry

Intelligent senior care solutions, also known as smart senior care, leverage modern information and communication technology to integrate multiple service systems, aiming to provide innovative care services for the aging population. This model transcends traditional frameworks of home, community, and welfare institutions. Utilizing remote monitoring technology, it collects and analyzes data on the physiological conditions and behavioral patterns of the elderly, enabling meticulous management of elderly care. As a result, this approach significantly enhances the quality of life for older adults.

3.2.1 Main Features

Intelligent elderly care is defined by advanced intelligence, refined services, and increased efficiency, addressing the diverse needs of the elderly. First, its intelligence

automates daily activities through network technology and electronic tools, enabling remote monitoring of health and location in real-time, ensuring safety. Second, it enhances service precision by using technologies like the Internet to create smart platforms that offer personalized care, transforming senior care into a more intelligent, precise, and diversified model. Lastly, it improves efficiency by facilitating rapid information exchange, networked management, and resource sharing, reshaping traditional care models through technological innovations and system upgrades.

3.2.2 Service model

Intelligent elderly care services encompass various models designed to provide comprehensive, round-the-clock care for seniors. The "service provider to service demander" (P to D) interaction model represents a bilateral active engagement, where the elderly care provider proactively shares relevant service information with the elderly care demander. Service providers must integrate, collect, and analyze data from the demand side in advance. For example, the 'Jingtong e' app, China's first comprehensive platform for seniors, allows users to access services via the government's website. Community organizations manage service selection, regulated by industry standards and public oversight, enabling seniors to use government subsidies for home care services.

3.2.3 Industry trend

As global aging intensifies, the digital transformation of the smart aging and senior care industry has become an irreversible trend. Governments, including China, have introduced policies to support its development, integrating smart aging into broader smart city initiatives and regulating market dynamics through relevant standards. With advancements in IoT, cloud computing, big data, and AI, the quality and efficiency of smart elderly care services will continue to improve. Future innovations will include more intelligent and user-friendly products and services to meet the growing needs of seniors. Additionally, smart aging will drive cross-sector integration, connecting industries such as healthcare, insurance, and real estate, fostering synergy across the industry chain and advancing senior care to new heights.

3.3. Main Models and problems of the Digital Senior Care Service Industry

As shown in Figure 2, from 2017 to 2019, the number of community service agencies in China steadily increased, alongside the development of intelligent, age-friendly residential areas in several cities. In these areas, not only did the number of community institutions rise, but digitalization also enhanced the intelligent care facilities, making them comparable to international "senior communities" with automated food, housing, and transportation services. For example, in 2016, Hubei province saw a surge in community service agencies, with Wuhan's Qiaoxi community introducing intelligent elderly care services. This initiative established a home-based care network utilizing technologies such as the Internet, mobile networks, and IoT, offering 6,863 elderly residents' access to services like laundry, cooking, repairs, hairdressing, and food delivery. While some cities have advanced in digitalization, the distribution of these services remains uneven across China, requiring continued efforts for comprehensive digital pension solutions. The following outlines the three main models of digital aging in China.

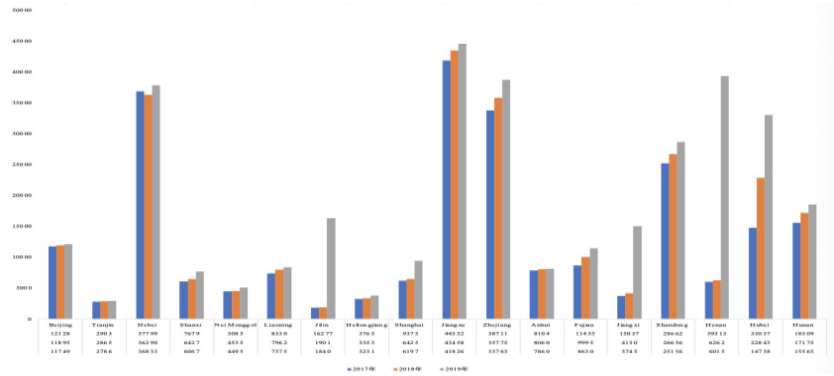

Fig.2 Number of community service agencies (2017-2019)

3.3.1 Main modalities

Digital home care primarily utilizes telemedicine, health consultations, mobile health monitoring, and smart home technology. Telemedicine and health consulting services enable the integration of elderly health management systems with community service centers and senior service stations, providing health monitoring, teleconsultation, and emergency response services. Through intelligent device apps, seniors can access convenient home health advice via integrated health data. Mobile health monitoring employs wearable devices, like smartwatches and bracelets, to track physiological data—such as heart rate, blood pressure, and blood sugar—in real time. These devices alert users to abnormal health readings and offer online medical consultations, allowing seniors to receive professional healthcare without leaving home. Smart home technology enhances security and convenience. Devices like smart refrigerators and smart lamps improve daily life, while security features such as smoke alarms and anti-theft sensors on doors and windows ensure a safe home environment for the elderly.

Digital institutional care includes intelligent travel and emotional accompaniment. One of the intelligent travels can be for the elderly in the nursing home to facilitate the mobility of the elderly to organize sunset red tourism, so that the elderly to participate in more cultural activities to carry out social exchanges.

3.3.2 Main Problems

The domestic intelligent aged-care industry is still in its infancy. China's current intelligent elderly industry has not yet established a large-scale operating system, high service costs, the industry's internal differences have increased significantly; the lack of effective and systematic methodology of operation and management, pension resources have not been fully utilized, the service system is extremely decentralized; smart elderly, although an emerging field, but has not yet built up a complete industrial chain, the lack of large-scale operation, sustainable development of the strength of the relatively weak. The strength of sustainable development is relatively weak.

China's smart elderly care system has several deficiencies. For example, as shown in Figure 3, the coverage rate of elderly care institutions varies significantly across the country, with cities like Beijing and Shanghai exceeding 100%, while some regions remain below 50%. Actively attracting foreign investment is a crucial initiative to address these disparities. Foreign-funded enterprises in the smart elderly care sector often possess advanced technology and extensive service experience, enabling them to offer more personalized and specialized services that meet the diverse needs of the

elderly. By introducing foreign investment, China can drive technological innovation and product upgrades within its smart elderly industry, accelerating the establishment of a competitive industry chain and ecosystem. In conclusion, attracting foreign investment in China's smart elderly care sector is a strategic decision of considerable significance. By enhancing international cooperation and promoting joint development and innovation, we can provide higher-quality and more efficient services for the elderly, improving their well-being and quality of life in their later years.

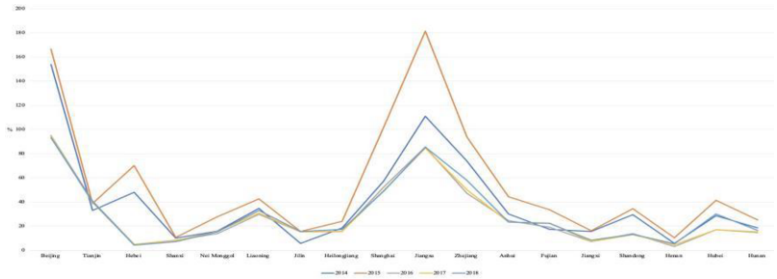

Fig.3 Coverage of community services (2014-2018)

4. Foreign investment into China's digital smart aging industry

4.1. New Policy Package to Boost Foreign Investment in China's Digital Aging Industry

4.1.1 Policies Encourage Foreign Investment in China's Smart Aging Industry

In recent years, China has a positive and open attitude towards foreign investment in the field of digitalized intelligent ageing, considering it an important way to enhance the level of China's ageing services and promote innovation in the industry. At the same time, the state also focuses on regulating and guiding foreign investors to ensure that they abide by Chinese laws and regulations, participate in market competition in an orderly manner, and jointly promote the healthy development of the smart elderly care industry.

4.1.2 Policies to encourage foreign investment in the pension finance industry

Since 2019, China's financial sector regulators have launched a series of heavyweight open-door policy initiatives, including the approval of a large number of major foreign-invested institutions' administrative licenses, involving the removal or relaxation of foreign-invested shareholding restrictions, the relaxation of access conditions for institutions and businesses, and the expansion of foreign-invested institutions' business scope. Table 4 summarizes the policy benefits related to encouraging foreign investment in the pension finance industry. Under the continuous release of policy dividends, China's diversified pension financial market has also been continuously energized by foreign financial institutions. Increased financial support can meet the large new demand for pension services and pension finance, bringing opportunities for foreign financial institutions and a greater supply of long-term capital to the capital market. The implementation of the personal pension system will also

bring new opportunities for existing pension financial products, optimize the financial structure and promote the rapid development of the financial market.

Table 4. Key Policies to Encourage Foreign Investment in the Pension Finance Industry

Timing	Deal	Element
December 2021	Regulations on Insurance Asset Management Companies (Exposure Draft)	Clarify that there is no restriction on the maximum percentage of shares held by foreign-funded insurance companies in domestic insurance asset management companies, and that there is no differentiation between shareholders due to differences between domestic and foreign countries
December 2021	Circular on Clarification of Measures Concerning the Opening-up of the Insurance Intermediary Market to the Public	Substantial removal of entry restrictions and lowering of entry thresholds for foreign insurance brokers
March 2021	Decision on Amending the Implementing Rules of the Regulations on Foreign Insurance Companies	Clarify the admission criteria for foreign insurance group companies and offshore financial institutions to invest in foreign insurance companies
January 2020	Circular on Clarifying the Points of Eliminating the Restrictions on the Ratio of Foreign Investment in Joint Venture Life Insurance Companies	Formally abolished the restriction on the proportion of foreign investment in joint venture insurance companies operating life insurance business, and the proportion of foreign investment in joint venture life insurance companies can be up to 100%.
July 2019	Relevant Initiatives on Further Opening Up of the Financial Sector to the outside World	Released 11 measures to open up the financial sector to the outside world: for example, foreign investment access restrictions were lifted and foreign financial institutions were allowed to invest in domestic pension management companies.

4.2. Modes of Foreign Investment into China's Digital Smart Aging Industry

In recent years, China's senior care market has rapidly expanded, with a steady increase in the number of provincial elder care institutions. According to the "China Senior Care Industry Investment Analysis and Prospect Forecast Report," the number of nursing home beds reached new annual highs from 2016 to 2020. The senior care industry in China features an extended industrial chain and broad field coverage. Between 2016 and 2020, market consumption exceeded 10 trillion yuan, with an average annual growth rate of 17%. The elderly industry is projected to surpass 20 trillion yuan within the next two decades, attracting significant interest from foreign companies. In line with the ongoing promotion of China's open policy for the senior care sector, several regions have implemented policies to relax access conditions for the market and actively encourage investment from social capital. As a result, the number of pension institutions across various provinces has continued to soar since 2020. These initiatives have created a favorable environment for foreign investors, positioning China as a key player in the global strategic landscape for foreign organizations. Among the many foreign-funded senior care companies, the "French faction" represented by Gallize, Opéra and Domouvie Pension Group tends to adopt the asset-light cooperation model to enter the Chinese market.

4.3. Characteristics of foreign investment into China's digital smart aging industry

4.3.1 Late entry of foreign capital

Over the past decade, the U.S. senior care sector has rapidly advanced, driven largely by private investment and commercialized operations. Compared to the United States and Europe, China's digital smart elderly care industry has developed later and at a slower pace. Policy constraints have led to relatively delayed foreign investment in China's senior care sector. Currently, China is primarily in the phase of learning and adapting foreign capital practices within its senior care industry. With the vast scale of China's senior care market and recent supportive policies, foreign companies have a promising future in China's digital smart senior care sector. The rollout of new policies underscores China's commitment to developing its digital senior care industry, presenting a timely opportunity for foreign enterprises. By leveraging their advanced experience in other markets and innovating in alignment with China's senior care policies, foreign-funded firms can contribute significantly to China's senior care system, enriching it with diverse, high-quality smart care products.

4.3.2 Diverse forms of foreign investment

Since the State Council promulgated the Several Opinions in 2013, the utilization of foreign investment in the intelligent senior care service industry has accelerated significantly [7]. Between 2013 and 2024, the number of foreign companies involved in China's senior care services will continue to rise. Foreign investment in the senior care industry is not only characterized by the rapid growth in the number of enterprises, but also by the diversification of their investment patterns. In terms of the composition of invested enterprises, the proportion of Chinese-foreign cooperative enterprises and wholly foreign-owned enterprises in all invested enterprises exceeded the 60% threshold between 2013 and 2024, and the proportion of these two types of enterprises soared to a high of 90% between 2017 and 2019 in particular. In terms of the size classification of investment enterprises, enterprises with registered capital below 10 million yuan dominate the market, with their proportion maintained between 40% and 87%; while enterprises with registered capital between 5 million yuan and 10 million yuan show a decreasing trend year by year, although their share ranges from 6% to 40%; and those with registered capital of more than 50 million yuan take up a share of 10% to 20%. In summary, foreign investment in China's senior care industry is dominated by small and micro enterprises with registered capital of less than 50 million yuan.

4.4. Foreign investment to empower China's digitized smart aging industry

In assessing the impact of competition from foreign multinational corporations on China's elderly care industry, it is essential to differentiate between long-term effects and short-term fluctuations, while adhering to principles of anti-monopoly, competition promotion, and equal treatment of foreign investment. The "catfish effect" generated by the presence of foreign multinationals should be leveraged to enhance the operational efficiency and competitiveness of China's service industry. By adopting a long-term perspective with a tolerant, open, and inclusive mindset, China can encourage foreign multinationals to enter high-end sectors of the service industry [8]. This approach not only fosters talent development in China's digital smart aging industry but also suggests that implementing a "going out" strategy—strengthening

exchanges and cooperation with foreign industry associations, higher education institutions, and research institutes—can promote innovation in China's service industry. Such collaboration can improve organizational models, operational mechanisms, and management practices, ultimately enhancing the operational efficiency and competitiveness of China's digital smart elderly care industry.

5. Conclusion

Considering China's aging population and the advancements in Internet technology, this paper examines the current state and practice models of digital smart elderly care and analyzes the impact of China's policies on foreign investment in this sector. The findings indicate that digital elderly care effectively addresses the challenges of population aging and enhances the quality of life for the elderly. China can leverage its national conditions to draw on effective foreign concepts and experiences, optimizing the smart elderly service model in a comprehensive and multi-dimensional manner while empowering the future of elderly services with innovative technologies. Strengthening policy support, innovating technology platforms, and enhancing talent training are crucial for promoting the sustainable and healthy development of smart elderly services.

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