Research on the Dynamic Mechanisms and Paths of the Integration between the Pension Industry and the Digital Economy from the Perspective of the Silver Economy

Kevin Meng

RDFZ Xishan School, Beijing, China

kevinmeng2025@163.com

Keywords: Silver economy; Pension industry; Digital economy; Integrated development; Dynamic mechanism

Abstract: In the context of population aging and the digital technology revolution, the silver economy has become a new engine for economic and social development, and the integration of the pension industry and the digital economy is an inevitable trend. From the perspective of the silver economy, this paper systematically discusses the dynamic mechanisms and the path of integration and development. The study found that technology, demand, policy, and the market together constitute a dynamic mechanism that promotes integration through factor coupling and transmission. The paths of integrated development are as follows: First, relevant stakeholders should optimize the supply structure for elderly care services, address the time-and-space mismatch in resource allocation, and achieve an accurate match between supply and demand. Second, the pension industry should reshape its value chain, promote the digital transformation of traditional business forms, and spawn new forms of smart elderly care. Third, the whole society should stimulate the efficiency of the social system, promote intergenerational harmony and social inclusion, and improve the level of social governance. This paper provides a theoretical framework and practical guidance for solving the bottleneck in the development of the pension industry and releasing the economic potential, which is of great significance for actively coping with the aging population and building an elderly-friendly society.

1. Introduction

1.1 Research Background

China is experiencing the most extensive and fastest population aging in the world, and the shift in the population structure has bred a "silver economy" with great potential. With the digital technology represented by big data, artificial intelligence, and the Internet of Things sweeping the world, the digital economy has become a key force in restructuring global factor resources and reshaping the global economic structure. Under the dual impacts, the traditional pension industry is facing challenges such as insufficient service supply, unbalanced resource allocation, and outdated models, making it difficult to meet the growing, diversified consumption needs of older people in the new era. The digital economy has given the pension industry a new impetus. Deep integration of the two is an inherent requirement for overcoming the dilemma and improving the quality of life of elderly individuals [1]. Furthermore, it is also a strategic choice to cultivate new economic growth points and build a new development pattern. This research systematically discusses the dynamic mechanism and practical path of integrating and developing the pension industry and the digital economy from the perspective of the silver economy, which is of practical necessity and significance of the times.

1.2 Research Significance

The research value is mainly reflected in the theoretical construction and practical application. As for the theoretical construction, this research creates an analytical framework integrating technology, demand, policy and market, systematically explains the integration mechanism and internal logic of pension industry and digital economy, deepens the understanding of the connotation of silver

  DOI: 10.25236/gemmsd.2025.123

economy, expands the application research of the theory of industrial integration and digital economy in the field of people's livelihood, and provides new perspectives and theoretical support for the development of related disciplines. As for practical application, this paper analyzes the current status, mechanism, and development path, and provides a decision-making basis for government departments to formulate accurate and efficient industrial support policies. Moreover, it offers guidance for old-age care institutions to facilitate digital transformation and innovate their business models. It effectively addresses the challenges of elderly care, promotes high-quality development in the pension industry, contributes to the creation of an elder-friendly society, and actively addresses the challenges posed by an aging population.

2. The Application of the Integration of Pension Industry and Digital Economy from the Perspective of Silver Economy

2.1 The Theoretical Basis and Practical Needs of the Integrated Development of Pension Industry and Digital Economy

The deep integration of the pension industry and the digital economy has a solid system foundation. The industrial integration model shows that the boundaries between fields will gradually blur due to technological innovation, giving rise to new business models. The penetration and energy efficiency of the digital economy's basic technology provide technical support for industrial integration; the long tail model illustrates how digital platforms can cater to the personalized, segmented needs of elderly individuals, thereby expanding market reach [2].

In terms of realistic demand, the contradiction between the huge demand driven by an aging population and the supply of traditional services is increasingly prominent. The pursuit of stability, safety, convenience, and high quality by the elderly groups constitutes a powerful driving force for consumption upgrading. In contrast, the traditional elderly care model has obvious shortcomings in efficiency, coverage, and the provision of customized services. With its high efficiency, accuracy, and intelligence, digital technology has become a way to address shortcomings in the traditional model and meet older people's wishes for a better life. Therefore, the integration of the pension industry and the digital economy is an inevitable trend in the development of the times.

2.2 Analysis of Application Scenario

First, digital technology improves the efficiency and accessibility of elderly care services. Digital technology is profoundly changing the supply mode of elderly care services. The Internet of Things (IoT) can enable real-time monitoring and early warning of health indicators for older people, and turn passive responses into active interventions. The smart pension platform integrates resources such as communities, medical institutions, and service providers. Therefore, the elderly individuals are to be provided with services such as assistance with meals, cleaning, and medical care through a one-click call or mobile app, which effectively solves the problem of uneven distribution of elderly care service resources in time and space. Telemedicine and online consultations facilitate access to high-quality medical care for older people in remote areas or with mobility difficulties, greatly improving service accessibility and efficiency [3].

Second, digital technology has innovated the model of elderly care products and services. The integration has spawned numerous new products and formats. Smart wearable devices, robots, and age-friendly smart home appliances emerge in an endless stream, providing all-weather security and convenience for older people. In the service mode, the flexible employment model of "platform + individual" emerges, connecting elderly individuals with service needs to professionals who provide services; virtual reality (VR) is used for cognitive training and elderly rehabilitation. Personalized health management scheme based on big data analysis has realized the accurate service upgrade from "a one-size-fits-all approach" to "tailored strategies for individuals".

Third, the digital economy improves the quality of life and social participation of older people. The digital economy is not only a tool but also a driver of connecting society and enriching life. Various age-friendly apps and smart terminals help older people bridge the "digital divide" and enjoy

social entertainment, online learning, mobile payments, and the convenience of a smart life. Platforms, such as online universities and interest communities, meet the spiritual and cultural needs of older people and promote their social interaction. Ultimately, the sense of acquisition, happiness, and security for older people is significantly improved, effectively reducing their loneliness while enhancing their social participation and self-worth.

3. Dynamic Mechanisms of Pension Industry-Digital Economy Integration from the Perspective of the Silver Economy

3.1 Internal Driving Forces

3.1.1 Innovation and Empowerment of Digital Technology

Technology is the core driving force behind the deep integration of the pension industry and the digital economy. The new generation of information technologies, represented by artificial intelligence, big data, IoT, and 5G, provides disruptive support for the pension industry. Intelligent algorithms use artificial intelligence to optimize service processes and achieve personalized health management; the IoT technology establishes an all-weather and multi-level security monitoring system through wearable devices and intelligent sensors; big data technology can be used to comprehensively analyze the behavioral characteristics and potential needs of the elderly individuals, and provide a decision-making basis for accurate service supply and product upgrading [4]. Through systematic empowerment, technology reshapes the information, business, and value chain flows in elderly care services, fundamentally improving the intelligence, automation, and precision of the industry, and becomes the internal driving force for integrated development.

3.1.2 Changes in the Structure of the Elderly Population and Consumption Upgrading

The aging of population structure and the iteration of the consumption concept constitute the core driving force of the integrated development of the pension industry and the digital economy. China's elderly population is large and growing rapidly, creating a broad, rigid service demand market. At the same time, some older adults had higher levels of education, greater consumption power, and stronger digital skills. Their needs have shifted from basic security to diversification and high quality, with a focus on stability, safety, convenience, participation, and self-worth. Expenditures related to livelihoods are growing slowly, while spending on development and leisure is rising quickly, posing a severe challenge to the traditional, homogeneous elderly care services system. It forces the industry to promote innovation using digital technology to meet the increasingly prominent, personalized, and refined needs of older people. In short, strong demand from consumers is the key driver of integrated development [5].

3.2 External Driving Forces

3.2.1 Policy Guidance: National Strategic Planning and Support System

The important external driving force and institutional basis of integrated development lies in policy. In view of population aging nationwide, both the central and local governments have paid close attention to the development of the pension industry and have successively launched a series of macro-planning and support measures. The State Council issued a guideline to promote the development of national undertakings for the aged and improve the elderly care service system during the 14th Five-Year Plan period (2021-2025). Additionally, various actions from the "Smart and Reassuring Elderly Care Action Plan" have been implemented. At the national level, the goal of digital reform has been established, and financial subsidies, tax relief, and pilot demonstrations have been used to provide financial and resource support for related enterprises. The perfection of laws such as data security and personal information protection has created favorable institutional conditions for the standardized and stable operation of integrated development [6]. This top-down strategy and policy support mechanism effectively reduces the research costs and risks for market entities, injecting strong vitality into the development.

3.2.2 Market-Driven: The Input of Social Capital and Business Model Innovation

Market entities are the driving force and growth engine of integrated development. The trillion-level market potential in the silver economy is attracting significant social capital, technology giants, and emerging enterprises to invest. Capital inflows inject sufficient fuel into technology research and development, platform construction and market promotion, and optimize cutting-edge management thinking and market operation practice. Driven by capital and technology, business model innovation emerges as an inevitable trend. New paradigms such as "platform + ecology," "hardware + service," "subscription," and "membership" continue to emerge, breaking through the profit bottleneck of the traditional pension industry. The market's profit-seeking characteristics and innovative vitality help us gain insight into changes in demand. They allow us to quickly adapt to technological innovation and convert potential demand into consumption through continuous business changes. They are the key driving force for integration.

3.3 Dynamic Synergy Mechanism

3.3.1 Constructing a "Technology-Demand-Policy-Market" Four-Wheel Drive Model

A single force does not drive the deep integration of the pension industry and the digital economy; rather, it is a system of synergistic forces: technology, demand, policy, and market. This paper puts forward a "four-wheel drive" framework for explaining the collaborative mechanism: first, technology, as the core engine, lays the foundation and improves collaboration efficiency. Second, as the fundamental orientation, the demands of elderly individuals define the direction and goal of integration. Third, the policy acts as a navigator and stabilizer, providing strategic guidance and institutional support for integrated development. Fourth, as a growth accelerator, the market transforms the integration potential into actual productivity through capital and business model innovation. The four driving forces, like the four wheels of a car, are indispensable. By exerting strength in the same direction and working in coordination, we will promote the industry's stable, far-reaching development.

3.3.2 Analyzing the Coupling and Transmission Path between the Elements

There are close relations and complicated transmission channels among these elements: the government guides and stimulates market power, promotes technological innovation and guides consumer demand; Changes in market demand will stimulate technological innovation and business model renewal in reverse, prompting the government to adjust its policies; Technological breakthrough can not only meet the existing demands, but also promote new demand, attract market resources and influence policy formulation; Successful market practice provides the good model for policy optimization and technology application. Therefore, a closed-loop transmission mechanism has been formed based on the idea of "stimulating the market with policy, promoting technology with the market, creating demand with technology, and using demand to feed back into policy." These elements form a dynamic, balanced, and mutually reinforcing whole that, together, build an integrated system of development and sustainable progress.

4. The Path of Integration of Pension Industry and Digital Economy: From the Perspective of Silver Economy

4.1 Optimizing the Supply Structure of Elderly Care Services

4.1.1 Solve the Problem of Uneven Distribution of Resources

The digital economy provides an efficient way to address the uneven distribution of spatial and temporal resources for elderly care services. On the spatial level, it is suggested to build a regional platform on intelligent elderly care services, integrate online and offline resources, and use the IoT and remote technology to transport resources like high-quality urban medical care and nursing to remote villages and communities, to realize "resources are in the cloud and services at your fingertips". At the time level, the intelligent nursing system and the rapid response mechanism, which operate

around the clock, make up for the vacancy in non-working hours. The "virtual and entity" supplier model overcomes physical constraints, providing older adults with timely and efficient service support regardless of time or location [7]. The model significantly enhances the balance and feasibility of service provision, making it a valuable tool for improving outcomes in healthcare.

4.1.2 Promote the Precise Matching of Supply and Demand

Accurate matching of supply and demand is the key to optimizing the supply system. It is necessary to describe the characteristics of the elderly population using big data and to comprehensively analyze their health status, consumption tendencies, service preferences, etc. These are the basic prerequisites for achieving the resource allocation. Intelligent algorithms accurately push personalized solutions and product information for target users, and replace "people looking for services" with "services looking for people". Furthermore, by utilizing digital platforms, older adults can provide real-time feedback on service quality. At the same time, evaluation information can be sent back to suppliers to adjust service items and standards, effectively reduce information barriers, promote rational resource allocation, and greatly enhance the efficiency and satisfaction of elderly care services through a data-closed-loop management mechanism.

4.2 Restructuring the Value Chain of the Pension Industry

4.2.1 Promote the Digital Transformation and Upgrading of Pension Industry

Digital transformation is the cornerstone of remaking the traditional pension industry value chain, requiring pension institutions and community service centers to undertake a comprehensive digital upgrade across internal operations and external businesses. Internally, it is suggested that an intelligent management system be introduced to optimize personnel scheduling, resource allocation, and financial accounting, thereby reducing operating costs. Externally, it is necessary to configure intelligent security equipment and build an online service system to improve service quality and professionalism [8]. To sum up, with data-driven decision-making, traditional pension enterprises have shifted from labor-intensive to technology- and information-intensive, achieving service standardization, refined management, and automated operations, and gaining a favorable position in the value chain.

4.2.2 Foster the Development of New Forms of Business in the Pension Industry

The deep integration of digital technology into the pension industry is driving the emergence of new business models and innovation across the value chain. This study proposes a "platform + individual" model for sharing resources in elderly care, facilitating the integration of idle resources. The ordering system with equipment, services, and data transforms product sales into a continuous service supply. Additionally, VR/AR technology is used to build a virtual community, creating a unique space for social interaction and entertainment. In conclusion, digital empowerment has led to the development of innovative business models across fields such as education, finance, and tourism for the aged. These new forms of business have enriched the industrial value chain, expanded growth points, and promoted the transformation of the pension industry into a modern industrial cluster with high added value and wide coverage.

4.3 Stimulate the Effectiveness of the Social System

4.3.1 Promote Intergenerational Harmony and Social Inclusion

The combination of the pension industry and the digital economy is one of the primary ways to promote intergenerational harmony and social inclusion. As a link between generations, digital tools help young people take better care of their older family members more conveniently through remote monitoring and intelligent companion devices. Meanwhile, older people can use social platforms and video calls to keep in close contact with their families and strengthen emotional interaction. The government is working to promote age-friendly digital products and to provide digital skills education to bridge the "digital divide", helping the aged access the development dividend of the digital society equally and avoid being marginalized. They will effectively enhance older people's social

participation and sense of belonging, foster a social atmosphere of respect for the elderly, promote the concept that technology is for good, and strengthen social cohesion.

4.3.2 Improve Social Governance Capabilities and Levels

This study offers innovative ways and support, based on big data, to improve the level of social governance. By building a fully covered, intelligent elderly care services system, the government can quickly and accurately capture key data, such as the elderly population's health status, demand distribution, and resource allocation within its jurisdiction, laying the foundation for scientific decision-making and precise policy-making. Moreover, data analysis can predict future trends and potential risks in elderly care services, and promote social governance from passive response to active prevention. The efficient operation of the digital supervision mechanism helps standardize market orders and ensure the quality of service and the legitimate rights and interests of elderly individuals. Against the backdrop of an aging population, the government's capacity and public service quality have been significantly improved through the application of refined data and intelligent governance.

5. Conclusion

From the perspective of the silver economy, this paper discusses the integration mechanisms and development paths of the pension industry and the digital economy, which are driven by technology, demand, policy, and market forces, and constitute a collaborative model. The development path is mainly reflected in three aspects: first, optimizing the service supply structure through digital means, resolving resource allocation imbalances, and achieving accurate matching between supply and demand. The second is to rebuild the industry value chain, promote the transformation of traditional business models, and cultivate new business formats and innovative methods. The third is to enhance the efficiency of the social system, promote intergenerational harmony and social inclusion, and improve governance level. In the future, it is essential to enhance top-level planning, improve digital infrastructure, and strengthen data security and privacy protection. We are working to improve the digital skills of older individuals and to build a fairer, more efficient, and sustainable pension system. These measures will provide a solid foundation for effectively coping with population aging and achieving high-quality development.

References

[1] Maestas N, Mullen K J, Powell D. The effect of population aging on economic growth, the labor force, and productivity[J]. American Economic Journal: Macroeconomics, 2023, 15(2): 306-332.

[2] McMaughan D J, Oloruntoba O, Smith M L. Socioeconomic status and access to healthcare: interrelated drivers for healthy aging[J]. Frontiers in public health, 2020, 8: 231.

[3] Leśna-Wierszołowicz E. Silver economy as a response to demographic changes[J]. Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, 2018 (529): 162-169.

[4] Eager B, Maritz A, Millemann J. The silver economy on wheels: a narrative review of the mature-aged, hypermobile gig worker phenomena[J]. Small Enterprise Research, 2022, 29(1): 68-85.

[5] Egeland T, Heinonen K, Stensaker I G. The Silver Economy: A Business Perspective on the Aging Society[J]. The Journal of Applied Behavioral Science, 2025: 00218863251397563.

[6] Butt S A, Kangilaski T, Draheim D. Lessons Learned from a Multi-National Project on Developing a Platform for the Silver Economy[J]. Procedia Computer Science, 2024, 239: 1006-1014.

[7] Krzyminiewska G. Silver economy in rural areas in the context of (un) sustainable development[J]. Roczniki (Annals), 2019, 2019(3).

[8] Kamal M, Abdullah C M, Shaiara F, et al. Blockchain-Based Pension System Ensuring Security, Provenance and Efficiency[J]. IEICE TRANSACTIONS on Information and Systems, 2023, 106(5): 1085-1088.