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The Impact of Artificial Intelligence on the Development of Consumer-Oriented Service Industries: A Case Study of the Elderly Care Service Industry

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Abstract: Against the backdrop of population aging and rapid digital technology evolution, artificial intelligence continues to penetrate Consumer-Oriented Service Industries, driving transformation in service models. As a vital sector for public welfare, elderly care services have long faced challenges such as nursing workforce shortages and immature business models, where AI provides technological support for their transformation. This paper employs literature review, case analysis, and inductive methods, using elderly care services as a case study to identify practical AI applications and explore their enabling value and real-world constraints. The research finds that AI can alleviate labor shortages in elderly care and promote upgrades in service supply, yet it faces obstacles including the digital divide among seniors, data security concerns, lack of humanistic care, and difficulties in implementing viable business models. Based on these findings, this paper proposes strategies focusing on age-friendly adaptations, market development, regulatory improvements, and multi-stakeholder collaboration to facilitate the integration of AI into elderly care services, offering insights for high-quality development in Consumer-Oriented Service Industries.

Keywords: artificial intelligence; life-service industry; elderly care service industry; smart elderly care; digitalization of the service industry

1. Introduction

China's population is aging steadily, with the elderly population continuously expanding and the number of disabled and semi-disabled individuals rising. According to the "Blue Book on Silver Economy: China Silver Economy Development Report (2024)", by around 2030, the proportion of people aged 65 and above in China will exceed 20%[1]. Traditional elderly care models, which rely heavily on manual labor, are increasingly facing challenges such as a significant shortage of caregivers and difficulties in matching service supply with the diverse needs of the elderly. Meanwhile, new-generation digital technologies-including big data, artificial intelligence, and the Internet of Things-are rapidly being integrated into public welfare service scenarios. The state has successively issued policy documents such as the "14th Five-Year Plan for National Aging Development and Elderly Care Service System" and the "Overall Layout Plan for Digital China," explicitly promoting the development of smart elderly care industries, encouraging the use of digital technologies to address shortcomings in elderly care services, and driving effective quality improvement and expansion of Consumer-Oriented Service Industries [2]. By leveraging big data algorithms, intelligent sensing hardware, and integrated service platforms, artificial intelligence can replace or assist in repetitive caregiving tasks within the elderly care sector, offering new possibilities for solving practical challenges in the service industry and providing an important case study for observing the digital transformation across the broader life-service sector.

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However, technological empowerment does not automatically lead to high-quality development. In the practical application of artificial intelligence in elderly care services, challenges such as digital access barriers, data security risks, and a lack of humanistic care have emerged simultaneously. A review of existing academic research reveals that domestic scholars have accumulated substantial findings on two main topics: the digitalization of Consumer-Oriented Service Industries and smart elderly care [3]. Nevertheless, most studies treat elderly care services as an independent subject, with few integrating them into a broader macro-analysis framework of Consumer-Oriented Service Industries to specifically explore how artificial intelligence, through the social welfare channel of elderly care, drives industrial transformation and offers practical insights for the entire sector. Addressing this research gap, this paper analyzes current journal literature, industry policies, and real-world practices in home-based, community-based, and institutional elderly care in China. Based on an examination of existing challenges, it proposes targeted solutions, aiming not only to provide reference for intelligent development in the elderly care industry but also to offer valuable insights for the digital transformation of similar life-service sectors such as household services and childcare.

2. Current Applications of Artificial Intelligence in the Elderly Care Service Industry

With policy support and industrial development, artificial intelligence has permeated various scenarios in home-based, community-based, and institutional elderly care, forming three major application areas: health monitoring, daily life companionship, and platform scheduling, becoming a typical example of digital transformation in the service industry.

2.1. Remote Observation and Health Monitoring Intelligent Applications

Applying digital technologies to community-based home elderly care enables remote and effective monitoring of seniors' conditions, enhancing both convenience and safety in their daily lives. Smart bands, smart mattresses, and fall-detection sensors are widely used. These devices employ AI algorithms to identify falls, abnormal heart rates, sleep disturbances, and other health issues. Once a risk signal is detected, they automatically send alerts to family members or community elderly care centers, providing immediate and proactive safety support [4]. Some community care centers use AI-powered chronic disease analysis tools to monitor seniors' blood pressure, blood glucose levels, and other vital signs, aggregating and analyzing health data to deliver personalized health reminders and care guidelines for those with chronic illnesses. Within institutional care settings, AI monitoring devices detect risks such as nighttime bed exits and falls among disabled seniors, reducing the burden on caregivers who would otherwise need to conduct constant manual rounds.

2.2. Daily Care and Lifestyle Services Applications

Artificial intelligence is driving the rapid development of the elderly care service industry, aiming to effectively meet the needs of older adults by building a new model of elderly care services. For instance, intelligent companion robots and AI voice assistants primarily provide functions such as simple companionship, medication reminders, rehabilitation care, and voice-based conversations. While assisting with daily living, they also offer cultural and recreational activities for seniors, alleviating loneliness among those living alone, thus focusing not only on their physical health but also on their mental well-being. By continuously integrating elderly care resources through digital technologies, these services are becoming more convenient and accessible [5].

2.3. Smart Platform Applications for Elderly Care in Communities and Medical Institutions

Currently, urban areas have generally established relatively comprehensive smart elderly care platforms and service networks, capable of meeting the diverse needs of older adults through multiple channels such as internet hospitals, telemedicine, and intelligent monitoring. Some regions have begun pilot programs implementing the "Internet + nursing" model, which leverages online-registered nurses to deliver nursing services via

the internet to discharged patients or special groups with limited mobility. Elderly individuals can now book home visits by nurses through the platform, receiving services such as wound dressing changes and rehabilitation guidance, all from the comfort of their homes [4].

3. The Dual Impact of Artificial Intelligence on the Elderly Care Service Industry (Life-Related Service Industry)

3.1. Artificial Intelligence Empowers the Service Industry, Driving Its High-Quality Development

3.1.1. Alleviate the Shortage of Elderly Care Workforce, Reduce Labor Costs, and Improve Service Efficiency

The elderly care industry in China has long faced a shortage of human resources, with a significant amount of repetitive tasks-such as routine inspections, data entry, and basic monitoring-consuming substantial nursing manpower. ZhaoZhe's research indicates that artificial intelligence can systematically eliminate such repetitive labor, freeing workers from mechanical and standardized tasks [6]. By utilizing digital smart devices to handle responsibilities like monitoring seniors' physiological data, conducting nighttime rounds, and issuing danger alerts, caregivers can be relieved of these duties and instead focus more effectively on complex, human-centered activities such as caring for disabled elders and providing psychological comfort, thereby better leveraging the complementary strengths of AI and human caregivers [4].

3.1.2. Expand the Boundaries of Elderly Care Services, Promoting Life Services Toward Greater Refinement and Round-The-Clock Availability

The key value of digital transformation lies in promoting the service industry toward refined and precise supply, which is also the core direction for high-quality development of life-related services. Traditional elderly care services mainly rely on human labor, constrained by caregivers' physical capacity and working hours, making it difficult to provide uninterrupted 24-hour care. In contrast, AI-powered intelligent monitoring devices enable round-the-clock supervision. By leveraging big data algorithms, they can identify differentiated needs among healthy seniors, those with chronic illnesses, and disabled elders, shifting elderly care from a one-size-fits-all, coarse approach to personalized, tailored services for each individual [4]. The key value of digital transformation lies in advancing the service industry toward refined and precise supply, which remains central to the high-quality development of life-related services.

3.1.3. Optimize Livelihood Security and Improve the Support System for Life-Related Service Industries

Smart elderly care systems built on the foundation of the Internet of Things, big data, and artificial intelligence not only revolutionize the logic of identifying service needs and allocating resources in elderly care, but also promote a shift in governance models from government-led to multi-stakeholder collaboration. These systems drive innovation in both technology and service content, facilitating the transformation of elderly care toward greater precision and intelligence. Through integrated smart elderly care platforms, governments can dynamically monitor seniors' service demands, optimize the allocation of financial subsidies and senior care facilities, ensure precise distribution of public elderly care resources, and improve resource utilization efficiency. Technological solutions help address gaps in elderly care services in rural and remote communities, advancing inclusive development of elderly care and strengthening the livelihood-oriented support system for life-related service industries.

3.2. Negative Impacts: The Practical Drawbacks of Artificial Intelligence in Empowering Elderly Care Services

3.2.1. The Digital Divide for the Elderly Is Difficult to Overcome

Most elderly people have limited education, and some senior groups are disconnected from modern society, making it difficult for them to keep pace with the

digital era and operate smart devices. Rural seniors, in particular, face challenges such as poor internet access and insufficient financial resources, leaving them unable to afford smart elderly care equipment. As a result, there remains a gap between the practical implementation of AI-powered elderly care services and their ideal state.

This issue is not unique to the elderly care industry, but rather a common challenge faced across the digitalization process of all Consumer-Oriented Service Industries. Certain vulnerable groups, such as the elderly, struggle to benefit from the convenience brought by digital services. Chang Meili's research on rural home-based elderly care confirms that there are disparities between urban and rural seniors in terms of economic conditions and digital literacy, which directly affects the effectiveness of smart elderly care products and the practical impact of intelligent elderly care service models on older adults [7].

3.2.2. Health Data Collection and Use Pose Risks of Data Security and Privacy Breaches

Wearable devices, smart monitoring equipment, and intelligent elderly care platforms collect and monitor highly sensitive personal information such as seniors' location data, physiological health metrics, and family circumstances. This places significant demands on the platform's data protection capabilities. If these protections are inadequate, there is a risk of data breaches, which could even be exploited by criminals to carry out telecom fraud targeting the elderly. Huang Bentao et al. found through public perception studies that privacy leakage and information security are the most concerning risks associated with AI-based elderly care in the public eye [8].

Consumer-Oriented Service Industries generally collect large amounts of personal information from residents, and the data risks exposed in the elderly care sector serve as a warning to other Consumer-Oriented Service Industries.

3.2.3. Artificial Intelligence Lacks Humanistic and Emotional Attributes in Elderly Care Services

The service industry, at its core, is people-oriented, with technology serving merely as an auxiliary tool that cannot fully replace human value. Elderly care services involve not only physical assistance but also emotional companionship and psychological comfort for the elderly. While companion robots and AI conversations can provide basic caregiving and simple interactions, they struggle to replace the genuine emotional connection offered by caregivers and family members. Overreliance on intelligent technologies, which weakens interpersonal interaction, may easily lead to a lack of emotional support for older adults.

3.2.4. High Costs of Smart Devices and Intelligent Elderly Care Platform Construction Make Large-Scale Implementation Difficult

The procurement of smart hardware and the development and operation of digital elderly care platforms require continuous financial investment. Currently, the overall business model for smart elderly care is not yet mature, with limited willingness and capacity among ordinary households to pay; relying solely on government fiscal subsidies makes it difficult for the model to sustain itself in the long term. Numerous enterprises have entered the smart elderly care market, but profitability remains challenging, and insufficient internal market momentum restricts the large-scale penetration and popularization of technology in grassroots and rural areas [4]. Zhang Hongsheng's research also highlights that cost and business model constraints are prominent practical barriers to the intelligent transformation of the elderly care industry [9].

4. Constraints on the Development of the Elderly Care Service Industry Enabled by Artificial Intelligence

Considering the above dual influences, I will further summarize and categorize the constraining factors from four dimensions: technology, market, institutions, and actors.

4.1. Technical Aspect: Insufficient Age-Friendly Design in Product Technology

Currently, many AI-based elderly care products are primarily developed by technology companies, with insufficient deep involvement from senior care institutions and the elderly population during the research and development phase. These products often focus narrowly on technical features while overlooking the actual physical and psychological usage habits of older adults, resulting in overly complicated operation processes. Additionally, smart devices from different manufacturers lack compatible interfaces, creating "information silos" that hinder data exchange between devices-this significantly diminishes the effectiveness of intelligent elderly care models [4]. Moreover, most software originally designed for other fields is merely adapted through simple functional extensions before being applied to elderly care, representing retrofitting rather than purposeful age-friendly design^{[9] [10]}. As a result, they fail to provide professional, comprehensive care tailored to seniors' needs and lack proper adaptation to real-life scenarios.

4.2. Market Level: The Smart Elderly Care Business Model Is Immature, Making Profitability Difficult

Smart elderly care is a capital-intensive field, requiring financial support for hardware procurement, platform operation and maintenance, and ongoing equipment servicing. On one hand, ordinary seniors face economic constraints that limit their ability to pay for products, and cultural attitudes also hinder their acceptance of intelligent devices, making it difficult to achieve widespread coverage among the elderly population. On the other hand, the smart elderly care industry is still in its early developmental stage, with many projects remaining at the pilot or demonstration level, making large-scale market expansion challenging [9].

4.3. Institutional Level: Incomplete Industry Standards, Regulation, and Data Security Systems

Smart elderly care has yet to establish a complete and unified industry standard system, with performance standards for smart hardware, data collection guidelines for elderly care platforms, and evaluation frameworks for AI-based elderly care services still needing improvement [10]. Although China has introduced laws related to personal information protection, detailed regulatory measures for highly sensitive personal data in elderly health care remain insufficient, and responsibilities are not clearly defined.

4.4. At the Main Body Level: Dual Constraints from Talent Shortages and Elderly Acceptance

On one hand, there is a shortage of multidisciplinary talent. The development of intelligent elderly care industries requires professionals who are familiar with elderly care services and also proficient in digital technologies. Frontline caregivers often lack the skills to operate smart devices effectively, limiting the full potential of intelligent equipment. Meanwhile, technical developers frequently lack hands-on experience in real-world elderly care settings, resulting in products that are disconnected from actual care environments^{[4] [5]}.

On the other hand, there are significant disparities among older adults in terms of digital literacy, economic status, and cognitive abilities, creating a "digital divide" with smart devices. This results in varying levels of acceptance toward smart technologies among seniors, with some harboring distrust toward new technologies and showing limited willingness to adopt them. These objective differences and uneven receptivity make it difficult to effectively implement smart elderly care initiatives^{[4] [7]}.

5. Optimization Strategies for High-Quality Development of the Elderly Care Service Industry Driven by Artificial Intelligence

This section proposes corresponding optimization policies in response to the constraints identified in Chapter Five, while also taking into account insights and implications for Consumer-Oriented Service Industries.

5.1. Technical Optimization: Strengthening Age-Friendly Design and Retrofitting to Enhance Adaptability Across Technical Scenarios

Adopt the "principles of accessibility, usability, availability, and affordability" proposed in the "General Requirements and Guidelines for Inclusive Digital Economy in an Aging Society" (GB/T 45747-2025) as guiding principles for the design and development of age-friendly products. Involve elderly care institutions and representatives of older users in requirement validation during the development phase, abandoning a narrow focus on technological gimmicks and maintaining a demand-driven approach. Simplify the operational logic of smart elderly care devices to lower the barrier to use for older adults. Promote unified device interface standards to enable interoperability across equipment from different manufacturers, thereby overcoming the problem of "information silos"[10]. Design diverse types and styles of age-friendly products tailored to the distinct realities of urban and rural areas, ensuring the availability of low-cost, simple, and reliable basic versions of smart elderly care products.

5.2. Market Development: Establishing a Diversified and Sustainable Business Model to Reduce Implementation Costs

The government should prioritize providing subsidies for smart devices to low-income, disabled, and rural elderly individuals, ensuring equitable access to basic elderly care products. For families with purchasing capacity, it should guide enterprises in developing tiered and differentiated market-oriented smart elderly care products to meet diverse needs. Enterprises should be encouraged to offer integrated "sales plus usage guidance" services to address the issue of users not knowing how to operate purchased devices. At the same time, efforts should be actively promoted to foster collaboration among elderly care institutions, research institutes, and enterprises through industry-academia-research partnerships, reducing product development and production costs and preventing insufficient investment due to high costs^[4] [5].

5.3. Institutional Development: Strengthening Industry Standards and Data Security Regulatory Systems

The government is accelerating the development of industry standards for smart elderly care and further improving the regulatory framework for AI, clearly defining technical specifications for AI-based elderly care hardware, requirements for digital elderly care platforms, and evaluation systems for service quality. It is strengthening oversight and governance against issues such as personal privacy breaches, AI-related fraud, and the dissemination of false information, establishing accountability mechanisms for data leaks, and resolutely safeguarding the privacy and security of older adults [8]. Additionally, the government should coordinate urban and rural fiscal resources and allocations, appropriately favoring county-level and rural areas to narrow the gap in smart elderly care development between urban and rural regions. Supportive policies should be introduced, including tax incentives and site support, to encourage private capital participation in building the smart elderly care industry [4].

5.4. Collaborative Efforts among Multiple Stakeholders: Addressing Talent Shortages and Bridging the Digital Divide for Older Adults

In terms of talent development: Introduce courses on smart elderly care into vocational and undergraduate programs related to aging services, cultivating interdisciplinary professionals who understand eldercare operations and are proficient in digital tools; regularly provide digital skills training for current nursing staff to enhance their practical ability in using intelligent monitoring devices and elderly care service platforms.

To address the digital divide, smart elderly assistance classes are conducted at community-based elderly care service centers, where volunteers provide hands-on guidance to seniors in operating intelligent eldercare devices, striving to enhance their understanding of smart elderly care. Traditional human-centered elderly care services are preserved, maintaining a parallel system of both intelligent and manual services. Technology should not entirely replace human care; instead, it should support and

complement manual services, ensuring that human care serves as a safety net when technology has limitations [10].

6. Conclusion

6.1. Research Findings

This paper takes elderly care services as a typical example of life-oriented service industries to explore the dual impacts, constraints, and optimization strategies of artificial intelligence on such sectors. First, AI has been implemented across various elderly care settings-including home-based, community-based, and institutional care-helping alleviate labor shortages and inefficiencies in traditional elderly care services through functions such as health monitoring and smart platforms. Second, AI can free up human resources, promote service refinement, and foster new business models, thereby enhancing social welfare; however, it also brings practical challenges such as the difficulty in bridging the digital divide, privacy breaches, lack of humanistic care, and difficulties in real-world implementation. Third, key constraints on AI's empowerment of elderly care services include insufficient age-friendly technology design, talent shortages, incomplete institutional standards, immature business models, and limited acceptance among older populations. Addressing these requires coordinated efforts across technological development, talent cultivation, closing the digital gap, strengthening regulation, and fostering sustainable business models. It is essential to uphold the principle that technology is merely a tool and cannot fully replace the value of human service. Fourth, practices in the elderly care industry offer valuable insights for other life-oriented service sectors. Digital transformation should not simply focus on accumulating hardware but must be grounded in people's actual needs, ensure inclusiveness and equity, balance technical efficiency with human-centered service, and achieve a model where technology assists while human support serves as a safety net.

6.2. Research Gaps

This paper employs a literature and case analysis approach, primarily conducting qualitative analysis based on publicly available documents and policy materials. It does not involve field surveys or questionnaires, lacks primary micro-level survey data, and has not carried out quantitative empirical testing.

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