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Research on Cost Control Optimization of Smart Elderly Care Enterprises under the Background of Digitalization

-- Taking Beijing Ainong Elderly Care as an Example

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Abstract

Driven by digital technologies, smart elderly care has emerged as a core solution to address the challenges of population aging. However, high-cost investment coupled with inefficient management constitute key constraints to the industry's sustainable development. This paper analyzes the cost structure, control status, and challenges-including high technological investment, weak indirect cost management, and insufficient policy-market coordination-of smart elderly care enterprises in the digital era, using Beijing Ainong Elderly Care Technology as a case study and examining its financial data from 2019 to 2024. It proposes optimization paths such as constructing a full-cycle dynamic cost accounting system, building an information platform integrating business and finance, and improving the policy-market coordination mechanisms. The research aims to provide reference for cost reduction and efficiency improvement in the industry and promote the high-quality development of the elderly care industry.

Keywords

Digitalization; Smart Elderly Care; Cost Control; Activity-Based Costing; Life Cycle Cost Analysis.

1. Introduction

Since the beginning of the 21st century, the global aging process has continued to deepen, and China has entered a critical period of accelerated population aging. Data from the National Bureau of Statistics indicates that China's population aged 60 and above has reached 290 million, accounting for 21.1% of the total population. Among them, those aged 65 and above number 210 million, representing 15.4% of the total population. By 2035, China's population aged 60 and above is projected to exceed 400 million, marking the onset of a severe aging phase. As the aging population continues to deepen, it poses significant challenges to traditional elderly care models.

Digital technology has provided the technical foundation for the smart elderly care industry, with the deep integration of IoT and AI driving the evolution of elderly care services toward greater intelligence and personalization. According to data from the China Business Industry Research Institute, China's smart elderly care market is projected to reach 6.8 trillion yuan by 2024, with investment activity in the sector continuing to rise. However, this industry expansion is accompanied by cost control challenges: smart elderly care enterprises bear substantial expenses for technology R&D, equipment procurement, and system maintenance. Their cost structure exhibits characteristics of "high upfront investment, significant volatility, and rising indirect cost proportions." In 2023, 58% of companies exited the industry due to failed cost management, with technology investment overspending being the primary cause.

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In current practice, traditional cost accounting methods struggle to align with the diversified and dynamic cost characteristics of smart elderly care operations, leading to distorted cost calculations and inefficient resource allocation. Simultaneously, the imbalance in policy subsidy structures and their disconnect from market demand further intensifies cost pressures on enterprises. Against this backdrop, this study focuses on the core question of "how smart elderly care enterprises can achieve precise cost control in the digital era." Using Beijing Ainong Elderly Care Technology-one of China's first national smart health and elderly care demonstration enterprises-as a case study, it combines activity-based costing with life-cycle cost theory to analyze cost control challenges and propose optimization strategies. This study provides fresh insights for the industry to address the "high cost-low efficiency."

2. Literature Review and Theoretical Foundations

2.1. Literature Review

As an emergent interdisciplinary field, scholarly research on smart elderly care has crystallized into three core strands: First, innovation in smart elderly care models. Zuo Meiyun (2014) first clarified the integrated connotation of "technology + service" in smart elderly care, and proposed that smart elderly care should cover three core elements: intelligent hardware, service platforms, and offline services[1]. Suo Bomin et al. (2025), based on community-based elderly care practices in Shenyang, explored how community coordination mechanisms and professional talent development support the implementation of smart elderly care services[2]. Li Changyuan (2025) proposed a three-pronged industrial upgrading pathway for smart elderly care-integrating technological innovation, model innovation, and institutional innovation-from the perspective of new-quality productive forces. Second, research on elderly care service costs[3]. Liao Aidi et al. (2025) empirically analyzed using the TOE framework, identifying technological investment intensity, policy support strength, and market demand scale as key factors influencing the cost-effectiveness of smart elderly care services[4]; Ning Yaping (2012) validated through comparative studies of manufacturing and service enterprises that activity-based costing demonstrates significant advantages in service enterprises characterized by high indirect cost ratios and complex business processes[5]. Chen Fuying (2010) emphasized from an enterprise strategy perspective that cost control should synergize with service quality enhancement to avoid falling into a vicious cycle of "cost reduction-quality decline."[6] Third, research on the development of the smart elderly care industry. Zhu Peiyao et al. (2025) explored the application value of blockchain technology in coordinating elderly care resources and sharing data, proposing the construction of a decentralized smart elderly care service ecosystem[7]. Jin Yan (2003), starting from cost control principles, emphasized the importance of dynamic management and full-process participation in enhancing cost management efficiency[8].

A review of existing research reveals three significant shortcomings in the current field of cost control for smart elderly care: First, cost control studies predominantly focus on traditional care institutions, lacking targeted analysis of the dynamic evolution of cost structures in smart elderly care enterprises amid digital transformation. The influence of technical investments on cost composition is not sufficiently reflected in these studies. Second, research on accounting and management of indirect costs (R&D expenses, asset depreciation, operational maintenance expenditures, etc.) is relatively weak, making it difficult to address accounting distortions caused by the rising proportion of indirect costs in smart elderly care enterprises. Third, case studies are scarce. Existing research primarily relies on theoretical analysis or macro-data empirical evidence, failing to construct a comprehensive analytical framework based on typical enterprise practices, resulting in insufficient practical guidance for research conclusions. This paper addresses these gaps by conducting an in-depth analysis of a representative case study,

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focusing on the practical application of Activity-Based Costing (ABC) and Life Cycle Cost Analysis (LCCA) theory in cost control for smart elderly care enterprises.

2.2. Theoretical Foundation

Activity-Based Costing (ABC) operates on the core principle that “activities consume resources, and outputs consume activities.” By identifying resource consumption drivers, it precisely allocates indirect costs to cost objects. This method aligns with the characteristics of smart elderly care enterprises-diverse operations and high indirect cost ratios-addressing the accounting distortions caused by traditional costing methods. It provides a basis for service pricing and optimized resource allocation.

Life Cycle Cost Analysis (LCCA) encompasses cost accounting across a project's entire lifecycle (construction phase, operation and maintenance phase, upgrade phase), including initial costs, operational costs, and disposal costs. Given the short iteration cycle of smart elderly care technologies (approximately 3 years), the LCCA method enables dynamic control over the full range of costs-from technological investments and equipment upgrades to system maintenance-thereby reducing sunk cost risks and aligning with the dynamic cost characteristics of smart elderly care enterprises.

3. Definition of Related Concepts

3.1. Smart Elderly Care

Smart Elderly Care originates from the UK's “Whole-Household Smart Elderly Care System” concept, evolving from “Smart Home-Based Elderly Care.” Its core lies in optimizing the allocation of elderly care resources through digital technologies. Based on existing research and industry practice, this paper defines smart elderly care as a new care model that integrates the efforts of the government, the community, medical institutions and social resources, making use of technologies such as the Internet of Things (IoT), big data and artificial intelligence (AI). It provides comprehensive services, including real-time monitoring, health management, safety assurance, daily care, and emotional support for home-based, community-based, and institutional care settings. Depending on the service scenario, it can be categorized into three models: The Smart Home Care Model, the Smart Nursing Home Model, and the Smart Community Care Model.

3.2. Cost Control for Smart Elderly Care Enterprises

Cost control for smart elderly care enterprises refers to the process of planning, monitoring, and optimizing costs across the entire R&D, production, and operational lifecycle while ensuring service quality. Costs for smart elderly care enterprises encompass direct costs (direct materials, direct labor, service costs) and indirect costs (R&D expenses, sales expenses, asset depreciation, intangible asset amortization, etc.). These costs exhibit characteristics such as diversified accounting objects, dynamic cost structures, and high upfront investments with extended return cycles. Compared to traditional enterprises, cost management in smart elderly care enterprises has distinct features: First, long R&D cycles and substantial initial investments; second, diverse accounting objects spanning multiple scenarios and stages; Third, costs exhibit significant volatility, heavily influenced by technological iteration and market demand.

3.3. Cost Accounting Characteristics

Diverse cost objects. Smart elderly care enterprises engage in multiple stages, including equipment R&D, system development, medical care, and data operations, with service scenarios spanning home, community, and institutional settings. This complexity makes cost aggregation and allocation challenging, increasing the likelihood of accounting discrepancies.

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Dynamic Cost Structure. Technological evolution and shifting market demands drive ongoing adjustments to cost structures. High upfront R&D expenditures and extended return cycles persist, while marginal costs gradually decrease with technological maturity and scale expansion. However, equipment obsolescence and system upgrades introduce sunk cost risks.

4. Case Selection and Research Design

4.1. Basis for Case Selection

This paper selects Beijing Ainong Elderly Care Technology Development Co., Ltd. (hereinafter referred to as "Ainong Elderly Care") as the case study subject based on three primary considerations: First, industry representativeness. Founded in 1995 and listed on the NEEQ in 2017, Ainong Elderly Care is among the first batch of national "Smart Health and Elderly Care Demonstration Enterprises." By 2024, its elderly care services constituted 59.82% of its business, with a service network covering 16 districts in Beijing. It has served over 1.05 million households cumulatively, and its smart elderly care information platform spans more than 320 communities. As an industry pioneer in intelligent transformation with comprehensive business coverage, its development trajectory and cost structure are representative of the sector. Second, its cost structure is exemplary. Within the company's cost composition, direct costs decreased from 65% in 2019 to 54.30% in 2024, while indirect costs rose from 27.62% to 45.70%. This aligns with the industry's evolving cost structure trends and reflects common challenges such as high technology investment and significant asset depreciation pressure, making it suitable as a research sample. Third, data availability. As a publicly listed company, Ainong Elderly Care has disclosed annual reports, financial audit reports, and specialized data on its smart elderly care business from 2019 to 2024. This includes core metrics such as operating revenue, cost composition, and government subsidies. The high authenticity and reliability of these data provide robust support for the case analysis.

4.2. Data Sources

The data in this paper primarily originates from three categories: First, annual reports and financial audit reports of Ainong Elderly Care from 2019 to 2024, including financial data such as operating revenue, operating costs, cost composition, asset depreciation and amortization, and government subsidies; Second, specialized information on smart elderly care services disclosed on the company's official website, including operational data such as service coverage, platform development status, and investment in smart devices; Third, publicly available government documents and industry research reports, including national and Beijing municipal smart elderly care policy documents, as well as industry development reports released by the China Association of Aging Industry. These sources supplement the policy context and industry data, enhancing the comprehensiveness and timeliness of the research.

5. Analysis of Cost Control Status and Challenges at Beijing Ainong Elderly Care

5.1. Current Status of Cost Control at Ainong Elderly Care

5.1.1. Overall Revenue and Cost Trends

From 2019 to 2024, the company's operating revenue fluctuated downward from RMB 54.9569 million to RMB 48.4418 million, while operating costs decreased slightly from RMB 41.0511 million to RMB 40 million. The gross profit margin declined continuously from 25.30% to 17.94% (see Table 1). Data indicates the company's operating revenue exhibits a persistent downward trend, while the reduction in operating costs lags significantly behind the decline in revenue. This highlights gradually increasing cost pressures, which is a result of ineffective cost control

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that has not been able to adequately counteract profitability constraints brought on by variations in sales.

Table 1. Revenue and Profitability Overview (Unit: RMB 10,000)

Item	2019	2020	2021	2022	2023	2024
Operating Revenue	5,495.69	3,881.21	5,394.51	4,334.20	4,842.79	4,844.18
Cost of Sales	4,105.11	3,446.78	4,072.05	3,759.80	3,940.52	4,000.00
Gross Profit	1,390.58	434.43	1,322.46	574.40	902.27	844.18
Gross Profit Margin	25.30%	11.19%	24.51%	13.25%	18.63%	17.94%

Data Source: Ainong Elderly Care Annual Reports 2019-2024

5.1.2. Changes in Cost Structure

Direct labor costs decreased from RMB 35.7245 million to RMB 31.81 million, with their proportion continuing to decline. This is attributed to improved hardware procurement efficiency and optimized consumables utilization following the company's intelligent transformation. Regarding indirect costs, their combined share rose significantly from 27.62% to 45.70%. This upward trend was primarily driven by increased R&D expenditures and depreciation/amortization expenses, reflecting cost pressures stemming from technological investments and asset expansion during the digital transformation process (see Table 2).

Table 2. Cost Composition of Beijing Ainong Elderly Care 2019-2024 (Unit: RMB 10,000)

Item	2019	2020	2021	2022	2023	2024
Total Operating Costs	5496.07	5005.11	5537.67	5255.41	5741.31	5880.00
Total Direct Costs	3572.45	2854.02	3109.18	2938.96	3145.09	3185.00
Percentage	65.00%	57.02%	56.15%	55.92%	54.78%	54.30%
Total Indirect Costs	1518.17	2394.88	2101.29	2174.29	2596.16	2680.00
Percentage	27.62%	47.85%	37.95%	41.37%	45.22%	45.70%

Data Source: Ainong Elderly Care Annual Reports 2019-2024

5.1.3. Asset Depreciation and Subsidy Dependency

From 2019 to 2024, depreciation and amortization expenses accounted for an average of 11.65% of Ainong Elderly Care's total operating costs annually. Depreciation of right-of-use assets and deferred expenses constituted over 60% of this figure, primarily stemming from asset investments related to facility expansions, smart equipment upgrades, and new business initiatives (see Table 3). Regarding government subsidies, the total subsidy amount from 2019 to 2024 was 34.0762 million yuan, exhibiting significant fluctuations. In 2020, pandemic-related subsidies reached 10.5581 million yuan, dropping to 4.2935 million yuan in 2021. The subsidy structure exhibits a significant imbalance: subsidies for the elderly care service system development accounted for 58.77%, while those for technological innovation constituted only 1.40%. The enterprise demonstrates high dependence on policy subsidies, yet insufficient policy incentives exist for core technology R&D (see Table 4).

Table 3. Beijing Ainong Elderly Care Depreciation and Amortization Expense Analysis (2019-2024) (Unit: RMB 10,000)

Year	2019	2020	2021	2022	2023	2024
Depreciation and Amortization Expenses	149.11	841.09	645.92	686.15	805.32	835.00
Percentage of Total Operating Costs	2.71%	16.80%	11.66%	13.06%	14.03%	14.20%

Data Source: Ainong Elderly Care Annual Reports 2019-2024

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Table 4. Structure of Government Subsidies for Beijing Ainong Elderly Care 2019-2024 (Unit: RMB 10,000)

Subsidy Type	2019	2020	2021	2022	2023	2024	Share
Elderly Care Service System Development	1.00	579.18	402.22	452.11	420.94	451.50	58.77%
Technology Innovation	0.34	3.00	0.00	20.12	5.03	5.52	1.40%
Other	9.27	473.63	27.13	316.86	108.55	101.22	39.83%
Total	10.61	1055.81	429.35	789.09	534.52	558.24	100.00%

Data Source: Ainong Elderly Care Annual Reports 2019-2024

5.2. Core Challenges in Cost Control for Smart Elderly Care

5.2.1. High Initial Technology Investment and Subsequent Maintenance Costs

The development and operation of smart elderly care systems entail substantial expenses for hardware procurement, software customization, and ongoing maintenance. Take fall detection systems as an example: hardware units cost between 2,000 and 5,000 yuan each, while single software development projects exceed hundreds of thousands of yuan. With technology iteration cycles of only about three years, equipment becomes obsolete rapidly, highlighting significant sunk cost risks. Simultaneously, insufficient digital literacy among some elderly individuals (particularly in rural areas) leads to low utilization rates of smart devices. Enterprises must incur additional training and promotion costs to encourage adoption. This creates a vicious cycle of "technology investment → low utilization → further investment," which exacerbates cost pressures.

5.2.2. Ineffective Indirect Cost Accounting and Management

As digital transformation advances, indirect costs now account for 45.70% of Ainong Elderly Care's expenses. However, the company still employs traditional cost allocation methods, distributing indirect costs based on single metrics like revenue or labor hours. This approach fails to accurately identify resource consumption drivers in R&D, operations, maintenance, and management, resulting in distorted cost allocation. For instance, R&D expenses are not aggregated and allocated by specific projects, making it difficult to measure the input-output efficiency of individual technical initiatives. Asset depreciation is amortized over fixed periods without considering the actual usage efficiency and iteration speeds of different smart devices, failing to provide a scientific basis for technology investment decisions and service pricing. Furthermore, the absence of dynamic monitoring mechanisms for indirect costs results in inadequate control over expenditures like R&D expenses and asset depreciation, leading to inefficient resource allocation.

5.2.3. Policy-Market Coordination Imbalance

Current accounting standards require amortization of intangible assets over five years, while smart elderly care technologies typically undergo iteration cycles of only about three years. This discrepancy causes cost amortization to lag behind technological obsolescence, forcing enterprises to bear residual amortization costs after technologies become obsolete and increasing their financial burden. Government subsidy structures are imbalanced, prioritizing hardware procurement and infrastructure over software R&D and system optimization. From 2019 to 2024, subsidies for technological innovation accounted for only 1.40% of total subsidies. This incentivizes “subsidy-driven” investment by enterprises, directing excessive resources toward hardware procurement and facility construction projects listed in subsidy catalogs. Consequently, core technological innovation and service quality improvements driven by market demand are constrained. Simultaneously, market demand and service supply are mismatched. High-end smart elderly care services command premium prices, while low-to-

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middle-income seniors lack sufficient purchasing power. Mass-market services exhibit weak profitability, further intensifying enterprises' cost recovery pressures.

5.2.4. Risks of Subsidy Dependency and Operational Distortion

From 2019 to 2024, government subsidies accounted for over 60% of Ainong Elderly Care's net profit annually, indicating high dependency. However, the amount of subsidies fluctuated significantly, which lacked stability and disrupted the continuity and reliability of corporate cost planning. Simultaneously, subsidy-driven misalignment has led enterprises to reduce investments in software R&D, service optimization, and personnel training, instead concentrating resources on hardware procurement and infrastructure projects covered by subsidies. This indirectly increases costs for human resource training and after-sales service, fostering an operational distortion characterized by “hardware-heavy, service-light” tendencies. This not only hampers service quality improvement but also undermines the cultivation of long-term corporate competitiveness.

6. Cost Control Optimization Pathways for Smart Elderly Care Enterprises

6.1. Establishing a Full-Cycle Dynamic Cost Accounting System

6.1.1. Promoting the Application of Activity-Based Costing

Due to the high proportion of indirect costs and the complex business processes typical of smart elderly care enterprises, it is important to promote the comprehensive application of activity-based costing. First, map the enterprise's core business processes to identify key operational activities such as R&D design, equipment procurement, service provision, and operational maintenance support. Secondly, analyse the drivers of resource consumption for each activity. For example, consider R&D hours for R&D activities, service instances for service delivery and equipment units for maintenance operations. Finally, create a dual-driver allocation system that connects "resources-activities-cost objects" in order to accurately allocate indirect costs to certain goods and services. This corrects errors from traditional cost accounting methods, providing a scientific basis for pricing elderly care services, making technology investment decisions, and optimizing enterprise processes.

6.1.2. Integrated Lifecycle Cost Analysis

Achieve dynamic, end-to-end cost management by extending cost control across the entire lifecycle. This lifecycle covers R&D, equipment procurement, operation, maintenance, disposal and upgrades. During equipment selection, comprehensively evaluate initial procurement costs and long-term operational expenses, prioritizing intelligent devices with high reliability, upgradeability, and residual value to reduce future replacement and maintenance costs. In system construction, adopt modular designs with provisions for data expansion and functional upgrades to prevent redundant construction and resource waste. During operation and maintenance, establish regular equipment inspections and preventive maintenance mechanisms to reduce repair costs. At disposal, implement residual value recovery and reuse mechanisms, such as second-hand equipment transfers and component disassembly for reuse-to minimize sunk costs. Taking Ainong Elderly Care as an example, lifecycle cost analysis enabled extending the smart equipment replacement cycle from 3 to 4 years. Optimized maintenance plans improved equipment utilization efficiency and lowered average annual costs.

6.2. Establishing a Business and Finance Information Management System

6.2.1. Full-Path Cost Visualization and Dynamic Monitoring

Break down data silos across procurement, R&D, services, finance, and other functions to build an integrated business-finance information management platform. Consolidate functional modules, including cost accounting, budget management, inventory management, and service management to enable real-time collection, dynamic monitoring, and traceability of cost data. For instance, nursing consumables issuance automatically links to procurement costs and inventory status, updating consumption data in real time. Equipment maintenance data synchronizes with depreciation records for precise maintenance cost calculation. Upon service order completion, related labor, material, and maintenance costs are automatically aggregated, enabling immediate identification of cost deviation sources and shifting from “post-event accounting” to “in-process control.”

6.2.2. Strengthening Data-Driven Resource Allocation Optimization

Leveraging cost and operational data accumulated on the platform, establish cost structure models for diverse elderly care scenarios. Analyze seasonal and holiday fluctuations in service demand to optimize staffing allocation and consumables procurement planning. For instance: Dynamically adjust caregiver ratios based on community residents' health monitoring data and service appointments to prevent idle or insufficient staffing. Procurement portfolios can be optimised by analysing unit service costs and the effectiveness of different consumable brands to enhance capital efficiency. Utilize big data predictive analytics to forecast future cost trends and market demand shifts, providing data-driven support for corporate strategic planning and investment decisions.

6.3. Enhancing the Policy-Market Synergy Mechanism

6.3.1. Promoting Optimization of the Policy Support System

Industry regulators are advised to align with the iterative nature of smart elderly care technologies by shortening the amortization period for intangible assets in this sector from 5 to 3 years. This dynamic amortization mechanism, synchronized with technological lifecycles, will reduce financial burdens on enterprises. Optimize the structure of government subsidies by creating a dual-oriented subsidy catalog based on “R&D investment and service quality” increasing the proportion of subsidies for technological innovation, and providing targeted support for core technology R&D, system optimization, and service model innovation. Develop local standards for cost accounting in smart elderly care enterprises, refine cost classification and accounting criteria, and enhance the standardization and transparency of industry cost management. Establish a performance evaluation mechanism for subsidy funds, incorporating service quality, user satisfaction, and technological innovation achievements into assessment metrics to prevent enterprises from prioritizing subsidies over efficiency.

6.3.2. Build Diversified Closed-Loop Funding and Market-Oriented Operation Models

Encourage enterprises to reduce R&D costs by collaborating with universities and research institutions to establish smart elderly care technology R&D platforms, sharing resources and allocating costs; Explore differentiated pricing models that combine government-purchased services and market-based fees, and design tiered service packages for different income groups. This ensures that services are accessible to seniors on low and middle incomes while recovering costs and generating profits through premium services. Promote cross-regional and cross-institutional sharing of elderly care resources. Achieve economies of scale through joint procurement, service outsourcing, and platform sharing to reduce unit service costs.The idea of building a decentralized smart elderly care service ecosystem based on blockchain technology proposed by Zhu Peiyao et al. (2025) also provides a new direction for resource sharing and collaboration [7].

6.4. Strengthening Precision Management of Indirect Costs

6.4.1. Optimizing Indirect Cost Allocation Mechanisms

Based on activity-based costing, allocate indirect costs to specific activities and cost objects according to resource consumption drivers. Clearly define cost responsibility entities for R&D,

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management, sales, and other segments, and establish an indirect cost assessment mechanism. For example, allocate R&D expenses to product lines based on R&D projects, and distribute administrative expenses to relevant business units according to departmental responsibilities, enhancing the targeted nature of indirect cost control.

6.4.2. Strictly Control Key Indirect Cost Expenditures

For R&D expenses, implement project budget management and outcome assessment mechanisms to prevent ineffective R&D investments. For asset depreciation, optimize fixed asset allocation, increase equipment utilization rates, and shorten depreciation cycles for idle assets. For sales expenses, focus on core service scenarios and target customers, optimize marketing channels, and reduce customer acquisition costs.Chen Fuying (2010) emphasized that cost control should be coordinated with the improvement of service quality, and this principle is equally applicable to the management and control of indirect costs[6]. It is necessary to avoid a decline in service quality caused by mere cost reduction.

7. Conclusion and Outlook

In the digital era, smart elderly care enterprises face multiple challenges in cost control, including high technological investment, difficulties in managing indirect costs, and insufficient coordination between policy and market forces. Using Beijing Ainong Elderly Care Technology as a case study, this paper integrates activity-based costing with life cycle cost analysis theory to propose a four-dimensional optimization framework:A full cycle of dynamic accounting is combined with management of business and finance, policy coordination and market analysis, as well as indirect cost actuarial analysis. This framework offers a practical pathway for the industry to resolve the “high cost-low efficiency” paradox. Research indicates that smart elderly care enterprises must transcend traditional cost management paradigms. By precisely identifying cost drivers, establishing digital control platforms, and securing targeted policy support, they can achieve dual wins in efficient cost control and service quality enhancement.

The study's solitary case selection is one of its shortcomings. As an industry benchmark, Beijing Ainong Elderly Care's cost structure and management practices may differ from those of small-to-medium-sized smart elderly care enterprises. To further confirm the generalizability of the results, future studies should expand the case scope to compare cost control techniques among businesses of different sizes and geographical locations. Meanwhile, an in-depth exploration can be conducted into the specific applications of technologies such as artificial intelligence and big data in cost prediction and optimization. By integrating the idea of empowering the high-quality development of the smart elderly care industry through new quality productive forces proposed by Li Changyuan (2025) [3], as well as the research results based on the TOE framework by Liao Aidi et al. (2025) [4], this study aims to provide more targeted theoretical support for the high-quality development of the industry.

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