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# Research on the Multi-Actor Collaborative Governance Model in the Smart Elderly Care Service System

Tiantian Zhang

School of Public Administration, Tianjin University of Commerce, Tianjin 300000, China

## Abstract

**With the acceleration of global population aging, traditional elderly care models are increasingly unable to meet the growing and diverse needs of the elderly. The rapid development of information and communication technologies has given rise to the emerging paradigm of "smart elderly care," which aims to provide precise health management and daily care through intelligent technologies and data-driven approaches. However, the success of smart elderly care is not merely a matter of technological accumulation; its core lies in constructing an efficient and sustainable service provision and governance system. From the perspective of public management, this study focuses on the "multi-actor collaborative governance" model within the smart elderly care service system. It first defines the connotations of smart elderly care and collaborative governance, and constructs a theoretical analysis framework of "actors-interaction-mechanism-environment." Subsequently, it systematically analyzes the roles, positioning, and interactive relationships of key actors, including the government, market, social organizations, communities, and families. Through case studies of three typical models-government-led, market-driven, and community-embedded-the study reveals the operational logic and limitations of different models. In response to current challenges in collaborative governance, such as coordination failure, service fragmentation, the digital divide, and data security, this paper proposes six countermeasures and suggestions: strengthening top-level design, building a unified data platform, cultivating a tiered service market, bridging the digital divide, and improving the legal and ethical framework. The aim is to provide theoretical and practical references for building an inclusive, resilient, and sustainable smart elderly care service system.**

## Keywords

**Smart Elderly Care; Collaborative Governance; Multi-Actor Cooperation.**

## 1. Introduction

### 1.1. Research Background: A Critical Issue at the Confluence of Two Major Trends

We are in a unique historical period marked by the convergence of demographic shifts and the digital technology revolution. The first major trend is the irreversible global aging of the population. According to United Nations projections, the global population aged 60 and over will reach 1.4 billion by 2030 and double to 2.1 billion by 2050. It is estimated that around 2050, China's elderly population will peak at 487 million, accounting for 34.9% of the total population[1]. Aging not only places immense pressure on pension systems but also poses unprecedented challenges to healthcare, long-term care, and social service systems. Traditional elderly care models, centered on the family and supplemented by institutions, are proving inadequate.

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The second major trend is the Fourth Industrial Revolution, represented by artificial intelligence, the Internet of Things, big data, and 5G communication. This technological revolution is reshaping public service delivery models with unprecedented depth. At the intersection of these two trends, the new concept of "smart elderly care" has emerged. It no longer views aging merely as a "problem" to be passively addressed but as an "issue" where technological innovation can be leveraged to actively manage and improve the quality of life for the elderly. Smart elderly care aims to empower traditional elderly care services with modern technology, using remote monitoring, smart wearable devices, and health management platforms to transition from "passive response" to "active prevention."

### 1.2. Problem Statement: From Technological Empowerment to Governance Transformation

Currently, smart elderly care platforms primarily offer standardized services, which struggle to fully meet the diverse and even personalized needs of the elderly, leading to a low fit between services provided and actual demands. Furthermore, elderly care service demand is characterized by dynamic changes, as it evolves with factors such as the advancement of seniors'age, changes in their health conditions, and shifts in family structure. Therefore, smart elderly care service platforms need to adapt to this dynamic nature[2]. In the early stages of smart elderly care development, public and policy attention focused mainly on the "technology" itself, such as sensor sensitivity and algorithm accuracy. However, as pilot projects expanded, it became clear that simply stacking technologies did not automatically translate into high-quality services. Many expensive devices lie idle, data platforms become isolated silos, service responses are slow, and elderly users' sense of gain is weak. The root of these problems lies not in the technology itself but in the underlying "governance" system. Smart elderly care involves numerous stakeholders: hardware manufacturers, software developers, telecommunications operators, medical institutions, housekeeping service companies, community neighborhood committees, government regulatory departments, and the families of the elderly. How to effectively integrate these dispersed actors into a collaborative network with clear rights and responsibilities, smooth information flow, and aligned incentives has become a core challenge. Therefore, the central question of this paper shifts to: How does an effective multi-actor collaborative governance model operate within the smart elderly care service system? What roles should different actors like the government, market, social organizations, and communities play? What are the core dilemmas faced by collaborative governance, and how can policy frameworks be designed and optimized?

## 2. Core Concept Definition and Theoretical Framework

### 2.1. Defining Smart Elderly Care

Smart elderly care represents the integration of "intelligent technology" and "elderly care services." It relies on intelligent devices and technological means, building a smart elderly care management system via the internet to provide personalized, high-quality services based on the needs of the elderly, thereby enhancing their sense of gain, satisfaction, and happiness[3].

Smart elderly care is an evolving concept in practice. In a narrow sense, it refers to the application of IoT technology in the eldercare field, emphasizing real-time monitoring of the elderly's condition through smart devices. However, from a public management perspective, it is an integrated, preventive, and participatory service ecosystem centered on the needs of the elderly. It deeply integrates new-generation information technology with traditional elderly care services, achieving optimal resource allocation and precise service matching through data-driven methods. Its core characteristics include a needs-centered approach, technology integration, data-driven operations, integrated services, and an ecosystem orientation.

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### 2.2. Theoretical Framework: Collaborative Governance

Faced with a complex socio-technical system like smart elderly care, the traditional bureaucratic governance model centered on a single government actor proves inadequate. Collaborative governance theory provides an analytical tool for multi-actor interaction in community-based smart elderly care. Its core lies in achieving a resource integration effect where "1+1 > 2" through institutional design[4]. This theory posits that when facing "wicked problems" like aging, a single organization lacks sufficient knowledge, resources, and authority. It must leverage diverse insights through cross-sectoral and cross-field collaboration. This study adopts an analytical framework based on collaborative governance, examining the smart elderly care service system from four main dimensions: Actors (government, market, social organizations, community, family), Interaction (cooperation, competition, conflict), Mechanisms (institutional arrangements, data sharing, incentives), and Environment (policies regulations, technological maturity, social culture, etc.).

## 3. Role Positioning of Different Actors in the Smart Elderly Care System

Within the collaborative governance framework, the successful operation of the smart elderly care service system depends on the clear positioning and effective interaction of each actor.

### 3.1. Government: Top-Level Designer and Resource Integrator

The government plays a "meta-governance" role in the collaborative governance of smart elderly care, meaning "governance of governance." Its core responsibility is not to directly provide all services but to create an institutional environment conducive to the participation of multiple actors. Specific tasks include: formulating national strategies and service standards to ensure hardware safety and data compliance; guiding social capital investment through financial subsidies and tax incentives; building public data platforms to break down data silos between departments, providing a data foundation for precise services; and enhancing efficiency through government procurement of services and contracting out.

### 3.2. Market: Main Driver of Technological Innovation and Service Provision

Market actors are the core force driving technological innovation and service delivery in smart elderly care. They possess advantages in technology, capital, and operational efficiency. These actors mainly include hardware providers, software platform developers, and integrated service operators. Large technology companies leverage their strengths in IoT and consumer electronics to offer solutions for home-based elderly care; financial institutions like insurance companies explore deeply integrated models combining "insurance, health management and senior living communities." However, the profit-driven nature of the market can also lead to risks like service exclusion and data monopolies.

### 3.3. Social Organizations: Capillaries Connecting Services

Social organizations play a complementary and gap-filling role in smart elderly care. They are often deeply rooted in communities and have established trusting relationships with the elderly. Social organizations undertake the execution of "last-mile" services and focus on serving economically disadvantaged or isolated elderly individuals without family support. Furthermore, they organize activities for spiritual comfort to alleviate loneliness among the elderly and act as policy advocates, relaying the genuine needs of the elderly back to policymakers.

### 3.4. Community: The Physical Space for Service Implementation

The community is a critical node for the implementation of smart elderly care services. It is responsible for promoting the age-friendly renovation of public facilities, integrating local

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resources such as medical and housekeeping services, and connecting them to the smart elderly care information platform for easy "one-button calling." Community neighborhood committees or property management companies serve as information hubs, responsible for promotion, outreach, and needs assessment. They also form a dual safety net by combining neighborhood mutual aid with technological monitoring.

### 3.5. Family and Individuals: The Ultimate Users of Services

The family and the elderly individual are the core of the smart elderly care system. The elderly are not only users of services but also co-producers, which is fundamental for system operation. The family's willingness and ability to pay directly determine the scale of services. Due to low digital literacy, financial burdens, or privacy concerns, the elderly may face barriers to usage, posing challenges to the design of the collaborative governance system.

## 4. Exploration of Practical Models

In practice, based on the leading force and the method of resource integration, smart elderly care presents various collaborative governance models.

### 4.1. Government-Led Integrated Platform Model

Governments can leverage modern information technologies to build an intelligent information management platform that covers the entire life cycle of digitally vulnerable groups. A case in point is the "Xiaojiang Caring" smart elderly care service system developed by District J for the senior population. Then, by establishing mechanisms for data flow and exchange sharing, it can reasonably cross-domain match, integrate, and share dispersed resources from other government agencies and social organizations. This builds a cooperation network involving multiple actors, breaking down information barriers between different departments and jurisdictions, allowing "data" to circulate[5].

Typical characteristics: Government-led, investing heavily to create a unified "smart elderly care service master platform." This platform horizontally integrates government data and vertically connects a four-tier service network, attracting qualified service providers through bidding. Advantages include strong authority, high resource integration capability, ensuring basic service equity, and robust supervision. However, system construction and maintenance costs are high, innovation vitality may be insufficient, and service processes may lack flexibility.

### 4.2. Market-Driven Service Ecosystem Model

Led by large technology companies or insurance groups, this model leverages their technological and capital advantages to build open platforms that attract various hardware manufacturers and service providers. Advantages include strong innovation vitality, diverse service choices, and high operational efficiency. However, it may lead to issues of service equity, risks of data monopolies, and regulatory lag.

### 4.3. Community-Embedded Social Enterprise Model

Deeply rooted in the community and initiated by social organizations, this model combines traditional neighborhood mutual aid with lightweight technology. Advantages include high social capital, low cost, and services with a personal touch, making it suitable for special needs groups. However, scaling up is difficult, professional service capacity may be insufficient, and technological capabilities are relatively weak.

## 5. Dilemmas Faced in Collaborative Governances

Although smart elderly care shows great potential, it faces profound dilemmas in the practice of collaborative governance.

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### 5.1. Coordination Failure and Service Fragmentation

Conflicting goals and interests among different actors lead to high coordination costs. Information asymmetry and data silos severely hinder collaboration. Furthermore, high coordination costs often result in a situation where "nine dragons manage the water" but there is a "service gap," meaning multiple agencies are responsible but services still fall through the cracks.

### 5.2. Digital Divide and Service Equity

Elderly individuals with poor economic conditions or low digital literacy risk being excluded from smart elderly care. The access divide, usage divide, and literacy divide constitute "technological exclusion." Without intervention, smart elderly care could exacerbate social disparities, creating a "Matthew effect" where the rich get richer and the poor get poorer.

### 5.3. Data Security, Privacy, and Ethics

Smart elderly care systems store vast amounts of highly sensitive personal data. A leak could cause immeasurable harm. Round-the-clock monitoring may infringe upon the dignity and privacy rights of the elderly. Ambiguity regarding data ownership and usage rights, as well as potential algorithmic bias, are pressing ethical dilemmas.

### 5.4. Sustainability Challenges

Government finances are under immense pressure, making full government funding unsustainable. While the market has potential, the willingness and ability of the elderly to pay are limited, and clear business models are lacking. Social organizations face unstable funding sources. The connection mechanism between long-term care insurance and smart elderly care services is not yet well-established. The core question remains: Who pays?

## 6. Countermeasures and Suggestions for Optimizing Collaborative Governance

In response to the dilemmas mentioned above, the following six systemic reform suggestions are proposed.

### 6.1. Strengthen Top-Level Design and Coordination Mechanisms

It is recommended to establish a cross-departmental "Smart Health and Elderly Care Leading Group" at the national level, coordinating ministries such as Civil Affairs, Health, and Industry and Information Technology. Enact a "Smart Elderly Care Service Promotion Law" to clearly define the rights and obligations of various actors, including the government, market, and society. Promote "power lists" and "responsibility lists" to clarify the responsibilities of governments at all levels in the field of smart elderly care, avoiding overlapping duties.

### 6.2. Build a Unified and Open Data Sharing Platform

Establish an authorization mechanism for "personal data accounts," allowing citizens to decide which institutions can access which of their data. Mandate standards for health and elderly care data, requiring public medical institutions and nursing homes to open data interfaces according to these standards. Actively apply privacy-enhancing technologies such as "multi-party secure computation" and "federated learning" to achieve "data availability without visibility," balancing data sharing with privacy protection.

### 6.3. Cultivate a Tiered Service Market

The government should shift from "subsidizing suppliers" to "subsidizing demanders" by distributing "service vouchers" or "digital currency" directly to the elderly, allowing them to choose service providers independently. Encourage the development of "silver economy"

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industrial clusters and support "specialized, refined, distinctive, and innovative" small and medium-sized enterprises in the smart elderly care sector. Explore Public-Private Partnership models to attract social capital for participation in large-scale infrastructure construction, achieving risk-sharing.

### 6.4. Bridge the Digital Divide and Promote Service Inclusiveness

Promote design standards for "age-friendly" products, mandating features like large fonts, large icons, and simplified operating procedures. Conduct large-scale digital skills training, integrating it into community education and senior university programs. Provide offline service safety nets to ensure that elderly individuals who cannot use smart technology can still access services. Provide equipment and internet subsidies for low-income groups.

### 6.5. Improve Laws, Regulations, and Ethical Norms

Strengthen supervision and law enforcement regarding data security, adopting a "zero-tolerance" policy towards data leaks and misuse. Establish independent ethics review committees to assess the ethical risks of AI applications in the field of smart elderly care. Establish clear channels for dispute resolution, providing accessible legal remedies for elderly consumers.

### 6.6. Empower Communities and Consolidate the Service Foundation

Support the establishment of "Community Comprehensive Elderly Service Centers" at the street or large community level, positioning them as offline experience centers. Deeply integrate smart elderly care platforms with existing community grid management systems, using smart terminals to dynamically monitor the situation of elderly residents. Vigorously support social organizations and volunteer services rooted in communities, integrating mutual aid models like "time banks" into the official incentive system.

## 7. Conclusion

Smart elderly care is not only an arena for technological innovation but also a testing ground for transforming public service delivery models. Its success hinges on constructing a multi-actor collaborative governance network with clear responsibilities, complementary advantages, and positive interaction. The government should shift from a "direct provider" to a "resource enabler," stimulating and guiding the initiatives of various stakeholders by strengthening top-level design, breaking down data barriers, cultivating the service market, bridging the digital divide, improving the legal and ethical framework, and consolidating the community foundation. Future research could further quantify the effectiveness of different models through empirical investigations or delve into the micro-level to explore how trust is built and conflicts are resolved.

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