Research on the Selection and Optimization of Policy Instruments for Promoting Artificial Intelligence in China's Primary Healthcare

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Abstract: *Primary healthcare serves as the foundational network of China's medical and health service system. Artificial intelligence technology provides a new pathway to address core challenges such as shortages of primary healthcare resources, insufficient service capacity, and uneven regional development. Policy instruments are the key lever for promoting the implementation and adoption of AI in primary healthcare. Based on the Rothwell & Zegveld policy instrument classification framework, this paper constructs a three-dimensional analytical system comprising supply-side, demand-side, and environmental instruments. It reviews policy texts related to AI in primary healthcare in China since 2017 and analyzes the structural characteristics and practical dilemmas in the selection of current policy instruments. The study finds that the policy instruments for promoting AI in China's primary healthcare suffer from notable issues, including structural imbalance, insufficient cross-sector collaboration, lack of precise adaptability, and weak implementation support. Accordingly, this paper proposes systematic optimization pathways from four aspects: optimizing the structure of policy instruments, strengthening multi-dimensional collaboration, enhancing differentiated adaptation capabilities, and consolidating the supporting system. These recommendations aim to provide theoretical reference and practical guidance for promoting the high-quality adoption of AI in China's primary healthcare, strengthening the foundation of primary health services, and advancing the Healthy China Initiative.*

Keywords: Primary Healthcare, Medical Artificial Intelligence, Policy Instruments, Promotion Pathways, Medical and Health Policy

1. Introduction

1.1. Research Background and Significance

"The Healthy China 2030" Planning Outline explicitly establishes a "primary healthcare-focused" guiding principle for health work. Primary healthcare institutions bear core responsibilities such as basic medical care, essential public health services, chronic disease management, and serving as the first point of contact in the tiered healthcare system, constituting the first line of defense in safeguarding public health. For a long time, China's primary healthcare has faced structural challenges including an overall shortage and imbalanced structure of human resources, weak service capacity, and significant urban-rural and inter-regional development disparities. The proportion of total national outpatient visits handled at the primary level has long remained below 60%, creating a bottleneck for implementing the tiered diagnosis and treatment system.

The iterative maturation of a new generation of artificial intelligence technology presents a breakthrough opportunity for enhancing the quality and efficiency of primary healthcare. Technologies like AI-assisted diagnosis, intelligent chronic disease management, telemedicine support, and intelligent public health surveillance can effectively compensate for the shortage of primary healthcare talents, improve the standardization of diagnostic and treatment services, and reduce service costs, serving as a core engine for promoting the high-quality development of primary healthcare. Since the introduction of the "Next Generation Artificial Intelligence Development Plan" in 2017, China has issued dozens of

policy documents at national and local levels to promote medical AI development, with primary care scenarios becoming a key focus area. However, in practice, the application of AI in primary healthcare still faces the predicament of being "difficult to implement, underutilized, and lacking sustainability." Most products remain in the pilot stage, failing to achieve large-scale adoption, with one of the core issues being systemic deficiencies in the selection, combination, and adaptation of policy instruments[1].

The research systematically examines the current status and underlying challenges in promoting AI within China's primary healthcare system, uncovering the core logic behind technology implementation. It proposes actionable and replicable systematic optimization pathways. This aims to provide practical references for relevant stakeholders, including technology developers, medical service institutions, and industry collaboration platforms, ultimately fostering the high-quality and widespread adoption of artificial intelligence in primary healthcare.

2. Research Status at Home and Abroad

Research on policy instruments for medical artificial intelligence abroad started relatively early, with a core focus on three major areas: regulatory frameworks, healthcare payment systems, and ethical constraints. The U.S. Food and Drug Administration (FDA) has established a pre-certification and lifecycle regulatory framework for AI/Software as a Medical Device (SaMD). The European Union’s "Artificial Intelligence Act" classifies medical AI as high-risk AI, subjecting it to stringent regulation. OECD countries commonly leverage demand-side instruments such as medical insurance reimbursement and government procurement to drive the market application of medical AI. Relevant studies confirm that demand-side instruments can effectively reduce market uncertainties in technology promotion and serve as a core lever for scaling the application of medical AI[2].

Domestic research in this area can be categorized into three main directions: first, studies on the development status and primary healthcare application scenarios of medical AI, focusing on analyzing the application value and practical barriers of AI in scenarios such as diagnosing common diseases and managing chronic conditions at the primary level; second, research on the policy evolution of medical AI, which sorts out the development stages and characteristics of China’s medical AI policies; and third, studies on the application of policy instruments in the medical field, where some scholars have used policy instrument frameworks to analyze the policy features of smart healthcare and telemedicine in China. However, existing research still has notable shortcomings: systematic investigation into policy instruments for promoting medical AI in primary healthcare remains scarce, with most studies focusing on macro-level policy reviews. There is a lack of in-depth analysis of the structure, coordination, and adaptability of policy instruments, and insufficient attention to the specificities of primary healthcare scenarios, making it difficult to guide policy practice[3].

3. Core Concepts and Theoretical Analytical Framework

3.1. Core Concepts

3.1.1. Primary Healthcare

The term "primary healthcare" in this paper refers to the foundational level of China's healthcare service system, specifically healthcare institutions below the county (district) level. This includes township health centers, community health service centers (stations), and village clinics. Their core functions involve the initial diagnosis and treatment of common and frequently occurring diseases, chronic disease management, provision of essential public health services, family doctor contracting services, and health education. They serve as the primary carriers of the tiered diagnosis and treatment system[4].

3.1.2. Artificial Intelligence in Primary Healthcare

Artificial intelligence in primary healthcare refers to AI technologies and products adapted to the service scenarios and capacity realities of primary care settings. These are applied in areas such as the auxiliary diagnosis of common and frequently occurring diseases, intelligent chronic disease management, telemedicine support, intelligent public health surveillance, and family doctor contracting services. Its core characteristics are low cost, ease of operation, high universality, low computing power requirements, and strong clinical adaptability. Its core value lies in compensating for the shortages of talent and technology in primary healthcare, thereby enhancing the standardization and accessibility of services[5].

3.1.3. Policy Instruments

Policy instruments are the sum of various means, methods, and mechanisms adopted by the government to achieve specific policy objectives. They serve as the crucial bridge for translating policy goals into practice. This paper adopts the widely used Rothwell & Zegveld policy instrument classification framework. Combined with the policy objectives for promoting AI in primary healthcare, the policy instruments are categorized into three main types: supply-side, demand-side, and environmental instruments. This clearly delineates the government's intervention pathways and operational logic in technology promotion.

3.2. Three-Dimensional Policy Instrument Analysis Framework

3.2.1. Supply-Side Policy Instruments

Supply-side policy instruments are those where the government provides direct support through the supply of essential factors, constituting a "policy push." Their core function is to address the issue of "availability" of AI in primary healthcare by bridging gaps in key elements such as technology, funding, talent, and infrastructure. Specific sub-instruments include: capital investment (special fiscal funds, research funding), infrastructure development (primary-level informatization, computing power networks, data platforms), technology R&D support (research initiatives, R&D subsidies), talent cultivation and training, and public service support (standard setting, testing and certification).

3.2.2. Demand-Side Policy Instruments

Demand-side policy instruments involve the government leveraging end-market demand to reduce the market uncertainty of technology promotion, constituting a "policy pull." Their core function is to address the issue of "adoption" of AI in primary healthcare by stimulating the motivation for its use among primary institutions, medical personnel, and patients. They are the core driving force for the large-scale promotion of the technology. Specific sub-instruments include: government procurement and subsidies, health insurance payment policies, pilot demonstration and promotion, regulation and opening of application scenarios, pay-for-performance mechanisms, and patient awareness guidance[6].

3.2.3. Environmental Policy Instruments

Environmental policy instruments are those where the government indirectly influences the entire process of technology promotion by creating a stable institutional environment, constituting a "policy enabler." Their core function is to address the issue of "feasibility" of AI in primary healthcare by establishing the rules and boundaries, removing institutional obstacles, and preventing and controlling various risks associated with technology promotion. Specific sub-instruments include: laws, regulations, and ethical norms, technical standards and market access systems, tax incentives and financial support, industry supervision and risk prevention/control, talent incentive policies, and regional

coordination policies.

4. Application Status and Characteristics of Policy Instruments for Promoting AI in China's Primary Healthcare

4.1. Evolution of Policies

Based on policy objectives and the characteristics of instrument application, the evolution of policies for promoting AI in China's primary healthcare can be divided into three stages:

4.1.1. Top-Level Design and Initial Stage (2017-2019)

In 2017, the State Council issued the "New Generation Artificial Intelligence Development Plan," which for the first time listed intelligent healthcare as a core application area for AI. It explicitly called for the "promotion and application of new AI-based treatment models and methods, and the establishment of a fast and precise intelligent medical system." This marked the elevation of medical AI development to a national strategy. Policies during this stage were predominantly environmental-type top-level planning, supplemented by a small number of supply-side R&D support policies. The core focus was on establishing the institutional framework and clarifying the development direction. Policies concentrated on technological R&D and high-end medical scenarios, with insufficient specificity for primary care settings[7].

4.1.2. Pilot Promotion and Standardized Development Stage (2020-2022)

The COVID-19 pandemic accelerated the clinical application of medical AI. The surge in demand for scenarios like primary-level pandemic prevention/control and telemedicine shifted the policy focus towards primary care settings. The National Health Commission successively issued documents such as the "Overall Plan for Primary Health Informatization Construction" and the "Guiding Opinions on Promoting the Construction and Development of Medical Alliances," explicitly proposing the pilot application of AI-assisted diagnosis at the primary level. The National Medical Products Administration released the "Technical Review Guidelines for Medical Device Software," establishing approval norms for medical AI products. Healthcare insurance authorities initiated pilot programs for reimbursing AI-based medical services. During this stage, the application frequency of supply-side instruments increased significantly. Environmental instruments shifted from macro-planning to specific regulations. Demand-side instruments began to emerge. Pilot demonstration projects for AI in primary healthcare were rolled out comprehensively[8].

4.1.3. Comprehensive Deepening and Quality-Efficiency Enhancement Stage (2023-Present)

The policy focus has shifted from pilot demonstrations to large-scale promotion and sustainable application, with primary care scenarios becoming the core focus. The National Health Commission issued the "National Primary Health Informatization Construction Work Guidelines (2023-2025)," explicitly stating the goal to "significantly increase the coverage of intelligent technology applications such as AI-assisted diagnosis in primary healthcare institutions by 2025." The "14th Five-Year Plan for Health Standardization Work" improved the technical standard system for medical AI. Various regions are accelerating the construction of county-level medical consortium AI platforms to promote the comprehensive coverage of AI technology at the primary level. During this stage, all three types of policy instruments are working in synergy, but issues such as structural imbalance and lack of precision persist.

5. Analysis of Deep-Seated Challenges in Promoting AI in China's Primary Healthcare

5.1. Inadequate Adaptation of Technology to Primary Healthcare Scenarios and Weak Foundational Support for Implementation

The mismatch between technology and application scenarios is a core barrier constraining the promotion of AI in primary healthcare. Currently, the development of most medical AI products is centered on the clinical data and diagnostic needs of tertiary hospitals, failing to fully consider the specificities of primary healthcare settings. This leads to a significant disconnect between the products and the actual needs at the grassroots level. Firstly, there is a lack of lightweight, adaptable products. Most products have high requirements for computing power, network infrastructure, and information systems, which cannot be reliably met by primary institutions, especially village clinics in remote areas, preventing stable operation. Secondly, products lack clinical suitability. Primary care mainly deals with common diseases, frequently occurring illnesses, and comorbidities, with the patient population predominantly consisting of the elderly and those with chronic conditions. However, existing products are often trained on single-disease, standardized case data, lacking the generalization ability for complex primary care clinical scenarios, and thus fail to meet actual diagnostic and treatment needs[9]. Thirdly, products have overly high operational barriers. Primary care doctors generally have limited information technology skills, while the operation processes of many products are complex and require specialized IT knowledge, leading to situations where primary care doctors "do not know how to use them" or are "unwilling to use them." Fourthly, there is a lack of operation and maintenance (O&M) support. Most companies concentrate their O&M services in urban areas. When equipment failures or system issues occur in primary institutions, especially in remote locations, timely technical support is often unavailable, ultimately leading to product abandonment.

Simultaneously, the fragmentation and variable quality of primary healthcare data further constrain technological iteration and implementation. Data is scattered across different institutions and systems, lacks uniform standards, and is difficult to interconnect, making it challenging to form a complete health data loop. Moreover, primary healthcare data often lacks completeness and standardization, failing to provide high-quality data support for the training and iteration of AI models. This prevents the continuous performance optimization of products and their adaptation to the dynamic needs of primary clinical scenarios[10].

5.2. Insufficient Endogenous Motivation on Both Supply and Demand Sides; A Bidirectional Promotion Model Has Yet to Form

From the supply side, technology R&D enterprises have severely insufficient motivation to focus on the primary healthcare market. Primary healthcare institutions have limited payment capacity, while the R&D investment for medical AI products is high with a long return cycle. The primary market offers narrow profit margins and unclear business models, causing most companies to focus their R&D efforts on the tertiary hospital market with stronger payment ability. Consequently, investment in developing products adapted for primary care scenarios is inadequate, hindering the supply of high-quality, highly adaptable products. Furthermore, the dispersed nature of primary care settings and significant variations in demand lead to high costs for product customization and localization, further reducing corporate willingness to participate.

From the demand side, the willingness to adopt AI among primary healthcare institutions, medical personnel, and patients is demonstrably lacking. Firstly, primary institutions lack application drive. They operate with limited funds, lacking stable financial resources for purchasing, maintaining, and upgrading AI products, making it difficult to bear the associated costs. Additionally, some institutions have an insufficient understanding of the value of AI technology, failing to fully recognize its potential for enhancing service capabilities, and thus lack the initiative to adopt it. Secondly, primary care medical staff show low acceptance and willingness to use the technology. On one hand, primary care doctors often lack IT and AI skills, making it difficult to operate related products proficiently—a "cannot use" problem. On the other hand, they have low trust in the diagnostic results of AI products and are concerned about the medical liability risks associated with their use—a "dare not use" concern. Moreover, some products do not genuinely reduce the workload for primary care doctors but instead add operational steps and burden, leading to an "unwilling to use" attitude.

Thirdly, patient recognition and acceptance are low. Most patients have limited awareness of AI-powered medical services, place greater trust in diagnoses from doctors at higher-level hospitals, and have insufficient trust in (or even resistance to) AI-assisted services at the primary level. This fails to effectively activate end-user demand.

5.3. Lack of Multi-Stakeholder Coordination Mechanism; Obstructions Exist Across the Entire Implementation Chain

The promotion of AI in primary healthcare involves multiple stakeholders, including technology R&D enterprises, primary healthcare institutions, higher-level hospitals, research institutes, and industry organizations. However, there is currently a lack of effective coordination and collaboration among these entities, preventing the formation of a positive ecosystem of co-created value. Obvious blockages exist across the entire technology implementation chain.

First, there is a disconnect between R&D and application ends. Significant information barriers exist between technology development and clinical needs. Enterprise R&D personnel mostly have technical backgrounds but lack primary care clinical experience. Their understanding of the actual scenarios, core needs, and pain points in primary care is inadequate, leading to a disconnect between product development and primary care needs. Conversely, primary care medical staff have limited technical knowledge and struggle to translate clinical needs into specific technical specifications, unable to provide effective feedback for product R&D. This creates a vicious cycle where "developed products are not useful, and needed products are not developed."

Second, there is insufficient linkage between lower and higher-level medical institutions, failing to form a closed-loop for technology application. Currently, the use of AI in primary healthcare is mostly confined to the primary institutions themselves, lacking effective vertical integration with higher-level hospitals. AI-assisted initial diagnosis results from primary care are not recognized or reviewed by higher-level hospitals. High-risk patients identified at the primary level cannot be quickly referred upward. Furthermore, the diagnostic and treatment experience from higher-level hospitals cannot be effectively transferred to the primary level through AI platforms. Consequently, the enabling value of the technology is not fully realized.

Third, collaboration between research institutes, the industry, and the application end is insufficient, leading to low efficiency in technology transfer. Research from academic institutions often focuses on technological frontiers and algorithm optimization, with insufficient connection to the actual needs of primary clinical scenarios. Research outcomes are difficult to translate into implementable products. Additionally, the lack of effective collaborative platforms for sharing resources and complementing strengths among research institutes, enterprises, and primary healthcare institutions hinders synergy across the entire process of R&D, clinical validation, and implementation.

Fourth, the boundaries of rights, responsibilities, and value distribution mechanisms among stakeholders are unclear, making it difficult to achieve a win-win situation for all parties. Industry-wide consensus and clear regulations are still lacking for core issues such as the division of medical liability in AI application, data rights allocation, and value sharing. This can easily lead to blame-shifting and conflicts of interest among stakeholders, further constraining the depth and breadth of collaborative efforts.

5.4. Sustainable Operation Models Have Not Yet Formed; Long-Term Viability of Technology Promotion is Lacking

Currently, the promotion of AI in China's primary healthcare mostly relies on short-term projects and pilot programs. Sustainable operation models have not yet been established, severely undermining the long-term viability of the technology promotion. First, profit models are singular. Current models primarily involve product sales and hardware procurement—essentially one-time transactions. Service-based, recurring revenue models are lacking. Enterprises cannot

obtain stable income through continuous service optimization, leaving them with no incentive to provide long-term supporting services like O&M, upgrades, and training for primary institutions. This leads to unsustainable product application. Second, cost-sharing and value-sharing mechanisms are absent. The application of AI in primary healthcare can bring value to multiple stakeholders, including primary institutions, patients, and the health insurance system. However, currently, the costs are mainly borne by the primary institutions themselves. Other beneficiaries do not participate in cost-sharing, making it difficult for primary institutions to sustain the related expenses long-term. Projects often become unsustainable after initial funding ends. Third, there is a lack of whole-lifecycle effect tracking and product iteration mechanisms. After most products are deployed, there is often a lack of long-term tracking and evaluation of their clinical application effectiveness. Products cannot be continuously optimized based on user feedback from primary care settings. This results in a growing mismatch between product performance and clinical needs, ultimately leading to product abandonment and disuse.

5.5. Absence of a Whole-Chain Talent Support System; Lack of Core Safeguard for Technology Application

Talent is the core safeguard for the implementation of AI in primary healthcare. Currently, a whole-chain talent support system is severely lacking in China's primary healthcare sector, becoming a key bottleneck hindering technology promotion. First, there is an extreme shortage of interdisciplinary talent proficient in both clinical practice and AI technology at the primary level. The IT literacy and AI skills of primary care doctors are generally insufficient. Most can only perform basic operations and cannot professionally interpret or judge AI outputs, let alone handle basic operational failures, preventing the full realization of the technology's potential value. Second, there is a lack of systematic, regular talent training systems. Current AI skill training for primary care medical personnel is mostly short-term and one-off. Training content is often disconnected from actual application scenarios at the primary level, and coverage is insufficient, making it difficult to effectively enhance practical application abilities. Additionally, specialized training for O&M personnel within primary institutions is lacking, preventing them from performing basic self-maintenance and troubleshooting. Third, effective talent incentive mechanisms are absent. The salary levels and career development opportunities in primary healthcare institutions are limited, making it difficult to attract interdisciplinary talent to work at the grassroots level. Furthermore, for primary care medical staff, incentive mechanisms related to AI technology application have not been established. AI skill levels and technology application effectiveness are not effectively linked to performance evaluations, professional title promotions, or commendations, making it difficult to stimulate the endogenous motivation of primary care staff to proactively learn and standardize the use of AI technologies.

6. Systematic Optimization Pathways for Promoting AI in China's Primary Healthcare

6.1. Centering on Primary Care Needs to Foster Deep Integration of Technology and Scenarios

Firstly, establish a demand-driven closed-loop R&D model. Build a full-chain, closed-loop R&D mechanism of "primary care clinics articulating needs - research institutes tackling key problems - enterprises developing products - primary care clinics validating." Through regular demand alignment and clinical feedback, R&D personnel can gain a deep understanding of the real-world scenarios and core pain points in primary care. Focus should be on high-frequency diseases and core service scenarios at the primary level to develop lightweight, low-cost, easy-to-operate, low-computing-power, and highly generalizable adaptive products. This addresses the disconnect between products and scenarios at the source.

Secondly, improve the foundational support system for technology application at the primary level. Establish unified provincial/municipal-level computing power platforms and operation and maintenance (O&M) service centers for primary healthcare AI. By providing cloud-based computing support, the hardware investment threshold for primary

institutions is lowered. Build an O&M service network covering county, township, and village levels, offering primary institutions 7x24 technical support, fault handling, and system upgrade services, solving the problems of "difficult O&M" and "unaffordability."

Thirdly, break down primary care data silos to promote compliant data sharing and value realization. Formulate unified primary healthcare data standards and norms, promote data interoperability between primary care institutions and county-level hospitals within a county, and construct a complete closed loop of resident health data. Establish mechanisms to improve the quality of primary healthcare data, standardizing the entire process of data collection, storage, and management to enhance data completeness and standardization. Under the premise of ensuring data security and patient privacy, leverage technologies like privacy-preserving computation to achieve compliant data sharing where data is "usable but not visible," providing high-quality data support for the training and iteration of AI models, thereby driving the continuous optimization of product performance.

6.2. Activating Endogenous Motivation on Both Supply and Demand Sides to Build a Bidirectional Promotion Model

Firstly, optimize the product and service system on the supply side to stimulate enterprise participation. Guide enterprises to develop tiered, modular product systems tailored to the characteristics of the primary market. Offer flexible cooperation models like pay-per-use or pay-for-service to lower the application threshold for primary institutions. Encourage enterprises to transform from "product sellers" to "service providers," building a whole-lifecycle service system. By providing continuous O&M, training, and optimization services, they can obtain stable recurring revenue, forming a sustainable profit model and stimulating their endogenous motivation to deeply engage in the primary market.

Secondly, enhance the willingness and capability for application on the demand side to activate primary-level adoption. For primary healthcare institutions, use pilot demonstrations and effectiveness evaluations to let them intuitively perceive the technology's role in improving service capacity and operational efficiency, thereby strengthening their recognition of its value. For primary care medical staff, implement systematic training to improve their AI skills and application capabilities. Simultaneously, optimize product design to genuinely reduce the workload of primary care doctors, making technology a helpful assistant rather than an extra burden, thus increasing their willingness to use it. For patients, employ health education, case promotion, and experiential services to enhance their awareness and trust in AI-powered medical services. Let patients genuinely experience the convenience and quality brought by the technology, thereby activating end-user demand.

6.3. Building a Multi-Stakeholder Collaboration System to Unblock the Entire Implementation Chain

Firstly, establish integrated industry-academia-research-application collaboration platforms. Set up collaborative innovation platforms involving research institutes, technology enterprises, primary healthcare institutions, higher-level hospitals, and industry organizations. This enables resource sharing, complementary advantages, demand alignment, and collaborative innovation, connecting the entire process from technology R&D and clinical validation to implementation, application, and continuous optimization, thereby promoting efficient technology transfer and deep application.

Secondly, strengthen the vertical linkage within county-level medical alliances to build a closed-loop for technology application. Centered on county-level hospitals, establish a unified county-level AI application platform to achieve technology sharing, data interoperability, and vertical coordination among county, township, and village-level institutions. Establish a tiered diagnosis and treatment closed-loop of "primary care initial diagnosis - AI assistance - higher-level review - two-way referral." Higher-level hospitals provide review and technical support for AI-assisted diagnosis and treatment results from primary care. High-risk patients identified at the primary level can be quickly referred upward. Diagnostic and treatment experience from higher-level hospitals is continuously transferred to the primary level via the

AI platform, fully unleashing the enabling value of the technology.

Thirdly, clarify the rights, responsibilities, and value distribution mechanisms for all stakeholders. Led by industry organizations, develop industry standards and operational guidelines for AI application in primary healthcare, clearly defining the division of medical liability, data rights attribution, and risk-sharing mechanisms in technology application to alleviate stakeholders' concerns. Construct a multi-party win-win value distribution mechanism, allowing all stakeholders to gain corresponding value returns from technology application, thereby forming long-term, stable collaborative partnerships.

7. Conclusions and Prospects

7.1. Research Conclusions

Artificial intelligence in primary healthcare is a key lever for addressing the shortcomings in China's primary healthcare service capacity, promoting the implementation of the tiered diagnosis and treatment system, and enhancing the accessibility and standardization of medical services. Currently, the promotion of AI in China's primary healthcare has achieved phased results: the product system is gradually being perfected, scenario coverage continues to expand, diversified promotion models are taking shape, and the enabling value of the technology is becoming preliminarily evident. However, in practice, the large-scale and sustainable promotion of the technology still faces deep-seated challenges: insufficient adaptation of technology to primary care scenarios, a lack of endogenous motivation on both supply and demand sides, imperfect multi-stakeholder coordination mechanisms, the absence of sustainable operation models, and a missing whole-chain talent support system.

The core of promoting AI in primary healthcare lies in value creation centered on the genuine needs of the grassroots. Only technology that truly addresses primary care pain points and creates practical value can achieve sustainable adoption. To drive the high-quality promotion of AI in primary healthcare, a systematic optimization pathway must be constructed: centering on primary care needs to foster deep integration of technology and scenarios; activating endogenous motivation on both supply and demand sides to build a bidirectional promotion model; constructing a multi-stakeholder collaboration system to unblock the entire implementation chain; innovating sustainable operation models to build a multi-party win-win value loop; and improving the whole-chain talent support system to solidify the talent foundation for technology application.

7.2. Research Limitations and Future Prospects

This research is based on the overall development status of the industry and the analysis of typical cases. The analysis of promotion details across different regions and models requires further depth. Future research could conduct comparative studies targeting regions with different economic development levels and varying primary healthcare foundations to extract more targeted promotion strategies. Furthermore, this study primarily employs qualitative analysis. Future work could incorporate quantitative research methods to build a quantitative evaluation model for assessing the effectiveness of AI promotion in primary healthcare, providing more precise empirical support for technology promotion and optimization.

Looking ahead, with the continuous iteration of artificial intelligence technology and the ongoing improvement of China's primary healthcare service system, the promotion of AI in primary healthcare will enter a new stage of large-scale, high-quality development. Through the deep integration of technology and scenarios, the collaborative co-creation of multiple stakeholders, and the continuous innovation of sustainable operation models, AI technology is poised to fully unleash its enabling effects. It will comprehensively enhance primary healthcare service capacity, truly channel

high-quality medical resources to the grassroots to benefit the entire population, strengthen the foundational network of China's healthcare service system, and provide robust support for national health.

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