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Research Progress on the Optimization of Human Resource Management Systems in Public Hospitals under the Dual Background of High-Qualit y Development and Northeast Revitalization

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Abstract

Under the background of the synchronous advancement of the national high-quality development strategy for public hospitals and the comprehensive revitalization strategy of Northeast China, the functional positioning of human resource management has undergone a fundamental transformation, upgrading from traditional transactional logistical support to a core strategic support that determines hospital operational efficiency, medical service quality, long-term core competitiveness, and regional medical talent retention. This paper reviews the research context of human resource management transformation in domestic public hospitals, combines the unique talent loss dilemma of the medical industry in Northeast China, and integrates the theoretical frameworks, mainstream practical models, and common governance challenges in the industry formed by existing research. It sorts out the internal logic and evolutionary path of the transformation from traditional personnel management to modern strategic human resource management, and conducts a review around five core issues: organizational structure and staffing allocation, full-cycle talent attraction-development-retention-utilization, performance and compensation incentive reform, digital construction of human resources, and occupational security and organizational culture development. The paper reviews international mature medical human resource management experience, combines localized reform practices of domestic tertiary hospitals, **and prudently delineates the applicability boundaries of foreign models within the Chinese context to prevent the direct transplantation of experiences.** And comprehensively identifies limitations in existing research, including insufficient empirical support, lack of region-specific adaptation theories, superficial implementation of digital technologies, regional research imbalance, and weak specialized research on medical talent retention in Northeast China. Based on the shortcomings of existing research, this paper proposes key exploration directions for this field in the future, and puts forward the construction of a public hospital human resource management ecosystem that takes into account national universality, Northeast regional adaptability, value orientation, and data-driven characteristics. It improves the full-chain institutional design of talent attraction, development, retention, and utilization. **This review only provides theoretical reference and feasible ideas, and the actual implementation effectiveness remains to be verified by subsequent empirical research.** Which not only provides theoretical and practical references for the high-quality development of public hospitals nationwide, but also provides feasible research ideas and implementation pathways for stabilizing local medical talent in Northeast China and empowering regional comprehensive revitalization through medical human capital.

1. Introduction

China's healthcare sector has entered a new stage of connotative quality improvement and development. The state has successively issued a series of policies clarifying that the development model of public hospitals must completely abandon the extensive growth path reliant on scale expansion, bed capacity increase, and large equipment procurement, and shift toward connotative development centered on medical safety and quality, refined operational efficiency, sustainable discipline construction, and patient

care experience[1]. This transformation in development model has driven public hospitals to upgrade their management capabilities across all dimensions. As the collective vehicle of clinicians, nurses, medical technicians, researchers, and administrative staff, human resources constitute the most dynamic and long-term valuable factor of production within the medical system[2]. The efficiency of staffing allocation, the effectiveness of incentive systems, and the stability of the talent workforce directly determine the height of hospital discipline development, clinical service capacity, emergency response capability in public health emergencies, and long-term market competitiveness[3]. In the context of the advancing comprehensive revitalization strategy of Northeast China, the continuous outflow of regional medical talent has become a core bottleneck constraining the quality and efficiency improvement of local public hospitals and hindering the upgrading of regional public welfare and livelihood security. Consequently, the optimization of the human resource system has become a key link connecting the two major national strategies of high-quality development of public hospitals and regional revitalization [4–5]. **As a literature review study, this paper does not conduct original empirical surveys; conclusions are summarized based on published literature, which may have inherent biases from the literature itself, providing a complete research narrative and practical references for talent management reform in public hospitals nationwide, especially in Northeast China.** This paper provides a comprehensive review of research achievements related to the optimization of human resource management systems in public hospitals, sorting out existing theories, practices, research gaps, and future research directions, so as to provide a complete research narrative and practical references for talent management reform in public hospitals nationwide, especially in Northeast China.

2. Research Background and Significance

2.1 Research Background

From the perspective of the overall operational status of public hospitals, the long-standing planned management model of public institutions has profoundly constrained innovation in human resource management. Administrative management thinking permeates the entire personnel process. Human resource departments have long been burdened with repetitive transactional tasks such as attendance calculation, payroll distribution, and personnel transfers, while lacking talent strategic planning aligned with the hospital's medium- and long-term development. The disconnect between human resource systems and the hospital's overall development objectives is widespread[6]. At the practical level, a series of structural contradictions have emerged, most notably the imbalance in personnel structure characterized by redundant administrative and logistical staff alongside a persistent shortage of frontline clinical personnel. Recruitment criteria are misaligned with the actual competency requirements of specific departments, making it consistently difficult to recruit and cultivate high-level academic leaders and scarce professionals in high-demand fields such as emergency and critical care and pediatrics[7]. Performance-based compensation still retains an egalitarian tendency, failing to tilt salary incentives toward high-load, high-risk, and high-contribution clinical positions. The single-track career development path for medical professionals forces a large number of clinical backbones to shift to

management positions in pursuit of better compensation. Chronic overwork has triggered widespread job burnout, and medical professionals' sense of professional belonging continues to weaken[8]. The aforementioned management shortcomings continuously hinder the realization of high-quality development goals in public hospitals and make it difficult to adapt to the management pressures brought by a series of healthcare reform tasks, including DRG/DIP medical insurance payment reform, the implementation of tiered diagnosis and treatment, and the construction of regional medical centers[9].

Public hospitals in Northeast China face all the common management challenges of public hospitals nationwide, while also giving rise to region-specific, extreme contradictions in talent development. With the continuous implementation of the Northeast Full Revitalization Strategy, the regional medical and health industry has become a foundational supporting industry for safeguarding public well-being, optimizing the business environment, and attracting talent backflow. However, multiple factors—including regional economic development levels, gaps in compensation and benefits, a scarcity of high-level research platforms, insufficient urban living support resources, and societal stereotypes about the medical profession—have collectively triggered persistent, large-scale outflows of medical talent[10]. Young physicians, departmental backbones, academic leaders, and senior nursing talent continue to flow toward economically developed regions such as the Beijing-Tianjin-Hebei area, the Yangtze River Delta, and the Pearl River Delta[11]. The shortage of professionals in high-demand fields such as emergency care, critical care, mental health, geriatrics, and pediatrics widens year by year. County-level primary public hospitals have fallen into a vicious cycle of difficulty in attracting talent, retaining local talent, and underutilizing existing personnel[12]. At the same time, problems such as traditional rigid personnel systems, inefficient incentive mechanisms, narrow career advancement channels, lagging digitalization of human resources, and insufficient coordination between local government and hospital talent policies are mutually nested. Talent loss and management inefficiency form a closed-loop negative cycle, which has become the core bottleneck constraining the quality improvement and upgrading of public hospitals in Northeast China, hindering the equalization of regional medical services, and impeding the Northeast Revitalization process. Against this backdrop, leveraging the optimization of the human resource management system to resolve the talent outflow dilemma, stabilizing the medical workforce to support high-quality hospital development, and relying on the upgrading of the medical and health industry to facilitate regional revitalization have acquired prominent theoretical research value and practical urgency.**It should be noted that talent outflow is the result of multiple social and economic factors, and human resource management optimization can only alleviate the problem, not unilaterally eradicate it completely.**

2.2 Research Significance

Positioned at the intersection of two major national strategies—high-quality development of public hospitals and the revitalization of Northeast China—this study synthesizes research findings on optimizing human resource management systems, offering both theoretical innovation value and practical guidance value. At the theoretical level, current domestic research on human resource

management in public hospitals mostly focuses on universal issues nationwide, while systematic studies addressing talent retention in Northeast China, regional hospital-government coordination, and the adaptation of localized human resource systems are relatively scarce. Existing relevant results are characterized by fragmentation and dispersion. By integrating four classic theories—strategic human resource management (SHRM), human capital, stakeholder theory, and ecosystem theory[13]—and combining the general principles of national public hospital reform with the specific predicament of medical talent mobility in Northeast China, this study constructs an integrated analytical logic of "national universal framework—Northeast regional adaptation mechanism—core objective of talent retention." This advances the localized and regionalized application of SHRM theory within China's healthcare context, fills the gap in specialized review studies on medical talent retention in Northeast China, enriches the theoretical system of public hospital governance with Chinese characteristics, and provides a comprehensive narrative reference and theoretical paradigm for subsequent region-specific and topic-specific medical human resource research.**This paper is a review study, which can only integrate existing literature to form an analytical paradigm, and does not claim to construct a completely original theory, providing a complete narrative reference and theoretical paradigm for subsequent subdivided medical human resource research.**

At the practical level, this study reviews mature medical human resource management models from China and abroad, as well as innovative reform cases from domestic hospitals, and outlines hierarchical, implementable optimization pathways for public hospitals nationwide and medical institutions at all levels in Northeast China. These can provide evidence-based decision-making references for hospital administrators, health administrative departments, medical insurance management agencies, and local talent management authorities. For public hospitals nationwide, the transformation pathways can drive the evolution from traditional transactional personnel management to strategic human resource management, address structural shortcomings in human resource management, activate the endogenous motivation of medical personnel, and enhance hospital operational efficiency and clinical service quality[14]. For Northeast China, the focus is on retaining local talent by outlining talent recruitment, cultivation, retention, and utilization systems adapted to the region's economic, demographic, and medical resource realities, thereby helping to stabilize the primary medical workforce and clinical backbones[15]. This will narrow the urban-rural gap in regional medical services, improve regional public well-being, empower the comprehensive revitalization of Northeast China through high-quality development of the medical workforce, and ultimately achieve the integrated development goals of improved medical service quality, optimized hospital operational efficiency, stable expansion of the talent pool, enhanced regional medical service capacity, and the coordinated advancement of high-quality hospital development and regional revitalization[16].**The above practical effects are expected effects derived from literature, and actual results are constrained by external conditions such as financial investment, establishment policies, and local economy.**

3. Evolution of Core Theoretical Cognition in Human Resource Management Optimization in Public Hospitals

The optimization of the human resource systems in public hospitals is not merely a matter of single-process reengineering or tool upgrading; rather, it constitutes a systemic institutional transformation that emerges from the deep integration of classical management theories with the public welfare attributes of the healthcare sector and the distinctive characteristics of clinical work[17]. Existing research widely identifies SHRM Theory, Human Capital Theory, Stakeholder Theory, and Ecosystem Theory as the theoretical foundations for the comprehensive reform of human resource management. These distinct theoretical perspectives give rise to differentiated narratives of reform logic, as detailed in Table 1.

SHRM Theory fundamentally overturns the passive, auxiliary positioning of traditional hospital personnel work. Its core proposition holds that human resource management must be deeply aligned with an organization's medium- and long-term development strategy, defining medical staff as the hospital's core strategic capital rather than a mere labor cost[18]. From this theoretical perspective, hospital human resource work must transcend basic administrative tasks—such as attendance tracking and payroll calculation—and shift toward top-level design functions, including medium- and long-term talent planning, disciplinary team building, enhancement of overall organizational efficacy, and the alignment of performance systems with strategic objectives[19]. Research focusing on the healthcare sector in Northeast China further extends the boundaries of this theory, proposing that regional public hospital human resource management planning must simultaneously align with the Northeast Revitalization Strategy, the layout planning of regional medical centers, and the differentiated development strategies of hospital specialty disciplines. It regards local medical talent as a core strategic resource for regional revitalization. Through forward-looking talent deployment, tiered and stepped cultivation, differentiated incentives, and full-cycle career security, a four-way synergy can be achieved among the personal growth of medical staff, the disciplinary development of hospitals, the construction of regional healthcare, and the national regional revitalization strategy. This drives the transformation of human resource departments from logistical support functions into core strategic drivers.

Human Capital Theory defines medical staff education, clinical training, research capability enhancement, and career development support as sustainable human capital investments. Continuous investment in these areas can, over the long term, improve the clinical output efficiency of medical staff and the overall operational performance of hospitals, generating cumulative dual returns—economic and public welfare[20]. Within the narrative framework of high-quality development in public hospitals, human capital investment is regarded as the fundamental pathway to disciplinary development and the upgrading of medical service capabilities. Existing research widely agrees on the need to establish a full-cycle growth system encompassing standardized physician training, cultivation of young backbone professionals, and the development of leading experts. It advocates for sustained investment in continuing education, clinical skills training, and academic research exchanges, thereby building a lifelong learning-oriented medical organization that continuously upgrades the professional competence of medical staff[21]. In response to the talent drain in Northeast China, mainstream research based on Human Capital Theory posits that regional medical institutions must increase long-term investment in cultivating local talent, address the shortcomings of high-level research platforms in the region, and

provide local medical staff with regular channels for advanced training and academic exchange. By enhancing the professional competitiveness of local talent, an endogenous driving force for talent to develop in situ is formed, thereby continuously accumulating a reserve of high-quality medical human capital for the Northeast region.**At the same time, it should be objectively recognized that human capital enhancement may also increase the market competitiveness of talents flowing outward, posing a potential risk of talent loss outward.**

Stakeholder Theory emphasizes that as public welfare institutions, public hospitals must balance the legitimate demands of multiple stakeholders in their human resource system design, rather than pursuing hospital operational benefits alone[22]. The core stakeholders of a hospital comprise four groups: patients, who require safe, affordable, and high-quality medical services; medical staff, who seek reasonable compensation, career development opportunities, professional dignity, and physical and mental well-being[23]; local governments, which assume the functions of medical public welfare regulation, public health service delivery, and medical cost control; and the public, who pursue regional health equity, livelihood security, and regional economic revitalization. Research based on this theory widely suggests that an optimized human resource management system must establish a collaborative balancing mechanism for multiple demands. It should link medical staff incentive mechanisms to medical quality and safety, the volume of public welfare services delivered, and contributions to regional grassroots support. This approach aims to enhance medical staff's sense of professional fulfillment while upholding the public welfare bottom line of public hospitals, and to increase the attractiveness of regional medical talent on the basis of controlling hospital operating costs[24]. Research specific to Northeast China further proposes that localized human resource system design must balance the interests of the government, hospitals, patients, and medical staff to achieve a win-win outcome for all parties, thereby highlighting the regional livelihood security responsibilities of public hospitals.

Ecosystem Theory conceptualizes public hospitals as open, dynamic, and complex systems characterized by the interactions of multiple actors. Human resource management is not an independent module; rather, it is an organic whole deeply embedded within clinical diagnosis and treatment, medical quality control, research and teaching, financial operations, logistical support, local talent policies, and regional public opinion[25]. Relevant studies consistently emphasize that human resource system optimization requires adherence to a holistic, collaborative reform approach. This entails linking human resource planning with key disciplinary development, aligning talent cultivation programs with clinical position requirements, adapting performance distribution systems to DRG/DIP medical insurance reforms, and integrating human resource data platforms with hospital intelligent operation systems[26]. At the expanded regional level in Northeast China, the human resource management ecosystem extends outward to form an external linkage system encompassing "hospitals—local governments—local medical universities—regional medical consortia—the public." Existing research suggests that by relying on local policy coordination, regional medical resource sharing, joint disciplinary platform building, and resonance with local humanistic culture, an external environment for talent retention—one that a single

hospital cannot achieve independently—can be established. Through regional ecological synergy, the stability of medical talent and the integrated development of regional healthcare can be realized[27].

Table 1
Comparison of Four Foundational Theories on Human Resource Management in Public Hospitals

Theoretical Foundation	Core Arguments	Applications	Regional Adaptation Extensions for Northeast China	Reference
SHRM Theory	Human resources are the organization's core strategic capital, and management activities must be deeply aligned with its medium- and long-term development strategy.	The top-level talent strategy planning, discipline echelon building, and performance systems are aligned with strategic objectives.	The strategy is synchronized with both the Northeast Revitalization Strategy and the regional medical center layout, treating local medical talent as a core strategic resource for regional revitalization, thereby achieving quadripartite collaboration.	[18]–[19]
Human Capital Theory	Talent capability enhancement constitutes a sustainable investment that yields long-term economic and public welfare returns.	A full-cycle talent development system, investment in continuing education and skills training, and the building of a learning organization.	Increase long-term investment in cultivating local talent, address the shortcomings of regional high-level research platforms, and build up a reserve of high-quality medical human capital in the region.	[20]–[21]
Stakeholder Theory	The institutional design must balance the legitimate interests of multiple stakeholders while reconciling organizational public welfare with operational efficiency.	The performance evaluation is linked to medical quality and public welfare services, while compensation incentives balance healthcare workers' sense of gain with cost control.	The design balances the interests of the government, hospitals, patients, and healthcare workers, highlights public hospitals' regional livelihood security responsibilities, and achieves mutual benefit for all parties.	[23]–[28]
Ecosystem Theory	Human resource management is an organic whole nested within organizational and regional environments, necessitating a coordinated approach to reform.	Human resource planning should be aligned with disciplinary development; the performance evaluation system should be adapted to healthcare reform; and HR data should be integrated into smart operation systems.	An external linkage system involving the hospital, government, medical universities, regional healthcare alliances, and the public should be established to foster a regional talent retention ecosystem.	[25]–[26]

4. Research Progress on the Five Core Dimensions of Human Resource Management System Optimization

With the continuous advancement of research on the high-quality development of public hospitals, the optimization of human resource management systems has gradually formed five mature research topics. Related studies have shifted from localized, piecemeal reform explorations to a narrative of whole-system reconstruction, and research outcomes across all dimensions have continued to expand, as shown in Fig. 1.

4.1 Organizational Restructuring and Refined Human Resource Allocation

Organizational structure and staffing configuration serve as the foundational for the implementation of the entire human resource management system. Existing research and industry practices revolve around three main themes: resolving imbalances in personnel structure, enhancing the efficiency of human resource utilization, and unleashing the vitality of frontline clinical staff. A large body of empirical studies points out that traditional public hospitals suffer from redundant hierarchical levels, high administrative barriers, and overly long decision-making transmission chains. The excessive proportion of administrative and logistical personnel crowds out clinical funding and establishment resources. Consequently, flat organizational restructuring has become a mainstream consensus in the literature[29]. Case studies of leading tertiary hospitals in China generally propose merging administrative and logistical departments with overlapping functions and inefficient operations, reducing the number of middle management positions, and reengineering end-to-end management processes[30–31]. Strict control should be exercised over the size of non-clinical staff. Given that administrative and logistical personnel account for an excessively high proportion of the total hospital workforce, establishment quotas, funding, and position resources should be continuously tilted toward frontline clinical departments, high-risk departments, and key specialty disciplines, thereby implementing the development orientation of "clinical-centered and patient-centered" at the organizational level. **Flat reform also carries management risks; for example, excessive compression of administrative positions may cause functional management gaps in hospitals. Reform should be advanced according to local hospital scale and business volume, and blind copying should be avoided.**

At the level of staffing configuration models, the extensive model characterized by fixed establishments, fixed positions, and uniform standards is gradually being rejected by academia. Data-driven dynamic and flexible allocation has become the mainstream research direction[32]. Existing studies propose establishing a controllable total, dynamically adjusted, on-demand allocated, and cross-department flexible shared human resource allocation mechanism, relying on objective quantitative data such as outpatient volume, surgical grading, bed turnover efficiency, emergency and critical care load, and disease severity. This mechanism promotes short-term mobility and allocation of personnel across

wards and hospitals, alleviating clinical staffing gaps during peak period of treatment and public health emergencies without expanding the total personnel establishment[33].

Regarding the narrow career development channels for medical staff, a large number of case studies have verified that the dual-track promotion model—running parallel management and professional technical tracks—possesses significant practical value[34]. Under the traditional model, clinical backbone staff had to shift to administrative management positions to obtain higher salaries and social status. The dual-track system builds an independent professional promotion path for clinicians, nurses, and medical technicians. By relying on professional titles, professional grades, and disciplinary positions for promotion, medical staff can obtain corresponding benefits and industry recognition, thereby relieve promotion competition pressure at the institutional level and stabilizing high-level clinical technical talents and core nursing teams[35]. **The implementation of the dual-track promotion system also faces constraints from total position and total salary policies, and the actual reform effect will be limited by the personnel system framework of public institutions.**

4.2 Research on the Construction of a Full-Cycle Talent Attraction, Development, Retention, and Utilization System

Medical talent, as the core developmental resource of public hospitals, has been addressed in existing research through a complete full-chain narrative covering precise recruitment, tiered training, scientific utilization, and long-term retention[36].

Research on talent recruitment generally reflects on the past extensive recruitment criteria that emphasized academic credentials and titles while neglecting practical clinical skills, proposing a differentiated and precise recruitment approach centered on competency models[37]. Medical institutions should focus on introducing discipline-leading talents, young top-tier research talents, and scarce professionals in emergency and critical care, pediatrics, and mental health. For high-level and scarce talents, flexible introduction mechanisms such as flexible talent recruitment, project-based cooperation, and green channels for establishment should be opened, breaking restrictions of geographical location and public institution establishment status. For county-level primary public hospitals, existing regional studies propose giving priority to recruiting local students and graduates from local medical colleges, leveraging their sense of belonging to their hometowns to reduce talent mobility intentions and enhance the long-term stability of primary-level teams[38].

Tiered and step-by-step talent cultivation has become a common feature in reform cases of top-tier hospitals in China. Existing studies have sorted out the progressive cultivation systems implemented by numerous hospitals, such as "Youth Seedling Training Program, Backbone Talent Cultivation Project, Discipline Leader Incubation Project, and Leading Talent Support Program," forming a complete growth chain from young physicians to clinical backbones, department heads, and discipline leaders[39–40]. The training content no longer focuses solely on clinical diagnosis and treatment skills but also covers comprehensive competencies including medical quality and safety standards, research and innovation

capabilities, clinical teaching, humanistic communication, and emergency public health response, achieving a high degree of alignment between talent cultivation programs and hospital discipline construction and actual clinical needs[41].

Research on lifelong career development guarantees incorporates continuing medical education, normalized on-the-job practical training, annual skills assessment, and academic exchange activities into institutionalized management[42–43]. It clarifies that training and assessment results are directly linked to professional title promotion, position employment, and performance-based distribution, building an integrated closed-loop mechanism of "training—assessment—appointment—incentive." This guarantees that the professional capabilities of medical staff continuously adapt to the iteration of medical technology, changes in disease spectrum, and updates in clinical diagnosis and treatment norms, providing stable support for the long-term career development of medical staff[44].

4.3 Research on Performance and Compensation Incentive Mechanism Reform

The performance compensation system is the core lever of human resource management reform and also the field with the most abundant current domestic research results and the deepest practical implementation[45]. Related research narratives revolve around three major directions: transformation of assessment orientation, application of scientific assessment tools, and inclination in compensation distribution.

A fundamental iteration has been completed in the value orientation of assessment. The past extensive assessment model centered on business revenue and total outpatient and inpatient economic volume has been comprehensively abandoned. Existing studies generally advocate for a value-oriented assessment system centered on medical quality and safety, patient satisfaction, hospital operational efficiency, research and teaching output, primary-level public welfare services, and contributions to regional medical support[46]. Assessment indicators are deeply aligned with national public hospital performance assessments and DRG/DIP medical insurance payment reform standards, completing the transformation from "quantity and economy orientation" to "quality and value orientation"[47].

Management tools such as the Balanced Scorecard, tiered KPI, Management by Objectives (MBO), and 360-degree multi-dimensional evaluation have undergone localized adaptation in hospital settings[48]. Relevant case studies confirm that these tools can achieve the step-by-step decomposition and alignment of hospital-wide strategies, departmental sub-goals, and individual work indicators, reducing subjective evaluation bias in assessments, alleviating the egalitarianism problem in compensation distribution, and enhancing the fairness and systematicity of the assessment system. **It should be noted that all kinds of management tools have limitations; excessive expansion of indicators will increase the administrative burden on clinical medical staff. Tools need to be simplified and adapted according to hospital scale, and cannot be mechanically copied.**

Research on compensation distribution uniformly recognizes the reform principle of "tilting toward frontline clinical staff, high-risk and high-intensity positions, and core backbone talents," optimizing the compensation structure, increasing the overall proportion of performance-based pay, and reasonably widening the income gap between different positions[49]. For discipline leaders, young top-tier talents, and medical staff in scarce specialties, flexible distribution models such as personalized compensation packages, agreed annual salaries, and special rewards for research projects are implemented to fully leverage the core functions of the compensation system in attracting, motivating, and retaining medical talents[50].**Compensation reform is constrained by the hard cap of the total salary policy for public hospitals. There is an objective upper limit to the salary improvement space, and relying solely on compensation cannot completely solve all problems of talent retention.**

4.4 Research on Digital Transformation of Human Resources

Digital and intelligent human resource management systems are core tools for enhancing management refinement and foresight. Related research narratives have gradually shifted from basic informatization construction to data-driven strategic decision-making[51]. The construction of an integrated human resource information platform is the foundation of digital transformation. Existing studies generally propose building an integrated smart HR system that integrates recruitment, training, attendance and leave, performance appraisal, compensation calculation, talent archives, and human resource statistical analysis. This breaks down information silos between departments, realizes real-time sharing of human resource data and online closed-loop business processes, freeing HR practitioners from repetitive transactional work and shifting their focus to high-value work such as talent strategic planning and employee relations management[52].

The integrated application of big data and artificial intelligence technologies is an emerging research hotspot in recent years. Existing empirical studies propose using in-hospital human resource big data to complete departmental staffing demand forecasting, talent structure gap analysis, early warning of backbone talent loss risk, and attribution analysis of performance distribution[53–54]. AI tools are used to complete intelligent resume screening, interview auxiliary evaluation, automatic compensation calculation, and personalized training course recommendation, promoting the shift of human resource management from ex-post empirical management to a data-driven model of ex-ante prediction and precise intervention, thereby enhancing the foresight and refinement of management[55].**Big data and AI tools are only auxiliary means and cannot completely replace the comprehensive judgment of human resource professionals. At the same time, there are practical obstacles such as data security, algorithm bias, and data collection costs.**

4.5 Research on Medical Staff Well-being Protection and Organizational Culture Building

With the continuous increase in epidemiological studies on medical staff burnout, employee physical and mental health, professional experience, and organizational culture building are gradually becoming indispensable components of the human resource management system. Related research revolves around two main themes: stress intervention and cultural identity.

Research on comprehensive prevention and control of burnout, targeting the occupational characteristics of medical staff involving high load, high psychological pressure, and high practice risks[56], proposes multi-dimensional comprehensive intervention plans: optimizing clinical staffing and scheduling mechanisms, and strictly guaranteeing statutory rest and leave. Building an Employee Assistance Program (EAP) platform and normalized psychological counseling channels. Simplifying non-medical administrative documentation work, optimizing logistical support services, reducing the non-clinical burden on medical staff, and comprehensively enhancing their sense of professional well-being.

Research on organizational culture building proposes establishing a hospital culture system that is "people-oriented, patient-centered, professional-respecting, and innovation-encouraging"[57–58]. Relying on the promotion of exemplary medical workers, team humanistic building, and fair and transparent management systems, it enhances medical staff's professional honor and organizational identity. By relying on career development platforms, humanistic emotional care, and a fair institutional environment, it achieves cultural retention and emotional retention, enhancing the overall cohesion of the medical staff team.**Organizational culture building is a long-term, subtle process. Short-term measures are difficult to produce rapid talent retention effects, and effect evaluation itself is also difficult to quantify.**

5. Narrative on International Management Models, Domestic Local Practices, and Adaptation Exploration in the Northeast Region

5.1 International Medical Human Resource Management Models and Implications for Domestic Adaptation

The American Magnet Hospital model is a global benchmark system for nursing human resource management. Existing studies indicate that its core features include fully empowering clinical nurses with autonomous decision-making authority in diagnosis and treatment, strengthening multidisciplinary team collaboration and empowerment, and establishing well-tiered continuing education and professional advancement pathways for nursing. By relying on a high-quality practice environment, it enhances nurses' job satisfaction and long-term retention rates, ultimately improving patient clinical outcomes[59–60]. Considering the prominent issue of nursing talent loss in the Northeast region, relevant regional studies propose that domestic hospitals, especially public hospitals in Northeast China, need to elevate the professional status and voice of nursing teams, improve independent career advancement pathways for nurses, and build a stable practice environment for nursing talent by drawing on the Magnet Hospital management philosophy. **It is not a direct copy of the model, but requires full**

consideration of the differences in China's nursing management system and compensation system, and should be used as a reference after localized adaptation.

The British National Health Service (NHS) adopts a nationally unified and standardized human resource planning model. It establishes a unified national system for talent training, assessment, promotion, and mobility, taking healthcare quality, patient experience, and medical safety as the core indicators for human resource evaluation, while balancing the public welfare nature of healthcare services and regional accessibility[61–62]. Existing research extracts insights on regional coordinated development from this, proposing that the three northeastern provinces can establish a provincial and cross-regional unified medical human resource planning mechanism, integrate regional training resources, unify competency evaluation standards for medical staff, promote orderly regional mobility of talent, and narrow the healthcare service gaps between urban and rural areas as well as among different cities.**The NHS model is built on its specific financial, medical insurance, and personnel systems. The three northeastern provinces of China have differences in financial capacity and medical resource distribution, so only the concept of coordinated governance can be borrowed, and the system cannot be copied in its entirety.**

5.2 Innovative Reform Practices of Domestic Public Hospitals

The personnel system reform of large tertiary hospitals in China has generated a large number of replicable practical models. Existing case studies have documented the implementation of an overall employment system, standardized post value evaluation, and an open competition mechanism for all staff. These reforms break down the barriers of traditional tenure-based establishment status and implement a dynamic employment mechanism characterized by setting posts according to needs, determining salaries based on posts, and applying survival of the fittest[63]. Through standardized post value evaluation, the work risks, technical difficulty, and responsibility intensity of different positions are quantified, providing an objective basis for tilting compensation toward high-risk clinical posts.

Top-tier medical institutions in China have established comprehensive full-chain talent cultivation systems. A tiered training model that integrates standardized physician training, special support for young backbones, and incubation programs for leading talents can form a sustainable disciplinary talent echelon. This model balances the cultivation of clinical practical skills and scientific research innovation capabilities, providing stable talent support for the hospital's long-term disciplinary leadership[64–65].**Most of the above reform experiences come from large tertiary hospitals in the eastern region. For underdeveloped prefecture-level and county hospitals in Northeast China, they will face practical constraints such as insufficient funds and limited platforms, and cannot be directly copied.**

Cases of smart human resource system implementation show that integrated online HR platforms enable the end-to-end online operation of recruitment, performance appraisal, and compensation processes[66]. Some hospitals have broken down the data silos between human resources, clinical, medical insurance, and finance databases. Relying on multi-dimensional data, they support scientific

decision-making in human resource allocation and performance distribution, significantly improving the efficiency and objectivity of human resource management[67–68]

6. Limitations of the Current Research System

Existing research on the optimization of human resource management in public hospitals has formed a complete narrative, but there are common shortcomings in nationwide research, and research in the Northeast region has more prominent region-specific defects.**This review itself also has limitations: First, it is a literature review and does not conduct primary questionnaire surveys or empirical tests; all conclusions are based on published literature. Second, the distribution of existing literature samples is uneven, with a scarcity of literature on county and northeastern primary hospitals, so the review is subject to sample bias from existing literature. Third, it is impossible to distinguish whether the reform plans in the literature are real practices or theoretical conceptions.**

6.1 Common Limitations of National-Level Research

The supply of high-quality quantitative empirical research is insufficient, and research methods are singular. Existing literature is dominated by theoretical explanation, policy interpretation, single-hospital experience summary, and qualitative case description. Empirical studies with large-sample multi-center long-term tracking, controlled trials, and quantitative effect evaluation account for a relatively low proportion[69–70]. Most studies only propose reform countermeasures, lacking standardized quantitative verification of the implementation effectiveness of the systems, making it difficult to objectively confirm the long-term effectiveness of reform plans. Research perspectives are mostly limited to a single management dimension, lacking interdisciplinary analysis integrating medicine, sociology, statistics, regional economics, and computer science, resulting in insufficient research depth and scientific argumentation.

Localized theoretical systems adapted to Chinese public hospitals have not yet taken shape, and the problem of copying foreign models is prominent. A large amount of existing research directly cites Western corporate human resource management theories and private medical institution management frameworks[71], without fully considering core national conditions such as the public welfare nature of domestic public hospitals, institutional constraints of public institutions, and regional economic development gaps. Mature reform plans from developed eastern regions become mismatched when directly copied to the central and western regions and the Northeast, lacking localized theoretical support for hierarchical adaptation.

Research on human resource digital construction remains at a superficial informatization stage, with widespread cross-departmental data silos[72]. Most hospital smart HR systems only complete the online digitization of attendance, salary, and personnel files. Big data and artificial intelligence technologies have not been deeply applied to talent loss early warning, precision incentive design, or medium- and long-term talent strategic planning[73]. Human resource databases are fragmented from clinical, medical

insurance, finance, and research system data, unable to support full-dimensional data-driven management decision-making.

Research subjects are concentrated in provincial tertiary hospitals in first-tier cities, with insufficient attention to primary medical institutions and underdeveloped regions. Existing literature samples mostly select top large tertiary hospitals in the east. Specialized research on prefecture-level and county-level primary public hospitals is scarce. Core pain points such as difficulty in talent recruitment, lack of management resources, and serious talent loss in primary hospitals lack systematic research support, further exacerbating the regional imbalance in national medical human resource management research.

6.2 Specific Shortcomings of Research in the Northeast Region

Quantitative empirical research specifically on medical talent retention is scarce, and a region-specific evaluation system is lacking. There are very few large-sample quantitative surveys and long-term tracking studies on the driving factors of medical talent outflow and the implementation effects of retention systems in the Northeast. A regional talent retention evaluation index system has not been established. Local governments mostly rely on experiential qualitative judgment when formulating talent policies, lacking quantitative empirical data support[74]. A localized theoretical framework adapted to the Northeast Revitalization Strategy is missing, and talent retention mechanism designs are one-dimensional. Existing regional studies fail to fully integrate the unique characteristics of the Northeast region's economic level, aging population structure, local talent's hometown attachment, and regional medical resource layout, and have not formed a dedicated theoretical system with "local talent retention" as the core goal. Existing reform plans mostly rely solely on salary increases to alleviate attrition, ignoring multiple retention factors such as career development platforms, regional emotional identity, local supporting policies, and regional medical culture, and cannot fundamentally alleviate the talent outflow trend[75].

Research on human resource digital construction is lagging, and digital tools do not serve the core goal of talent retention[76]. The overall level of digital construction in medical institutions in the Northeast is significantly lower than that in the eastern region, with low coverage and single-function smart HR systems. Existing regional studies have not explored intelligent early warning models for talent loss adapted to the Northeast, local talent profiling systems, or digital tools for matching the return of outflow talent. Digital construction has not been connected to the core regional demand for talent retention, and the inter-regional medical human resource data collaboration and sharing mechanism is completely blank[77]. Research on cross-regional talent collaboration is insufficient, and primary hospitals have become a weak blind spot. A unified medical talent coordinated development mechanism has not been established among the three northeastern provinces or among cities within each province. Existing research lacks exploration of cross-regional talent resource sharing, unified evaluation standards, and joint training systems. County-level primary public hospitals suffer the most severe talent loss and have the weakest guarantee systems, but corresponding specialized research and policy support are the most

scarce, becoming a prominent shortcoming restricting the high-quality development of regional healthcare[78].

Research on the linkage between hospital and local government talent policies is insufficient, and an integrated talent retention ecosystem has not been formed. Talent retention is a systematic project. Existing research mostly focuses solely on internal hospital personnel reform, lacking systematic exploration of collaborative pathways between hospital human resource systems and local housing, education, employment, and talent subsidy policies. A complete talent retention ecosystem of "hospital-led, government-supported, medical colleges supplying, regional medical collaboration, and social participation" has not been constructed. Policy synergy is insufficient, and the governance effect of talent retention is greatly reduced.

7. Future Research Directions and Narrative in Key Areas

In alignment with the high-quality development of public hospitals and the long-term national strategy for the comprehensive revitalization of Northeast China, future research must adhere to a problem-oriented, empirical, and regionally differentiated approach, continuously deepening exploration[79]. It is essential to expand interdisciplinary and large-sample quantitative empirical studies. Future research should increase multi-center, long-term tracking quantitative surveys across the nation and within the Northeast region to accurately identify the key influencing factors of medical talent loss and retention. A standardized and quantifiable evaluation index system for the effectiveness of human resource management reforms should be constructed, with local talent retention rates, return rates of outflow talent, medical staff job satisfaction, medical service quality, and hospital operational efficiency serving as core evaluation indicators[80]. Promoting the interdisciplinary integration of public administration, clinical medicine, sociology, statistics, regional economics, and artificial intelligence will enhance the scientific rigor of research and its reference value for policy-making.

Constructing a Dual-Layer Localized Theoretical Framework of "National General+Northeast Specific". At the national level, a complete localized theoretical system for human resource management should be built, adapted to the public welfare attributes of domestic public hospitals and the medical reform policy environment. At the regional level of Northeast China, with "retaining local medical talent" as the core thread, integrating regional economy, population, talent flow patterns, and the hospital-government collaborative governance mechanism, a theoretical framework for medical human resource management specifically serving the revitalization of Northeast China should be constructed to provide exclusive theoretical guidance for regional medical institution reforms[81]. Promoting the deep integration of digital technology and talent retention goals. Upgrading human resource digital systems from basic transaction electronization to strategic smart platforms centered on talent retention[82]. Developing intelligent models for talent loss risk early warning, local talent profiling, outflow talent return matching, and personalized precision incentives[5]. **Models are only auxiliary decision-making tools, and their practical application needs to fully consider issues such as data privacy and algorithm fairness.**

Breaking down data barriers among human resources, clinical, medical insurance, finance, and local talent administration. Strengthening the cultivation of digital human resource management professionals in Northeast China, relying on digital tools to achieve precise talent recruitment, systematic talent cultivation, scientific talent retention, and efficient talent utilization.

Shifting the research focus to the grassroots level and exploring cross-regional medical talent collaboration mechanisms in Northeast China.Increasing investment in special research on human resource management in county and primary public hospitals, systematically analyzing the root causes of talent recruitment and retention difficulties at the grassroots level, and studying precise governance solutions such as targeted training, primary-specific incentives, flexible urban-rural talent mobility, and cross-regional counterpart support platform sharing[83]. Exploring an integrated medical talent collaborative development system for the three provinces of Northeast China, unifying regional standards for talent training, competency evaluation, and mobility incentives, to achieve regional medical human capital co-construction, sharing, and complementary advantages. Constructing a four-dimensional composite talent retention system of "treatment, development, emotion, and policy," and improving the hospital-government collaborative governance ecosystem. Systematically studying the four-dimensional integrated retention mechanism of compensation and benefits, career development platforms, local emotional identity, and local supporting policies. Focusing on exploring the implementation path for the effective connection between hospital internal incentive systems and local talent subsidies, housing security, children's education, and family employment support policies. Building a multi-subject collaborative talent retention governance ecosystem, relying on systematic institutions to solve the long-term outflow problem of medical talent in Northeast China. **The goal is to alleviate talent outflow, not to completely eliminate talent mobility.** Conducting forward-looking exploration in combination with new regional development trends: the training and retention mechanism of geriatric medicine specialists under the background of deep aging in Northeast China[84]; the medical human reserve, rapid deployment, and practice guarantee system under public health emergencies; the impact of artificial intelligence and medical robots on the career development of medical staff and response paths[85]; the return and cultivation system for medical talent from Northeast China who have moved out and overseas medical talent; long-term and stable governance strategies for county and primary medical and health talent, etc., continuously expanding the research boundaries, responding to the new needs of the development of the medical industry and regional revitalization in the new era, as shown in Fig. 2.

8. Conclusion

Against the backdrop of the dual national strategies of high-quality development of public hospitals and the comprehensive revitalization of Northeast China, optimizing the human resource management system serves as a core strategic lever to enhance hospitals' core competitiveness, stabilize regional medical talent teams, ensure grassroots medical services for public livelihood, and support regional economic revitalization. From the perspective of the overall development of public hospitals nationwide, medical institutions must complete a transformation from traditional transactional personnel

management to a strategic-oriented, value-driven, data-powered, and medical-staff-focused modern human resource management model. Relying on systematic reforms across five dimensions—organizational restructuring, full-chain talent pipeline development, performance and compensation system reform, digital platform construction, and medical staff well-being and culture building—they can overcome structural shortcomings in human resource management and achieve high-quality, connotative hospital development. Focusing on the regional realities of Northeast China, "stabilizing local medical talent and reducing brain drain" stands as the most critical and urgent goal of human resource management reform. Regional medical institutions need to base themselves on local economic, demographic, and medical resource conditions, address prominent issues such as continuous talent outflow, rigid management models, insufficient high-level research platforms, weak living support facilities, and inadequate regional talent coordination, and build a complete localized human resource management system adapted to the Northeast revitalization strategy.

Optimizing the human resource management system in public hospitals is a long-term systematic project that cannot achieve lasting results through short-term, piecemeal reforms. Future research and industry practice should proceed in parallel with theoretical innovation and field reform, combine top-level policy design with grassroots hospital innovation, and balance national general reform principles with Northeast-specific governance solutions. It is essential to continuously balance the public welfare nature of public hospitals with fine-grained operational efficiency, and coordinate the interests of patients, medical staff, the government, and society. **This review is a literature integration analysis, and the proposed system framework belongs to a theoretical conception. The actual implementation effect is subject to multiple external conditions such as finance, personnel establishment, and local economy, and remains to be verified by subsequent empirical research and practice.** Ultimately, a modern human resource management ecosystem should be built—one that is locally adaptive, clearly value-oriented, driven by data for decision-making, focused on talent retention, and serves regional revitalization. With the continuous deepening of empirical research and the ongoing implementation of localized reform practices, the overall level of human resource management in domestic public hospitals will steadily improve, and the medical talent team will continue to grow. This will not only provide solid human capital support for the high-quality development of public hospitals nationwide, but also help Northeast China stabilize its local medical talent, enhance the equalization of regional medical services, and improve people's livelihood protection. It will provide long-term and stable medical talent momentum for the comprehensive revitalization of Northeast China, realizing the development goal of medical talent taking root in their hometowns, serving the people, and empowering regional revitalization.

Declarations

Ethical approval

Compliance with ethical standards.

Consent to participate

No consent to participate is required.

Consent to publish

No consent to publish is required.

Competing interests

The authors declare no competing interests.

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Author Contribution

C.W. Y.X.and Q.X. wrote the main manuscript text and K.S. prepared figures 1-2 and table 1. Z.M. was responsible for inspection and supervision. All authors reviewed the manuscript.

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Data Availability

Data availability: No datasets were generated or analysed during the current study. All supporting materials are derived from publicly accessible published academic literature cited within the reference list of this article.

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Figures

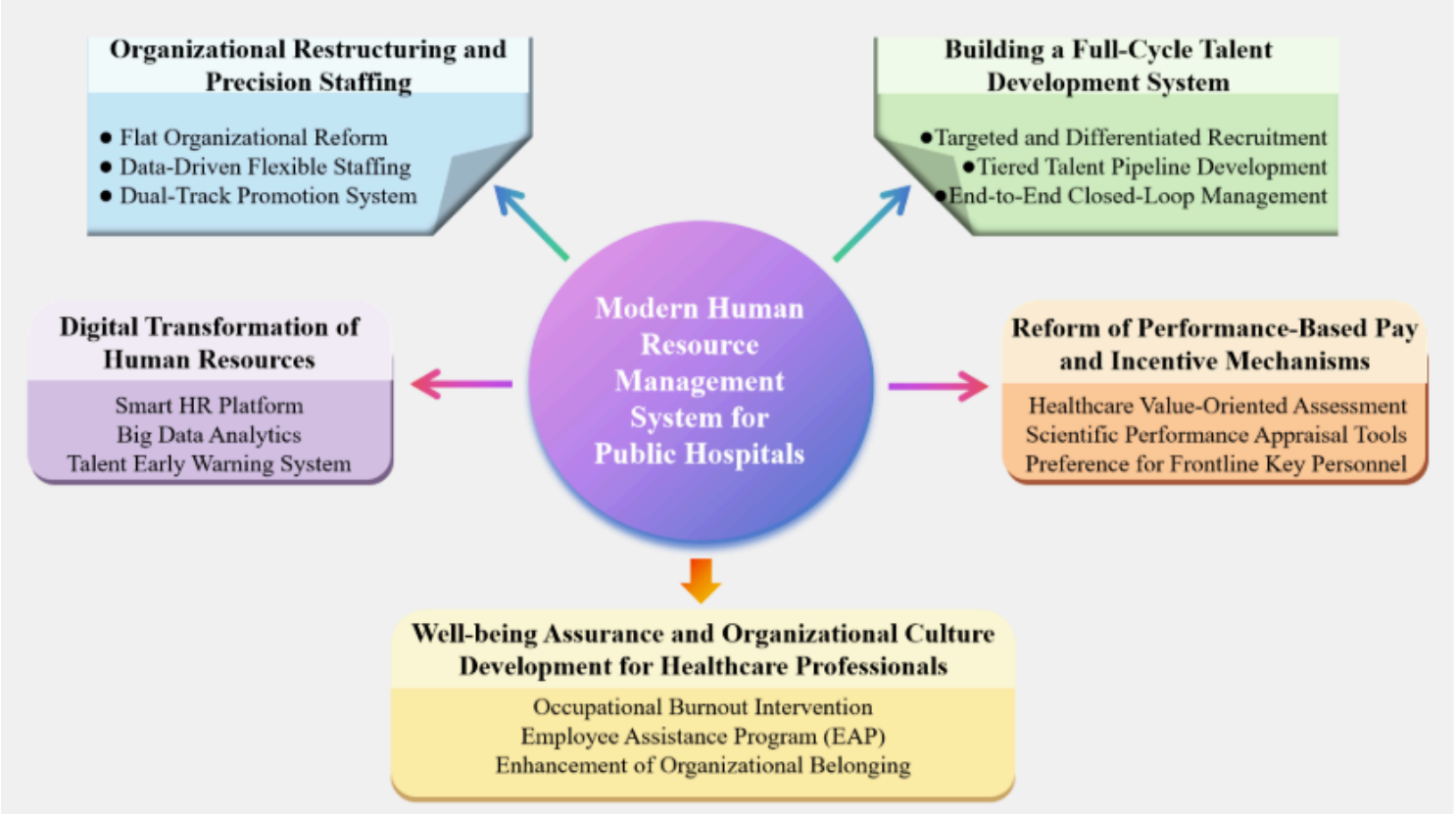


Figure 1

Framework of the Five Core Dimensions of the Modern Human Resource Management System in Public Hospitals

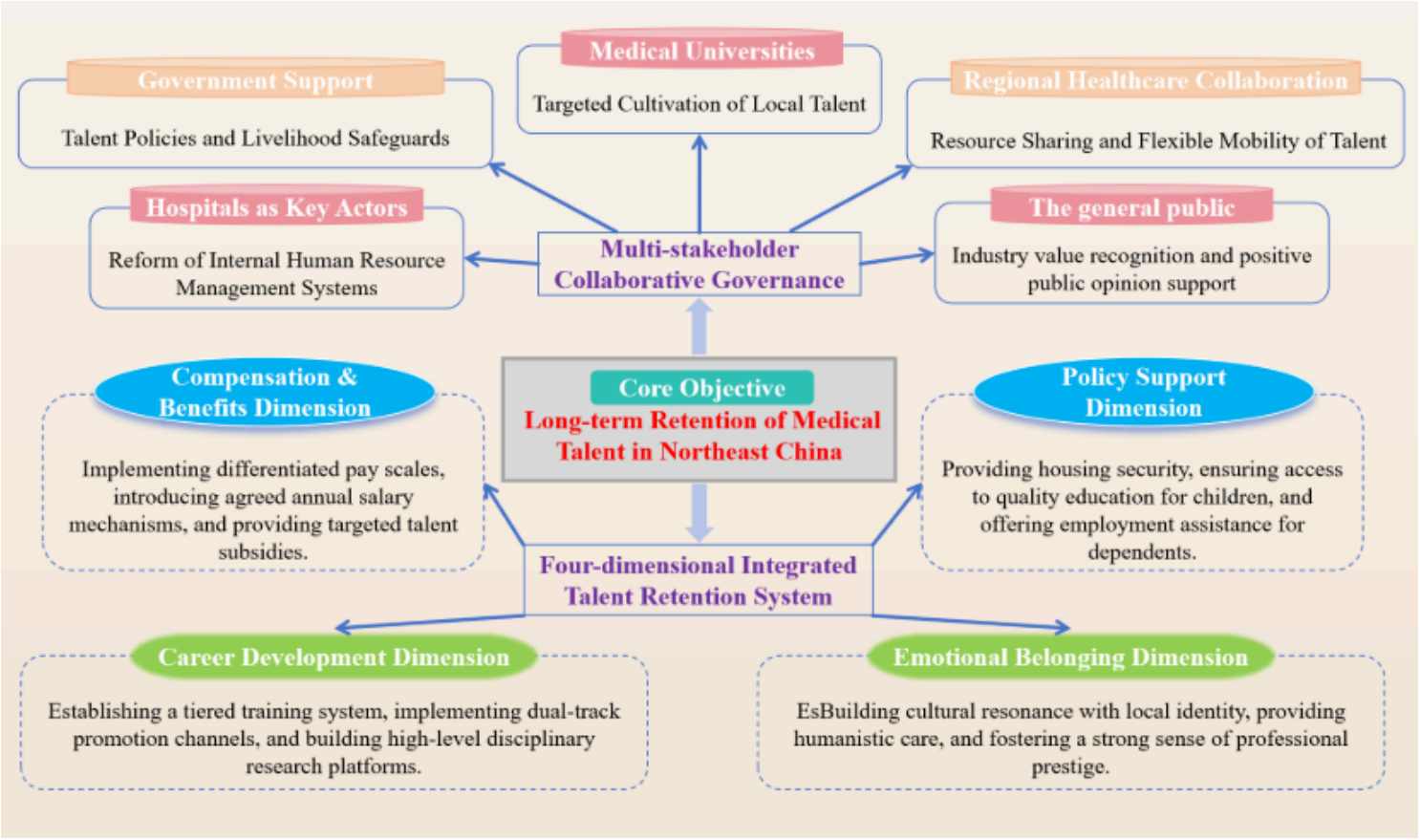


Figure 2

Schematic Diagram of the Governance Ecosystem for Medical Talent Retention in Northeast China