ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

Key Drivers of Outstanding Performance in R&D Talents of China's Hidden Champions

Qiong Wang[1,a], Honghao Shao[2,b,*], Ning Zhu[1,c], Bin Qian[3,d]

[1]School of Management, University of Science and Technology of China, Hefei, China
[2]School of Business, Anhui Wenda University of Information Engineering, Hefei, China
[3]School of Marxism, University of Science and Technology of China, Hefei, China
[a]wq1992@mail.ustc.edu.cn, [b]shh12345@mail.ustc.edu.cn, [c]zhuning@ustc.edu.cn, [d]qianb@ustc.edu.cn
**Corresponding author*

Abstract: *R&D talents are crucial to the innovation and sustainable development of China's "Little Giant" enterprises, the hidden champions in specialized manufacturing. However, these firms face challenges, including talent mismatches and high turnover. This study identifies the key drivers that transition R&D talents from good to great. Through empirical research, including behavioral interviews and a questionnaire survey of 128 respondents from 10 Hefei-based Little Giants, we constructed a competency model. The analysis reveals five core drivers with their weights: Professionalism (29.09%), Sense of Responsibility (27.27%), Coordination & Communication (19.39%), Teamwork (14.55%), and Performance Orientation (9.70%). This model effectively distinguishes outstanding performers and offers a scientific framework for talent selection, development, and retention, filling a critical gap in empirical research for these vital enterprises.*

Keywords: *Hidden champion enterprises; R&D positions; Competency model; Talent management; Empirical research*

1. Introduction

The International Monetary Fund[1] indicates that the global economy is experiencing a moderate slowdown in overall growth, accompanied by increased uncertainty, a resurgence of trade protectionism, and a growing emphasis on national and regional supply chain security. In this context, small and medium-sized enterprises (SMEs) play a significant role, particularly those focused on niche markets and striving for excellence in these areas—known as hidden champions. Emulating Germany's "hidden champion" enterprises, China began to discover and cultivate "specialized, refined, unique, and new Little Giants" enterprises (hereinafter referred to as "Little Giants") in 2022. Given that Little Giants are selected based on criteria including leading niche market share, significant technological accumulation, and a long-term R&D orientation, R&D talent represents the core asset underpinning their sustainable development and competitive advantage.

In contrast to high-tech enterprises emphasizing rapid iteration of frontier technologies and intellectual property expansion, Little Giants prioritize deep specialization in niche segments. Their focus centers on lean process optimization, localization of core technologies, and strategic fortification of critical supply chain nodes. Consequently, R&D positions in Little Giants place greater emphasis on profound industry experience, technological resilience, and engineering transformation capabilities. Nonetheless, due to a structural mismatch between job demands and talent supply, existing R&D personnel in such enterprises commonly face limited technical skills, weak comprehensive capabilities, inadequate career stability, and restricted career development pathways.[2] There is an urgent need to scientifically develop a competency model for talent in these positions, providing a theoretical framework and practical guidance for the development of similar enterprises.

Therefore, this study employs an empirical approach, focusing on 10 Little Giant enterprises in Hefei, China. Utilizing methodologies including interviews, questionnaires, and the Delphi technique, it successfully establishes a competency model for R&D positions. The research delivers six key innovations and contributions: (1) It pioneers the construction of a competency model for Little Giant R&D positions within the Chinese context, marking a breakthrough in domestic research and presenting a "Chinese solution" that supplements international scholarship in this domain. (2) The investigation encompasses a broad spectrum of 10 enterprises in the field, enhancing data validity and ensuring model

ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

robustness. (3) It represents the first dedicated study of the Hefei region; search results indicate that Little Giant research predominantly concentrates on areas like Guangdong and the Yangtze River Delta, leaving Hefei unexplored. As of November 2024, Hefei has cultivated 2,311 provincial-level Little Giants (representing 30.4% of the provincial total) and 248 national-level Little Giants, ranking 14th among Chinese cities and 6th among provincial capitals[3], thus rendering the focus on Hefei theoretically and practically significant. (4) The sample demonstrates strong representativeness, with selected enterprises meeting specific criteria—2023 revenue of 34-100 million RMB, 150-200 employees, and 30-60 R&D personnel—to control for size-related confounding factors. (5) By adopting empirical research methodologies, this work addresses a critical domestic data gap, establishing a foundational dataset for future research both within China and internationally. (6) The model systematically allocates weights to key competency elements, providing clear visibility into their relative importance and practical applicability.

2. Theoretical Foundation and Research Review

2.1. Competency

David C. McClelland[4] first introduced competency theory, defining it as the knowledge and skills requisite for job performance. Subsequent theoretical developments reconceptualized competencies as the underlying capabilities that influence individual performance in professional roles, encompassing work attitudes, knowledge, professional skills, values, work habits, and interpersonal relationships. In contrast to high-tech enterprises, the competencies of R&D talent in Little Giants exhibit distinct characteristics of specialization and contextualization.

International scholarship indicates that competencies for R&D personnel in high-tech enterprises predominantly include technical skills, communication, collaboration, and innovation. For instance, South Korean researchers identified political skill as a core competency[5]. American scholar Li[6] emphasized communication, collaboration, learning, and innovation as critical competencies. European research identified teamwork, interdisciplinary communication, virtual interaction, and leadership as essential competencies[7]. Indonesian scholars demonstrated that professionalism, management, learning, and communication constitute core competencies[8]. However, studies focusing on "Hidden Champions" and analogous enterprises reveal substantial divergence in competency requirements for R&D talent. German research underscores "craftsman spirit" as fundamental[9]; Japanese studies prioritize "practical ability," entailing deep immersion in production line operations[10]; American perspectives highlight strong commercialization awareness and entrepreneurial mindset[11]; South Korean analysis emphasizes agile responsiveness and interdisciplinary collaboration in competitive environments[12]. Collectively, these findings indicate that R&D talent in "Hidden Champion"-type enterprises must possess both profound technical expertise and comprehensive knowledge of business, processes, and markets, evolving into versatile professionals.

Research conducted in China suggests that competencies for R&D personnel in high-tech enterprises encompass knowledge, skills, values, and attitudes. For example, Liu[13] asserted that R&D competencies include not only observable elements, such as knowledge, but also latent factors, such as motivation, personal traits, and values. Li, Wu, and Wu[14] demonstrated that distinguishing qualities between exceptional and average performers include values, attitudes, motivation, and social roles. Zeng[15] identified professional attitude, work capability, and specialized knowledge as competencies influencing performance outcomes. Studies on Little Giants in the Chinese context have addressed topics including the impacts of digital transformation, the effects of supply chain finance on financing efficiency, an international comparative analysis of policy support, and the influence of policy on innovation performance. Nevertheless, research specifically examining R&D talent competencies in this context remains unexplored.

Through systematic review and synthesis of the global literature, the primary competencies of R&D talent in "Hidden Champion"-type enterprises are consolidated in Table 1, establishing the theoretical foundation for subsequent analysis.

2.2. Competency Model

A competency model integrates fundamental quality requirements for competency in a specific position with standard analytical tools, such as the iceberg and onion models. Competency models enable organizations to evaluate and manage employees effectively, while also facilitating employee

ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

development. Research on competency models for R&D positions in high-tech enterprises and Little Giants reveals notable disparities between domestic and international studies. In global research on high-tech enterprises, Rifkin et al.[16] employed qualitative and quantitative analyses, identifying technical capability, teamwork, Sense of Responsibility, and personal growth as key indicators in the competency model for R&D positions. Kansal and Singhal[17] utilized the Delphi method and practical workshops, concluding that personal capability, performance, and related factors are critical competency indicators for R&D roles. Kusumasari et al.[18] found that technical capability, project management skills, teamwork, learning ability, and responsibility constitute key elements of the competency model for R&D positions. Conversely, research on competency models for R&D positions in "Hidden Champion" type enterprises remains limited and fragmented. For instance, German studies emphasize a "deep technology + customer co-creation" model, highlighting technological foresight, patent strategy, and long-term customer relationship building[9]. Japanese research proposes "core technology mastery," "commitment to internal R&D," and "cross-domain technological expansion" as essential components[19]. Studies in the United States and South Korea are scarce, primarily qualitative, and underscore indicators such as "government funding" and "technology iteration capability."

Table 1: Competency dimensions of R&D talent in hidden champion-type enterprises worldwide.

Category	Core Competency	Constituent Elements
Germany's "Hidden Champions"	Craftsmanship Spirit	Meticulous work ethic, Quality focus
Japan's "Global Niche Top" Enterprises	Practical Ability	Hands-on production line experience, Process immersion
Americans' "Small Advanced Technology Enterprises"	Entrepreneurial Spirit	Innovation drive, Market commercialization awareness
South Korea's "World Class Products (WCP)"	Collaborative Agility	Cross-functional communication, Interdisciplinary coordination, Rapid adaptive response

Note. Data were synthesized from international comparative studies referenced in the literature review.

In the Chinese context, research on competency models for R&D positions in high-tech enterprises is limited, with most work appearing in master's theses rather than in core journal publications. For example, Tang[20] identified indicators for the R&D position competency model, including innovation, skills, breadth of knowledge, general abilities, motivation, information analysis and processing, Sense of Responsibility, customer service, and judgment. He[21] developed a competency model indicators encompassing teamwork, Coordination and Communication, information processing, learning ability, quality control, problem analysis, and logical processing. Zhang[22] demonstrated that technical capability, learning proficiency, time consciousness, achievement orientation, information processing, cooperation, and communication are key indicators for competency models in R&D positions. However, research specifically addressing competency models for R&D positions in Little Giants represents a significant gap. Thus, studies on competency models for R&D positions in Little Giants are scarce in both domestic and international literature, necessitating urgent supplementation. Relevant research on competency models for R&D positions in "Hidden Champion" type enterprises is consolidated in Table 2, providing a theoretical foundation for this study.

Table 2: Key indicators of competency models for R&D positions in hidden champion-type enterprises.

Category	Key Indicators	Research Method
Germany's "Hidden Champions"	Technology, Customer-Oriented	Quantitative Research
Japan's "Global Niche Top" Enterprises	Core Technical Capability, Loyalty, Technical Expansion	Quantitative Research
U.S. "Small Advanced Technology Enterprises"	Federal Government Funding	Qualitative Analysis
South Korea's "World Class Products (WCP)"	Technology Iteration Capability	Qualitative Analysis

Note. Source: Compiled by the research team based on relevant literature.

ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

2.3. Review of Global Research

An analysis of the global research landscape indicates that studies on competency models for Little Giant-type enterprises remain limited and lack standardized measurement instruments. International scholarship on this topic is fragmented, lacks established, coherent frameworks, and notably lacks investigation in the Chinese context. Within China, relevant studies are particularly scarce, with no relevant publications identified in the CNKI database. Nevertheless, insights can be derived from existing research on high-tech enterprises. This landscape informs the following research objectives of this study: (1) to develop a localized competency model providing context-specific solutions for China; (2) to employ quantitative research methods, establishing a data foundation for future global research; (3) to investigate a broad yet targeted sample of enterprises, ensuring the wider applicability of the model findings.

3. Empirical Research

This study employed an empirical research methodology through a systematic four-phase approach. First, structured interviews were conducted with enterprise management teams to examine current conditions and challenges in R&D positions. Second, comprehensive data collection from R&D personnel enabled the identification of key competencies distinguishing high performers. Third, specifically designed questionnaires were administered, followed by rigorous data analysis and validation of the collected responses. Finally, the competency model was constructed and subjected to comparative analysis, addressing specific research questions and formulating evidence-based strategies. This systematic approach constitutes an iterative cyclical process.

3.1. Analysis of R&D Position Challenges

Keyword extraction from interview transcripts revealed several core competencies, including: Coordination and Communication, Innovation Capacity, Professional Attitude, Values, and Sense of Responsibility. Subsequent analysis and synthesis identified four primary challenges facing R&D positions in Little Giant enterprises: recruitment difficulties, high turnover rates, skills-position mismatch, and undefined career progression pathways. The detailed interview protocol is presented in Table 3.

3.2. Extraction of Key Competencies for R&D Talent

This study utilized the Behavioral Event Interview (BEI) method to identify key competencies. To ensure model robustness, the research cohort was restricted to R&D personnel holding bachelor's degrees within the sampled enterprises. The specific sampling protocol was implemented as follows:

(1) Selection of Outstanding and Control Groups. From each of the 10 enterprises, three R&D personnel performing in the top 20% were selected to constitute the Outstanding Group (n=3 per enterprise). Concurrently, three R&D personnel from the same enterprises, distributed between the 20th and 40th percentiles, formed the Control Group (n=3 per enterprise). The Outstanding Group represents the elite R&D talent whose behavioral patterns are presumed to encapsulate the competencies essential for breakthrough contributions. The Control Group comprises reliably competent personnel capable of fulfilling routine R&D tasks but seldom achieving breakthroughs, thus providing a valid comparative baseline.

(2) While both groups demonstrate fundamental role competency, the Outstanding Group possesses distinctive competencies that catalyze superior performance. This comparative design effectively controls for baseline capabilities, enabling the precise identification of the critical transitional competencies that facilitate the progression of R&D talent from "good" to "great," thereby providing an evidence-based foundation for strategic talent selection and development.

(3) Interview Implementation. The interviews consisted of two segments: an introductory briefing and the structured Behavioral Event Interview. The BEI technique elicits competencies by examining specific, real-world work behaviors, thereby informing the subsequent questionnaire design. The BEI protocol is detailed in Table 4, and the competencies derived from the interview analysis are synthesized in Figure 1.

ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

Table 3: Interview schedule.

Period	Participants	N	Key Interview Questions
September 2023 - April 2024	Company Executives	10	Focus on corporate strategy, culture, talent management philosophy, and standards; current state and challenges of R&D positions; competency requirements for R&D talent.
	R&D Managers	10	(1) What are the primary responsibilities and main tasks of the R&D department? (2) What actions lead to outstanding performance? Which tasks potentially impact work performance? (3) Do R&D staff experience high work pressure? What are the primary behavioral manifestations? (4) What is the current state of development in the R&D department? Are there any existing challenges? If so, what are they? (5) Please describe a memorable incident from your R&D management experience, including its cause, process, outcome, involved personnel/resources, timing, context, location, your thoughts at the time, actions taken, and resulting consequences. In retrospect, what improvements could have been made? Have you subsequently increased focus on any particular areas? (6) What characteristics do you believe enable R&D talent to perform better at work? (7) What competencies are essential for succeeding in R&D positions? In which specific work scenarios or tasks are these competencies demonstrated? Please rank them by importance.
	R&D Supervisors	20	
	R&D Team Leaders	20	
	Chief Financial Officers	10	
	HR Directors	10	

Note. Source: Developed and compiled by the research team based on study objectives.

Table 4: Behavioral event interview protocol.

Interview Type	Interview Content
Success Events	(1) What do you believe were the key factors for your success in this role? Please illustrate with specific examples. (2) What specific incidents during your work have given you a sense of satisfaction? (3) Can you describe instances where you believe you contributed significantly to the company's development? (4) Are there any incidents where you received positive feedback from colleagues or supervisors?
Failure Events	(1) Can you describe work incidents that you were dissatisfied with? (2) Were there situations where you worked hard but the outcomes were unsatisfactory? (3) Have you experienced incidents that had negative consequences for the company or yourself?
Additional Insights	(1) Can you recall any events that had a significant impact on your career? (2) Are there any incidents that had both successful aspects and areas where handling could have been improved?

Analysis of the results presented in Figure 1 reveals significant disparities between the Outstanding and Control Groups across five dimensions: Professionalism, Performance Oriented, Coordination and Communication, Sense of Responsibility, and Teamwork. Consequently, these five areas are established as the key competencies for R&D talent within Little Giant enterprises, forming the foundational structure for the ensuing questionnaire.

3.3. Questionnaire Survey

The analysis in sections 3.1 and 3.2 revealed complementary findings between management perspectives and empirical data from comparative group analysis. While minor variations existed, these results demonstrated fundamental convergence and were synthesized into unified operational definitions presented in Table 5. Grounded in these identified measurement constructs, a structured questionnaire was developed with performance level as the dependent variable. The survey instrument was administered to all managerial personnel overseeing R&D positions to evaluate how various competency factors influence performance outcomes. All variables were measured using a 7-point Likert scale.

ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

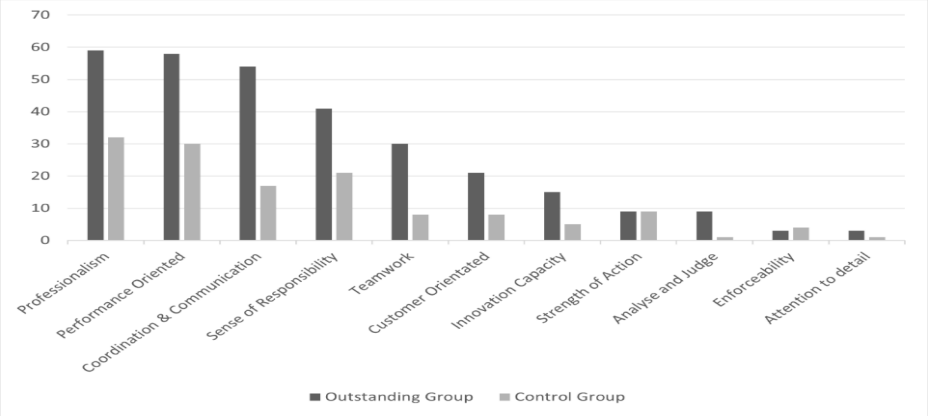

Figure 1: Competency survey frequency chart.

Table 5: Competency definitions and measurement items.

Construct	Description	Item ID	Scale Item	Validity Scope
Professionalism	The employee's level of technical capability or knowledge	H1	Demonstrates exceptionally high professional competence in specific tasks.	Skill level, Professional knowledge
		H2	Demonstrates strong capability in generating novel ideas and knowledge.	
Performance Oriented	Individual behaviors that contribute to enhanced personal effectiveness	W1	Has frequently excelled at completing core job responsibilities.	Problem-solving, Customer orientation, Innovation
		W2	Consistently ensured tasks were completed correctly.	
Coordination & Communication	Goal-oriented processes of effective information exchange and relationship building	R1	Possesses a thorough understanding of the job requirements.	Communication, Coordination, Responsiveness
		R2	Consistently communicates project status to team members in a timely manner.	
Sense of Responsibility	Employee's initiative in providing constructive suggestions and improving work processes	F1	Frequently seeks to improve their work methods and outcomes.	Work attitude, Values, Accountability
		F2R	Tends to avoid correcting errors. (R)	
Teamwork	Collaboration among team members, stress management, and support for new members	G1	Frequently receives support from team members.	Work cooperation
		G2	Is willing to work late to assist colleagues.	
		G3R	Is unwilling to work late to assist colleagues. (R)	

Before full implementation, a pilot study was conducted to refine the questionnaire. Comprehensive respondent training was provided to all participants to ensure data quality and enhance measurement reliability and validity. The formal survey employed a census approach, encompassing all R&D management personnel across the 10 sampled enterprises to systematically collect data on R&D talent with bachelor's degrees. After eliminating invalid responses, the final dataset comprised 128 complete and valid questionnaires.

3.4. Data Analysis

3.4.1. Descriptive Statistics of the Sample

Detailed descriptive statistics for the sample are presented in Table 6. The results reveal a pronounced

ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

gender imbalance within R&D positions at these enterprises, with a significant predominance of male employees. The demographic profile indicates a predominantly young workforce, with the majority aged 20 to 35, and most participants with over 5 years of professional experience.

Table 6: Descriptive statistical results.

Factor	Subcategory	N	Valid %
Gender	Male	87	67.969%
	Female	41	32.031%
Age	Under 20 years	3	2.344%
	20–24 years	23	17.969%
	25–29 years	26	20.313%
	30–34 years	24	18.750%
	35–39 years	16	12.500%
	40–44 years	22	17.188%
	45–49 years	8	6.250%
	50 years and above	6	4.688%
Work Experience	Under 3 years	26	20.313%
	3–4 years	21	16.406%
	5–9 years	51	39.844%
	10 years and above	30	23.438%

3.4.2. Factor Analysis and Reliability Analysis

Factor analysis and reliability analysis were performed to assess the construct validity and internal consistency of the questionnaire scales.

(1) Factor Analysis

Variables were retained for factor analysis based on thresholds of communalities > 0.5, factor loadings > 0.5, and the absence of significant cross-loadings. The analysis yielded a Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of 0.713, a statistically substantial Bartlett's test of sphericity, and a cumulative variance explained of 78.04%. These results confirm the validity of the measurement scales. The rotated component matrix is detailed in Table 7.

Table 7: Factor analysis results.

Item	PC 1	PC 2	PC 3	PC 4	PC 5	Variance %
F1	0.892					25.75%
F2R	0.887					
W2		0.785				17.91%
W1		0.746				
H1			0.866			17.78%
H2			0.764			
R2				0.889		17.17%
R1				0.786		
G2					0.827	17.05%
G3R					0.806	
G1					0.878	
Cumulative %						**95.65%**

Note. F1, F2R = Sense of Responsibility; W1, W2 = Performance Oriented; H1, H2 = Professionalism; R1, R2 = Coordination and Communication; G1, G2, G3R = Teamwork. Blank cells indicate factor loadings below 0.5.

(2) Reliability Analysis

The internal consistency reliability of the scales was evaluated using Cronbach's alpha coefficient. As summarized in Table 8, all constructs demonstrated high reliability, with Cronbach's alpha values exceeding the 0.7 threshold. Furthermore, deleting any single item did not lead to a substantial increase in the alpha values for its respective construct. These findings collectively affirm the strong reliability and internal consistency of the measurement instrument.

The mean values for the validated constructs were subsequently computed for further analysis using the following formulas:

ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

$$\text{Sense of Responsibility mean} = (F1 + F2R) / 2 \quad (1)$$

$$\text{Performance Oriented mean} = (W1 + W2) / 2 \quad (2)$$

$$\text{Coordination and Communication mean} = (R1 + R2) / 2 \quad (3)$$

$$\text{Teamwork mean} = (G1 + G2 + G3R) / 3 \quad (4)$$

$$\text{Professionalism mean} = (H1 + H2) / 2 \quad (5)$$

Supplementary hierarchical regression analysis indicated that neither age nor work tenure exerted a statistically significant influence on performance levels.

Table 8: Reliability analysis.

Factor	**α**	**α if Deleted**
Sense of Responsibility	0.971	—
F1	—	—
F2R	—	—
Performance Oriented	0.967	—
W2	—	—
W1	—	—
Coordination and Communication	0.946	—
R2	—	—
R1	—	—
Teamwork	0.963	—
G3R	—	0.923
G2	—	0.958
G1	—	0.957
Professionalism	0.957	—
H1	—	—
H2	—	—

Note. Source: Based on questionnaire data analysis.

3.4.3. Between-Group Comparison

Independent-samples t-tests were conducted to examine differences in competency scores between the Outstanding and Control Groups, verifying the efficacy of these variables in distinguishing exceptional performers. The results, compiled in Table 9, demonstrate statistically significant between-group differences for Professionalism, Performance Oriented, Coordination and Communication, Sense of Responsibility, and Teamwork.

Table 9: Comparison of competency level differences between the outstanding and control groups.

Variable	Outstanding Group (N=30)		Control Group (N=30)		Difference (O - C)	p
	M	SD	M	SD		
Sense of Responsibility	5.400	1.029	3.450	1.241	1.950	0.000
Performance Oriented	5.633	0.999	4.733	0.998	0.900	0.001
Coordination & Comm.	4.467	0.798	3.333	0.824	1.134	0.000
Teamwork	4.822	0.825	4.078	1.071	0.744	0.004
Professionalism	4.650	0.790	3.567	1.305	1.083	0.000

Note. Source: Based on questionnaire data analysis.

3.4.4. Weight Assignment

An expert panel of 11 members was assembled. They ranked the importance of the five competencies: Professionalism, Performance Oriented, Coordination and Communication, Sense of Responsibility, and Teamwork. The Analytic Hierarchy Process (AHP) was employed for data processing, and weights for each competency were finalized after consistency validation, as detailed in Tables 10 and 11. Scores for

ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

each member in the outstanding and control groups were calculated using the assigned weights, and the resulting rankings aligned with the actual performance rankings.

Table 10: AHP judgment matrix.

M	Item	Prof.	Resp.	Coord.	Team	Perf.
4.364	Prof.	1	1.067	1.5	2	3
4.091	Resp.	0.938	1	1.406	1.875	2.813
2.909	Coord.	0.667	0.711	1	1.333	2
2.182	Team	0.5	0.533	0.75	1	1.5
1.455	Perf.	0.333	0.356	0.5	0.667	1

Note. Source: Prof. = Professionalism; Resp. = Sense of Responsibility; Coord. = Coordination and Communication; Team = Teamwork; Perf. = Professionalism

Table 11: AHP hierarchical analysis results.

Item	Eigenvec.	Weight	λmax	CI
Professionalism	1.455	29.09%	5	0
Sense of Responsibility	1.364	27.27%		
Coordination and Communication	0.97	19.39%		
Teamwork	0.727	14.55%		
Performance Oriented	0.485	9.70%		

3.4.5. Data Analysis Results

The comprehensive data analysis confirms that the competency model for R&D positions in Little Giant enterprises is constituted by five primary dimensions with their respective weights: Professionalism (29.09%), Sense of Responsibility (27.27%), Coordination and Communication (19.39%), Teamwork (14.55%), and Performance Oriented (9.70%), as depicted in Figure 2.

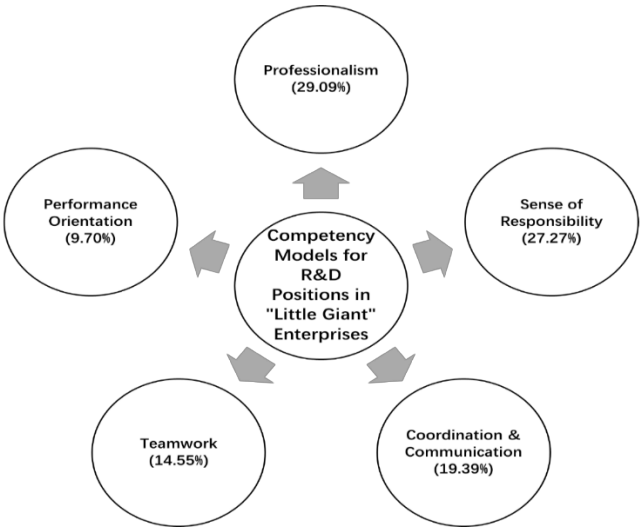

Figure 2: Competency model for R&D positions in Little Giant enterprises.

4. Discussion

A comparison between the enterprise-specific challenges identified in Section 3.1 and the industry-wide issues presented in the Introduction demonstrates remarkable structural similarity and consistency. This indicates that the solutions derived from this study possess substantial transferability to other regions in China, underscoring their significant theoretical and practical value. The implications operate across multiple organizational levels:

(1) Organizational Strategy: Supports senior leadership in precisely diagnosing the strategic contributions and developmental constraints of R&D functions.

(2) Functional Management: Equips human resources departments with an integrated management

ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

toolkit and standardized evaluation metrics for talent "selection, development, deployment, and retention," thereby streamlining processes and enhancing the efficiency of human capital allocation.

(3) Business Operations: Provides R&D managers with structured frameworks for guiding employees and motivating performance, ultimately strengthening team productivity and stability.

(4) Individual Development: Clarifies career advancement trajectories and competency development pathways, thereby increasing R&D professionals' self-efficacy and organizational commitment, which synergistically drives both individual performance and the achievement of corporate objectives.

4.1. Recruitment Optimization Strategy Based on the Competency Model

Integrating the developed competency model into the complete recruitment lifecycle enables significant optimization of hiring practices. This approach facilitates the precise identification of candidates who possess both deep specialized knowledge and strong industry alignment, thereby reducing selection inaccuracies and subsequent attrition. This directly addresses the prevalent challenge of recruiting for R&D roles and lays a robust foundation for building stable, high-performing R&D teams from the initial hiring stage onward.

(1) Establish Professionally-Oriented Selection Criteria: Shift focus from sole reliance on credentials and prior experience by introducing situational evaluations during interviews, such as technical deep-dive sessions and project retrospective analyses. The assessment should prioritize evaluating the depth of candidates' knowledge architectures and their capacity to engage with technological advancements, ensuring a direct match between their Professionalism and the role's core technical demands.

(2) Incorporate Behavioral Event Interviews for Responsibility Screening: Enhance the recruitment process by systematically assessing candidates' historical accountability for meeting quality standards, adhering to procedures, and delivering outcomes in prior R&D initiatives. This method helps identify intrinsic motivation and professional ethics, providing a robust measure of their Sense of Responsibility.

(3) Implement Scenario-Based Assessments for Interpersonal Skills: Strengthen the evaluation of soft skills by designing simulated exercises, such as cross-functional collaboration scenarios and technical proposal defenses. These tasks offer direct observation of candidates' abilities in information conveyance, resource coordination, and collaborative problem-solving, effectively addressing the common industry shortcomings of technical narrowness and underdeveloped comprehensive competencies (Coordination and Communication and Teamwork).

(4) Embed Performance Orientation to Set Clear Expectations: Consistently communicate the organization's culture, which emphasizes innovative outputs and project value creation, throughout the recruitment process. Evaluate candidates based on their resonance with ambitious goals and their documented history of achieving tangible results. This ensures the attraction and selection of R&D talent whose drive is aligned with the organization's performance-oriented standards.

4.2. Retention Mechanism Optimization Strategy Based on the Competency Model

The persistently high turnover rate among R&D talent fundamentally stems from a misalignment between their intrinsic drivers and the developmental opportunities offered by the organization. The pivotal strategy involves evolving the competency model from a mere recruitment tool into the central framework for comprehensive retention management. Addressing the profound developmental aspirations of R&D professionals is essential for mitigating attrition. The specific implementation strategy comprises the following elements:

(1) Institute Continuous Learning Systems: Establish structured on-the-job learning programs for core R&D personnel, providing access to advanced technical training, expert consultation sessions for complex problems, and participation in academic conferences. This directly addresses their need for professional growth and counters the professional stagnation and turnover often resulting from the obsolescence of specialized knowledge.

(2) Foster a Profound Sense of Ownership: Actively cultivate an environment where the Sense of Responsibility demonstrated by R&D talent is genuinely respected and channeled into granting them significant autonomy and influence over project outcomes. This empowerment markedly strengthens their organizational commitment and intention to remain.

(3) Cultivate a Collaborative Team Ecology: Develop robust cross-departmental communication

ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

channels and implement organized knowledge-sharing platforms to foster a genuinely supportive and open team atmosphere. This fulfills higher-level social and esteem needs, thereby enhancing the sense of belonging within the organization.

(4) Implement a Performance-Linked Recognition System: Design and deploy a multi-faceted incentive system that transparently links both short-term rewards and long-term career advancement to measurable innovative outputs and project contributions. Ensuring that exceptional performance, guided by Performance Oriented, receives prompt and equitable recognition reinforces a powerful positive feedback loop between achievement and organizational valuation.

4.3. Dynamic Job-Person Matching Strategy Based on the Competency Model

The core issue of person-position mismatch lies in the disconnect between an individual's capabilities and the essential demands of their role. A dynamic alignment mechanism, grounded in the R&D position competency model and operating throughout the employee lifecycle, should be established. This mechanism, utilizing ongoing assessment, constructive feedback, and targeted development, facilitates mutual adaptation between the individual and the position, ultimately boosting the R&D team's overall effectiveness and organizational agility.

(1) Utilize Professionalism and Performance Orientation for Strategic Placement: Base initial role assignments on a precise evaluation of an individual's Professionalism, ensuring they are placed in projects commensurate with their technical depth. Concurrently, from the very start of employment, explicitly communicate role-specific objectives and success metrics rooted in a performance-oriented culture. This upfront alignment prevents the underutilization of skills and vague performance expectations that lead to low contribution.

(2) Leverage Responsibility and Collaboration for Role Integration: Use a Sense of Responsibility and collaborative aptitudes (Coordination, Communication, and Teamwork) as foundational elements to clarify roles and ensure systemic integration. Clearly defined responsibilities, articulated through formal job descriptions and project charters, are prerequisites for activating accountability. Furthermore, by instituting structured collaborative workflows and interdisciplinary projects, proactively develop employees' capacities for Coordination, Communication, and Teamwork. This enables them to transcend merely executing isolated technical tasks and become effectively integrated components within the broader R&D value chain, thereby maximizing the synergy between individual input and collective organizational objectives.

4.4. Dual-Career Pathway Strategy Based on the Competency Model

The persistent issue of unclear career progression stems from the organization's inability to align its strategic requirements with individual employee growth aspirations effectively. Grounded in the R&D position competency model, a structured "dual-path" career development system should be implemented to offer R&D professionals clear, personalized roadmaps for advancement. This strategy effectively mitigates career uncertainty and fosters synergistic growth for both the individual and the organization.

(1) Deepen the Technical Track with Professionalism and Responsibility: Establish a clearly defined technical promotion ladder based on demonstrated Professionalism, featuring tiers such as Junior Engineer, Senior Expert, and Chief Technology Officer, with explicit criteria for required knowledge depth and technical influence at each stage. Concurrently, treat Sense of Responsibility as a critical behavioral metric for advancement, ensuring that a corresponding growth matches increasing technical expertise in accountability.

(2) Expand the Management Track by Integrating Collaboration Skills: For employees with strong aptitudes in Coordination, Communication, and Teamwork, create a dedicated management pathway leading to roles such as Project Manager and Team Lead. Within this track, these collaborative competencies must be explicitly designated as central development goals and key evaluation criteria for promotion.

(3) Apply Performance Orientation as the Unified Benchmark: Maintain Performance Orientation as the fundamental standard for assessing growth and contribution across both career paths. Tightly integrate the development system with performance management, ensuring that demonstrable improvements in competencies and tangible achievements on either the technical or management track form the objective basis for promotions and rewards.

ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

5. Conclusion

This study has successfully developed a competency model for R&D positions within China's Little Giant enterprises through systematic empirical investigation. The model delineates five core competencies—Professionalism (29.09%), Sense of Responsibility (27.27%), Coordination and Communication (19.39%), Teamwork (14.55%), and Performance Oriented (9.70%)—and establishes their relative weights, marking a pioneering systematic breakthrough in this research domain inside China. The model exhibits robust reliability and validity, effectively differentiating between high performers and their average counterparts, thereby furnishing a scientific foundation for the integrated talent management processes of "selection, development, deployment, and retention." Furthermore, the study outlines concrete application strategies across four organizational tiers: strategic, functional management, operational, and individual development. These strategies, encompassing recruitment optimization, retention mechanisms, dynamic person-position matching, and dual-career pathways, provide a systematic framework for addressing critical R&D workforce challenges, including recruitment difficulties, high turnover, skill-role mismatches, and nebulous career progression. The research outcomes possess substantial scientific rigor and practical utility, are suitable for nationwide dissemination, and can significantly aid Little Giant enterprises in achieving strategic alignment through effective talent management.

6. Limitations and Future Research

Despite its significant contributions, this study acknowledges several limitations. Geographically, the sample was drawn exclusively from the Hefei region. While moderately representative, the model's generalizability may be affected by regional cultural and industrial specificities, warranting further validation. Regarding the participant pool, the focus on R&D personnel holding bachelor's degrees excludes those with other educational backgrounds (e.g., associate, master's, or doctoral degrees), potentially limiting the model's comprehensiveness and nuanced application across different academic strata. Methodologically, the study's static design lacks longitudinal tracking of how these competencies evolve in response to technological shifts, industrial transformations, and the impact of disruptive technologies such as AI, thereby precluding insights into long-term causal relationships between competencies and performance.

Future research should pursue the following directions to extend this work. First, expanding the geographical and organizational scope to include Little Giant enterprises from diverse regions across China, varying in size and developmental stage, would enhance the model's adaptability and generalizability. Second, longitudinal studies are needed to trace the trajectory of competency development in R&D roles and to elucidate the dynamic interplay between competency development and organizational performance over time. Third, leveraging advanced technologies such as AI and big data analytics for talent profiling and behavioral assessment could facilitate the creation of an intelligent competency evaluation system and enable the model to be dynamically updated. Finally, incorporating emerging competencies such as digital literacy and cross-domain collaboration into the framework will expand its relevance and application, particularly by strengthening talent pipelines and boosting organizational innovation capacity, thereby providing continued theoretical and practical support for China's Little Giants in their pursuit of sustained competitiveness within the global industrial landscape.

Acknowledgement

This work was supported by Anhui Wenda University of Information Engineering (Grant No. XSK2024B03).

References

[1] International Monetary Fund. World Economic Outlook, October 2025: Subtitle if available[EB/OL]. (2025)[2025-11-22]. https://www.imf.org/en/-/media/Files/Publications/WEO/2025/October/English/text.pdf.

[2] DU C, WANG T, WANG Y, et al. Analysis of challenges and countermeasures for the international development of China's specialized, refined, distinctive, and innovative (SRDI) enterprises[J]. Science and Technology Management Research, 2025, 45(3): 9-20. DOI: CNKI:SUN:KJGL.0.2025-03-002.

[3] Hefei Municipal Government. How do "little giants" generate huge energy?[EB/OL]. (2024-11-

ISSN 2616-5902 Vol. 7, Issue 12: 96-108, DOI: 10.25236/AJBM.2025.071213

30)[2025-11-22]. https://www.hefei.gov.cn/ssxw/zwyw/110724451.html.
[4] MCCLELLAND D C. Testing for competence rather than for "intelligence"[J]. American Psychologist, 1973, 28(1): 1-14. DOI: 10.1037/h0034092.
[5] LEE K J, YUN Y J, KIM E Y. Political skills and career success of R&D personnel: a comparative mediation analysis between perceived supervisor support and perceived organisational support[J]. Technology Analysis & Strategic Management, 2019, 31(11): 1270-1282. DOI: 10.1080/09537325.2019.1605051.
[6] LI L. Reskilling and Upskilling the Future-ready Workforce for Industry 4.0 and Beyond[J]. Inf Syst Front, 2024, 26: 1697-1712. DOI: 10.1007/s10796-022-10308-y.
[7] European Commission, Directorate-General for Research and Innovation. Skills and intersectoral, interdisciplinary, and interoperable careers: mutual learning exercise on research careers: second thematic report[EB/OL]. (2025)[2025-11-22]. https://doi.org/10.2777/0001859.
[8] RAHYASIH Y, RASTO R. Resource management of higher education personnel[C]//Proceedings of the 2nd International Conference on Research of Educational Administration and Management (ICREAM 2018). Paris: Atlantis Press, 2019: 400-403. DOI: 10.2991/icream-18.2019.84.
[9] SIMON H. Hidden champions of the twenty-first century: success strategies of unknown world market leaders[M]. New York: Springer, 2009. DOI: 10.1007/978-0-387-98147-5.
[10] HIRANO M, TOBINO D. Successive innovations in global and local markets: strategies of global niche top enterprises in Japan[C]//2018 Portland International Conference on Management of Engineering and Technology (PICMET). Piscataway, NJ: IEEE, 2018: 1-6. DOI: 10.23919/PICMET.2018.8481936.
[11] National Science Foundation. SBIR/STTR Phase I program description (NSF 22-551)[EB/OL]. (2022)[2025-11-22]. https://www.nsf.gov/pubs/2022/nsf22551/nsf22551.htm.
[12] LEE K, LIM C. Technological regimes, catching-up and leapfrogging: findings from the Korean industries[J]. Research Policy, 2001, 30(3): 459-483. DOI: 10.1016/S0048-7333(00)00088-3.
[13] LIU Y. Building and analysis of iceberg model for innovation capability of R&D personnel in enterprises[C]//2011 International Conference on Management and Service Science. Piscataway, NJ: IEEE, 2011: 1-4. DOI: 10.1109/ICMSS.2011.5998055.
[14] LI R, WU M S, WU D T. Evaluation index system of high-level innovative talents in engineering technology[J]. Science and Technology Management Research, 2017, 37(18): 57-62. DOI: CNKI:SUN:KJGL.0.2017-18-010.
[15] ZENG J. Research on the construction of competency model for R&D positions in Company Z[D]. University of Electronic Science and Technology of China, 2024. DOI: 10.27005/d.cnki.gdzku.2024.002415.
[16] RIFKIN K I, FINEMAN M, RUHNKE C H. The human side: Developing technical managers-First you need a competency model[J]. Research-Technology Management, 1999, 42(2): 53-57. DOI: 10.1080/08956308.1999.11671273.
[17] KANSAL J, SINGHAL S. Development of a competency model for enhancing organizational effectiveness in a knowledge-based organization[J]. International Journal of Indian Culture and Business Management, 2018, 17(1): 1-22. DOI: 10.1504/IJICBM.2018.090909.
[18] KUSUMASARI T F, TRILAKSONO B R, AISHA A N, et al. Competency profile for software development team that support project success[J]. International Journal on Advanced Science, Engineering and Information Technology, 2020, 10(6): 1171-1178. DOI: 10.18517/ijaseit.10.6.11674.
[19] Ministry of Economy, Trade and Industry. 2020-nen ban gurōbaru nitchi toppu kigyou 100-sen kekka hōkokusho [EB/OL]. (2020)[2025-11-22]. https://www.meti.go.jp/policy/mono_info_service /mono/gnt100/index.html.
[20] TANG L N. A research on competency model of R&D personnel in DG Company[D]. University of Electronic Science and Technology of China, 2015.
[21] HE C X. A study of the improvement on R&D personnel training system of T Software Company based on the competency model[D]. Guangxi University, 2016.
[22] ZHANG X Q. Model construction research based on R&D personnel competence in small and medium-sized software enterprises – Taking P Company as an example[D]. Capital University of Economics and Business, 2017.