

**TALENT COMPETITIVENESS OF
INTELLIGENT INDUSTRY IN CHONGQING,
CHINA: AN EXPLORATORY STUDY ON
MODEL, INDEX AND STRATEGY**

XU XIANHANG

UNIVERSITI SAINS MALAYSIA

2025

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MODEL, INDEX AND STRATEGY**

by

XU XIANHANG

**Thesis submitted in fulfilment of the requirements
for the degree of
Doctor of Philosophy**

June 2025

ACKNOWLEDGEMENT

Writing this thesis has been a pleasant, instructive and challenging experience. Completing my thesis is not easy work and cannot be achieved without the help of many great people. Among all, I greatly appreciated my supervisor, Associate Professor Dr Mohd Anuar Arshad for his professional instructions. His dedication and responsiveness inspired me since the beginning of the process. With his instructions, I could smoothly finish this thesis. Thanks for his wisdom, which makes me progress and grow up very fast. A special thanks to Associate Professor Dr Daisy Kee Mui Hung and Associate Professor Dr Khairul Anuar Mohammad Shah for all the wonderful ideas, challenging questions and comments on my proposal. I also want to show my sincere appreciation to Ms. Robitah for her kindness and friendliness.

Many thanks also to the SOM's Professors, Lecturers and administrative staff for giving me the opportunity to learn and grow. I would like to thank the staff of IPS and the library for their assistance during my studies. I would also like to give thanks to my PhD friends from China in the USM—your names are always in my heart. Finally, I would like to express my heartfelt thanks to my family and colleagues, who have always supported and encouraged me. They are the greatest reason for my perseverance throughout this study.

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
GHCI	The Global Human Capital Index
GTCI	Global Talent Competitiveness Index
HOD	Head of Department
HRD	Human Resource Development
HRM	Human Resource Management
IMD	International Institution for Management Development
INSEAD	European Institute of Business Administration
MTM	Macro Talent Management
TC	Talent Competitiveness
TCI	Talent Competitiveness Index
TCM	Talent Competitiveness Model
TCMI	Talent Competitiveness Model and Index
TD	Talent Development
TM	Talent Management
TEIP	Technology Experts Introduction Plan
UNDP	The United Nations Development Programme
WEF	World Economic Forum
WIPO	World Intellectual Property Organization
WTR	World Talent Ranking

LIST OF APPENDICES

- Appendix A Interview Guideline for Data Collection
- Appendix B Data Collection Letter from Supervisor

**KOMPETENSI BAKAT DALAM INDUSTRI INTELIGEN DI CHONGQING
CHINA: KAJIAN PENEROKAAN TERHADAP MODEL, INDEX, DAN
STRATEGI**

ABSTRAK

Pada era ekonomi berasaskan pengetahuan, industri inteligen muncul sebagai hala tuju baharu bagi pembangunan ekonomi dan perancangan industri di banyak negara. Meningkatkan daya saing bakat memainkan peranan penting dalam memastikan pembangunan lestari industri ini. Chongqing dipilih sebagai tempat kajian kerana ia merupakan pusat bandar utama di China dan pangkalan penting bagi pembuatan moden, dengan KDNK dan jumlah penduduk yang setara dengan Malaysia. Dalam beberapa tahun kebelakangan ini, Chongqing telah melaksanakan pelbagai strategi pembangunan bakat untuk menyokong industri inteligen dan telah mencapai kemajuan dalam meningkatkan daya saing bakat. Namun begitu, keseluruhan daya saing dan strategi pembangunan bakat dalam industri inteligen di Chongqing masih memerlukan penambahbaikan serta kajian mendalam. Oleh itu, kajian ini bertujuan untuk meneroka kefahaman, komponen, model dan indeks daya saing bakat dalam industri inteligen serta mencadangkan strategi pembangunan bakat bagi industri inteligen di Chongqing. Kajian ini menggunakan pendekatan kualitatif dan mengaplikasikan kaedah fenomenologi. Dalam kajian ini, pensampelan bertujuan digunakan untuk memilih responden. Data dikumpulkan daripada enam belas orang responden melalui temubual mendalam separa berstruktur dan dianalisis menggunakan perisian NVivo 14. Dapatan kajian menunjukkan bahawa sumber bakat, sumbangan bakat, pelaburan bakat, sokongan pembangunan bakat dan persekitaran bakat merupakan komponen utama membentuk daya saing bakat dalam industri

intelligen. Membangunkan model dan indek daya saing bakat berdasarkan lima komponen tersebut berserta atribut berkaitan berupaya dan berkesan bagi menyediakan asas untuk merangka strategi pembangunan bakat. Kajian ini turut membincangkan strategi sedia ada dan kelemahan dalam pembangunan bakat industri intelligen di Chongqing, serta mencadangkan strategi penambahbaikan. Strategi tersebut termasuk memperkukuh pendidikan dan latihan, mengukuhkan kerjasama industri-universiti-penyelidikan, mengoptimumkan mekanisme bagi menarik minat dan mengekalkan bakat, meningkatkan sokongan terhadap inovasi dan keusahawanan, serta mempromosikan kerjasama antarabangsa. Semua strategi ini dijangka dapat meningkatkan daya saing bakat dan keupayaan inovasi industri intelligen di Chongqing, sekali gus menyokong pembangunan lestari dan kemajuan teknologi industri tersebut.

**TALENT COMPETITIVENESS OF INTELLIGENT INDUSTRY IN
CHONGQING, CHINA: AN EXPLORATORY STUDY ON MODEL, INDEX
AND STRATEGY**

ABSTRACT

In the era of the knowledge economy, the intelligent industry is emerging as a new direction for economic development and industrial planning in many countries. Enhancing its talent competitiveness plays a vital role in ensuring the sustainable development of the industry. Chongqing is a major central city in China and a key modern manufacturing base, with a GDP and population comparable to those of Malaysia. In recent years, Chongqing has implemented a range of talent development strategies to support the intelligent industry and has made progress in improving talent competitiveness. However, the overall talent competitiveness and talent development strategies of Chongqing's intelligent industry still require further enhancement, highlighting the need for an in-depth investigation. Therefore, this study aims to explore the understanding, components, model and index of talent competitiveness for the intelligent industry and propose talent development strategies for Chongqing's intelligent industry. It is qualitative and adopts the phenomenological method to explore. In the study, the purposive sampling was used to select interviewees. The data were collected from sixteen respondents through semi-structured in-depth interviews and analyzed by NVivo 14 software. The results show that talent resources, talent contribution, talent investment, talent development support, and talent environment are the major components of talent competitiveness in intelligent industry. Developing a talent competitiveness model and index based on these five components and related attributes is feasible and effective, which provides a basis for formulating the talent

development strategy. This study also discussed the current talent development strategies and shortcomings of Chongqing's intelligent industry and proposed improvement strategies. The strategies include strengthening education and training, reinforcing industry-university-research collaboration, optimizing talent attraction and retention mechanisms, enhancing support for innovation and entrepreneurship, and promoting international cooperation. These strategies may enhance the talent competitiveness and innovation capability of Chongqing's intelligent industry, thereby promoting sustainable development and technological advancement in the industry.

CHAPTER 1

INTRODUCTION

1.1 Introduction of the Chapter

This chapter is a brief overview of the study. It begins with an introduction to the research background, followed by the problem statement, research objectives, research questions, research significance, and the scope of the study. To help readers understand, it also defines key terms related to the study. Finally, this chapter briefly summarizes the overall structure of the thesis.

1.2 Background of the Study

1.2.1 World Intelligent Industry Development

The intelligent industry belongs to an emerging industry, including industries produced with artificial intelligence (AI) and big data technologies, as well as those based on related technologies for intelligent product design and manufacturing (Xu, Qi, & Song, 2021). The intelligent industry involves the application of AI in the industry (Kühn, 2019), aiming to promote synergy between the digital world and the engineering world, helping enterprises build intelligent products, operations, and services (Gya, 2023). It can be divided into 12 sub-industries, including big data, AI, integrated circuits, intelligent supercomputers, software services, the Internet of Things, automotive electronics, intelligent robots, intelligent hardware, intelligent connected vehicles, intelligent manufacturing equipment, and digital content (Chongqing Municipal Bureau of Statistics, 2022). Although the AI industry is only one of these sub-industries, it is the core of the intelligence industry.

As the critical area in the world's next round of scientific and technological revolution (Moll, 2021), the intelligent industry is highly significant for world development (Ayentimi & Burgess, 2019). It has significantly impacted the global economy, international relations, and national security (Allen, 2019; Yu & Carroll, 2022), and it is becoming a new direction for economic development and industrial layout in many countries. Nations worldwide have deployed AI as the core technology and strategic focus for the future. The United States was the first to raise AI in its national strategy (He et al., 2021), followed by developed countries such as the United Kingdom, Germany, and Japan (Zhou, 2017; Horowitz, 2018; Fatima, Desouza, & Dawson, 2020). Emerging economies like Brazil and India also regard AI as an important emerging field (Marda, 2018; Machado & Winter, 2023).

The Intelligent industry has developed rapidly worldwide. Taking the AI sub-industry as an example, the global AI market size was US \$515.31 billion in 2023, and it is expected to reach US \$2,740.46 billion by 2032, with an annual growth rate of 20.4% during the forecast period (Fortune Business Insights, 2024). The intelligent industry is not only developing rapidly, but also represents the future direction of many industries (Blackman, 2017). It has become a new engine driving economic growth and is highly valued by countries around the world.

1.2.2 Intelligent Industry in China and Chongqing

Like many other countries, China attaches great importance to the development of the intelligent industry, treating it as a strategic priority and supporting enterprises and universities in conducting relevant research (Ding & Zhao, 2023). Although China entered the intelligent industry later than some countries, it has seized the opportunity for rapid growth. In recent years, China's intelligent industry has made positive

progress in technological innovation, industrial ecosystem development, and integrated applications (Sima, 2019; Xu, 2021; Wang, 2023), forming a comprehensive industrial system. According to the *China Internet Development Report 2024*, the value of China's core intelligence industry reached 578.4 billion yuan in 2023, an increase of 13.9% year-on-year (Li, 2024). The intelligent industry is developing rapidly in China, serving as a key driver of economic growth and an essential direction for high-quality industrial development (Wu, 2023).

Chongqing, located in the southwest of China (see Figure 1.1), is one of the four centrally administered municipalities and an important modern manufacturing base in China. Since 2017, Chongqing has vigorously promoted the intelligent industry, with the government implementing a range of policies to create a favorable development environment for the industry (Cui & Liu, 2018).



Figure 1.1 The location of Chongqing

Source: Adopted from Amap (www.amap.com)

In 2023, the added value of Chongqing's intelligent industry accounts for 32.2% of the secondary industry (Qin & Liu, 2024). The development of Chongqing's intelligent industry has achieved significant results, and an industrial system has been initially established. However, despite the rapid development of Chongqing's intelligent industry, its competitiveness remains weak.

According to Figure 1.2, Chongqing's GDP reached 3.01 trillion yuan in 2023, ranking fifth among China's mainland cities, after Shanghai, Beijing, Shenzhen, and Guangzhou (Wang & Huang, 2024; World Bank, 2024a). Taking the AI industry as an example, Chongqing's AI competitiveness ranks last among the top 10 GDP cities in China. The four cities with higher GDP than Chongqing rank 1st to 4th in the AI competitiveness ranking (TMT Intelligence, 2024). Compared with these cities, the development of Chongqing's intelligent industry significantly lags behind its economic development (Liu & Liu, 2024).

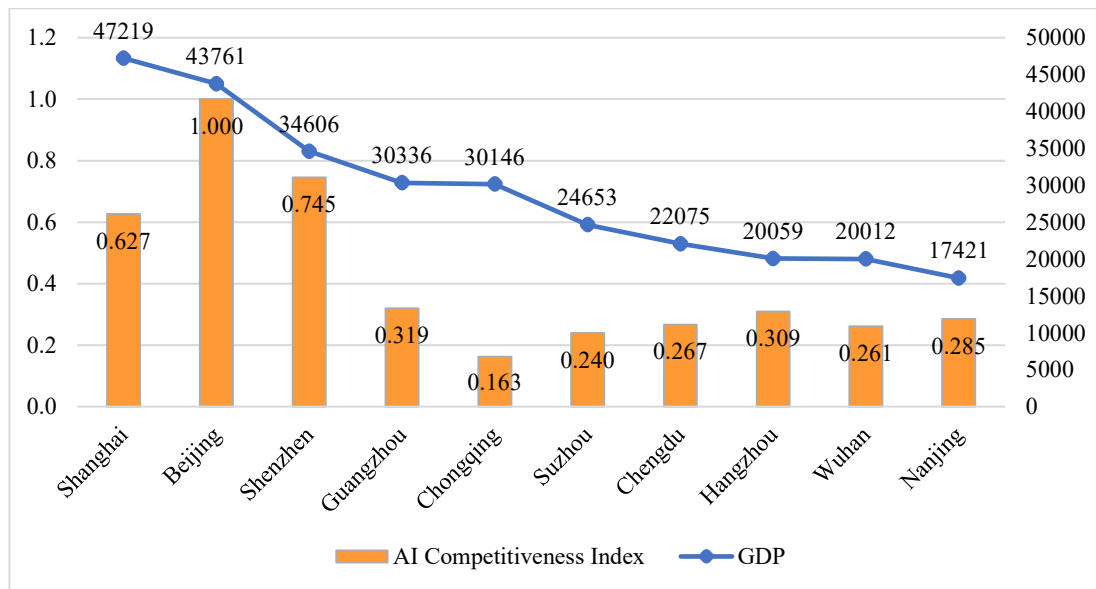


Figure 1.2 2023 AI Competitiveness Index of Top 10 GDP Cities in China (Unit: 100 Million Yuan)

Source: Adopted from Wang & Huang (2024); TMT Intelligence (2024)

As a new driving force for high-quality economic development, the intelligent industry is an important direction for Chongqing's industrial development. Chongqing's intelligent industry has enormous development potential and is highly worthy of research. Whereas, its competitiveness still needs improvement, which also underscores the significance of focusing this study on Chongqing's intelligent industry.

1.3 Problem Statement

In the knowledge economy era, talent strategies have become increasingly prominent (Warraich & Ahmed, 2020). The development of the economy and industry cannot proceed without talent, and talent competitiveness has become the core competitiveness of the country (Teagarden, 2020), playing a crucial role in the sustainable development and competitiveness of industries (Muyia et al., 2018). Under these circumstances, the sustainable economic development direction of Chongqing is centered on the intelligent industry, with a focus on improving its talent competitiveness. In recent years, Chongqing has implemented a range of talent development strategies for the intelligent industry and achieved notable progress, improving the talent competitiveness of the industry. However, talent competitiveness and talent development strategies still require further improvement.

Talent competitiveness refers to the comprehensive strength demonstrated by factors such as the quantity, quality, composition, and environment of talent in a country or region during development and competition (Ding, 2005; Ma, 2008; Li, 2010; Bris et al., 2017). It also involves policies, practices, and contexts that enable a region to attract, develop and retain talent (Evans, Rodriguez-Montemayor, & Lanvin, 2022). The intelligent industry includes multiple sectors, and its talent competitiveness is complex. How to understand, evaluate, and improve its talent competitiveness is an

urgent issue that Chongqing needs to address. According to the above definition and the model proposed by Xu, Arshad, and Mahmood (2021), the talent competitiveness of Chongqing's intelligent industry can be preliminarily analyzed from five dimensions: talent resources, talent contribution, talent investment, talent development support, and talent environment.

Regarding talent resources, they reflect the quantity, quality, and composition of talent (Henriksen, Stambulova, & Roessler, 2010; He, 2015), which influence organizational performance and sustainability (Pantouvakis & Vlachos, 2020). Chongqing's intelligent industry lacks talent at all levels. The annual demand for talent in Chongqing's intelligent industry is expected to increase by 89,300 people from 2023 to 2025. However, the industry faces an annual shortage of nearly 30,000 skilled professionals (Chongqing Economic and Information Commission, 2022). Senior talent is also scarce. For example, in the software and information technology services industry, the proportion of employees with master's degrees or above in Chongqing in 2021 was only 7.86%, far below the national average of 12.22% (Ministry of Industry and Information Technology, 2022). Additionally, the Chongqing AI Scholars Index score is 76, ranking 21st in China in 2023 (AMiner, 2023), which indicates a shortage of top-level talent.

In terms of talent contribution, this refers to the output of human resources in a region over a certain period of industrial and technological activity (Guan & Shen, 2004), emphasizing the value and impact that individuals or teams bring to the organization (Beechler & Woodward, 2009; Hongal & Kinange, 2020; Chen, Lee, & Ahlstrom, 2021). The talent contribution of Chongqing's intelligent industry is not outstanding, as evidenced by patent and industry revenue data. In 2021, the number of intelligent industry patent applications in Chongqing was 4,493, and the number of

granted patents was 6,314, ranking 16th and 17th in China, respectively. For example, in the manufacturing of electronic equipment and communication equipment, the industry's output was 331.1 billion yuan, ranking 13th in China—only 7.54% of the top-ranked Guangdong (National Bureau of Statistics of China, 2023b).

As for talent investment, this involves the process of investing in the talent and skills of individuals or teams (Schiemann, 2014; Kesenne, 2015; Cowle et al., 2024), reflecting comprehensive investment in talent development within a certain period (Ganaie & Haque, 2017). Talent investment in Chongqing's intelligent industry remains insufficient, as seen from the investment in education and R&D. In 2022, Chongqing's education investment was 82.77 billion yuan, ranking 21st in the country. Among these, the average education expenditure per student in colleges and universities was 16,979 yuan, ranking 26th in China, and lower than the national average of 22,205 yuan (Ministry of Education of the People's Republic of China, 2023). Chongqing's R&D investment intensity was 2.36%, ranking 10th in China, and it was also lower than the national average of 2.54% (National Bureau of Statistics of China, 2023c).

Talent development support reflects the industry's support for cultivating and developing talent (Xu & Qi, 2022). Education, technology, and industry sectors have all contributed to talent development in Chongqing's intelligent industry, but overall, the support remains insufficient. By the end of June 2023, there were 71 universities in Chongqing, accounting for 2.52% of the national total (Ministry of Education of China, 2023). However, only Chongqing University and Southwest University were selected as "Double Tops" universities, representing just 1.36% of such universities nationwide (Eol.cn, 2023). The proportion of higher education students in Chongqing

is 3605 per 100,000 people, which is higher than the national average of 3,301 (National Bureau of Statistics of China, 2023a). Although Chongqing has advantages in terms of the number of universities and students, the lack of top universities affects its ability to attract and retain talent. The development of the high-tech industry also influences talent aggregation. In 2022, there were 6,348 high-tech enterprises in Chongqing. However, this number still falls significantly short compared to regions such as Beijing, Zhejiang, and Shaanxi (Sun, 2023).

Regarding the talent environment, it influences both the work and life of talent, and a high-quality environment is a key factor in attracting and retaining talent (Si & Chen, 2015; Cable & Vermeulen, 2018). For example, the proportion of days with excellent air quality in Chongqing reached 90.9% in 2022, higher than the national average of 86.5% (Chongqing Ecological Environment Bureau, 2023). From an economic perspective, Chongqing's GDP per capita in 2022 was 90,700 yuan, higher than the national average of 85,700 yuan. However, the average annual salary for workers in Chongqing was 107,000 yuan, lower than the national average of 114,000 yuan. In terms of the social environment, per capita consumption expenditure in Chongqing was 25,400 yuan, slightly higher than the national average of 24,500 yuan (Chongqing Municipal Bureau of Statistics, 2023). Overall, Chongqing's talent environment has continued to improve. However, further enhancement may be required to sustain the development of top talent.

In addition, to effectively evaluate the talent competitiveness of intelligent industry, it is necessary to conduct an in-depth study of its model and index. In recent years, scholars have made some progress in this field. Xu, Arshad, and Mahmood (2021) applied a quantitative method to investigate the talent competitiveness of intelligent industry. Other scholars have quantitatively examined the talent

competitiveness of some sub-industries within the intelligent industry, such as the green chemical technology industry (Chen, 2017), the chip industry (Zhang & Yu, 2019), and the manufacturing industry (Wang & Qiu, 2021). These studies provide a foundation for qualitative research on talent competitiveness in the intelligent industry, and this study can further re-confirm their usefulness. However, the existing models and indices proposed by scholars are mainly developed from national or urban talent competitiveness, which may differ from the actual situation in the intelligent industry. For example, the intelligent industry may emphasize talent's ability to innovate. These models and indices may not accurately capture talent competitiveness in this context, and their implications for government policy formulation may be limited. Therefore, there is a need to develop a more comprehensive, accurate, and purpose-driven model and index.

The above evidence shows that Chongqing's intelligence industry has some foundation in talent development. However, its talent competitiveness and talent development strategies still require further improvement, and there is an urgent need to develop a talent competitiveness model and index tailored to the industry. Therefore, this study attempts to deeply explore the understanding and components of talent competitiveness in the intelligent industry. Developing a model and index for talent competitiveness in the intelligent industry will also help inform more effective talent development strategies for Chongqing, enhancing its overall competitiveness. This study is viewed as necessary and in need of the present time, which has practical significance for formulating future development strategies to enhance the competitiveness of Chongqing's intelligent industry.

1.4 Research Objectives

This study aims to explore the understanding and components of talent competitiveness in the intelligent industry, as well as its model and index, and to propose talent development strategies for Chongqing's intelligent industry. The research objectives (RQs) are as follows:

RO1: To critically explore the understanding of talent competitiveness within the intelligent industry.

RO2: To analyze the components of talent competitiveness—Talent resources, Talent contribution, Talent investment, Talent development support, and Talent environment—within the intelligent industry.

RO3: To develop and validate a comprehensive model and index of talent competitiveness for the intelligent industry by synthesizing qualitative findings.

RO4: To propose actionable and time-bound talent development strategies for Chongqing's intelligent industry, addressing current gaps and aligning with future industry demands.

1.5 Research Questions

Based on the issues discussed above, a total of four research questions (RQs) are identified as follows:

RQ1: What is the understanding of talent competitiveness in the intelligent industry?

RQ2: What is the understanding on the components of talent competitiveness in the intelligent industry, focusing on Talent resources, Talent Contribution, Talent Investment, Talent development support, and Talent environment?

RQ3: What is the understanding of talent competitiveness model and index for the intelligent industry?

RQ4: What are the current talent development strategies in Chongqing's intelligent industry, and how can they be improved to support the future development of Chongqing's intelligent industry?

1.6 Scope of the Study

This study is limited to Chongqing's intelligent industry. It mainly discusses the understanding and components of talent competitiveness in the intelligent industry, as well as its model and index, and proposes the talent development strategies for Chongqing's intelligent industry. This study adopts a qualitative research approach and employs semi-structured interviews for data collection. The target population includes government officials from the Chongqing Economic and Human Resources Commissions; experts in the fields of human resource management and economics at universities; heads of associations in the intelligent industry (such as the presidents of computer and software industry associations); and heads of human resources and business development departments in intelligent industry enterprises.

1.7 Significance of the Study

1.7.1 Practical Significance

This study holds significant policy value and strong practical relevance, providing decision-making support for the government. Intelligent industry is the focus of economic development and industrial layout in many countries. Grounded in the actual needs of Chongqing's intelligent industry and based on an analysis of its talent competitiveness, talent development strategies for Chongqing's intelligent industry are proposed, addressing the urgent need to accelerate the development of industrial human resources and aligning with global, national, and local industrial development priorities. It offers scientific and practical recommendations for local governments in formulating talent policies and plans. Based on the study's findings, governments can allocate resources more effectively, develop targeted talent development strategies, and enhance the talent competitiveness of the intelligent industry.

In addition, this study contributes to the advancement of the intelligent industry. By analyzing and examining the understanding, components, model and index of talent competitiveness in the intelligent industry, both enterprises and government agencies can gain clearer insights into how to enhance talent competitiveness. It enables them to identify key areas and directions for talent development more effectively, and to implement targeted measures for attracting, cultivating, and retaining talent. Ultimately, this provides strong talent support for the intelligent industry and promotes its sustainable development.

1.7.2 Theoretical Significance

This study explores the understanding and components of talent competitiveness in the intelligent industry, as well as its model and index, and analyzes the talent development strategies of Chongqing's intelligent industry. Its theoretical implications are reflected in the following aspects.

First, this study concretizes the concept of talent competitiveness within the specific context of the intelligent industry, providing a relatively novel research perspective that enriches the theoretical literature on talent competitiveness.

Second, it systematically analyzes the composition of talent competitiveness in the intelligent industry by identifying its key components and attributes, thereby refining and deepening the conceptual framework in this field.

Third, it develops a talent competitiveness model and index for the intelligent industry, providing a theoretical framework for future quantitative research. These tools can be applied and empirically tested in subsequent studies, further advancing research on talent competitiveness.

Finally, this study integrates theoretical exploration with the practical realities of Chongqing's intelligent industry, proposing a research pathway that bridges theory and practice. This approach offers new perspectives for both talent competitiveness theory and talent development theory, and provides valuable insights for future theoretical studies and practical applications.

1.8 Definition of Key Terms

Intelligent Industry: Intelligent industry refers to high-end manufacturing sectors, including industries produced with artificial intelligence and big data technologies, as well as those based on related technologies for intelligent product design and manufacturing (Xu, Qi, & Song, 2021).

Talent Competitiveness: Talent competitiveness refers to the comprehensive strength demonstrated by factors such as the quantity, quality, composition, and environment of talent in a country or region during economic and social development and competition (Bris et al., 2017).

Industrial Talent Competitiveness: Industrial talent competitiveness refers to the comprehensive competitiveness of a country or region regarding the quantity, quality, structure, and environment of talent within a specific industry. It involves the industry's scale, structure, and efficiency of talent, as well as the investment, policies, and environment that influence talent development within the industry (Xu, Arshad, & Mahmood, 2021).

Talent competitiveness model: Talent competitiveness model is a multidimensional framework covering various aspects of talent management. It explains how strategic talent management contributes to competitive advantage through talent selection, development, and talent pool building (Hanif et al., 2013).

Talent competitiveness index: Talent competitiveness index is a tool for evaluating talent competitiveness, used to measure a country's ability to attract, develop, and retain talent. It is crucial for enhancing national competitiveness and innovation (Serban & Andanut, 2014).

Talent Resources: Talent resources refer to individuals with high levels of knowledge, skills, or expertise, emphasizing the quality of human resources and reflecting the quantity, quality, and composition of talent (Kravariti & Johnston, 2020).

Talent Contribution: Talent contribution refers to the value and impact that an individual or team brings to an organization through their skills, knowledge, creativity, and work efficiency, including both direct work output and positive effects on organizational culture and performance (Febrian & Solihin, 2024).

Talent Investment: Talent investment refers to the process of investing in individuals or teams, reflecting comprehensive investment in talent development (Cowle et al., 2024).

Talent Development Support: Talent development support refers to the strategies, procedures, and practices used to support and promote talent development, reflecting the role of cultivating and developing talent (Ramaditya et al., 2022).

Talent Environment: Talent environment refers to the living and working conditions that affect talent attraction, development, and retention, including the natural environment, economic climate, and social conditions (Niemi et al., 2021).

Talent Development Strategy: Talent development strategy refers to a set of plans and practices formulated by an organization to ensure its human resources align with its long-term goals and strategies, with an emphasis on achieving organizational objectives by attracting, utilizing, developing, and retaining talent (Kaliannan et al., 2023).

1.9 Organization of Chapters

This thesis is arranged as follows: Chapter One introduces the study, including the background, problem statement, objectives, questions, scope, significance, and definition of key terms. Chapter Two highlights the relevant literature and presents the conceptual framework. Chapter Three describes the methodology, including the research philosophy, approach, strategy, sampling, data collection, and analysis methods. Chapter Four presents the analysis and findings based on the research objectives and research questions. Data were gathered through in-depth interviews and analyzed thematically using NVivo 14. Chapter Five is the conclusion part of the study. It discusses the data findings in detail, and proposes the talent competitiveness model and index as well as talent development strategies for Chongqing's intelligent industry. In addition, the research implications, limitations, and recommendations for future research are elaborated upon.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview of the Chapter

This chapter reviews the literature related to talent competitiveness and provides an overview of relevant topics. It begins by introducing new trends in global talent competition and talent competitiveness from an industrial perspective. Next, it analyzes studies on talent competitiveness in terms of types and indices. Finally, this chapter presents a comparative analysis of talent competitiveness in the intelligent industry and proposes the conceptual framework for this study.

2.2 Introduction of the Literature Review

With the development of competitiveness theory and the advancement of human resource management (HRM) research, the critical role of human resources in competitiveness has become increasingly apparent (Maulidin et al., 2024). Talent has emerged as the most effective means for countries to gain global competitive advantages (Vaňová et al., 2019). In addition, recent trends in global talent competition have been observed, which should be carefully considered when studying talent competitiveness (Susan, 2021).

Talent is an important source of competitiveness and has attracted the attention of managers and governments, as it represents a key step toward achieving global competitiveness (Cascio & Boudreau, 2016). As a result, talent resources, as a distinct

competitiveness, have gained increasing recognition from scholars (Maier et al., 2014). Talent competitiveness has become a distinct branch of competitiveness (Leikuma-Rimicane et al., 2021), and scholars have primarily examined it from three aspects.

First, scholars have begun to explore talent competitiveness from an industry perspective. Talent competitiveness is closely related to the theories of talent, human capital, human resource development (HRD), and talent management (TM), which together form its theoretical foundation (Vaňová, Šúrová, & Seková, 2019). In recent years, research on talent competitiveness has increasingly focused on its role within specific industries, establishing talent competitiveness as a new dimension of industrial development and highlighting its role in enhancing industry competitiveness and promoting sustainable development (Leikuma-Rimicane et al., 2021).

Second, scholars have examined different types of talent competitiveness. Based on different research contexts and practical needs, studies have analyzed talent competitiveness at various levels, including national and regional (such as economic zones, provincial administrative regions, and cross-regional areas), city, industry, and enterprise levels (Wang & Qiu, 2021; Kuznetsova, 2022; Zhang & Deng, 2024).

Third, scholars have developed talent competitiveness indices, which are a core focus of talent competitiveness research because measurement is essential for improvement (Sousa et al., 2024). Talent competitiveness indices can be targeted at regions and industries (Liu & Wang, 2023). According to their main content, these

indices can be categorized into two types: those based on talent resources and those taking a comprehensive perspective.

These studies have advanced the theory of talent competitiveness, laying a foundation for exploring talent competitiveness in the intelligent industry (Alsawalhah, 2020). However, compared to the rapid development of the intelligent industry, research on its talent competitiveness remains limited. It is still a weak and emerging field. Meanwhile, the importance of talent in industrial development is becoming increasingly evident (Shneikat et al., 2023). Objectively, it is urgent to study the industrial talent competitiveness (Shikweni et al., 2019). In addition, systematic research is lacking in terms of understanding, components, model, and index of talent competitiveness in the intelligent industry, as well as how to enhance it through talent development strategies. To address these gaps, it is necessary to combine the theoretical foundation and related literature on talent competitiveness.

2.3 New Trends in Global Talent Competition

Since ancient times, talent has been highly valued by countries around the world. In the knowledge economy era, talent has become a key productive force and is recognized as an essential resource for both competition and national development (Collings et al., 2019; Farndale et al., 2022). Recent trends in global talent competition should also be considered when studying talent competitiveness.

First, talent resources have increasingly become the core element of global competition (Guerra et al., 2023). Economic and social development is fundamentally

based on the possession and effective utilization of resources (Hu & Li, 2018). The focus on global economic growth and resource development has gradually shifted toward talent resource development, which is both capable and sustainable (Susan, 2021). Talent has become the most important strategic resource for countries, and the primary, strategic, and decisive role of talent competitiveness in national strength is becoming increasingly evident (Areesophonpichet et al., 2024).

Second, the global flow of talent has become increasingly prominent (Kerr et al., 2016). In 2022, the number of global migrants was about 281 million, with most migrating to developed countries in Europe and North America (United Nations, 2022a). Promoting immigration enables countries to leverage global talent to enhance their competitiveness (Dennis, 2020). In addition, changes in the global population structure are expected to increase international migration (Khilji & Keilson, 2014). The world population surpassed 8 billion in 2022, but the aging population in developed countries is becoming increasingly severe (United Nations, 2022b). By 2050, developed countries will face worker shortages, while some developing countries will have insufficient job opportunities (Khilji et al., 2015), further accelerating the flow of talent (Gupta, 2014).

Third, talent strategy has become one of the main approaches for countries to compete globally. Talent resources can be acquired through training, recruitment, and aggregation (Gadgil et al., 2024). All countries recognize the importance of talent (Sousa et al., 2024). Developed countries have formulated talent strategies to compete

for high-level talent globally. For example, Germany introduced the *Technology Experts Introduction Plan*, the United Kingdom implemented the *High Potential Talent Visa Program*, and Japan adopted the *Senior Talent Points System*. Since 2017, the United States has tightened H-1B visa requirements to attract top foreign talent (Qu & Hu, 2020).

In summary, global talent competition has become a strategic race focused on talent resources, mobility, and national strategies (Dennis, 2020). As talent drives innovation and development, talent competitiveness is now central to national agendas, highlighting the need to examine how it is reshaping industrial development (Susan, 2021). The following section explores how talent competitiveness has become a new dimension of industry, emphasizing its increasing importance in fostering innovation, sustaining competitiveness, and guiding strategic talent management.

2.4 Talent Competitiveness: The New Dimension of Industry

Talent is the foundation of global competitiveness (Vavra, 2013), and the competition of nations is ultimately the competition for talent (Schuler & Jackson, 2011). Over the past two decades, talent management and talent development have gained increasing prominence (Kaliannan et al., 2023). As globalization enters the 4.0 era, innovation has become the driving force of economic growth (Ren & Zou, 2021). High-value-added talent resources have become critical assets for national competitiveness and are expected to have an even greater impact (Qin et al., 2022). Countries have proposed talent strategies and strengthened talent management (Hunt,

2014; Waheed & Halim Zaim, 2015). Talent management helps promote talent competitiveness (Khilji & Schuler, 2017; Evans et al., 2022), and talent competitiveness has emerged as a new dimension of industrial development, playing a crucial role in the competitiveness and sustainable development of industries (Kaliannan et al., 2023). To explore talent competitiveness in the context of industrial development, it is essential to clarify its theoretical foundations, including the concepts of talent, human capital, HRD, and talent management.

2.4.1 Talent

The term "talent" has existed for thousands of years and is rooted in many languages and cultures (Huang & Tansley, 2012). Although this term has a long history, its definition remains multifaceted and incomplete (Lewis & Heckman, 2006; Gallardo-Gallardo et al., 2013; Ross, 2013).

Talent can be explained as exceptional ability (Tansley et al., 2006), commitment and contribution (Ulrich & Smallwood, 2012), or a special skill that a person excels at (Raso, 2015). From another perspective, talent may relate to individual development and performance (Tansley et al., 2006). It can result from personal learning experiences (Polonia, 2017), and should be distinguished from giftedness (Gagné, 2000). Therefore, talent is often regarded as a combination of skills, knowledge, cognitive abilities, and potential (Tansley et al., 2006), representing the overall capabilities of an individual (Michaels et al., 2001; Nijs et al., 2014).

In this study, talent refers to a specific group of individuals who possess valuable human capital (King & Vaiman, 2019) or demonstrate exceptional ability and value (Tansley & Sempik, 2008; Gallardo-Gallardo & Thunnissen, 2016). Similar definitions are found in Chinese culture, where talent refers to people with superior inherent qualities who contribute to social development and human progress through creative achievements (Xu, 2018). They are individuals with high abilities and qualities within the human resources pool (The State Council of China, 2010), and can create greater social value within the same working time (Li, 2010).

Talent is often associated with excellent performance (Meyers, 2015). High performance and high potential form the basis of most talent definitions (Iles et al., 2010; Tansley, 2011). The characterizations "high achiever" or "high performer" are often attributed to talented employees who outperform their peers in terms of capability and performance, and who are considered of strategic importance within an organization (Cooke et al., 2014; Meyers & Woerkom, 2014). Most of these definitions emphasize that talent is better than ordinary people and has two essential attributes. One is creative labor, and the other is contribution or value.

2.4.2 Human Capital

The concept of human capital was first proposed by Schultz (Schultz, 1960; Schultz, 1961). It is one of the core theories in HRM and refers to a unit of resources generated by an individual's knowledge, skills, abilities, or other characteristics (Ployhart & Moliterno, 2011). Romer (1986) and Lucas (1988) introduced the

endogenous economic growth model, which revealed the key role of human capital in economic growth. Scholars have since used this model to analyze and validate the relationship between human capital and economic growth (Vandenbussche et al., 2006; Huang et al., 2009; Fleisher et al., 2010; Čadil et al., 2014; Du et al., 2014; Pelinescu, 2015). More recently, scholars have incorporated new models and variables in examining this relationship (Liang & Zhang, 2016; Lu & Su, 2017; Ogundari & Awokuse, 2018; An & Lei, 2019; Mabrouki, 2023).

With the deepening of the industrial revolution and the development of HRM research, scholars have begun to focus on human capital from two perspectives when examining the factors influencing industrial upgrading (Howard, 2019). The first is to verify the alignment between human capital and industrial upgrading using various models (Guan & Chen, 2011; Tang, 2014; Ahmeti, 2015; Ma, 2015). The second is to analyze the impact or contribution of human capital on industrial upgrading (Aleknavičiūtė et al., 2016; Chen & Li, 2017; Chen et al., 2019; Harris, Wright & McMahan, 2019; Shi & Wang, 2024).

Human capital promotes economic growth and industrial upgrading and is vital to organizations (Ran et al., 2023). Organizations can recruit and select knowledgeable employees, as well as train their existing workforce to supplement human capital (Khan, 2014). Continuous investment in human capital supports knowledge creation, facilitates organizational modernization (Sung & Choi, 2014), and provides