

Optimizing Talent Allocation to Empower the Digital Transformation of Manufacturing Industry in Guangdong Province

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Abstract: *Digital transformation of the manufacturing industry has entered a new stage of systematic development. Optimal talent allocation provides necessary skills support and innovative impetus. This paper selects the manufacturing industry in Guangdong Province as research object, analyzing the practical pathways of optimizing talent allocation to empower the digital transformation of the manufacturing industry. Results find that driven by market, technological, and management transformation, optimized talent allocation effectively empowers the digital transformation process of the manufacturing industry. Furthermore, focusing on the strategic system, development environment, and cultivation model of digital transformation talent, this paper presents practical strategies for effectively optimizing talent allocation, to accelerating the digital transformation and upgrading of the manufacturing industry in Guangdong province.*

Keywords: Manufacturing industry; Digital Transformation; Talent allocation.

1. INTRODUCTION

The penetration of emerging technologies such as artificial intelligence and big data has accelerated the digital transformation of the manufacturing industry, presenting an innovative development path of “manufacturing + platform + services.” Digital talent, as a core element of industrial upgrading, is playing an increasingly important role in the digital transformation of the manufacturing industry, becoming a fundamental guarantee for its high-quality development.

As a major manufacturing and leading province in the digital economy, Guangdong Province’s talent allocation significantly impacts the level, structure, and quality of its industrial transformation. In 2020, Guangdong Province, focusing on the mutual promotion of talent clusters and industrial clusters, took the lead in issuing the “Opinions on Strengthening Talent Support for High-Quality Development of Manufacturing in Guangdong Province.” Its initiative aimed to accelerate the introduction and cultivation of high-level talent to drive the development of high-tech industries, optimize and upgrade traditional advantageous industries, and enhance the level of the industrial chain, thereby improving the digital transformation capabilities of Guangdong’s manufacturing industry. Currently, Guangdong’s manufacturing industry has entered a crucial stage of in-depth development, moving up the value chain. While the digitalization of manufacturing creates significant economic value, it also triggers numerous shocks to the labor market. Therefore, a thorough analysis of the value implications, logical mechanisms, and practical paths of optimizing talent allocation to empower Guangdong’s manufacturing industry is of practical importance for promoting the digital transformation of Guangdong’s manufacturing sector.

2. THE CONNOTATION AND EMPOWERING BACKGROUND OF OPTIMIZED TALENT ALLOCATION

2.1 The Connotation of Optimal Allocation of Talent

The report of the 20th CPC National Congress clearly stated that the strategy of strengthening the country through talent should be implemented in depth, and talent should provide a sustainable growth energy pole for innovation. Since 2016, various provinces and cities have successively introduced talent cultivation and introduction policies for high-quality, professional outstanding engineers, industrial designers and leading talents in quality standards [1]. For example, the “Several Policy Measures of Guangdong Province to Promote the Innovative Development of Artificial Intelligence and Robotics Industry” clearly stated that high-level leading talents should be introduced and cultivated, and relevant cities should be encouraged to introduce special policies for talents in the artificial intelligence and robotics industry. Talent is the primary resource for economic and social development, and it is also a laborer with high ability and quality among human resources. They have professional knowledge and skills,

generate social value through creative labor, and are the decisive factor in comprehensive competition. In addition, talent resources also highlight strong mobility and driving force, and play an important guiding role in the rational allocation and coordinated development of regional resources [2].

Talent allocation highlights the competition and mobility of talent. Based on a specific social and economic system, it involves the effective coordination and balance of talent supply and demand in terms of both quality (abilities and expertise) and quantity. Imbalances between talent supply and demand can lead to talent waste, insufficient innovation, and other problems, hindering the maximization of human capital benefits and the effective utilization of talent. Under certain conditions, a balance between talent supply and demand results in effective talent allocation. At this point, both sides can achieve satisfactory utility, meaning that both talent supply and demand are effective. This also reflects the optimization of human capital structure and can significantly improve the overall quality of the labor force.

Talent allocation also reflects the behavior and results of combining talent with labor positions or material resources. Its rationality is affected by multiple factors such as the total supply and demand of talent, spatial distribution and structural level, and is reflected in economic and social development. Talent allocation is of great significance to both technological innovation and national economic growth [3]. To a certain extent, compared with economic development, technological innovation, government-led, and market competition, talent allocation schemes may have a more significant effect on industrial structure upgrading [4]. A reasonable talent allocation can fully tap the potential of talent and means of production and effectively combine the two in time and space, which is conducive to creating an environment for the development of innovative talents, enhancing the vitality of economic operation, and enabling them to play a greater role in the process of enterprise transformation and upgrading [5].

2.2 The Background of Talent Optimization and Allocation Empowering the Digital Transformation Manufacturing in Guangdong Province

The “14th Five-Year Plan for High-Quality Development of Manufacturing in Guangdong Province” explicitly emphasizes “adhering to the principle of making manufacturing the foundation of the province.” Manufacturing is a crucial pillar industry for Guangdong’s economic development. According to the 2025 China Top 500 Manufacturing Enterprises list, Guangdong, Jiangsu, Shandong, and Zhejiang, four major economic provinces, continue to lead the pack. In terms of the number of listed companies, Guangdong ranks fourth with 47. Regarding the number of companies in the top 20 in R&D intensity, Guangdong has 5 companies on the list, accounting for 25%. Leveraging its advantageous geographical location and a number of top-tier technological giants, Guangdong’s manufacturing industry is expanding its presence in the global industrial landscape, demonstrating leading development through a steadfast strategic focus. Data from the “2024 Guangdong Provincial Statistical Bulletin on National Economic and Social Development” shows that the added value of Guangdong’s high-tech manufacturing industry increased by 10.2% year-on-year, accounting for 32.0% of the total added value of industries above designated size. Investment in high-tech manufacturing increased by 8.7%, accounting for 10.5% of fixed asset investment. The total profit of industries above designated size reached 1,036.723-billion-yuan, equivalent to 874.608 billion yuan. As of September 2025, the total number of skilled personnel in Guangdong Province has reached 22.01 million, including 8.27 million highly skilled personnel. 171 integrated skill ecosystem chains connecting industry, education, and evaluation have been established, further strengthening the guarantee of highly skilled personnel in key industries [6].

According to the incomplete statistics, Guangdong province has 31 major manufacturing categories and 90,000 industrial clusters with an output value exceeding 100 million yuan. However, in terms of urban distribution, the uneven regional development of manufacturing industry in Guangdong Province is still quite evident, as shown in Figure 1.

Thus, the demand for human capital in the digital transformation of manufacturing exhibits industry and regional heterogeneity [7]. However, the attraction and cultivation of highly skilled personnel remain a practical need for the construction of Guangdong’s modern industrial system and the digital transformation of its manufacturing industry.

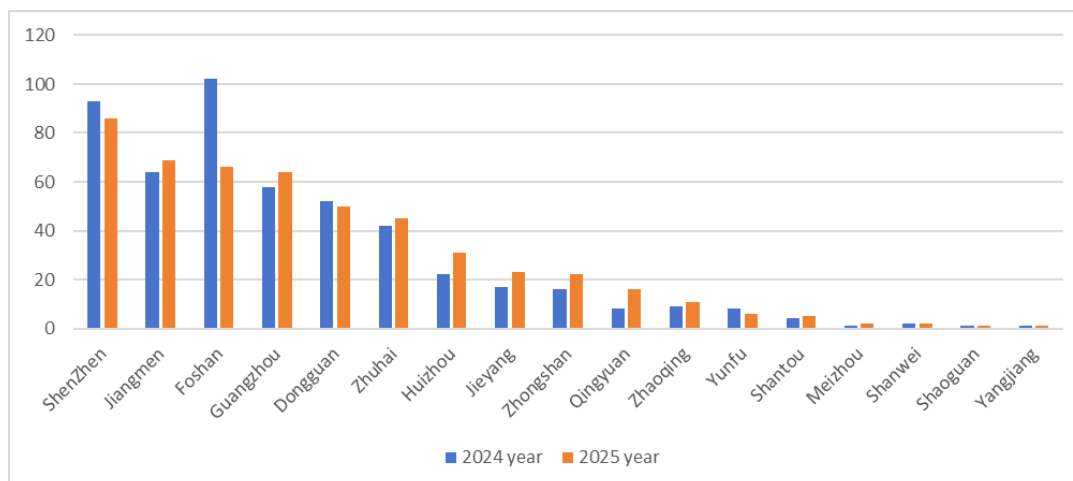


Figure 1: Number of enterprises from each city selected as Guangdong's Top 500 Manufacturing

3. THE LOGICAL ANALYSIS OF TALENT OPTIMIZATION IN EMPOWERING THE DIGITAL TRANSFORMATION OF MANUFACTURING

Faced with the rapid development of global informatization and intelligence, the digital transformation of the manufacturing industry has become an inevitable trend for the high-quality development of the manufacturing industry. The digital transformation of the manufacturing industry needs to make full use of digital technology and data resources to carry out in-depth changes in industrial structure, innovation capabilities and social benefits [8], and realize the effective integration of traditional production factors and new production factors [9]. Based on the coupling framework of “market-technology-management”, the optimal allocation of talent plays an important role in the digital transformation of the manufacturing industry. The digital transformation of the manufacturing industry not only requires compound talents who combine digital technology and market knowledge, but also new talents in intelligent manufacturing, new generation information technology industry, etc. Specifically:

3.1 Market-driven

Attracting, cultivating, and utilizing talent are prerequisites for the development of the manufacturing industry, especially the attraction and cultivation of professional and technical personnel, management personnel, and skilled personnel. In the context of digital transformation, it is necessary to quickly improve the digital technology application capabilities of these three types of personnel and adhere to the path of talent-led development. This is also a common need for all types of enterprises in the manufacturing industry. Against the backdrop of booming digitalization, the mismatch between the supply and demand of digital talent is also a common problem. However, the manufacturing industry has many sub-sectors and fields, with uneven levels of digital development, and the demand for digital talent varies. Emerging digital technologies have brought about a series of product and market innovations, stimulated new consumer demands, and spawned new models and new business formats, becoming an important factor driving the digital transformation of traditional enterprises. Digital technologies are constantly being updated and upgraded, from meeting needs to stimulating and creating needs. Only by combining digital technology with market demand, fully utilizing data value to uncover customer needs, and stimulating changes in enterprise management concepts and business operation processes can we more effectively promote the digital transformation of enterprises.

3.2 Technology-driven

The underlying logic of digital transformation in manufacturing is the application of digital technology. The future development of manufacturing is closely related to internet research and development, product technology, quality, performance, and design. The deep integration of digital information technology with traditional manufacturing production models has profoundly changed production methods and factors, giving rise to a number of emerging industries and job positions, and posing new demands on technical talent. The need to integrate into the wave of digital reform and development has accelerated the shift from talent management to talent governance. In particular, the shift towards micro-level talent governance requires increasing the demand for high-end talent, focusing on optimizing enterprise processes, and 挖掘 and highlighting the value of data. This inevitably

necessitates building a diversified talent allocation system and mechanism using digital thinking and digital technology, leveraging vast data resources to improve the efficiency of talent allocation, and driving the manufacturing industry to a higher level of development.

3.3 Management Transformation Driven

The digital transformation of the manufacturing industry involves restructuring enterprises' businesses, processes, and organizational structures. The biggest challenges in this process are the shift in mindset and the power struggles arising from the restructuring of authority. In the digital economy era, manufacturing companies adopt flexible employment and shared employment management measures to address labor shortages and other issues caused by rapid iteration, as well as to reduce costs and improve efficiency. The traditional employment model transforms into a collaborative model.

In terms of organizational management models, the application of digital technologies has led to a trend towards flatter and more networked organizational structures. The digital transformation of the manufacturing industry is not merely technological innovation, but also business process reengineering, and the co-creation and continuous optimization of the organization. This is also a process of value reshaping in the manufacturing industry, requiring professional and technical personnel to drive the application and system integration of new technologies.

4. PATHWAYS FOR OPTIMIZING TALENT ALLOCATION TO EMPOWER DIGITAL TRANSFORMATION IN MANUFACTURING

4.1 Building Strategic System for Digital Transformation Talent

According to the Liepin Big Data Research, among the industries with the fastest year-on-year growth in talent demand from January to May 2025, manufacturing ranked first with a growth rate of 82.5%. Industrial upgrading and technological innovation have a significant impact on talent demand. However, the manufacturing industry generally lacks a large number of digital innovation talents during its digital transformation, resulting in a relatively slow digitalization process. Possible reasons include a lack of digital thinking among senior managers and a low level of awareness of transformation among employees, as well as a relative lack of understanding and application of emerging information technologies such as artificial intelligence and intelligent manufacturing. Therefore, in the process of digital transformation, Guangdong's manufacturing industry needs to base itself on the fundamental laws of manufacturing, learn from successful experiences in various countries at home and abroad, tailor talent allocation strategies to local conditions, establish long-term mechanisms, and improve the institutional reform and innovation of talent allocation. Only when talent policies and talent needs are perfectly aligned can a virtuous cycle of common development and mutual promotion among "government, enterprises, and talents" be truly formed, building a multi-party collaborative talent allocation mechanism involving "government, industry, universities and enterprises, individuals, and society," constructing a full-chain mechanism for talent attraction, cultivation, retention, and utilization, and fully leveraging strategic synergy. Specifically: Regarding the educational level of personnel in manufacturing enterprises, targeted improvement goals can be proposed and support increased; while cultivating top-notch talents, the cultivation of basic talents should also be strengthened; resource channels should be broadened, the achievements of digital reform should be utilized, and the needs of enterprises should be accurately met; and a sound evaluation system for the efficiency of enterprise digital talent allocation should be established.

4.2 Creating Environment Conducive to the Development of Digital Transformation Talents

The digital transformation of the manufacturing industry involves multiple scenarios, including R&D, manufacturing, operation and maintenance services, business management, and supply chain management. The demand for talent in this transformation is differentiated and diversified. These talents often have varying requirements regarding living environment, social security, compensation and benefits, and innovation. Simultaneously, the structural mismatch of talent and human capital is a major problem in building a digital talent pool for the manufacturing industry.

Therefore, the government and relevant departments should pay attention to and absorb talent needs when allocating talent resources, creating a favorable environment for talent development services. A guiding role needs to be actively played. With the government's visible hand, various resources should be guided to converge, providing direction for the digital transformation of the manufacturing industry and guiding and facilitating talent

mobility. The digital empowerment of the manufacturing industry requires a large number of interdisciplinary and cross-sectoral innovative talents as support. A reasonable policy implementation, enforcement, and feedback mechanism should be established, relying on relevant special funds and a binding institutional supervision system to gradually achieve the effective allocation of manufacturing talent resources in Guangdong Province. At the same time, it is necessary to accelerate the construction of a talent resource database and a regional human resources information sharing and service platform, promote the transformation of the talent market from a market-based model to an information network model, and facilitate the sharing and utilization of talent resources. Especially high-tech talent resources in strategic emerging industries such as artificial intelligence and intelligent hardware. According to the Top 500 Manufacturing Enterprises in Guangdong Province by 2025, the proportion of strategic emerging industries has reached 81.6%.

4.3 Improve the Training Model for Digital Transformation Talents

The digital transformation of manufacturing enterprises has placed new demands on talent development, with talent being the core driving force. This is especially true for digital talents with high multi-faceted abilities, capable of knowledge integration and construction, and creatively solving complex problems. Further optimization of the allocation of industry-academia-research resources can have a strong positive impact on optimizing the talent allocation structure and improving the efficiency of talent allocation in Guangdong's manufacturing industry. In this regard, those universities in Guangdong Province should actively innovate talent development models, deepen the integration of industry and education, and improve the innovation and practical abilities of technical personnel. For example, new talent development models such as industry-academia-research cooperation, industry-specific training programs that match personnel to jobs, and the participation of senior enterprise personnel in university education can create a favorable development space for the growth and cultivation of innovative talents. In addition, it is possible to fully utilize diverse educational resources, to emphasize the guiding force of top enterprises and local application-oriented university, actively integrate internal and external training, vocational education, to supporting enterprises to form innovation consortia with universities and research institutions, and other methods to construct a complete digital job competency matrix, strengthen the cultivation and development of various talent teams, and optimize the talent structure eventually.

The significance of digital talent in the digital transformation of the manufacturing industry is becoming increasingly prominent. And the allocation of digital talent needs to consider both technological innovation and industrial transformation. At the same time, it is also necessary to adapt to local conditions, analyze the context of manufacturing development in Guangdong province, fully consider and respect the needs of talent. Finally, it is better to promote the coordinated flow of innovation factors and achieve the optimization of human capital structure to empower the collaborative development of manufacturing innovation cluster in Guangdong province.

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