Green Innovation and Industry and Talent

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With increasing pressure on industry resulting from the need for ecological and environmental protection and sustainable development, green innovation development has gradually become a central issue of concern. With predictions of “peak” carbon, the need for carbon neutrality, and the requirement to pursue sustainable development goals, green innovation is not only important for the high-quality growth of the pharmaceutical industry but also represents an impetus to develop high-level talent. The promotion of the further coordination and integration of industry and talent through green innovation is an important issue in contemporary industrial economic development.

green innovation pharmaceutical industry talent support fusion of industry and talent

1. Introduction

In recent years, a green development approach with the theme of “economic growth, resource conservation and environmental friendliness” has been given a great deal of attention. With increasing pressure on industry resulting from the need for ecological and environmental protection and sustainable development, green innovation development has gradually become a central issue of concern [1]. According to the Health Care Without Harm Report 2021, with the rapid growth of medical treatment globally, the energy consumption generated by medical services, pharmaceutical R&D, and production has increased substantially, with industry carbon emissions now accounting for 4.4% of all carbon emissions [2]. The impact of pharmaceutical manufacturing on ecological degradation and global warming cannot be ignored. In the process of economic development, green innovation resources have significant advantages over other innovation resources. Thus, strengthening the development of green innovation resources and capitalizing fully on green innovation resources are key to promoting industrial transformation and economic development. Globally, highly concentrated industrial clusters, and the employment of highly skilled people, are important features of the development of the pharmaceutical industry. The need to ensure that talent is available to meet the needs of industry reflects contemporary developments and the technical advancement of the industry. In recent years, China has sought to accelerate the matching of available talent to the needs of the pharmaceutical industry. However, the current Chinese pharmaceutical industry is large but not strong, and there is an urgent need for talent resources that match modern industrial developments. A lack of understanding of the green agenda and insufficient independent innovation ability have become major constraints [3]. With predictions of “peak” carbon, the need for carbon neutrality, and the requirement to pursue sustainable development goals, green innovation is not only important for the high-quality growth of the pharmaceutical industry but also represents an impetus to develop high-level talent [4]. Green innovation can enable the saving of resources and protection of the environment based on the characteristics of novelty and value [5]. The promotion of the further coordination and integration of industry and talent through green innovation is an important issue in contemporary industrial economic development. It is important to determine how green innovation can affect the integration of industry and talent, in order to optimize the allocation of industrial resources, enhance the level of scientific and technological innovation, and promote green development.

The economic belt along rivers has long been regarded as a strategic priority for economic development globally. As the largest inland river economic belt in the world, China's Yangtze River Economic Belt (hereafter referred to as the Belt) spans three regions in eastern, central, and western China. It is the largest developable economic belt with the widest influence in China. As an important pharmaceutical production base in China, the Belt shows some distinct advantages in the pharmaceutical industry, which accounted for 40% of the country's GDP in 2020. In the context of global scientific and technological revolution and industrial transformation, as well as the influence from such domestic policy changes as volume-based procurement and the dynamic adjustment made to the national medical insurance catalog, the macro-environment of China's pharmaceutical industry has frequently changed in the direction of development, with green innovation accepted as an important theme of the pharmaceutical industry. Although the Belt stands out in the wave of green innovation due to its superior innovation resources and greater market inclusiveness [6], the green innovation efficiency of the Belt is low, and there is a significant spatial variation in industrial green innovation between different regions [7]. To address this issue, this entry is aimed at analyzing the logic of FIT and the mechanism of influence exerted by green innovation on FIT, evaluating the comprehensive development score of the pharmaceutical industry, talent support, and green innovation through a comprehensive development model and exploring the current state of FIT and the promoting effect of green innovation on FIT in the Belt according to the fusion model. This is expected to enrich the research results on FIT and the impact of green innovation on FIT, thus providing a reference for the further improvement of FIT in the Belt.

2. Green-Innovation-Related Studies

Since the 1980s, when Brundtland put forward a sustainable development model in his report Our Common Future, there has been close attention paid by academics to the issue of economic development and resource and environmental constraints [8]. Since the beginning of the 21st century, such economists as Cooke have attempted to combine green development with innovation systems, with the relevant studies conducted from the perspectives of resource conservation and environmental protection [9][10]. Various issues of performance measurement [11], efficiency measurement [12][13], impact mechanism [14], and policy research on green innovation have become the main areas of research for domestic and international scholars.

As for industrial sustainable development, there is a growing concern about the negative impact of industrial activities on the environment and an increasing commitment made to developing environmentally friendly or less harmful products to reduce environmental stress and achieve sustainability. As indicated by Qu and Liu, green innovation plays a crucial role in this process and is effectively addressing the growing environmental issues and requirements for sustainable industrial development, as green production processes can be adopted by firms to develop the new green products that differentiate themselves from the competitors [15]. According to Jiang et al., the increase in energy consumption can motivate firms to perform green innovation activities, which suggests a positive and bilateral relationship between green innovation and economic sustainability [16]. As revealed by Li et al., green innovation exerted not only a significant influence on corporate sustainability in energy-intensive industry through the structural equation model but also a positive impact on performance both financially and socially [17]. In the view of Fei and Li, the adoption of green innovation technologies in the manufacturing industry is conducive to enhancing sustainability under market mechanisms [18]. Notably, it was discovered that green entrepreneurship plays an important role in the process of increasing green innovation level to enhance sustainability, which allows firms to build awareness and capacity for green innovation directly or indirectly [19]. Besides, green innovation exerts a reverse promotion effect on green entrepreneurship [20]. Therefore, the leading strategic role of green entrepreneurs is to encourage firms to develop the organizational dynamics that not only empower them to produce

as many innovative green products as possible but also promote the development of their green innovation level for the sustainable development of individual firms in the industry [21].

Regarding the performance in industrial development, Bülent and Çankaya conducted regression tests on the data collected from 53 companies in the automotive, chemical, and electronics manufacturing sectors in Turkey, demonstrating that green manufacturing applications had a significant positive impact on environmental and social performance [11]. Relying on technology and innovation, OECD countries and emerging economies explored new ways to accelerate the transition to green development [22]. By analyzing the data from 2005 to 2007 for 110 manufacturing sectors in eight countries—China, Germany, France, Italy, Japan, Korea, the UK, and the US—Sam Fankhauser et al. discovered that green innovation can enhance the competitive advantage of manufacturing among countries [23], but at the same time the path of green technology innovation affected the transformation, and the upgrading of manufacturing varies with the level of environmental regulation. Besides, it was found in the study of Zhang to exert a dampening effect when the level of environmental regulation is low, stimulate the industry to develop rapidly when the level is medium, and move the industry into a low and stable period when the level is high [24][25].

With regard to the impact of talent concentration, there has been a consensus reached within the industry and in enterprise management on the existence of a talent war and the scarcity of talent as a resource [26]. In spite of this, there are fewer scholars who have directly investigated the impact of green innovation on talent concentration, which can be described from two perspectives. One is the impact of green environmental development on talent concentration and mobility. When economic development reaches a certain level, income level rises, people's demand for environmental comfort grows, and the possibility of talent migration or loss increases [27]. Jiang and Li analyzed the panel data collected from 211 Chinese cities to discover the impact of improving the habitat environment on urban innovation, which leads to the results showing that the concentration of high-quality talent can be promoted by the improvement of the living environment and innovation capacity [28]. The other is the effect of innovation on industrial talent clustering. In practice, innovative-oriented cities can produce talent clustering effects, while human clustering and human capital structure levels are capable of producing knowledge and diffusion effects, which is a reaction to regional technological innovation [29][30].

Through literature review, it can be found that there is plenty of literature focusing on the relationship between green innovation and industrial development quality. However, the connotation and extension of industry are very broad, with only a few studies relating directly to the pharmaceutical industry. Besides, when it comes to the research contents, the research on the relationship between green innovation and industrial development and talent development focused mostly on one-way impact analysis, which results in a shortage of the research on the impact of green innovation on the fusion of industry and talent. Thus, this entry is expected to enrich the research on the FIT and green innovation and to reveal the impact of green innovation on the FIT in the pharmaceutical manufacturing industry through quantitative empirical evidence, thus contributing ideas to further improving the level of FIT in China's Yangtze River Economic Belt.

3. Logic of FIT and Mechanism of Green Innovation's Influence on the FIT

3.1. Logic of the FIT

According to the theory of synergy, there is mutual influence and cooperation between various open systems with different properties in the environment [31]. In terms of regional economic development, industry-related and talent-related indicators are integrated to constitute a

consortium through the mutual promotion of mutual constraint methods, with the coupling of industry and talent in the regional economy as the form or relationship that works together. The coupling suggests a strong correlation between two or more subsystems, as the subsystems are coordinated with each other, promote each other, or constrain each other [32]. After a unity is reached for the development score and coordination level of industry and talent, the coupling relationship becomes closer, which is referred to as fusion. In this entry, the pharmaceutical industry is represented by three dimensions: industrial scale, industrial efficiency, and industrial growth potential, with talent support divided into talent scale, talent structure, and talent effectiveness. **Figure 1** shows the logic of FIT and the mechanism of the impact made by green innovation on the FIT.

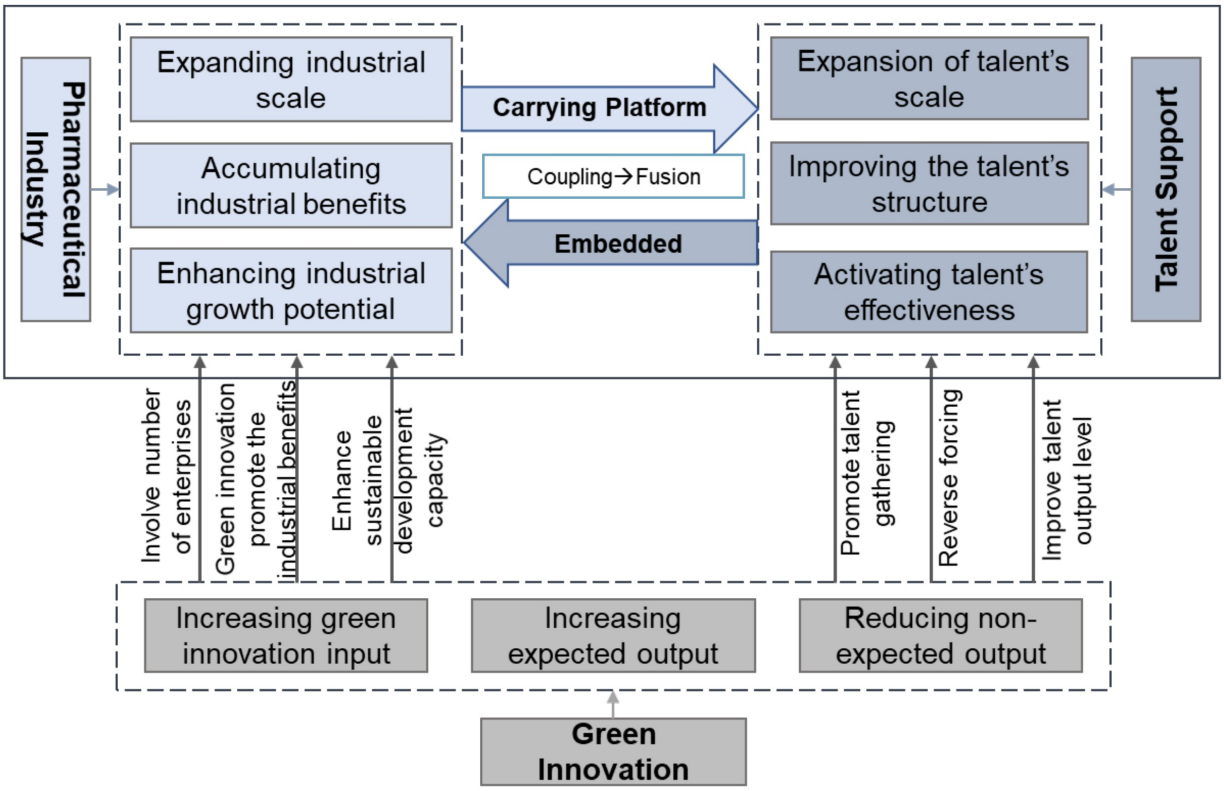

Figure 1. The logic of FIT and the mechanism of green innovation's influence on the FIT.

Under the FIT, the development, upgrading, and transformation of industry present a powerful platform for the concentration and development of talent resources [33]. In the meantime, the essence of talent development is embedded in industry, providing a solid supporting force for industrial development. On the one hand, from raw materials to product manufacturing, it is further extended to the upstream basic research and downstream market expansion. As every session of industrial development is inseparable from the support of talent, so the development and upgrading of the industry can be considered as the process of constantly investing in human resources for intellectual breakthroughs. On the other hand, the expansion of industrial scale and the accumulation of benefits provide abundant funds and comprehensive technical support for talent cultivation. As a result, there is an increase in returns, which induces the continuous expansion of talent scale and the optimization of talent structure and effectiveness. In addition, the stability and upgrading of industrial development show a new trend toward the high level and quality of talent support, which drives the optimization of talent structure and the improvement of talent effectiveness on a continued basis.

3.2. Mechanism of Green Innovation's Impact on FIT

In this entry, green innovation consists of green innovation input, expected output, and non-expected output. To achieve the purpose of promoting further integration of industry and talent, it

is necessary to reinforce the carrying role of industry and enhance the supporting force of talent by increasing green innovation input and expected output and by reducing non-expected output.

As for the influence of green innovation on solidifying the industrial carrying role, it is mainly reflected in three aspects: expanding industrial scale, accumulating industrial benefits, and enhancing industrial growth potential. Firstly, promoting green innovation is not confined to reducing the consumption of resource inputs and pollution emissions in the production process. Instead, the emphasis should also be placed on increasing the demand for pollution control technologies, clean production processes, green intelligent equipment, and so on. This requires green technology innovation to be practiced in each enterprise, which in turn prompts enterprises to improve their R&D effectiveness constantly. Moreover, the diffusion of innovative technologies will involve more similar enterprises in transactions and cooperation, which is conducive to achieving industrial scale [34]. Secondly, improving the quality of R&D can help expand the innovative output of the industry and increase the industrial benefits continuously. Finally, green innovation can not only improve the material input and innovation environment of industrial innovation development but also promote the recyclability and sustainable development of industry. As a common theme of global economic development, the practice of the sustainable development concept will further drive the growth of industrial potential [35].

The influence of green innovation on enhancing the talent support force is reflected in the expansion of talent scale, as well as the improvement of talent structure and effectiveness. On the one hand, the economic and industrial development shows the trend of innovation, and the clustering of innovation talent is essential for innovation activities, which means the success or failure of innovation depends on the growth of innovative talents. Therefore, due to the enhancement of innovation capability, the talent team is required to meet the demand for innovation development by constantly optimizing and adjusting the quantity and structure of talents. On the other hand, promoting innovation development is conducive to creating a positive innovation environment and promoting the free flow of scientific and technological factors. This is a prerequisite to promoting the positive connection between the scale of innovation input and the level of talent output, ensuring the effectiveness of talent transformation and raising the overall level of talent support.

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