

Exploring the Deep Integration Model of Industry and Education, Research on the Construction of Modern Industrial Colleges in Universities

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Abstract

As a key measure under China's industry-education integration strategy, the construction of modern industrial colleges is an important part of promoting the high-quality development of universities. This innovative reform form aims to meet the urgent needs of applied universities for talent training, and to provide strong support for the cultivation of high-quality applied talents that meet market demand by building a close industry-education integration mechanism. This paper aims to deeply explore the construction and development of industrial colleges, especially how industrial colleges can become a key bridge connecting higher education and industrial development in the context of deep integration of industry and education. Through the analysis of industrial colleges, the important role of industrial colleges in promoting industry-education integration, responding to industrial upgrading and transformation, and alleviating the contradiction between talent supply and demand is revealed, and corresponding countermeasures and suggestions are put forward for the challenges faced in the construction process, aiming to provide practical guidance and reference for relevant policy makers and educators.

Keywords

Industrial Colleges, Industry-education integration strategy.

1. Introduction

With the rapid development of globalization and informatization, human society is undergoing unprecedented changes. In this era, industrial transformation and upgrading has become an important driving force for the sustained and healthy development of economies in various countries. Both developed and developing countries are actively exploring the path of industrial upgrading in order to gain a favorable position in global competition. Industrial transformation and upgrading not only involves technological innovation and industrial restructuring, but also a profound economic and social change. It requires the education system to be closely connected with industrial development to jointly cultivate high-quality talents that meet the needs of the new era[1].

Under this macro background, the relationship between higher education and industrial development is becoming increasingly close, and the interaction and mutual influence between the two are becoming more and more significant. On the one hand, as an important base for talent cultivation and scientific and technological innovation, higher education provides a continuous source of knowledge, technology and talent support for industrial development. On the other hand, industrial development also provides a broad practice stage and rich educational resources for higher education, promoting the updating of educational content and the transformation of educational methods. Therefore, how to achieve the deep integration of

higher education and industrial development has become the key to improving education quality and promoting industrial upgrading[2][3].

Industry-education integration, as an innovative educational concept and practice model, came into being in this context. It emphasizes the organic combination of education and industry, and through the establishment of a close cooperative relationship, realizes resource sharing and complementary advantages, and jointly promotes the comprehensive improvement of talent training, technological innovation and social services. Industry-education integration can not only improve the pertinence and effectiveness of education, make educational content closer to industrial needs, but also promote the transformation, upgrading and innovative development of the industry, and inject new vitality into economic and social development.

Under the guidance of this concept, industrial colleges have emerged as a new type of organizational form and have become an important force in promoting higher education reform and industrial upgrading. The construction and development of industrial colleges not only concerns the quality and efficiency of higher education, but also directly relates to the long-term development of the national economy and the improvement of competitiveness. Therefore, the construction and development of industrial colleges are of great strategic significance. On the one hand, the construction of industrial colleges can promote the reform and innovation of the higher education system. By deepening the integration of industry and education, industrial colleges can break the shackles of traditional education models, build a talent training system oriented by market demand, and achieve close connection between educational content and industrial needs. At the same time, industrial colleges can also promote changes in educational methods, introduce flexible and diverse teaching models such as project-based and work-study alternation, and stimulate students' learning interest and innovation potential. On the other hand, the development of industrial colleges can promote industrial upgrading and economic structure optimization. By strengthening cooperation with enterprises, scientific research institutions and other industries, industrial colleges can cultivate high-quality talents who have both solid theoretical knowledge and proficiency in practical operations, providing strong talent guarantee for industrial development. At the same time, industrial colleges can also promote technological innovation and transformation of results, promote the deep integration of industrial chains and innovation chains, and provide new impetus for industrial upgrading and economic structure optimization.

In short, the construction and development of industrial colleges has very important strategic significance in promoting higher education reform and industrial upgrading. In the future, with the deepening of globalization and informatization, industrial colleges will usher in broader development prospects and more important historical missions.

2. Background and Significance

2.1. Policy Background of the Integration of Industry and Education

In China, the exploration of industry-education integration began in the early 1980s, when China's economic reform and opening up had just started, and colleges and universities began to try to cooperate with enterprises, mainly in the form of internships and training opportunities provided by enterprises. With the deepening of reform and opening up, the Chinese government gradually realized the importance of industry-education integration and began to issue a series of policy documents to support the cooperation between colleges and enterprises. From the late 1980s to the early 1990s, the government clearly put forward the concept of "school-enterprise cooperation" and increased its support for school-enterprise cooperation. Entering the 21st century, the government further increased its support for industry-education integration, put forward the concepts of "combining industry, academia and research", "school-enterprise cooperation" and "enterprise as the main body", and issued a

series of supporting policies, including encouraging enterprises to invest in education and providing preferential policies in taxation and other aspects. During the planning period, the government continued to increase its support for industry-education integration, encouraged colleges and universities to carry out in-depth cooperation with enterprises, and promoted technological innovation and industrial upgrading.

The policy development of industry-education integration abroad has also gone through a similar process, from encouraging enterprises to participate in education, to promoting school-enterprise cooperation, the integration of industry, academia and research, to emphasizing the deep integration of innovation, entrepreneurship and talent training. Different countries and regions have formulated corresponding industry-education integration policies based on their own needs to promote the coordinated development of education and industry.

The core of the industry-education integration policy is to promote the close connection and organic interaction of the education chain, talent chain, industrial chain and innovation chain through the four-party linkage mechanism of government guidance, enterprise participation, school initiative and social coordination. The government should play the role of macro-control and strategic planning, and guide and encourage enterprises to deeply participate in the school-running process of vocational education and higher education through incentives such as financial subsidies, tax incentives, and project support; enterprises should actively participate in key links such as professional setting, curriculum development, internships, and technology research and development based on their own development needs; schools need to actively adapt to industrial development trends, optimize professional structures, innovate talent training models, and strengthen in-depth cooperation with enterprises, industries and social organizations[4]; social organizations should also actively participate in the industry-education integration process and give play to their unique advantages in industry guidance, talent demand forecasting, and professional qualification certification.

The implementation of the industry-education integration policy has achieved remarkable results, which are mainly reflected in the following aspects: First, it has promoted the connection between supply and demand of talent training, and improved the employment rate of graduates and the employment satisfaction of enterprises; second, it has improved the level of "Double Qualified Teacher" team construction, and improved the teaching quality and practicality of education; third, it has promoted collaborative innovation among industry, academia, research and application, accelerated the pace of technological innovation and the industrialization process of scientific and technological achievements; fourth, it has increased the employment competitiveness of graduates and achieved a virtuous interaction between education and employment.

The role of the industry-education integration policy in promoting the construction of industrial colleges is also multi-dimensional and far-reaching. From the perspective of policy support and financial guarantees, the government has provided a solid policy foundation and a clear development direction for the construction of industrial colleges, and has provided necessary financial support for the construction of industrial colleges through various forms of financial support such as the establishment of special funds and tax incentives. At the same time, the policy has also promoted the improvement of the school-enterprise cooperation mechanism, promoted resource sharing, complementary advantages and collaborative innovation. In addition, the policy also encourages universities to cooperate with enterprises to open dual degree, dual certificate and other projects, which has promoted the development of talent training models in a diversified and compound direction, and enhanced the visibility and influence of industrial colleges.

In the future, with the deepening of globalization and informatization and the continuous development and changes of the economy and society, the industry-education integration policy will continue to play an important role and be continuously improved and optimized.

The government, enterprises, schools and social organizations should work together to promote the in-depth implementation of the industry-education integration policy and the rapid development of industrial colleges, and provide strong talent guarantee and intellectual support for economic and social development and industrial transformation and upgrading.

2.2. The necessity of the construction of the industrial college

In the context of global economic integration and accelerated industrial upgrading, the construction of industrial colleges is particularly necessary, and its importance is highlighted from multiple perspectives such as market demand, educational innovation, and industrial upgrading. From the perspective of market demand, with the continuous advancement of science and technology and the rapid development of industry, the market demand for high-quality technical and skilled personnel is increasingly strong, and industrial colleges are an important platform for cultivating such talents. Through in-depth cooperation with enterprises, industrial colleges can accurately grasp market demand, optimize curriculum settings and teaching methods, and cultivate high-quality technical and skilled personnel with both solid theoretical foundation and rich practical experience to meet the urgent market demand for talents. From the perspective of educational innovation[5], the construction of industrial colleges has promoted the innovation and transformation of educational models. Traditional education models often focus on the imparting of theoretical knowledge, while industrial colleges pay more attention to the cultivation of practical and innovative abilities. Through cooperation with enterprises to carry out practical teaching, project research and development and other activities, students' innovative thinking and practical ability are stimulated, and the quality of talent training is improved. In addition, the construction of industrial colleges is also of great significance for industrial upgrading. Through in-depth cooperation with enterprises and scientific research institutions, the Industrial College can deeply understand the industrial development trends and technological innovation needs, promote the in-depth development of industry-university-research cooperation, accelerate the transformation and application of scientific and technological achievements, and provide strong support for industrial upgrading. At the same time, the Industrial College can also promote the development of the regional economy. Through talent training and technological innovation, it can drive the development of education, science and technology, culture and other industries in the surrounding areas, form industrial clusters and new growth points for the regional economy, and inject strong impetus into the sustainable and healthy development of the regional economy.

2.3. The significance of the building of the industrial college

The construction of industrial colleges has far-reaching significance in the current context of social and economic development. It is not only a profound change within the education system, but also an important force to promote industrial upgrading, promote regional economic development and enhance the overall innovation capacity of society. First of all, the construction of industrial colleges breaks the limitations of the traditional education model and realizes the deep integration of education and industry. Through cooperation with enterprises, industries, scientific research institutions and other parties, industrial colleges can accurately meet market demand, optimize curriculum settings and teaching methods, and cultivate high-quality technical and skilled talents with both solid theoretical foundation and rich practical experience. This talent training model not only meets the demand for talents in industrial development, but also provides a broader space for students' employment and career development. Secondly, the construction of industrial colleges has a significant driving effect on industrial upgrading and regional economic development.[6] Through close cooperation with enterprises, industrial colleges can deeply understand the development trends of the industry and the needs of technological innovation, and promote the in-depth development of industry-university-research cooperation. This not only accelerates the transformation and

application of scientific and technological achievements, provides strong support for industrial upgrading, but also promotes the agglomeration and coordinated development of industries in the region, forming a benign interaction between the industrial chain and the innovation chain. This interaction not only enhances the competitiveness of the regional economy, but also injects new vitality into the sustained and healthy development of the regional economy. Finally, the construction of industrial colleges is also of great significance for improving the overall innovation capacity of society. By building an industry-university-research cooperation platform, industrial colleges have promoted the gathering and sharing of innovative resources and promoted scientific and technological innovation and achievement transformation. This not only provides a continuous source of innovative power for industrial development, but also provides strong support for the overall progress of social economy. At the same time, industrial colleges also focus on cultivating students' innovative awareness and practical ability, and cultivate more high-quality talents with innovative spirit and practical ability for the innovative development of society. In short, the construction of industrial colleges has far-reaching significance in the current social and economic development. It is not only a profound change within the education system, but also an important force to promote industrial upgrading, promote regional economic development and enhance the overall innovation capacity of society.

3. Challenges and Countermeasures Facing the Construction of Industrial College

3.1. Challenges

The latest policy document clearly states the core mission of the Modern Industry College, which is to focus on the key challenges of industrial technological innovation and carry out collaborative innovation activities. This initiative aims to accelerate the effective flow and transformation of university knowledge resources so that it can directly benefit regional economic development. At the same time, the Modern Industry College is also committed to promoting the transformation of applied scientific research into practical applications, ensuring that scientific research results can be quickly transformed into productivity, thereby effectively promoting the transformation, upgrading and sustainable development of the industry. [7] However, during its construction, it faces a series of challenges, mainly including issues such as policy environment, capital investment, faculty strength, and school-enterprise cooperation mechanism.

3.1.1. Policy environment

The policy environment is an important factor affecting the construction of industrial colleges. Although a series of policy documents encouraging the integration of industry and education have been issued at the national level, in actual operation, these policies often lack specific implementation details and supporting measures, resulting in the policy effects being difficult to fully exert. For example, for key issues such as the legal status, ownership, and benefit distribution of industrial colleges, the existing policy documents have not yet given clear definitions and solutions, which to a certain extent restricts the standardization and sustainable development of industrial colleges. In addition, there is a certain lag and difference in the implementation of policies at the local level. Different regions attach different importance to and support the construction of industrial colleges, resulting in uneven development levels and results of industrial colleges in various places. Therefore, how to formulate specific and feasible implementation details and supporting policies under the macro-guidance of national policies and in combination with local realities has become a major challenge facing the construction of industrial colleges.

3.1.2. Capital input

Funding is an important guarantee for the construction of industrial colleges. However, in actual operation, the funding sources of industrial colleges are often relatively single, mainly relying on government grants and school self-raised funds. This funding structure is not only difficult to meet the needs of the long-term development of industrial colleges, but may also lead to inefficient use of funds and waste of resources. At the same time, since the construction of industrial colleges involves multiple subjects, including schools, enterprises, industry associations, local governments, etc., how to coordinate the interests of all parties and share the capital investment is also a major problem facing the construction of industrial colleges. Especially in the current economic situation, enterprises are not very enthusiastic about participating in the construction of industrial colleges, and their willingness to invest funds is not strong, which further aggravates the problem of funding shortages in industrial colleges.

3.1.3. Teaching staff

Teaching staff is the key to the construction of industrial colleges. However, the current teaching staff of industrial colleges generally has problems such as unreasonable structure and insufficient practical ability. On the one hand, school teachers often lack corporate practical experience and find it difficult to effectively combine theoretical knowledge with practical skills; on the other hand, although corporate teachers have rich practical experience, their teaching ability is relatively weak and it is difficult for them to adapt to the teaching requirements of the school. In addition, since the construction of industrial colleges involves multiple subject areas, how to introduce and train teachers with interdisciplinary backgrounds and innovative capabilities is also a major challenge facing the construction of industrial colleges. Especially in the current context of the popularization of higher education, how to attract and retain outstanding talents and improve the overall quality and teaching level of the teaching staff has become an urgent problem to be solved in the construction of industrial colleges.

3.1.4. School-enterprise cooperation mechanism

The school-enterprise cooperation mechanism is the core of the construction of industrial colleges. However, in actual operation, school-enterprise cooperation often has problems such as weak willingness to cooperate, shallow cooperation level, and poor cooperation effect. On the one hand, enterprises are not very enthusiastic about participating in the construction of industrial colleges and lack the willingness and motivation for long-term cooperation [3]; on the other hand, the cooperation between schools and enterprises often remains at a superficial level, lacking in-depth cooperation content and effective cooperation mechanisms. In addition, due to the different management systems and operating mechanisms of schools and enterprises, how to coordinate the interests of both parties and establish effective cooperation mechanisms and communication channels is also a major problem faced by the construction of industrial colleges. Especially under the current economic situation, how to break the bottleneck of "introducing enterprises into schools" and achieve mutual benefit and win-win results between schools and enterprises has become an urgent problem to be solved in the construction of industrial colleges.

In summary, the construction of industrial colleges faces many challenges in terms of policy environment, capital investment, faculty, school-enterprise cooperation mechanism, etc. In order to promote the healthy development of industrial colleges, the government, schools, enterprises and other parties need to work together to strengthen policy guidance and support, increase capital investment, optimize the structure of the faculty, deepen the school-enterprise cooperation mechanism, and jointly create a high-quality technical and skilled talent training platform that meets the needs of industrial development.

3.2. The countermeasures of industrial college construction

As an important platform for promoting the deep integration of industry and education and cultivating high-quality technical and skilled talents, the construction and development of industrial colleges face many challenges. In response to these challenges, this paper proposes the following countermeasures and suggestions, aiming to improve the policy environment, increase financial investment, strengthen the construction of the teaching staff, deepen the school-enterprise cooperation mechanism, and promote the healthy development of industrial colleges.

3.2.1. Improve the policy environment

Refine policy clauses: The state should issue more specific policy implementation rules to clarify key issues such as the legal status, ownership, and profit distribution of industrial colleges, and provide institutional guarantees for the standardized development of industrial colleges. **Strengthen policy implementation:** Local governments should actively respond to national policies, formulate specific implementation plans and supporting policies based on local realities, and ensure the effective implementation of policies. At the same time, a policy implementation supervision mechanism should be established to conduct regular evaluation and feedback on policy implementation, and adjust and optimize policies in a timely manner. **Optimize the policy environment:** Create a policy environment conducive to the development of industrial colleges, including policy support in tax incentives, land use, talent introduction, etc., to reduce the construction and operation costs of industrial colleges and improve their market competitiveness.

3.2.2. Increasing capital input

Diversify funding sources: Encourage social capital to participate in the construction of industrial colleges, and broaden the funding sources of industrial colleges through government-guided funds, social capital investment, etc. **Optimize the use of funds:** Establish a scientific fund management mechanism, improve the efficiency of fund use, and ensure that funds are used for infrastructure construction, faculty team building, practical teaching, etc. of industrial colleges. **Strengthen fund supervision:** Establish and improve the fund supervision system, conduct regular audits and assessments on the use of funds for industrial colleges, and ensure the legality and compliance of fund use.

3.2.3. Strengthen the construction of the teaching staff

Introduce outstanding talents: Establish a flexible talent introduction mechanism to attract outstanding talents with rich practical experience and innovation ability to join the faculty of the Industrial College. **Improve teaching ability:** Strengthen the exchange and cooperation of teachers between schools and enterprises, and improve the practical ability and teaching level of school teachers through enterprise practice, teaching seminars, etc. **Establish an incentive mechanism:** Establish a scientific incentive mechanism to commend and reward outstanding teachers to stimulate their work enthusiasm and creativity.

3.2.4. Deepening the school-enterprise cooperation mechanism

Establish a cooperation platform: Build a school-enterprise cooperation platform to promote information exchange and cooperation between schools and enterprises, jointly formulate talent training programs, and carry out practical teaching and scientific research projects. **Deepen the content of cooperation:** Expand the scope of school-enterprise cooperation and deepen the content of cooperation, including jointly building training bases, jointly carrying out technical research and development, and jointly cultivating innovative and entrepreneurial talents. **Establish a long-term mechanism:** Establish a long-term mechanism for school-enterprise cooperation, clarify the rights and obligations of both parties, and ensure the stability and sustainability of cooperation. At the same time, establish a regular communication

and evaluation mechanism to promptly resolve problems that arise during the cooperation process.

In short, in response to the challenges faced by the construction of industrial colleges, it is necessary to take practical and effective measures from the aspects of policy environment, capital investment, faculty team construction, school-enterprise cooperation mechanism, etc. to promote the healthy development of industrial colleges. Through the joint efforts of all parties, we will create a high-quality technical and skilled talent training platform that meets the needs of industrial development, and provide strong talent support and intellectual guarantee for economic and social development.

4. Conclusion

Driven by globalization and informatization, industrial transformation and upgrading have become the key to economic development. In this context, the integration of higher education and industrial development has become increasingly close, and the integration of industry and education has become an important strategy to improve the quality of education and accelerate industrial upgrading. As a new organizational form of industry-education integration, industrial colleges are becoming a bridge connecting the two, which is of great significance to promoting educational innovation and industrial upgrading. Governments of various countries attach great importance to the integration of industry and education, and have introduced policies and measures to provide strong support and point out the direction for the construction of industrial colleges. Changes in market demand, urgent needs for educational innovation and industrial upgrading have made the construction of industrial colleges particularly necessary. However, the construction of industrial colleges faces many challenges, such as the complexity of the policy environment, limited capital investment, insufficient faculty, and imperfect school-enterprise cooperation mechanisms.

To meet these challenges, this article proposes countermeasures: refine policy terms, strengthen enforcement, and optimize the policy environment; broaden funding sources, optimize the use structure, and strengthen supervision; introduce outstanding talents, improve teaching capabilities, and establish incentive mechanisms; establish a cooperation platform, deepen cooperation content, and ensure the stability of cooperation. The construction and development of industrial colleges is a long way to go, and they will shoulder heavier missions and responsibilities. We will continue to explore new models of deep integration of industry and education, strengthen international exchanges and cooperation, and promote the international development of industrial colleges.

In short, the construction and development of industrial colleges is an important measure to promote higher education reform and industrial upgrading. In the face of future challenges and opportunities, we will adhere to the core concept of industry-education integration, promote industrial colleges to achieve more significant results, and contribute wisdom and strength to economic and social development.

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