Adult and Higher Education (2024)
Clausius Scientific Press, Canada

DOI: 10.23977/aduhe.2024.060618
ISSN 2523-5826 Vol. 6 Num. 6

A new model of modern industrial colleges in application-oriented universities, based on the theory of harmony and symbiosis

Jialiang Pan[1,a,*], Dong Kong[1,b], Can Chen[1,c], Yilei Jiao[1,d], Wenqi Zhou[1,e]

[1]School of Business and Management, Jiaxing Nanhu University, Jiaxing, China
[a]220055@jxnhu.edu.cn, [b]201292@jxnhu.edu.cn, [c]220086@jxnhu.edu.cn, [d]220158@jxnhu.edu.cn, [e]207080@jxnhu.edu.cn
[*]Corresponding author

Keywords: Harmony and symbiosis theory; Industrial College; Applied universities

Abstract: Here we study the sustainable and healthy development of local application-oriented undergraduate colleges and universities and the development experience of industrial colleges in the world. Accordingly, we propose a model of "school-enterprise-association co-construction of modern industrial colleges." The model establishes the long-term mechanism of school-enterprise-association cooperation, constructs the characteristic curriculum system and evaluation system of the three-subject cooperation mode.The model realizes the innovation of the co-construction subject of industrial colleges, promotes the rapid growth of "double-qualified" teaching staff. And it provides a reference for the construction of modern industrial colleges of the school-enterprise-association cooperation in application-oriented undergraduate colleges.

1. Introduction

The high-quality development of application-oriented universities is an important part of higher education, and the modern industrial college is a new organization for the integration of industry and education into application-oriented universities. Based on the theory of harmony and symbiosis, we propose a model for modern industrial colleges in application-oriented universities, as well as a harmony and symbiosis system of modern industrial colleges from three dimensions: Harmonious symbiotic subjects, harmonious symbiotic models, and harmonious symbiotic environments. The establishment of the new model will accelerate the organic connection of education chain, talent chain, industry chain and innovation chain, and promote the high-quality development of modern industrial colleges.

The word *hehe*, meaning harmony, comes from Guoyu and Guanzi. Harmony means that different things and different viewpoints complement each other, which is the law of the generation of new things. "Harmony" and "integration" are "complementary to each other, complementary to each other, coordinated and unified, and harmonious progress." "Symbiosis" refers to the relationship of mutual assistance and mutual benefit between different organisms and different subjects, which are interdependent and shared in a common environment. In a symbiotic

relationship, each party gains benefits and maintains a stable relationship. This is characterized by the relevance of interdependence and the stability of the relationship. “Harmony and symbiosis” advocate for the harmonious development, symbiosis, and co-prosperity of enterprises, society, countries, and the environment, aiming to advocate cooperation with allies and competitors, sharing resources, and the benefit of harmony, as well as to complement each other with differences, complement each other with opposites, coordinate and unify, advance harmoniously, and develop together.

2. The Current Situation of the Development of Mixed Industrial Colleges in the World

Scholars globally have studied school-enterprise cooperation for a long time. Canada explored it in 1957. The results showed that school-enterprise cooperation helped schools significantly improve the quality of personnel training. Subsequently, more countries began to increasingly follow this model; accordingly, most scholars focused on the connotation of school-enterprise cooperation, the training mode of cooperative education, the cooperative relationship, and the motive force of cooperation. Thus, the research direction was more to explore the role of the government in school-enterprise cooperation[1]. The results indicate that school-enterprise cooperation can help schools and enterprises achieve a holistic symbiotic advantage in the process of training talent together[2].

Presently, the primary models of industrial colleges are the “sandwich” model in Britain, the “cooperative education” model in the United States, and the “industry-university cooperation” model in Japan. The “cooperative education” model of industry-education collaboration in the United States has developed to cover more than one-third of the universities nationwide.

China’s research on school-enterprise cooperation is also rich. Since 2005, the State Council has issued a series of documents on education reform and since 2017, more scholars have been studying and discussed this topic[3]. Various scholars have conducted research from the perspectives of the connotation of school-enterprise cooperation, collaborative education, and comprehensive construction , and they have produced a lot of research results[4]. As a typical form of deepening the integration of industry and education and school-enterprise cooperation, industrial college has been received more attention from researchers in recent years[5], enabling an effective exploration of industry-university cooperation in training technical and skilled talents, as well as a new form of school-running organization to promote the deep integration of production, learning, research, transfer and application[6].

Industrial colleges have become a research hot spot of industry-education integration and collaborative education in China. This can promote the deep integration of the education chain and industry chain in capital, interests, structure, mechanism, and many other aspects. The current development situation in China is as follows: industrial colleges have gone deep into all aspects of personnel training in colleges and universities; in terms of collaborative education, industrial colleges embody the “chain-to-chain” docking of specialty and industry, and modern industrial colleges are one of the active research topics in the field of university development. However, scholars globally have mostly focused on the cooperation between schools and enterprises, leaving relatively brief discussion on the new model of the three main bodies of schools, councils, and enterprises.

Of 2,738 universities, 1,152 are local undergraduate universities in China. In December 2021, the Ministry of Education and the Ministry of Industry and Information Technology announced the list of the first batch of state-level modern industrial colleges to promote the construction of modern industrial colleges. Notably, modern industrial colleges focusing on application functions have become the primary development direction of local undergraduate colleges; moreover, the

co-construction of two main bodies of school-enterprise cooperation is the fundamental mode of the development of modern industrial colleges. There are 886 national trade chambers of commerce in China, which have become a bridge between local governments and market enterprises. The existing cooperation between chambers of commerce and universities is more as research institutes, which hinders the chambers of commerce advantages. Based on the theory of harmony and symbiosis, we studied the new development model of modern industrial colleges in application-oriented universities and propose the operation strategy and countermeasure path of a new model of "school-enterprise-association co-construction of modern industrial colleges" in local application-oriented undergraduate universities.

3. The Construction Background of the "School-Enterprise-Association" Co-construction of Mixed Industrial College

In December 2017, the General Office of the State Council of China issued "Several Opinions on Deepening the Integration of Industry and Education." In light of this, local application-oriented undergraduate colleges and universities actively promote the co-construction of modern industrial colleges, carry out multi-school-enterprise cooperation, and focus on the development of modern industrial colleges with application functions. From the perspective of the combination of co-builders, current industrial colleges can be divided into the following categories.

"School-enterprise" industrial colleges are jointly built by universities and leading enterprises in the industry.

"School-association" industrial colleges are jointly established by universities and trade associations.

"School-government" industrial colleges are jointly established by universities and local governments.

"School-Government-Enterprise" industrial colleges are jointly built by universities, local governments, and leading enterprises in the industry.

Industrial colleges are generally established in the mode of diversified investment, collaborative governance, value creation, and achievement sharing, and "making the cake bigger" and "dividing the cake well" are the main driving forces for the cross-border symbiosis of the co-construction subjects. To make the cake bigger, the value of talent, technology, capital, social benefits, and other elements can be increased by integrating the participating resource elements. In addition, by balancing and meeting the interest demands among the co-construction subjects, we can divide the cake well. In the process of co-construction of modern industrial colleges, government organizations should promote regional economic development and gather industrial talents; colleges and universities should improve the comprehensive strength of schools through resource integration; industry organizations should enhance their social influence and industry control; and enterprises should improve the core competitiveness and profitability of organizations. However, in the actual process of co-construction, some negative factors often arise, such as an uncertain transformation of academic achievements, periodicity in personnel training, complex technological innovation, long-term accumulation of social reputation, and instability of expected returns. A realistic problem facing the construction and operation of industrial colleges in colleges and universities is that the enthusiasm of industry enterprises to participate is low and that most industrial colleges are built on university campuses. As such, introducing enterprises into schools is still the mainstream mode of school-enterprise cooperation. However, industrial colleges are far away from the real industrial environment, which leads to the high cost of sharing industrial resources with industrial colleges, thus reducing their enthusiasm to participate in the construction and operation of industrial colleges. In addition, the identification of industrial colleges and the lack of evaluation criteria for operational

quality restrict the healthy development of industrial colleges, which could lead to the integration of industry and education. Against the background of the industrial-college industry, the mode of "school, enterprise, and association" co-construction of modern industrial colleges based on the theory of harmony and symbiosis thus emerges based on necessity.

4. Co-construction of industrial colleges by the three subjects of universities, enterprises, and society, based on the theory of harmonious coexistence

4.1 The symbiotic elements of the three main bodies of harmony and symbiosis in building industrial colleges

Based on the theory of harmony and symbiosis, the symbiotic elements of the three-subject co-construction of industrial colleges include four elements: "symbiotic unit, symbiotic mode, symbiotic interface and symbiotic environment," each of which play an important role in the symbiotic process and mechanism of the three-subject co-construction of industrial colleges.

4.1.1 Symbiotic unit

A symbiotic unit refers to the energy production and exchange unit that constitutes the symbiotic relationship within the symbiotic system. The resource complementarity between symbiotic units is the basis and prerequisite for the formation of a symbiotic relationship. The material, energy, information, and other symbiotic units in the symbiosis circulate and exchange among the symbiotic units. In the process of co-construction of modern industrial colleges, symbiotic units constantly exchange and flow funds, resources, data, information, technology, and talent through interaction, forming a strategic cooperative relationship. These units make up for each other's functional deficiencies and establish a symbiotic relationship of interdependence and complementarity.

4.1.2 Symbiosis mode

The symbiosis mode refers to the symbiotic relationship formed by the interaction of symbiotic units, which can be divided into "parasitic, partial symbiosis, symmetrical and reciprocal symbiosis, and harmonious symbiosis" according to the symbiotic mode. In the process of co-construction of modern industrial colleges, the parasitic mode is excluded because of its low specificity and unstable symbiotic interface, which limits the development of symbiotic relationship. The partial-benefit symbiosis mode is not conducive to the co-construction and development of industrial colleges, and it is only biased toward the development of unilateral symbiotic units, which cannot achieve a holistic symbiotic advantage; the symmetrical reciprocal symbiosis is a better state for the symbiotic mode, which needs to achieve the balance of power, responsibility, and interests, with a clear division of labor and mutual benefit among symbiotic units. Relatively, harmony and symbiosis (1) offer the ideal model for the co-construction of modern industrial colleges; (2) achieve the coordination and cooperation between the symbiotic units; (3) enable resource sharing; and (4) benefit from harmony. In addition, harmony and symbiosis complement each other with their differences, coordinate and unify, and advance and develop together harmoniously.

4.1.3 Symbiotic interface

The symbiotic interface—a carrier platform for the realization of material and information elements between the symbiotic units—in modern industrial colleges is composed of application-oriented universities, industry associations, enterprises, and government organizations. To achieve the ideal results of the co-construction of industrial colleges by the three main bodies of

"school, enterprise, and association," it is necessary for each symbiotic unit to work together, establish effective platform operation rules of mutual restriction, form a strategic combination of various symbiotic interfaces, and achieve the ideal results of the co-construction of industrial colleges by the three main bodies of "school, enterprise, and association."

4.1.4 Symbiotic environment

A symbiosis environment is the external environment of a symbiosis unit and also the external condition of the existence and development of symbiosis platform. The symbiotic environment includes the "industry policy environment, capital, equipment and technology environment, personnel training environment." The ideal symbiosis environment should minimize the internal friction between the symbiotic units in the symbiosis body, and each unit should have a symbiotic competitive advantage over each unit outside the symbiont.

Based on the above analysis of the connotation, characteristics, and elements of the symbiosis of industrial colleges jointly built by the three main bodies of "school, enterprise and association," the present study constructed a system framework of the symbiosis of industrial colleges from the perspective of the theory of symbiosis. This is a complex system integration, in which the elements are interrelated, interactive, and interdependent. The symbiotic unit is the basic condition for the symbiotic mode, symbiotic interface, and symbiotic environment to play their roles. Furthermore, the symbiotic mode is the concrete embodiment of the relationship between symbiotic units. The degree of complementary advantages of symbiotic units and the symbiotic environment and interface comprehensively affect the strengths and weaknesses of each symbiotic unit. Moreover, the symbiotic interface is the platform for the realization of co-construction of industrial colleges, which needs the support of symbiotic units, environments, and modes. The symbiotic environment is the objective condition for the sustainable development of the harmonious system of modern industrial colleges. Without the support of good political, policy, and technological environments, the symbiotic unit, interface, and mode lose the basis of co-construction. The symbiotic unit is the foundation, the symbiotic mode is the core, the symbiotic interface is the key, and the symbiotic environment is an important condition in the co-construction of industrial colleges and symbiotic systems by the three main bodies of "school, enterprise, and association." The symbiotic unit, mode, interface, and environment are organically integrated, coordinated, and unified to facilitate harmonious and common development.

Organizational innovation is an inevitable way for local application-oriented universities to build a new model path of "school-enterprise co-construction of modern industrial colleges." We should start from the framework construction of organizational governance, take the functions of modern industrial colleges as the kinetic energy elements, and reform and integrate the organizational structure and governance methods; moreover, we should carry out process transformation and mechanical reorganization; construct a new, dynamic, and scientific organizational model; promote the quality improvement of the connotation of modern industrial colleges; and promote the application of innovation and realization. The three main body cooperation modes of "school-enterprise-association co-construction of modern industrial colleges" represent the concrete practice of the innovation of the organizational mode of modern industrial colleges.

5. The operation strategy of “university, enterprise, and society” to build a modern industrial college base on that symbiosis theory

5.1 Select professional chambers of commerce and leading enterprises in the industry, and establish a long-term mechanism for school-enterprise-association cooperation

Local application-oriented undergraduate colleges and professional chambers of commerce should establish strategic cooperative relations and cooperative research institutes, and take this as a platform to select leading enterprises in the industry.The moedl establish a long-term mechanism for school-enterprise-association cooperation, allow the excellent enterprise resources in chambers of commerce to develop fully. And we jointly explore the establishment of modern industrial colleges, which can not only break the development of local application-oriented undergraduate colleges and universities but also solve the problem of training all kinds of professionals in the development of enterprises.

5.2 Construct the characteristic curriculum system of the three-subject cooperation mode

Multiparty cooperation in the development of application-oriented courses and teaching materials and industry enterprises is deeply involved in the construction of professional curriculum systems and application-oriented teaching materials in modern industry colleges. Therefore, we should optimize the professional teaching content with ability training as the core and reform the teaching methods and means of applied courses. Moreover, to study and formulate curriculum standards to meet professional requirements, we must deepen the adjustment and optimization of the professional curriculum system of industrial colleges; further promote the integration of curriculum resources, curriculum settings, and curriculum content with enterprises; and form a distinctive curriculum system with deep integration of industry and education.

5.3 Promote the rapid growth of “double-qualified” teachers

The two-way flow mode of full-time and part-time teachers in schools and enterprises is adopted to promote the rapid growth of “double-qualified” teachers. Industrial colleges strengthen the cultivation of the practical application ability of the whole industry chain for full-time teachers in schools.New cooperation model will carry out special training for part-time teachers in cooperative enterprises, encourage part-time teachers to obtain teacher qualification certificates,and adopt a two-track and two-way evaluation for the professional titles of full-time and part-time teachers between schools and enterprises.

5.4 Build distinctive practice and training bases inside and outside the school

To implement the “1 + 1 + 1” precise talent training mode, local universities, enterprises, and trade chambers of commerce have cooperated to build a comprehensive training base. School-enterprise-association chambers of commerce use their advantages to create a “learning factory” type of engineering training environment in the whole industry chain and support the practice training, graduation design, and other teaching links based on the practice environment. This approach can not only solve the problem that students’ enterprise practice stays at the observation level but also the employment problem of students and create a new mode of professional practice and employment-base construction.

5.5 Establish the index evaluation system of modern industrial colleges in the three-subject cooperation mode

Personnel training, scientific research innovation, and serving the local economy are the core functions of colleges and universities. In addition, the quality of personnel training, the level of scientific research innovation and achievement transformation, and the ability of production and service are the core elements of the performance evaluation of modern industrial colleges under the collaborative innovation mechanism of school-enterprise-association cooperation. Given the management, education, innovation, and service functions of modern industrial colleges, combined with the micro data collected from empirical research, we can establish a set of index evaluation systems with strong applicability to modern industrial colleges.

Acknowledgement

Project Source: Research Project of Educational Science Planning of Zhejiang Province in 2023

Project Name: Research on the New Model Path of "Modern Industrial College Jointly Built by the University and the Enterprise" in Local Application-oriented Undergraduate Universities Project No.: 2023SCG062.

References

[1] Alessandro Muscio&Andrea Pozzali. The effects of cognitive distance in university-industry collaborations: some evidence from Italian universities [J].The Journal of Technology Transfer. August 2013, Volume 38, Issue 4, pp 486-508.

[2] Marge Seppo, Kärt Rõigas, Urmas Varblane. Governmental Support Measures for University Industry Cooperation Comparative View in Europe[J]. Journal of the Knowledge Economy, June 2014, Volume 5, Issue 2, pp 388-408.

[3] Gao Hong& Zhao Xin. Research on the Construction of Higher Vocational Industrial College Based on the Deep Integration of Industrial Chain and Talent Chain [J]. Vocational Education Forum, 2021, 37 (04): 33-38.

[4] Deng Zemin& Li Xin. Research on the Basic Connotation and Definition Requirements of Vocational Education Industry College [J]. Vocational Education Forum, 2021, 37 (04): 44-50.

[5] Jin Jinbiao, Hou Jiachun, Li Jifang. Legal Risks and Prevention in the Construction of Modern Industrial Colleges: An Empirical Analysis Based on the Construction of Jiangsu and Zhejiang Industrial Colleges [J]. Education Development Research, 2021, 41 (05): 20-27.

[6] Li Xiaojie, Institutional Logic and Policy Significance of Industrial College [J]. Vocational and Technical Education, 2015, 36 (31): 49-52.