

Research on the Coupling Interaction Between the Development of Application- Oriented Universities and the Transformation and Upgrading of Regional Industries - Take Huaiyin Institute of Technology As An Example

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Abstract:

As an important part of the higher education system, application-oriented colleges and universities should insist on serving the national and local economic development as their own responsibility, and realize the benign interaction between the connotative development of colleges and the transformation and upgrading of regional industries. In specific practice, due to the imperfection of the school enterprise cooperative development mechanism, the insufficient financial support of the government, and the low recognition of the application-oriented universities, the integration of schools and cities has fallen into a certain dilemma. The application-oriented universities should “actively break through the encirclement”, the local governments should “actively build bridges”, and the social enterprises should take the initiative to connect, so as to stimulate the enthusiasm of University local cooperation and promote the benign interaction between the University and the local government. The practical exploration of the integration development of Huaiyin Institute of technology can provide some reference and Enlightenment for other application-oriented universities.

Keywords:

Regional Industrial Transformation and Upgrading, School Local Integration, Coupling Interaction, Connotative Development, Application-oriented Colleges

1. Logical Fit Between the Connotative Development of Application-Oriented Colleges and Universities and Transformation and Upgrading of Regional Industries

1.1. Responding to the new requirements for the connotative development of Chinese higher education

General Secretary Xi Jinping pointed out in the report of the 19th National Congress of the Communist Party of China that efforts should be made to realize the connotative development of higher education. Application-oriented colleges and universities refer to regular institutions of higher education with distinctive spirit of the times and local characteristics, which take application-oriented education as their orientation, focus on undergraduate teaching, serve the needs of local and regional economic and social development and cultivate application-oriented talents needed by front-line production and service. [1] Application-oriented colleges and universities are an important part of higher education in China. As the booster of local economy and society, application-oriented colleges and universities are the important subjects of higher education system and the main force to realize transforming popularization of higher education to universalness. [2] In the process of promoting connotative development, application-oriented colleges and universities should not only take root in, face, and serve local areas, but also adhere to serving the national and local economic development as their own responsibility, enhance integration and initiative, and promote regional economic development to improve quality and efficiency.

1.2. Responding to the new needs of the transformation and upgrading of traditional industries

The Outline of the National “14th Five-Year Plan” proposes to “promote the deep integration of digital technology and the real economy, enable the transformation and upgrading of traditional industries, give birth to new industries, new formats and new models, and strengthen new engines for economic development.” In order to actively respond to and implement the national call, Huai’an, Jiangsu clearly stated to “adhere to the development direction of green, high-end and integrated industries, focus on the development of industrial clusters and the cultivation of large and strong backbone enterprises, vigorously promote the upgrading of industrial foundation and the modernization of industrial chain, focus on building a ‘333’ modern industrial system, and promote the construction of a “strong, rich, beautiful and high” new Jiangsu during the “14th Five-Year Plan” period. The transformation and upgrading of traditional industries cannot be separated from the support of high-quality application-oriented talents with strong innovation ability and high practical level. The demand of the country and society for application-oriented, composite and technical skilled talents is constantly increasing. The role of application-oriented colleges and universities in participating in and supporting the transformation and upgrading of regional industries is crucial and indispensable.

2. Practical Dilemma of the Transformation and Upgrading of Regional Industries of Application-Oriented Colleges and Universities

The connotative development of application-oriented colleges and universities has the same goal with the transformation and upgrading of regional industries, which is inseparable from regional functional positioning, talent demand, and technological breakthrough. [3] Theoretically, the connotative development of application-oriented colleges and universities can achieve a good coupling interaction effect with the transformation and upgrading of regional industries, thus promoting the high-quality development of local economy. In this study, 5 application-oriented colleges and

universities and 5 enterprises in Xuzhou, Huai'an, Lianyungang and Yancheng in the north of Jiangsu have been investigated. The questionnaire, divided into college and university version and enterprise version, is designed in the form of five-level scale. Due to the epidemic, questionnaires are distributed online and offline, where a total of 200 college and university version questionnaires are distributed with 196 valid questionnaires recovered, and 230 enterprise version questionnaires are distributed with 224 valid questionnaires recovered. Through online and offline questionnaires, it is found that application-oriented colleges and universities and enterprises have generated benign coupling interaction through technical services, joint training of talents, technical consulting services, talent resource sharing and other forms, which supports traditional industries to reduce production costs and solve technical problems to a certain extent. However, there are also problems such as insufficient power for local industries and universities to take advantage of the integration of development, and the synergy which needs to be further deepened among universities, government and enterprises.

2.1. Inconsistent understanding of the importance of university-local development

Although government departments strongly advocate the formation of alliances among enterprises, universities and scientific research units to promote the integration of technology and market, it is found in the investigation that in terms of the emphasis on university-city integration, application-oriented colleges and universities and local enterprises do not have the same understanding. Compared with large enterprises, a considerable number of small- and medium-sized enterprises lack competitiveness. In this case, people will subconsciously think that it is not significant to promote university-city integration with the help of scientific and technological innovation achievements of colleges and universities and university-city integration shows the phenomenon of "hot university and cold enterprise". More than 92% of the respondents in colleges and universities believe that their own universities attach great importance to or relatively attach importance to the university-regional integration, and have a positive attitude towards the cooperation among government, industry, university and research. However, only 77% of the respondents in enterprises believe that the unit attaches importance to or relatively attach importance to the university-local development. Most enterprises are in a wait-and-see state about how much benefits universities can bring to enterprises, while a small number of enterprises believe that they will get some financial subsidies and support from the "policy flow" through university-local cooperation, and will passively choose to carry out industry-university-research cooperation instead of consciously actively cooperating with colleges and universities to form an independent innovation R & D mechanism.

2.2. Inconsistent opinions on the cooperation model of university-local development

University-local integration is a systematic project, involving the collaboration of universities, enterprises and government. Therefore, all parties have their own evaluation standards and considerations for the effects of integration, while the grade of the assessment results affects the cooperation process, that is, the choice of cooperation mode. For colleges and universities, their main objectives are to improve the academic level of students, attract high-level talents, complete high-level research projects, and strive for important scientific research awards. Therefore, talent exchange, entrusted development, and cooperative development are the main modes of industry-university-research cooperation adopted by colleges and universities,

accounting for 59.23%, 49.58%, and 45.21% respectively, followed by talent training, technology transfer and joint construction of research and development institutions, accounting for 42.86%, 38.67% and 29.16% respectively. Joint organization of major project bidding or major technology introduction, and joint construction of joint ventures also account for a certain proportion. However, enterprises emphasize risk management and control, and pay more attention to the promotion and guidance role of the government, thinking that government support is the most reliable and hoping to reduce risk investment through government policy support. Therefore, 58.93% of the respondents hope to establish an industry-university-research cooperation with cooperative units through government traction.

2.3. Inconsistent expectations for the university-local development

Talent training is the mission and original intention of the university. As a public education organization, application-oriented colleges and universities should undertake the social responsibility of developing education to train a large number of professionals meeting the needs of enterprises and market operation. From the perspective of educational attributes, higher education is public utilities, which is not for profit, but for strong external benefits. Through the analysis of the survey results, it is found that colleges and universities have goal of university-local development different from the enterprises. Colleges and universities hope to further deepen talent training through university-local integration, achieve corresponding employment for students, and provide scientific research and practice bases for students, accounting for 80.16%, 75.34% and 56.58% respectively. However, enterprises pay more attention to interest driving, accounting for the highest proportion of economic benefits from cooperation with universities, reaching 78.9%. For those small- and medium-sized enterprises with weak willingness for scientific and technological innovation and insufficient demand for key technologies, they lack long-term strategic vision for enterprise transformation and upgrading. Therefore, the proportion of demand for “improving the research and development capacity of enterprises” has dropped to 45.70%, and the proportion of talent training is only 36.1%.

3. Reasons for the Conflict Between the Connotative Development of Application-Oriented Colleges and Universities and the Upgrading and Transformation of Regional Industries

From the perspective of higher education functions, serving the society is one of its five functions. Application-oriented colleges and universities play an overall, leading and fundamental role in regional economic and social development. Therefore, the crux is analyzed from the perspective of enterprises, governments and universities.

3.1. The coordinated development mechanism between universities and enterprises needs to be improved

The key to the “hot universities and cold enterprises” of university-local integration is that university-local integration and university-enterprise cooperation may not necessarily bring rich benefits to enterprises in theory. On the one hand, when serving enterprises, application-oriented colleges and universities are often one-to-one linkage, which makes it difficult to play a radiation role and may cause waste of resources. On the other hand, application-oriented colleges and universities are not attractive to local pillar industries and enterprises. The level of talent training, scientific research and social service of application-oriented colleges and universities is limited, and it is

difficult to attract the cooperation of large enterprises. It can be seen that the system and mechanism of interactive development between application-oriented colleges and universities and regional economy are still not perfect, and the communication and contact between them need to be further improved. Although the path of application-oriented colleges and universities connecting with enterprises also needs to be further unblocked, the interactive and win-win operating system and mechanism of “government, industry, university, research and application” have not been formed.

3.2. Government financial support needs to be further strengthened

Financial support from government is equally important for application-oriented colleges and universities and enterprises. On the one hand, application-oriented colleges and universities run their schools locally, which are highly dependent on capital investment. In essence, the investment in application-oriented colleges and universities belongs to the regular investment of local governments in education and is the financial education fund[4]. In addition, the training of application-oriented talents also puts forward higher requirements for the construction of practical training bases, equipment and facilities, and the per student education cost is higher than other general education. The shortage of government investment will directly lead to the decline of the quality and level of training application-oriented talents. Therefore, the government’s necessary and stable capital investment in application-oriented colleges and universities will have a positive impact on the normal operation of the schools, so that they can pursue the innovation of talent training mode without distractions and concentrate on improving the quality of talent training. On the other hand, for small- and medium-sized enterprises themselves, in addition to lacking science and technology development funds, they are short of capital accumulation, and have fewer funds for the university-local development, which easily leads to their low enthusiasm.

3.3. Social recognition of application-oriented colleges and universities needs to be improved

Application-oriented colleges and universities are the main front for training application-oriented talents and the important support force for regional economic and social development. However, many places ignore the important role of application-oriented colleges and universities in economic and social development, but only regard them as a low-end form of higher education, which makes application-oriented colleges and universities in a marginal position in the distribution of higher education resources in China. Resources are the basis for local application-oriented colleges and universities to attract industrial enterprises to cooperate, improve the quality of talent training, mobilize the enthusiasm of the main body of university-local integration, and deepen the coupling interaction between universities and local industries. The society does not attach importance to the resources, resulting in the lack of resources of application-oriented universities, making it difficult to attract industrial enterprises to cooperate, and unable to effectively encourage application-oriented colleges and universities to give full play to their due role in the process of university-local integration.

4. Measures to Promote the Benign Interaction Between Application-Oriented Colleges and Universities and Transformation and Upgrading of Regional Industries

4.1. Application-oriented colleges and universities should “take the initiative to break through”

4.1.1. Clarify the orientation of running a school and strengthen the awareness of serving regional economic and social development

Adhere to the school-running concept where application-oriented colleges and universities are based on, rooted in, serving and developing the local, clarify the regional functions and positioning of local application-oriented colleges and universities, and find the right direction for running schools. For example, Huaiyin Institute of Technology has defined the service orientation of “running Huaian people’s own university” since the day it was founded, and Yancheng Teachers University has proposed to “strengthen the school running characteristics in serving regional social development”.

b. Adjust specialties timely to meet the needs of regional economic and social development

Application-oriented colleges and universities should have keen social observation and responsiveness, grasp the trend of regional economic development, adhere to the concept of “doing something and not doing something” according to the regional leading industries, industrial clusters, and industrial chains, and establish and improve the professional dynamic adjustment mechanism and professional early warning mechanism, improve the degree of fit between professional settings and regional economic development, realize the close connection between disciplines and regional characteristic industries, and cultivate technical and skilled talents that meet the needs of regional economic and social development.

c. Strengthen information communication and realize optimal allocation of resources

Build a cooperation platform for application-oriented colleges and universities in the region, establish an application-oriented college and university alliance, integrate the advantageous resources of each member unit, realize internal sharing and complementarity, and promote coordinated development. At present, more and more application-oriented colleges and universities have established application-oriented education groups on the basis of learning from others. Through various platforms at all levels in each school within the group, a multi-level, all-round, open and cooperative technology transfer and service system has been built, various data bases have been established, integrated resources have been further optimized, and a mutually beneficial and win-win cooperation platform has been built. For example, the “Bozhou modern manufacturing vocational education group” established in 2017 in Bozhou, Anhui, led and supported by the People’s Government of Bozhou, integrates 9 local colleges and universities, and integrates more than 20 enterprises such as Zoomlion, Chery Group and Haier Group. Relying on university-enterprise cooperation, the Group strengthens industrial integration, gives full play to their respective advantages, and jointly builds a modern manufacturing brand with professional and industrial development as the link.

4.2. Local governments should “take the initiative to build bridges”

a. Improve relevant laws, regulations and policy support

Government departments should further clarify the responsibilities, rights and obligations of all parties in university-enterprise cooperation to ensure the normal operation of in-depth cooperation. At the same time, relevant policy support is given in tax, land, project declaration, achievement transformation and other aspects to create a good institutional environment for university-enterprise cooperation.

b. Increase capital investment

In view of the increasing demand for talents in regional economic and social development, governments at all levels should attach great importance to the important role of local application-oriented colleges and universities in regional economic development, invest as much budget planning as possible in local application-oriented colleges and universities, and allocate it in place in time. With Jiangsu as an example, the economic development level of Southern Jiangsu is higher than that of Central Jiangsu, and the economic development level of Central Jiangsu is higher than that of Northern Jiangsu [5]. In order to ensure the balanced development of local application-oriented colleges and universities in Northern Jiangsu, Central Jiangsu and Southern Jiangsu, it is necessary to play the macro-control function at the provincial level. In view of the characteristics and trends of economic development in different regions and cities, the provincial financial focus is inclined to the application-oriented colleges and universities in the economically underdeveloped Northern Jiangsu.

c. Enhance publicity effect

In the era of We-Media, on the one hand, application-oriented colleges and universities should take the initiative to occupy the position of new media, increase publicity, and improve social influence. On the other hand, the government should actively guide the society to correctly understand the application-oriented education, strengthen the publicity of the mainstream media, publicize the typical cases of university-government-enterprise cooperation in the prominent area of the official media of the government and at the appropriate time, and enhance the emphasis of the society to the application-oriented colleges and universities.

4.3. Social enterprises should take the initiative to connect

a. Build a university-government-enterprise cooperation model

In terms of enterprises and the government, enterprises should take the initiative to put forward demands to the government, while the government should give full play to its leading and think-tank role, give suggestions on the planning of local leading industries and emerging industries and incorporate them into the agenda of discussion and decision-making. In terms of enterprises and schools, enterprises can set up innovation and entrepreneurship colleges, famous teacher' studios, university-enterprise laboratories and other cooperative platforms, formulate training plans, compile textbooks, and explore student training models together with application-oriented colleges and universities.

b. Carry out on-the-job training for enterprise employees

Flexibly set up talent training mode according to the needs of enterprises. The school can flexibly plan the time, place and mode of talent training according to the needs of enterprises. For example, Xiamen Institute of Economics and Management

and JD Logistics Group jointly set up a “smart logistics innovation talent class”. After 8 months of training, internship and job rotation, 24 of the 35 students in the class finally took up their posts in JD Logistics Group after voluntary registration and enterprise selection, achieving the goal of cooperative education and employment.

c. Strengthen the construction of practice bases

Taking the training base construction as the platform and combining with the needs of transformation and upgrading of regional industry, universities and enterprises jointly build an innovation base to provide high-quality application-oriented talents for enterprise development. At present, Huawei, ZTE, Iflytek and other well-known enterprises have joined hands with local application-oriented colleges and universities to build teaching and scientific research innovation bases and platforms in the colleges and universities by building industrial colleges and production education integration training bases, so as to jointly carry out university-enterprise talent training and achieve the deep integration of industry, university and research.

5. Practice and Exploration of Huaiyin Institute of Technology Serving Industrial Transformation and Upgrading of Huai’an

As a local application-oriented undergraduate college, Huaiyin Institute of Technology, focusing on the national strategy of strengthening education and the goal of building a local high-level Huai’an university, adheres to the concept of “taking root in Huai’an to run universities and serve Huai’an for development” and comprehensively promotes the connotative development of the college.

5.1. Discipline and major match regional leading industry

Adhere to the idea of integrated discipline and specialty construction, closely connect with the development needs of strategic emerging industries in Jiangsu and Huai’an, focus on application-oriented disciplines, and develop strategic emerging industries and disciplines urgently needed for the deep utilization of local endowment resources.

During the 13th Five Year Plan period, the College met the needs of the four major industrial leading industries (new generation information technology, new energy vehicles and parts, new materials for salinized attapulgitite and food) of Huai’an, and built and approved 5 key disciplines in Jiangsu. Chemical engineering and technology, the only provincial-level key cultivation discipline among similar universities in Northern Jiangsu, and 4 provincial-level key construction disciplines - transportation engineering, mechanical engineering, software engineering and crop science have formed a discipline system with advantages of materials and chemical engineering, smart transportation and modern agriculture.

In 2021, the College actively responded to the “333” leading industry system proposed by the Huai’an Municipal Party Committee and Government, promoted the transformation and upgrading of traditional disciplines such as chemical engineering and technology, mechanical engineering and construction engineering and vigorously developed new generation information technology, intelligent transportation and other emerging interdisciplinary fields, and did a good job in special design, management, crop science and other disciplines. At the same time, the College dynamically adjusted majors, properly handled the relationship between the stock and increment of majors, focused on the development of majors with good foundation and in line with

the development situation, or resolutely eliminated them otherwise. For majors with good foundation but not suitable for economic and social development, the College adhered to transformation and upgrading, but gave key support to the majors that meet the needs of economic and social development but have a weak foundation and strived to make them stronger. Meanwhile, the College adhered to excellence in majors that meet the needs of economic and social development and have a strong foundation. In the past two years, the College has added majors such as artificial intelligence, robotics engineering, data science and big data technology, and stopped majors such as process equipment and control engineering, marketing, new energy science and engineering and automobile service engineering. According to the enrollment of major categories, there are 61 enrollment majors, with a matching degree of more than 80% with local industries, further increasing the compatibility between the College's talent training and the development of local regional industries.

In addition, the College adheres to the "engineering education major certification" as an important starting point to promote education and teaching reform and improve the quality of talent training. 7 majors have passed the certification, and 25 majors have been approved as national and provincial first-class professional construction sites. The quality of talent training has been greatly improved, and the competitiveness of talents has been significantly improved.

5.2. Scientific and technological innovation achievements serve regional industrial development

Huaiyin Institute of Technology implements first-class scientific and technological services, always adheres to the working idea of "facing local needs, deepening industry-university-research cooperation, and improving the level of scientific and technological services" and to the positioning of the bridge and link among government, industry, education and research, actively participates in university-local cooperation, and continuously expands the scale of cooperation.

In the process of deepening the integration of industry and education, the College has established and improved the "three meetings" mechanism of "holding school enterprise exchange meetings at any time, regular university-government joint meeting, and annual university-city development meeting", so as to promote the real development of university-city integration and promote it in depth. Two sessions of the university-city integrated development conference are organized and held. More than 30 university-county talent cooperation projects and new R&D institution projects are signed on the spot, and more than 100 technical contracts are signed, with a total amount of more than RMB 10 million. The "1111" innovative service project of university-city integration is proposed, that is, 1 university leader serves 1 county and district, helps more than 10 large-scale enterprises, and creates economic and social benefits of more than RMB 100 million per year. Through the "1111" project, the College integrates the innovative forces of universities and enterprises, builds an information platform for industrial enterprises, and actively acts as an assistant of the government in promoting industrial development. On the basis of realizing the full coverage of the strategic cooperation of Huai'an county and district in the "1111" project, the College does not only further expand the scope of cooperation and signed cooperation projects with 31 government departments and enterprises including Huai'an customs, Huai'an Culture, Radio, Television and Tourism Bureau and Everbright Bank, but also actively expands the service scope such as signing cooperation agreements with Guannan County of Lianyungang, Sihong County of

Suqian, Yangzhong City of Zhenjiang, etc. The radiation effect of the “1111” project gradually appears.

At the same time, the North Jiangsu Development Research Institute is jointly established with the Jiangsu Provincial Association of Social Sciences and the Research Office of the Jiangsu Provincial People’s government. The Institute provides consulting services for the government around the Huaian Grand Canal Culture, food culture, red culture and other excellent traditional cultures, and promotes the inheritance and innovation of local excellent cultures.

5.3. Talent training aims at the needs of regional economic development

Insisting on serving the local area unswervingly, Huaiyin Institute of Technology has explored and implemented a “multiple-integration” talent training system for government, industry, university and research. Relying on scientific research platforms such as the National University Science Park and the National Agricultural Science and Technology Park, the College has established eight major industrial colleges including Traditional Equipment Intelligent Guidance, Jiangsu Suyan Jingshen, Jin Shi Yuan Liquor, and Zhongxing University. Taking the industrial college as the starting point, serving the local leading industries, and promoting the effective connection between talent training and industrial needs, the College jointly builds the characteristic courses of “dual standard docking” with enterprises, creates a teaching base of “dual course interoperability”, carries out the team practice of “dual post alternation”, implements the evaluation mechanism of “dual dimension evaluation” and reconstructs the training mode of engineering comprehensive practical ability. The “dual standard docking” refers to professional standards docking with industry standards, analyzing enterprise technical resources, and building 139 characteristic courses for industrial clusters. The “dual course interaction” refers to building 125 virtual enterprise classrooms on campus and 95 cooperative enterprises off campus to realize the intercommunication between the College’s virtual enterprise class and the enterprise’s real-world class. The “dual post alternation” refers to that facing the ability requirements of posts such as design, production, operation and maintenance, relying on the teaching and training posts in the school and the production practice posts in the enterprise, the dual post alternation carries out practical teaching integrating theory with practice and combining work with learning. The “dual dimension evaluation” refers to the joint participation of schools, enterprises and teachers in the evaluation of students’ engineering practice according to professional standards and industry standards, and the evaluation of students’ professional ability achievement and engineering ability compliance.

The College encourages teachers to convert scientific research resources into teaching resources, incorporate the high-level scientific research results into teaching materials and teaching, form 303 classroom teaching cases, compile 99 textbooks such as Container and Multimodal Transportation, and build more than 180 professional courses. In addition, the College actively promotes the integrated construction of teaching and scientific research laboratories, gives full play to the educational role of scientific research platforms, realizes the cooperative educational role of 43 teaching and scientific research platforms at and above the provincial level, including the national and local joint engineering research centers, enables students to participate in projects, laboratories and teams early, strengthens the application of professional knowledge, and achieves the effective integration of professional theoretical knowledge learning and engineering innovation ability training.

Conflicts of Interest

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