

Study on the Establishment of Symbiotic Mechanism between Wenzhou Vocational Colleges and Regional Industrial Clusters

Ziyan Zheng^{1,*}

¹Wenzhou Polytechnic, Wenzhou 325000, China

*Corresponding author: yan998112@126.com

Abstract: Wenzhou's industry-university-research system suffers from poor matching of resource supply and demand, inefficient symbiosis model and insufficient support from the external policy environment, presenting a symbiotic state of "biased symbiosis-intermittent symbiosis". The suggestions for optimization are to build a symbiotic model based on the compatibility of quality and quantity of resources, the integration of industry-university-research, and a two-way incentive policy environment for the integration of education and industry.

Keywords: Wenzhou, Symbiosis theory, Vocational education.

1. Introduction

The in-depth integration and development of industry-university-research has been an important proposition in China's education reform. The cross-border synergistic development of vocational education and regional economy and society is a major strategic mission to deepen the reform of vocational education. At present, there is still a problem of insufficient symbiosis between the construction of Wenzhou's higher vocational colleges and regional development, without really establishing a new curriculum system that adapts to the actual needs of modern vocational jobs and enterprise production, and the ability to lead the optimization and upgrading of regional industrial structure is not strong.

2. Analysis of the Current Situation of The Symbiotic Network Between Wenzhou Higher Vocational Colleges and Regional Industrial Clusters

(1) Symbiotic units

Symbiotic units are the basic units of energy production and exchange that constitute a symbiosis or symbiotic relationship. According to the American scholar Mitchell's three-dimensional division, higher education institutions, research institutes and industrial clusters constitute the "deterministic" stakeholders of Wenzhou's industry-university-research network, and can be regarded as the three main symbiotic units in its symbiotic system.

(2) Symbiotic model

The symbiotic organization mode reflects the degree and way of matching the supply and demand of resources among cooperative subjects, and the symbiotic behavior mode reflects the way of distributing benefits among cooperative subjects. The Wenzhou industry-academia-research network presents the state of "partial benefit symbiosis-intermittent symbiosis". The supply and demand matching of industries in the professional service areas of Wenzhou vocational colleges

can be started from the classification of industrial chains.

Firstly, the main connection between traditional industries and the education chain is as follows. The supply quality of the electrical industry-education chain in the city is good, but the training scale needs to be improved. Wenzhou Polytechnic has set up electrical industry chain-related majors covering a wide range of areas and the professional construction has been certified at national and provincial levels. Zhejiang Dongfang Vocational and Technical College and Wenzhou Institute of Science and Technology have set up related majors. However, at present, the training of skilled talents in the electrical industry is far from the demand of enterprises, and the talent gap in the product design chain is particularly obvious; the demand for skilled talents in the footwear industry-education chain is huge. Only Wenzhou Polytechnic and Zhejiang Vocational Institute of Industry and Trade have set up footwear design and technology majors. Although they have both reached the national level of excellent professional construction, the retention rate of graduates is low, and there is still an urgent need to expand the scale and breadth of enrollment; the shortage of talents in the garment design industry-education chain is large, and the scale of related majors needs to be expanded. Only Wenzhou Polytechnic has set up a higher vocational institution closely related to the garment industry chain, specializing in garment design and craft, fashion performance and communication. The automotive and auto parts industry-education chain still has not formed a corresponding high-quality professional group, and the importance is not high, and the completion of professional construction and the breadth of opening still need to be strengthened. Zhejiang Institute of Industry and Trade Vocational and Technical College, as the only higher vocational institution that sets up relevant majors, covers many aspects of the automobile and auto parts industry chain; the pump and valve industry-education chain has not formed a highly targeted specialty. Only Wenzhou Polytechnic has set up a special pump and valve specialty: mechanical design and manufacturing (valve design and manufacturing), and has achieved the title of Wenzhou City Advantageous Specialty and the honor of municipal-level practical training and research and development platform.

Secondly, the main alignment between strategic emerging industries and the education chain is as follows. The city's intelligent equipment industry-education chain is more complete, the professional group construction is mature, but the scale of talent training still does not meet the job gap. Among them, Wenzhou Polytechnic, Zhejiang Industry and Trade Vocational and Technical College, Wenzhou Institute of Science and Technology and Security Vocational and Technical College are set up related professional, and professional development degree is high, part of the four-year undergraduate program; digital economy industry-education chain is more complete, Wenzhou five institutions of higher education are set up related professional, which, Wenzhou Polytechnic and Zhejiang Security Vocational and Technical College professional coverage The most extensive, including digital media technology, information security technology, virtual reality technology, etc. Zhejiang Institute of Industry and Trade Vocational Technology has won provincial honours for its e-commerce, computer network technology and software technology pa large shortage of skilled talents; the new materials industry-education chain is weak, only Zhejiang Institute of Industry and Trade Vocational Technology has set up a material engineering technology major, and there arogrammes. On the whole, the professional group corresponding to the digital economy industry has excellent connotation construction and covers a wide range, but there is re many gaps in the corresponding professional chain; the life and health manufacturing industry-education chain has many matching gaps, the level of professional construction is low, and there is a shortage of relevant talents, and the corresponding professional chain is only Zhejiang Dongfang Vocational Technology College. There are many gaps in the matching education chain for the new energy industry, and the corresponding professional chain is not mature. Wenzhou Polytechnic has set up new energy vehicle technology, and Zhejiang Institute of Industry and Trade Vocational and Technical College has set up mechatronics (intelligent environmental protection equipment technology direction), both corresponding to the new energy and energy-saving industry chain.

As for research institutions, the city's higher vocational colleges and research institutions are more mature in connecting to the smart equipment industry and the digital economy industry, with both depth and breadth. In the new materials industry, undergraduate institutions are more active in participating in the industry, so the number of higher vocational colleges connecting to this industry is low, but there are still high-capacity platforms set up. The footwear and garment industries mostly use provincial and municipal research platforms as carriers to communicate and cooperate with higher vocational institutions, and the quality of research services is high. On the contrary, the emerging life and health industry and the new energy and energy-saving industry still need to improve the capacity of their research institutions. The auto parts industry has no targeted research platforms for higher education institutions, and the pump and valve industry only has a Wenzhou valve technology research and development and service platform.

(3) Symbiotic environments

The sum of all elements outside the symbiotic unit is collectively referred to as the symbiotic environment, which is the basic condition for the creation and development of the symbiotic relationship and its unit. ①Policies and regul-

ations: Wenzhou has issued the Rules for the Implementation of Wenzhou City's High-Level Building of a Highly Skilled Workforce, but the amount invested has not met expectations. The preferential policies on taxation, land, finance and credit for the integration of industry and education are still at the stage of "strongly advocating";②Economic culture: The majority of enterprises in Wenzhou are more utilitarian and the function of "nurturing" is weaker, making the two chains contradictory in that "the industrial chain is ahead of the educational chain" but "the enterprises are not highly motivated";③Social development: Wenzhou has a large shortage of skilled personnel to meet the needs of the five emerging industries, and there is a shortage of relevant composite professionals and talents.

(4) Symbiotic mechanisms

The formation of the symbiotic relationship between higher education institutions, research institutes and enterprises also depends on the symbiotic mechanism of industry-university-research.①the quality-parameter comp-

atibility mechanism: the cooperation subjects are required to have some kind of dependence on the supply and demand of talent, knowledge, technology, information and other resource elements;②the symbiotic energy generation mechanism: within a certain time frame, the total output of the transformation of results should be greater than the total input, otherwise the education and research resources will face;③The symbiotic system evolution mechanism: upg- rating the industry-university-research network requires the construction of an integrated cooperation mechanism among the symbiotic subjects, as well as the construction of a benefit distribution mechanism among the symbiotic subjec- ts based on "Pareto optimality".

3. The Dilemma of Symbiotic Network Development Between Wenzhou Higher Vocational Colleges and Regional Industrial Clusters

(1) Poor matching of demand and supply of resources

With the deepening of the integration of industry and education, the reform of the training mode of applied talents and the transformation of the production mode of knowledge have put forward higher requirements on the resources for the integration of industry and education, but as the cooperation mode between schools and enterprises has not yet been deepened, structural contradictions between supply and demand have already arisen and are highlighted in three aspects: Firstly, there is a lack of quality educational resources from shared enterprises. The leading enterprises in Wenzhou's "5+5" industries still stay at the level of traditional "hard" educational resources such as internships and practical training for students, and lack "soft" educational resources such as cutting-edge technology and product technology. It is difficult to meet the demand of higher vocational colleges for quality educational resources. Secondly, the information resources of shared industry associations are lagging behind. As a collaborator of the symbiosis of industry-university-research cooperation, the absence and dislocation of industry associations in human capital forecasting, industry development planning and school-enterprise resource allocation have caused structural contradictions in supply and demand, which greatly restrict the symbiotic effect of the

main body of industry-university-research cooperation. Thirdly, the sharing of local government policy dividends is insufficient. Local governments tend to tilt educational resources towards higher-level schools.

(2) Ineffective industry-academia-research symbiosis model

Wenzhou industry-academia-research symbiosis network is a kind of non-reciprocal cooperation relationship linked by interests, and its foundation and stability are relatively fragile. From the perspective of the mode of action, the non-competitive and non-exclusive characteristics of higher education often lead to the "prisoner's dilemma" for the supply of industry enterprises; in addition, the cooperation subjects are bound to form different degrees of contribution due to differences in resource input or capacity, while the talent training and knowledge innovation of higher education institutions have obvious "positive external" characteristics, which will inevitably lead to "free-riding" behaviour of the cooperation subjects, and eventually lead to the depletion of resources.

(3) Insufficient support from the external policy environment

The role of policy incentives or regulation can effectively reduce the opportunistic behaviour and transaction costs of cooperative agents, and thus promote the generation of mutually beneficial behaviour. At present, the external policy environment is not sufficiently supportive, mainly in three aspects: Firstly, there is the problem of convergence at the policy design level. In recent years, the government has issued a series of supportive policies on deepening the integration of industry and education, such as the Opinions of the General Office of the State Council on Deepening the Integration of Industry and Education and the National Implementation Plan for Vocational Education Reform. However, in terms of the effectiveness of policy implementation, as these policies are mostly programmatic documents at the macro level and lack rigid regulations at the micro level, the implementation of policies in Wenzhou is caught in a dilemma of multilateral gaming. Secondly, there is the problem of synergy in the implementation of policies. The necessary communication and coordination between government departments is not sufficient, resulting in inefficient policy implementation, which hinders the synergy of policy implementation. Thirdly, the problem of supporting policies at the operational level. The network of industry-university-research symbiosis cannot rely on vocational education alone, but also requires corresponding policy support from industry, industry, finance and other parties.

4. Suggestions for Optimizing the Symbiotic Network Mechanism Between Wenzhou Higher Vocational Colleges and Regional Industrial Clusters

(1) Building a mechanism to match supply and demand of resources based on the compatibility of qualitative and quantitative parameters

The symbiotic effect depends on the matching of all elements of the symbiotic unit based on the compatibility of quality and quantity. By promoting the cooperation and symbiosis of multiple entities, we promote the grafting of resource elements to form a resource amplification effect, and ultimately realise the integrated evolution of talent training, knowledge innovation and social services.

In-depth promotion of school-enterprise co-education to enhance the level of compatibility of the main quality and quantity of participation. Organize experts from industry enterprises, research institutions and schools to work together, conduct in-depth research, clarify the objectives, specifications and career orientation of undergraduate level vocational education, and sort out the corresponding training mode, curriculum system, credit hour arrangement, teaching process arrangement, implementation guarantee, graduation requirements, etc. The professions focus on demand orientation, face high-end industries and industrial high-end, and serve local economic and social development. The university and enterprises are invited to participate deeply in the whole process of training talents in universities, adhere to the principle of "unity of knowledge and practice and integration of engineering", jointly formulate the training programmes for talents, and incorporate new technologies, new techniques and new standards into the curriculum standards and teaching contents in a timely manner. Schools are encouraged to appoint outstanding technical talents from enterprises as mentors to carry out joint teaching, and to select outstanding technical and technical talents as mentors from enterprises to carry out practical teaching of technical skills; to carry out on-the-job training from the perspective of career development planning, and to explore the training mode of major category first, followed by major and job direction; to deeply integrate enterprise culture with campus culture, and to promote two-way recognition between enterprises and students.

Establish the concept of innovation-driven development, and attach importance to science and technology research and development to feed industry. Emphasis will be placed on the ability of teachers to provide research services to ensure that technology is truly "on the ground" in enterprises. To further improve the incentive mechanism for scientific research, increase the incentive for high-impact scientific research results, and improve the management policies for scientific research projects and funding management; to build scientific research platforms according to the concept of "demand-direction". The university will build R&D platforms according to the concept of "demand-directi- on-conditions", integrate and optimize R&D platforms around industrial strategies and the construction framework of the university's professional clusters; strengthen applied research, and carefully build platforms for high-end equipment manufacturing, information, fashion and other industry-university research and innovation. In addition, the university and enterprises will set up R&D teams in the direction of development tasks, carry out technological development, explore the operation mode of mixed ownership technology service companies, promote the market-oriented operation of scientific and technological achievements, and enhance the "overflow efficiency" of scientific and technological R&D.

(2) Building a symbiotic model of "integration and symmetrical reciprocity" between industry, academia and research

The positive evolution of symbiotic systems is derived from an efficient symbiosis model, and integrated symbiosis and symmetrical reciprocal symbiosis are the prerequisites for the formation of an efficient symbiosis model. Symbiotic subjects form symbiotic systems and strategic partnerships of an independent nature based on a stable symbiotic interface and a dominant medium, resulting in a high degree of coupling of resource elements such as knowledge, technology, information and capital.

Establish a dynamic adjustment mechanism for majors to enhance the matching between resource elements. Establish a long-term mechanism for adjusting the structure of majors in an appropriately advanced manner, and actively serve the strategic new development needs of Wenzhou. Adjust and optimise the setting of traditional engineering majors, strengthen the internal construction of pump and valve-related majors, and adapt to and promote the needs of the transformation and upgrading of traditional industries. According to Wenzhou industrial planning targeting major industrial technology development trend, adjusting professional layout around new generation information technology and Internet of things industry, high-end equipment manufacturing industry, leading and serving industrial development. New materials, new energy and energy conservation, life and health manufacturing and other emerging industries and traditional industries of automobile and auto parts are the main directions for future development. For the Rui Pu new energy industry base project, Weimar Wenzhou intelligent manufacturing base and other super tens of billions of single manufacturing projects, the school should explore the potential to add new majors in metal materials, new energy materials, intelligent logistics and other new majors, according to the demand of Cangnan nuclear power project to add smart grid technology and other majors to provide manpower support for the transformation and upgrading of Wenzhou industries. Professional construction reform should be put into practice, adhere to the stock structure adjustment as the main, supplemented by incremental structure adjustment, stop professional duplication construction, promote professional upgrading, the low benefit, demand is not large professional stop, and or transfer.

Form an aggregated ecological solid chain and promote the establishment of a third-party coordination platform. Focus on the integration of resources and data for the integration of industry and education, and form an aggregated ecological solid chain, for example, establish practice bases for the integration of industry and education in the agglomeration of colleges and universities, and rely on existing industrial chains and R&D centres to build bases for the integration of industry and education; give full play to the subjective initiative of enterprises, and gradually form a chain of student sources, industrial chains, teacher chains, information chains, results transformation chains and employment chains within the vocational education group, so as to promote the common progress, improvement and It also promotes the establishment of a third-party coordination platform to facilitate the integration of external resources into the evaluation system within the university, assigning employers to conduct a comprehensive assessment of the rationality of professional settings in Wenzhou's higher education institutions, providing advice on professional development in the context of regional development and the strategic needs of enterprises, and ensuring that the training objectives of institutions are

consistent with the needs of industrial development.

(3) Building a policy environment based on "two-way incentives" for the integration of education and industry

A positive external environment is conducive to promoting the evolution of the symbiotic system to a higher level, and in turn the positive evolution of the symbiotic system will accelerate the generation of a benign external environment, thus forming a synergistic development of the environment and the symbiotic system. The key to promoting the symbiotic development of industry-university-research in Wenzhou is to establish a perfect policy support system for the integration of industry and education. Strengthen the effective articulation of the policy system for the integration of industry and education. To achieve close articulation and unity of standards in policy refinement and implementation, and to avoid damage to the unity of the policy of integration of industry and education due to policy fragmentation. Strengthen the synergy in the implementation of the policy on integration of industry and education. Establish a coordinated mechanism for policy implementation, and co-ordinate the interactions and checks and balances among the policy implementation bodies. Strengthen the internal and external support at the operational level of the policy on integration of industry and education. Promote preferential tax policies, industrial support policies and education surtax exemptions for enterprises that integrate industry and education.

5. Conclusion

Wenzhou's industry-university-research system has difficulties such as low matching of resource supply and demand, inefficient symbiotic model, and insufficient support from external policy environment. It presents a symbiotic state of "biased symbiosis-intermittent symbiosis". The optimization proposal is to build a resource supply and demand matching mechanism based on the compatibility of qualitative parameters, a symbiotic mode of "integration and symmetrical reciprocity" of industry university research and a policy environment of "two-way incentive" for industry education integration.

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