Research on the Construction of Cross-border E-commerce Specialty Group in Higher Vocational Colleges from the Perspective of Regional Industrial Chain Coordination

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ABSTRACT

Based on the theory of regional industrial chain synergy, this study discusses the structural adaptation mechanism between cross-border e-commerce (CBEC) specialty groups in higher vocational colleges (HVC) and Hunan industrial ecology. By combing the characteristics of CBEC industry policy texts and industrial chain nodes in Hunan Province, this article constructs a "cohesion-outreach" two-dimensional collaborative analysis framework, and reveals the interactive relationship between the internal resource integration logic of professional groups and the external industry docking path. Hunan's CBEC industry chain presents three-dimensional characteristics: brand transformation at the manufacturing end, ecological fragmentation at the platform end and complicated performance at the service end, which reflects the differentiated capability requirements such as multi-modal product presentation, multi-platform rule adaptation and cross-border customs compliance. Professional groups should realize curriculum reorganization through complementary core guidance and support, and establish institutionalized docking by relying on Industry-Education Integration community. At the institutional level, policy binding, organizational linkage and three-dimensional evaluation coordination should be strengthened to form a spiral implementation path. Professional groups must go beyond the traditional professional aggregate form and evolve into organic education units that co-exist with the regional industrial ecosystem, so as to effectively solve the structural mismatch between talent supply and industrial demand.

Keywords: *Regional industrial chain coordination, Higher vocational education, CBEC, Professional group construction, Industry-education integration.*

1. INTRODUCTION

The systematic coordination of regional industrial chains is becoming a key force driving the high-quality development of local economy. Vocational education, as the main channel for the supply of technical and skilled talents, is directly related to the sustainability of regional competitiveness [1]. In recent years, relying on the policy superposition effect of China (Hunan) Pilot Free Trade Zone, CBEC Comprehensive Experimental Zone and China-Africa Economic and Trade Cooperation Pioneer Zone, CBEC industry has shown an accelerated agglomeration trend [2]. However, industrial practice also exposes structural contradictions [3]. Enterprises at the manufacturing end generally lack the ability of brand going out to sea and digital marketing, and the service end is short of professional services in cross-border payment, customs compliance and multilingual customer service. The information fragmentation and inefficient coordination between nodes in the industrial chain restrict the overall competitiveness [4]. The complexity and dynamics of this industrial ecology put forward higher requirements for talents' knowledge complexity and job adaptability, and it is difficult for a single professional training model to respond to the practical needs of multi-link linkage in the industrial chain.

The field of higher vocational education has responded positively to this. Hunan Provincial Department of Education has incorporated CBEC related majors into the construction sequence of provincial-level characteristic professional groups, and many HVC have tried to integrate professional resources such as e-commerce, international economy and trade, modern logistics management, and explored the path of cluster education [5]. However, the existing practice still has obvious limitations [6]. The curriculum system within the specialty group has not been truly modularized, and the training resources are scattered in the independent construction of each specialty, so it is difficult for the knowledge structure of the teaching staff to cover the whole chain business scenario of CBEC [7]. There is a lack of institutionalized docking mechanism between the construction of professional groups and the evolution of regional industrial chains, and the mapping relationship between talent training specifications and the capacity requirements of industrial nodes is vague, resulting in a structural mismatch between education supply and market demand. Based on the theory of regional industrial chain synergy, this study regards the CBEC specialty group in HVC as an educational subsystem coupled with industrial ecology, and analyzes the interactive logic between them in structure, function and value. By combing the CBEC policy texts in Hunan and analyzing the gap of the main capacity of the industrial chain, this study reveals the evolution path of professional group construction actively embedded in the industrial collaborative network.

2. THEORETICAL COUPLING BETWEEN INDUSTRIAL CHAIN COORDINATION AND PROFESSIONAL GROUP CONSTRUCTION

The theory of industrial chain synergy emphasizes that upstream and downstream entities break organizational boundaries through information sharing, resource complementarity and risk sharing, and build a value-creating network to maximize the overall efficiency of the system. The construction of professional groups in vocational education is guided by core majors, integrating related professional resources, and forming a cluster education unit through embedding courses, sharing platforms and integrating teachers, thus enhancing the complexity and adaptability of personnel training [8]. They are highly isomorphic in structural logic. The vertical integration and horizontal networking of industrial chain correspond to the hierarchical structure and modular curriculum system of professional groups, and the collaborative needs between industrial chain nodes are mapped to the integration requirements of cross-professional capabilities within professional groups. The multi-node linkage ecology formed by Hunan CBEC industry chain at the manufacturing end, platform end and service end naturally requires talents to have comprehensive literacy across a single post boundary. This provides theoretical justification for professional groups to respond to complex industrial needs in the form of clusters. The dynamic adaptation and value-added pursued by the industrial chain in coordination form a value resonance with the resource intensive and continuous optimization emphasized by the construction of professional groups, and jointly point to the structural matching between education supply and industrial demand.

3. STRUCTURAL CHARACTERISTICS AND TALENT DEMAND MAP OF CBEC INDUSTRY CHAIN IN HUNAN

The CBEC industrial chain in Hunan Province has formed a structural feature of “manufacturing-platform-service” under the dual effects of policy drive and location advantage. The upstream relies on national industrial clusters such as Changsha construction machinery, Zhuzhou rail transit equipment and Xiangtan electrical appliances. Manufacturing enterprises are transforming from OEM mode to brand going out to sea, but these enterprises generally lack the ability of digital expression of products and deep insight into overseas consumers [9]. They urgently need compound talents with the ability of product visual reconstruction and cross-cultural marketing planning. The middle reaches show the characteristics of platform ecological diversification. In addition to Amazon and AliExpress, local enterprises actively deploy emerging channels such as TikTok Shop, and take advantage of the China-Africa Economic and Trade Cooperation Zone to explore the African market, and put forward detailed requirements for multilingual content operation, real-time data monitoring and dynamic adaptation of platform rules. The downstream focuses on the construction of cross-border fulfillment system. The overseas warehouse network of “Xiangpin Going to Sea” has

covered European and American hubs and key cities in Africa, but the collaborative efficiency of warehousing intelligence and terminal distribution is still insufficient. Logistics information tracking, customs compliance processing and reverse logistics management constitute key capacity gaps.

"Table 1" presents the priority ranking of the key links of the industrial chain to the talent ability dimension in the sample survey of the CBEC industry alliance in Hunan Province in 2025. The survey covers 47 representative enterprises in Changsha, Yueyang and Chenzhou, and the five-level scale is used to evaluate the strength of various capacity requirements. This differentiated demand distribution reveals that higher vocational education must break down professional barriers and build a capacity training system covering the whole chain of product development, digital marketing and cross-border performance, so as to realize the accurate docking of talent supply and the demand of industrial chain nodes.

Table 1. Distribution of Talent Competency Demand Intensity in Key Links of the CBEC Industry Chain

Industry Chain Link	Competency Dimension	Average Demand Intensity	Proportion of Enterprises with High Demand (%)
Manufacturing Side	Product Multimodal Presentation Competency	4.62	89.4
	Overseas Consumption Trend Analysis Competency	4.38	76.6
Platform Side	Multi-platform Rule Adaptation Competency	4.75	93.6
	Real-time Traffic Conversion Competency	4.51	85.1
Service Side	Cross-border Customs Compliance Handling Competency	4.83	95.7
	Multi-currency Settlement Risk Identification Competency	4.47	80.9

The dynamic mapping relationship between the structural characteristics of industrial chain and talent demand requires HVC to establish a curriculum module system corresponding to the capacity gap of industrial nodes in the construction of professional groups, and realize the systematic reconstruction of talent knowledge structure through interdisciplinary curriculum reorganization.

4. CBEC PROFESSIONAL GROUPS INTERNAL COLLABORATION AND EXTERNAL DOCKING MECHANISM

The construction of CBEC professional groups needs to build a "cohesion-outreach" two-dimensional collaborative mechanism. This mechanism takes CBEC as the core, integrates international economy and trade, modern logistics management, business English and digital media technology, and forms a "one core and multiple" layout. Core majors focus on platform operation and digital marketing ability training, supporting majors strengthen special literacy such as customs compliance, cross-border logistics, cross-cultural communication and visual content creation, while expanding majors introduce big data and artificial intelligence modules to enhance technical adaptability. The course breaks down the barriers through modular splitting and collaborative teaching with multi-professional teachers, and the training relies on the shared simulation platform to realize the students' mixed team to complete the whole process project exercise.

Table 2. Functional Restructuring Statistics of CBEC Professional Clusters in Colleges under the "Double High Plan"

Major Name	Functional Positioning	Aligned Industry Chain Link	Number of Core Competency Output Modules
CBEC	Core Leadership	Full-process Operations	7
International Economics and Trade	Compliance and Risk Control Support	Transactions and Payments	5
Modern Logistics Management	Fulfillment Service Support	Warehousing and Distribution	6
Business English	Cross-cultural Communication Support	Marketing and Customer Service	4
Digital Media Technology	Visual Content Support	Product Presentation	5

"Table 2" presents the mapping relationship between professional function orientation and ability output established by six national "Double High Plan" construction units in Hunan Province in the reconstruction of professional groups in 2024. The table shows that more than 90% of colleges and universities have positioned international economics and trade as a "compliance and risk control support unit", and the curriculum system has strengthened the application of RCEP rules and the identification of cross-border payment anti-money laundering. Modern logistics management majors generally add overseas warehouse intelligent dispatching and cross-border return reverse logistics training content to accurately respond to the performance gap in the downstream of the industrial chain. External docking mechanism realizes the linkage between professional groups and key nodes of industrial chain through institutionalized design. The manufacturing side focuses on the digital expression and brand narrative ability of products, the platform side strengthens multilingual content generation and algorithm adaptability training, and the server side focuses on customs document processing and dispute mediation practice. The appointment system of "industrial professors" promoted by Hunan Provincial Department of Education provides an organizational carrier for this mechanism, and the technical backbones of leading enterprises deeply participate in the formulation of professional standards and the topic selection of graduation design to ensure that the teaching content is synchronized with the evolution of industrial technology.

5. INSTITUTIONAL COORDINATION AND IMPLEMENTATION PATH OF PROFESSIONAL GROUP CONSTRUCTION

The sustainable promotion of specialty group construction depends on the institutional support system composed of policy coordination, organization coordination and evaluation coordination. The Implementation Opinions on Deepening the Industry-Education Integration of CBEC jointly issued by the Hunan Provincial Department of Education and the Department of Commerce included the construction of professional groups in the scope of provincial special funds. The document clearly requires that 15% of the industrial support funds must be used for the production training base jointly built by schools and enterprises and the enterprise practice of "double-qualified" teachers, effectively integrating education and industrial policy resources. The Industry-Education Integration Community, led by CBEC Association of Hunan Province, has absorbed eight HVC and 23 leading enterprises. The Community has established a quarterly joint meeting system. The Community has also established a dynamic early warning mechanism for specialty setting, which automatically triggers curriculum adjustment when the fluctuation of job demand exceeds 20% for two consecutive quarters. Evaluation synergy breaks through the single employment rate orientation, and builds a three-dimensional evaluation framework with industrial chain adaptability, post competence and development sustainability as the core. Among them, the fitness of industrial chain is quantitatively characterized by the distribution density and retention time of graduates at key nodes, which together break the structural obstruction of Industry-Education Integration.

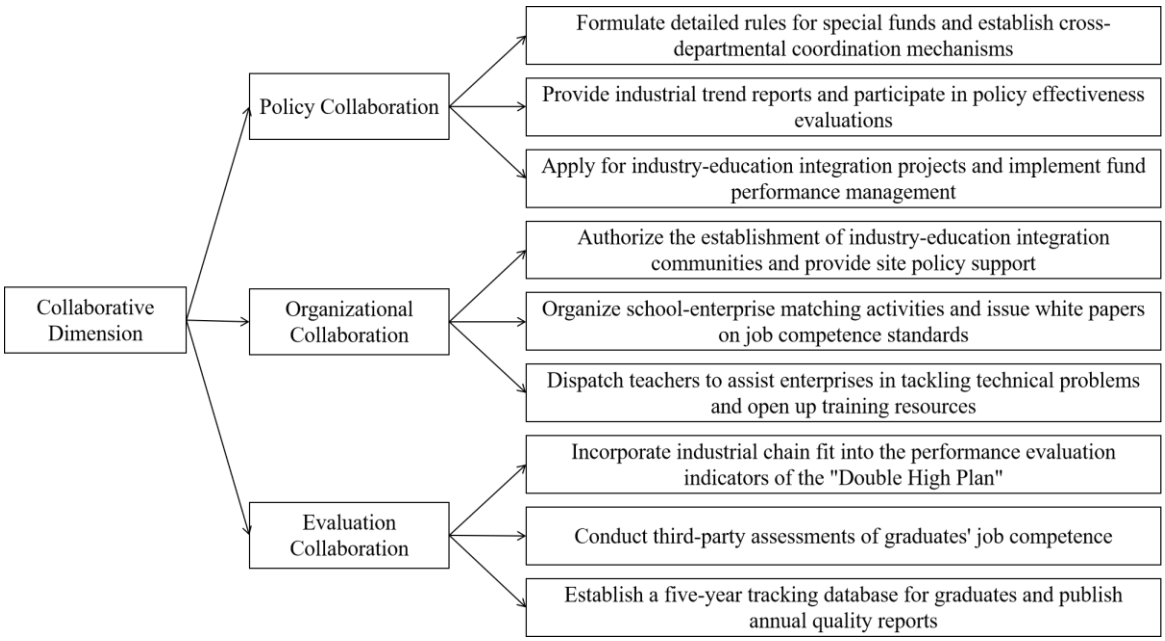


Figure 1 Rights and Responsibilities of Entities in the Institutional Collaboration for the Construction of CBEC Professional Clusters.

"Figure 1" summarizes the power and responsibility allocation of three types of subjects under the framework of institutional coordination. The scheme makes it clear that government departments should fulfill the responsibility of rule supply, industry organizations should play the role of bridges and ties, and colleges and universities should reserve the space for independent implementation, so as to avoid synergy failure caused by vague powers and responsibilities. The construction of specialty groups follows the spiral path of "demand diagnosis-structural reconstruction-resource integration-dynamic optimization". In the early stage, we will identify the capacity gap through the industrial chain map, promote the reorganization of curriculum modules and the construction of shared training platform in the middle stage, and rely on the tracking data of graduates' career development to feed back the iteration of training programs in the later stage. This path promotes the construction of professional groups from project and movement to normalization and mechanism, and finally realizes the co-evolution of education subsystem and industrial ecosystem.

6. CONCLUSION

From the perspective of regional industrial chain coordination, this study systematically explains the theoretical logic and institutionalized path of CBEC specialty group construction in HVC. It is found that the CBEC industry chain in Hunan Province has structural tension in manufacturing, platform and service. Manufacturing enterprises generally lack the ability to digitally express products and judge overseas consumption trends. Platform operators face the dual pressures of fragmentation of multi-platform rules and fluctuation of traffic conversion efficiency, while the service side highlights the capacity gap of customs compliance processing and multi-currency settlement risk identification. This multi-node intertwined industrial ecology requires personnel training to break through the single professional boundary, making the construction of professional groups an inevitable choice.

The "Cohesion-Outreach" two-dimensional collaborative mechanism proposed by the study shows that the internal curriculum modules need to be guided and supported by the core majors to complement each other, while the external ones need to rely on the Industry-Education Integration Community to establish a dynamic response with key nodes in the industrial chain. Six "Double-High Plan" colleges in Hunan have positioned the major of international economy and trade as a "supporting unit of compliance and risk control", and the major of modern logistics management has strengthened the intelligent dispatching training for overseas warehouses, which confirms the accurate response of resource reorganization to industrial demand. At

the institutional level, 15% of industrial support funds are directed to the training base jointly built by schools and enterprises, quarterly joint meetings led by industry organizations, and curriculum adjustment triggered by 20% fluctuation of post demand, which together constitute the guarantee of sustainable operation. The essence of specialty group construction is not the simple superposition of specialties, but the deep coupling of education subsystem and industrial ecosystem in structure, function and value. Only when the professional groups can dynamically adjust the output module according to the evolution of the industrial chain, and feed back the iteration of the training scheme through the five-year career development tracking data of graduates, can vocational education truly become the endogenous force to improve the toughness of the regional industrial chain.

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