

Development of Strategic Industrial Clusters in Guangdong Higher Vocational Colleges based on the “Double High Plan”

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Abstract: This article analyzed the ten strategic pillar industry clusters and the ten strategic emerging industry clusters which were confirmed and announced by Guangdong Province in May 2020 in addition to the 14 professional groups of schools in Guangdong Province which were shortlisted in the “Double High Plan.” With comparison and analysis, the degree of coincidence between the professional groups of higher vocational colleges and strategic industrial clusters in Guangdong Province which covered most of the industrial clusters was relatively high. The higher vocational colleges that were shortlisted in the “Double High Plan” still required dynamic adjustments in the construction of professional groups to achieve an all-rounded integration of the supply of talents and industrial demands.

Keywords: Double High Plan; Professional group; Industrial clusters

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1. Introduction

On March 29, 2019, China’s Ministry of Education and the Ministry of Finance implemented the “High-level Higher Vocational Schools and Professional Construction Plan with Chinese Characteristics” project. There were 197 construction units which comprised of 56 high-level school construction units and 141 high-level professional group construction units.^[1] Based on the world’s industrial development practice and Guangdong’s own industrial development, Guangdong proposed that by 2025, the construction of a modern industrial system would reach a new level and nurture industrial clusters with global competitiveness. This research included 19 professional groups from 14 higher vocational colleges in Guangdong Province, focused on analyzing the degree of coincidence between these professional groups and the need for strategic industrial clusters in Guangdong Province, as well as provided suggestions for the realization of a comprehensive integration of the structural elements in regard to the supply and industrial demands of talent training.

2. Overview of strategic industrial clusters in Guangdong Province

On May 18, 2020, the Guangdong Provincial Government issued the “Opinions of the People’s Government of Guangdong Province on Cultivating and Developing Strategic Pillar Industrial Clusters and Strategic Emerging Industrial Clusters” (hereafter, referred to as the “Opinions”).^[2] Among the 20 strategic industrial clusters in Guangdong Province, the electronic information and equipment manufacturing industries play the leading roles in this round of industrial development in which there are 7 industrial clusters in the electronic information industry and 6 in the equipment manufacturing industry. The new energy and environmental protection industries are the focus in the second round of industrial development. While

pursuing industrial transformation and upgrading, the concept of green, low-carbon, environmentally friendly, and sustainable development are adhered to. The development of this round of strategic industrial clusters takes into account of people's livelihood in which the growth of industries such as biomedicine, health industry, modern agriculture, and food industry meet the people's growing needs for a better life.

3. Analysis on the professional groups of higher vocational colleges in Guangdong Province's "Double High Plan"

The announcement of the Ministry of Education and the Ministry of Finance in regard to the construction units of high-level vocational schools with Chinese characteristics and professional group construction units listed 14 higher vocational colleges in Guangdong Province.^[3] There were 19 professional groups shortlisted in the "Double High Plan" which covered 9 major categories: light industry and textiles, biology and chemical engineering, equipment manufacturing, transportation, electronic information, medicine and health, culture and art, water conservancy, as well as resources, environment and safety. Among them, the electronic information category has the largest number of professional groups which has 6 groups, followed by the light industry and textiles category which includes 3 professional groups, while equipment manufacturing, transportation, as well as culture and art categories each has 2 groups. Other major categories comprise of one professional group each.

The 19 professional groups have distinctive characteristics which are consistent with the school's orientation and characteristics. The 14 higher vocational colleges focused on forming related professional groups based on their advantages in running the schools. Mechanical and electrical higher vocational colleges focused on constructing a professional structure with the advanced manufacturing professional group as the main body and the professional groups of electronic information industry and modern service industry as its two wings. Higher vocational colleges with water conservancy and hydropower characteristics use the advantage of traditional schools to optimize the cultivation of regional industrial talents and high-level majors to serve in national key industries and regional pillar industries of strategic fields such as hydropower energy supply and safety assurance. 80% of majors in these types of schools closely follow the hydropower industry, serve key industries such as modern water conservancy and power in addition to building an industry-oriented vocational education brand. Shenzhen Vocational and Technical College, Shenzhen Vocational and Technical College of Information Technology, Dongguan Vocational and Technical College, and Guangdong Vocational College of Science and Technology use Guangdong's software and information service industry to ascend with the goal to cultivate compounding innovative and high-quality technical talents that meet the needs of this intelligent era. Drawing close to Shenzhen's pillar industries and emerging industry majors, focusing on the establishment of professional groups such as electronic information engineering technology, software technology, communication technology, etc. to be in sync with the new generation of communication equipment, networks, mobile phones, smart terminals, high-end semiconductor components, Internet of Things sensors, big data, artificial intelligence, blockchain, information technology innovation applications, and other industries are closely related.

4. Analysis on the degree of coincidence between professional groups and industrial clusters

In this study, Guangdong Province's top ten strategic pillar industry clusters, ten strategic emerging industry clusters, and 19 professional groups shortlisted in the "Double High Plan" higher vocational colleges (two of which were electronic information technology professional group and the software technology professional group) were classified and sorted. The professional groups were classified and linked to the industrial clusters as shown in **Figure 1**.



Figure 1. Classification of professional groups and industrial clusters

4.1. Relatively high degree of coincidence between professional groups and industrial clusters

There are 16 professional groups in Guangdong's double-high school (two of which are the same as two professional groups in higher vocational colleges) which can be linked to 17 strategic industrial clusters. In view of that, the cluster coincidence is high. The electronic information category has the most professional groups and industry clusters which are the electronic information industry cluster, smart home appliances industry cluster, software and information service industry cluster, ultra-high-definition video display industry cluster, semiconductor and integrated circuit industry cluster, blockchain and quantum information industry cluster, as well as digital creative industry cluster. The second is the equipment manufacturing category in which there are 4 professional groups and 6 industrial clusters linked. The 6 industrial clusters are the advanced materials, high-end equipment manufacturing, laser and additive manufacturing, precision instrument equipment, intelligent robot, and frontier new material industry cluster. On the other hand, there are 3 professional groups that can be linked to the modern light industry and textile industry cluster, namely the jewelry technology and management group, furniture design and manufacturing group, as well as the

packaging planning and design professional group. The fine chemical technology professional group meet the needs of the green petrochemical industry cluster while the surveying geographic information technology professional group meet the needs of the safety emergency and environmental protection industry cluster. Lastly, the Chinese pharmacy professional group formed links with the biomedicine and health industry cluster.

4.2. Connection of industrial clusters with cultural and artistic professional groups

The art design and the product art design professional group are cultural and artistic majors. Their dockings with the industrial cluster are weak. However, the cultural and artistic professional group is flexible as they can form connections with the electronic information professional group or the equipment manufacturing professional group. Hence, it is possible to integrate, excavate, and cultivate compounding talents in this major.

4.3. Strengthening the construction of agricultural and new energy professional groups

Among the 19 professional groups, there is no agriculture or new energy professional groups to meet the needs of industrial clusters pertaining modern agriculture and food, automobile, and new energy. Water conservancy and hydropower construction engineering professional groups are mainly linked to infrastructure industries which is difficult to dock the former batch of strategic industrial clusters.

Generally, the professional groups shortlisted in the “Double High Plan” in Guangdong Province improve the support in terms of the development needs in strategic industrial clusters especially the six professional groups in the electronic information category which account for the largest proportion among the professional groups. There are roles for these professional groups in industries such as new generation communication equipment and networks, mobile phones and new smart terminals, high-end semiconductor components, IoT sensors, as well as new generation information technology innovative applications, hence, meeting the demands of the national strategic development. In addition to that, under the equipment manufacturing category, professional groups of the computerized numerical control (CNC) technology, refrigeration and air conditioning, railway power supply technology, and aircraft electromechanical equipment maintenance also satisfy industries pertaining high-end CNC machine tools, aviation equipment, and rail transportation equipment. The equipment manufacturing industry, intelligent manufacturing and industrial robots industry, factory automation and smart factories, as well as other industries are upgraded and developed to supply more talents and intellectual supports for high-end equipment manufacturing in Guangdong Province.

5. Countermeasures and suggestions

5.1. Dynamic adjustments in the construction of professional groups

The professional group is linked accurately with national and regional leading industries, pillar industries, as well as key areas of strategic emerging industries.^[4] The professional groups of higher vocational colleges in Guangdong should be connected to advanced manufacturing industries, strategic emerging industries, and modern service industries in the Greater Bay Area and further adjustments and optimization of the professional structure is needed. More opportunities should be created for development, compounding and innovative technical talents should be cultivated, and a service strategy should also be formed as a model for emerging industries. Among the 20 strategic industrial clusters, most of the key industrial clusters are involving the electronic information industry and equipment manufacturing industry. The construction of professional clusters should closely follow the forefront of technological development while focusing on big data, artificial intelligence, industrial robot development and technological

application, as well as connecting with advanced ones. In order to serve the transformation and upgrading of regional key industries in terms of technological development trends and actual production needs of enterprises, dynamic adjustments are necessary in the construction of professional groups. First, new industry technologies and new processes should be introduced into lessons in a timely manner to achieve continuous interactions between talent training and industry. Next, specific “work situations” in regard to enterprises’ real projects should also be introduced while creating high-quality professional project-orientated core courses with equal emphasis on education and training, new-form teaching materials, as well as cultivating students’ skills. Other than that, contents pertaining new technologies and technology development, new processes, new products, technical services, as well as high-quality scientific research results of strategic industrial clusters should be selected and converted into loose leaf textbooks and electronic multimedia resources to keep abreast with the latest industrial and development trends.

5.2. Strengthening the cultivation of compounding talents

The McKinsey Global Institute report pointed out that by 2030, China would face the largest employment changes in which 111.2 million jobs are expected to be replaced by automation.^[5] Responding to the contradiction between the supply and demand of talents and to further expand the supply of these talents, it would require the creation of a new education system that is personalized, diversified, and crossing-borders. The “professional +” training form should be explored to meet the current and future industrial upgrading needs. For general majors that do not have clear industry orientations or industry carriers such as marketing, business management, English, Japanese, and other majors, they would require timely modifications in regard to combination with other majors of strong industrial characteristics while implementing “professional +” which improves the pertinence and applicability of talent training as well as to cultivate compounding talents. In order to cultivate students’ ability to expand and achieve a composite growth in terms of knowledge, technical skills, and key abilities, strategic industrial clusters should be based upon while integrating and creating new professional groups. Moreover, introductory lessons, professional cultural literacy, and basic courses should be provided in addition to encourage sharing among professional groups. The cultivation of core and professional public knowledge, cultural qualities, and technical skills required by the industry are also vital while giving students opportunities to choose their own majors. Professional elective courses and new technical courses should also be included into professional courses.

5.3. Constructing “professional group + company”

Valuable professional groups should be given the upper hand while introducing new industry companies, establishing market-oriented operating entities, forming a “professional group + company” operating model, and emphasizing on part-timers and their salaries in regard to mutual employments. There is a necessity to further integrate industries and education as well as promoting a diversified school-running pattern. Through enterprise training of teachers, promotion of employees, joint training of personnel, interoperability, and other measures, teachers’ skills in terms of cognition, cooperation, innovation, and professionalism would be improved. In addition to that, a two-way dynamic cooperation between school and enterprise personnel should be established to promote the integration of production and education.

5.4. Adherence to the integration of production and education, work and learning, knowledge and action, as well as school-enterprise cooperation

The optimization and upgrading of Guangdong’s advanced manufacturing industry has been improving simultaneously with emerging technologies such as automation and informatization. In labor production,

cross-field collaborations as well as the integration of innovation models and production methods require schools to further improve the integrative mechanism of production and education while effectively integrating them into the regional innovation system to strive for service contribution improvements. Guided by Guangdong's strategic industrial clusters which are rooted in the Guangdong-Hong Kong-Macao Greater Bay Area, in order to achieve continuous interaction between talent training and industries, focusing on regional key industries and high-end competitive industries while introducing new technologies and processes as well as to persistently integrate industry and education, work and learning, knowledge and action with school-enterprise cooperation are important. Enterprises should be promoted as an important subject of vocational education while establishing a set of talent training standards that is recognized by industrial enterprises to further strengthen the integration of production and education.

Disclosure statement

The author declares no conflict of interest.

References

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