ISSN: 2688-9323

Research on the Compatibility between Disciplinary Design and Industrial Growth in Guangdong Province

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Abstract

Higher education provides human resource support for industrial development, is the assurance of the industry's sustainable development, and the adaptation of majors and industries is a crucial foundation for the industry's balanced development. From the perspective of regions and cities, the current situation of industrial development and employment is analyzed, and when combined with an analysis of the professional settings of higher education, it is determined that the mismatch between industry and employment is more severe and that the professional settings lag behind the "one nuclear, one belt, and one district" plan. Based on this suggestion, to form a professional cluster with regional characteristics, we will investigate new mechanisms for professional settings, improve the overall planning of the region, strengthen the information circulation between businesses and colleges, and promote the in-depth integration of industry and education to promote the precise docking of professional industries and form a strong support for industrial development.

Keywords

Industrial Structure; Professional Environments; Structural Adequacy.

1. Introduction

Currently, the world is developing in a multipolar manner, the trend of economic globalization is accelerating, social informatization is improving, cultural diversity is developing in-depth, and the global governance system and international order are in an accelerated reform phase. The countries of the world are interdependent in all aspects of economy and culture, and their ties are deepening, and a new round of scientific and technological revolution and industrialization are on the horizon. In 2019, the State Council issued the Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area, which provided programmatic documents for the construction of the Hong Kong-Zhuhai-Macao Greater Bay Area. It will unite Guangdong, Hong Kong, and Macao to construct the Greater Bay Area, build a cluster of world-class cities, and establish an international science and technology innovation center with global influence. Under the direction of the development plan, Guangdong Province adheres to the fundamental principles of development, adapts to local conditions, "one group and one policy," strives to promote the industrial layout of "one nuclear, one belt, and one region," and encourages the professional and differentiated development of industrial clusters in various cities. On this basis, ten strategic pillar industrial clusters and ten strategic emerging industrial clusters are planned to promote the development of industrial agglomeration to industrial clusters, realize the qualitative change from agglomeration to cluster, comprehensively improve quality and efficiency, and enhance development power, thereby laying the groundwork for high-quality economic development. The development of industrial clusters and high-quality development have presented new requirements for talent education, and there is an urgent need for talent training in colleges and universities to meet the needs of industrial development, satisfy the requirements of supply-side reform, and dock the industrial structure, and provide talent support. Numerous domestic studies on the creation of the

ISSN: 2688-9323

Guangdong-Hong Kong-Macao Greater Bay Area have revealed a mismatch between the setting of higher vocational professions and the Greater Bay Area's industrial structure [1], based on the industrial layout of one nuclear, one belt, and one area. Suggestions for enhancing the adaptability of vocational education [2] Based on Guangdong's 14th Five-Year Plan, this study examines the compatibility between professional settings and strategic pillar sectors, and strategic rising industries.

2. Industrial Status

Guangdong Province adheres to the manufacturing industry as a province and is at the forefront of China's manufacturing industry development. Since the reform and opening, the industrial economy has been fully developed. Guangdong Province has generally exhibited a "three-two-one" development pattern in recent years, as the proportion of the output value of the tertiary industry has steadily increased, the output value of the secondary industry has remained stable, and the output value of the primary industry has steadily decreased. However, the development trends of the province's cities vary.

Table 1. Gross regional product of cities in 2020 (percentage)

Cities	the share of the province	The share of the primary industry	The share of the secondary industry	The share of the tertiary industry
Guangzhou	22.59	1.15	26.34	72.51
Shenzhen	24.98	0.09	37.78	62.13
Zhuhai	3.14	1.72	43.39	54.88
Shantou	2.47	4.51	47.74	47.75
Foshan	9.77	1.52	56.35	42.13
Shaoguan	1.22	14.66	34.34	51.00
Heyuan	1.00	12.42	33.98	53.61
Meizhou	1.09	20.28	30.40	49.32
Huizhou	3.81	5.19	50.56	44.25
Shanwei	1.01	14.21	36.33	49.47
Dongguan	8.71	0.31	53.81	45.87
Zhongshan	2.85	2.27	49.40	48.33
Jiangmen	2.89	8.57	41.65	49.77
Yangjiang	1.23	19.38	35.66	44.97
Zhenjiang	2.80	20.06	33.93	46.01
Maoming	2.96	19.78	31.48	48.74
Zaoqing	2.09	18.92	39.03	42.06
Qingyuan	1.60	16.77	33.00	50.23
Chaozhou	0.99	9.72	47.32	42.96
Jieyang	1.90	9.72	36.86	53.42
Yunfu	0.90	19.27	31.11	49.62

According to the Guangdong Statistical Yearbook for 2021, the overall output value of Guangdong Province in 2020 will be 11,076.094 billion yuan, and the share of tertiary production will be 4.31 percent, 39.23 percent, and 56.46 percent, respectively. The output value of the primary industry climbed by 9.64 percent, 0.19 percent, and 3.77 percent annually, with a clear "three-two-one" development tendency. The entire output value of the Pearl River

ISSN: 2688-9323

Delta region in 2020 is 8952.393 billion yuan, representing 80.83 percent of the province's GDP, while the share of tertiary production is 1.75 percent and 39.96 percent, respectively. The share of primary output value is extremely low at 58.29 percent, while the growth of secondary and tertiary production is consistent. The entire output value of the east wing region in 2010 was 705.351 trillion-yuan, accounting for 6.37 percent of the province's GDP, while the proportions of tertiary and primary production were 8.42 and 42.61 percent, respectively. 48.97 percent. The overall output value of the west wing region in 2 2020 is 773.997 trillion-yuan, accounting for 6.99% of the province's GDP, and the proportion of tertiary production is 19.82% and 33.2%. 46.98 percent. The entire output value of the northern ecological region in 2020 is 644.354 billion yuan, representing 5.82 percent of the province's GDP, and the proportions of secondary and tertiary production are 16.63 percent and 32.67 percent, respectively. 50.71 percent. Guangzhou and Shenzhen have the highest proportion of total output value, at 2.259% and 24.98% respectively. The proportion of tertiary production in Guangzhou is 1.15 percent and 26.34 percent respectively 72.51 percent, the proportion of tertiary industry output value is extremely high, while the proportion of tertiary industry in Shenzhen is 0.09 percent, 37.78%, and 62.13 percent respectively. The cities in the east wing, west wing, and northern ecological zone exhibit a "three-two-one" growth pattern; however, the share of production value from the second and third sectors is close to that of the primary industry.

From the perspective of the province's cities' pillar industries, Guangzhou's three-pillar industries are automobile manufacturing, computer, communication, and other electronic equipment manufacturing, and electricity, heat production, and supply. The output value of these three major industries in 2010 accounts for 46.37 percent of the scale. Shenzhen's pillar industries are computer, communication, and other electronic equipment manufacturing, electrical machinery and equipment manufacturing, and special equipment manufacturing, with the computer, communication, and other electronic equipment manufacturing accounting for 61.4% of the city's total industrial output. The main industries of Zhuhai are the manufacturing of electrical machinery and equipment, computer, communication, and other electronic equipment, and chemical raw materials and chemical products, with the manufacturing of electrical machinery and equipment as the major industry. Shantou's pillar industries include the textile and clothing industry, the apparel industry, the rubber and plastic products industry, the culture and education, art and art, and the sports and entertainment products manufacturing industry, with the textile and clothing industry being the most important. The core industries of Foshan are the production of electrical machinery and equipment, metal products, and non-metallic mineral products. The pillar industries of Zhaoqing are non-metallic mineral products, computer, communication, and other electronic equipment manufacturing, and non-ferrous metal smelting and rolling processing. These industries account for 11.96 percent, 11.80 percent, and 11.53 percent of the gross industrial output value, respectively. Dongguan's top three sources of operating income are computer, communication, and other electronic equipment manufacturing, electrical machinery and equipment manufacturing, rubber and plastic products, and five pillar industries, electronic information manufacturing industry, electrical machinery and equipment manufacturing industry, textile, clothing, shoes, and hats manufacturing industry, food, and beverage processing and manufacturing industry, and paper and paperboard manufacturing industry. Computer, communication, and other electronic equipment production, electrical machinery, equipment manufacturing, and chemical raw materials and chemical products manufacturing are the top three industries in terms of industrial output value in Huizhou. Electrical machinery and equipment manufacture, computer, communication, and other electronic equipment manufacturing, and general equipment manufacturing account for the top three operating incomes of industrial companies in Zhongshan of a defined size or above. Metal goods, electrical machinery, equipment manufacture, and computer, communication, and other electronic

ISSN: 2688-9323

equipment production are the three industries that contribute the most to Jiangmen's total industrial output above the designated size.

3. Deviation Analysis

Measure the fit between industry and employment by calculating the degree of deviation of structure [3]. The degree of deviation = the proportion of tertiary industrial output value minus the proportion of employed people in tertiary industries. The size of the degree of bias reflects the size of the fit between the two. If the deviation is modest, employment and production are about to coincide, and industrial development is more profitable; if the divergence is too great, the industry is unbalanced, and it is challenging for the industry to continue to develop healthily. When the deviation is positive, the employment ratio is less than the proportion of output value, indicating a possible problem with insufficient labor supply; when the deviation is negative, the employment ratio is greater than the proportion of output value, indicating a possible problem with inefficient industrial production.

According to the 2021 Guangdong Statistical Yearbook, calculate the structural deviation of cities in Guangdong Province in 2020, the deviation of tertiary production in the Pearl River Delta region is 1.70, -10.12, 8.42, the deviation value of the primary industry is small, the deviation value of the secondary industry is negative, and the deviation is large, there may be too many jobs in the secondary industry, and the productivity is low, The deviation value of the primary industry is small The deviation of tertiary production in the east wing region is 8.25, -0.14, and -8.11, while the deviation of primary production is positive and significant. There is underemployment in the primary industry, the deviation value of the secondary industry is small and more balanced, the deviation value of the tertiary industry is negative and the deviation is large, and there is an urgent need to release excess labor in the tertiary industry. The deviation of the three industries in the west wing is 19.08, 0.02, and -19.10, and the three industries are like those in the east wing, but the deviation values are greater in the west wing. It demonstrates that the industrial employment problem in the east and west wings is comparable, but the problem in the west wing region is more severe; therefore, it is necessary to strengthen the coordination of industrial and employment relations. The deviations of tertiary production in the northern ecological region are 16.41, -4.26, and -12.15, and the deviation values for the three industries and employment are substantial. There exists a significant disparity between industry and employment.

The situation between industry and employment in each city is more diverse, primarily displaying three types of situations, the first type of Guangzhou, Foshan, the overall deviation of the three industries is the smallest, and the three industrial development coordination, of which Guangzhou "three two one" The development trend is evident, whereas Foshan displays a development trend of "two-three one," and the proportion of output value of the secondary industry is the highest. The second type of Shenzhen, Zhuhai, and Shantou, in which the overall deviation of the three industries is greater than the first type, belongs to an uncoordinated city, and the development of the three industries is relatively balanced, with Shenzhen and Zhuhai secondary and tertiary industries deviation values that are negative and positive, respectively, and similar deviation values, which may be due to the impact of the epidemic. The third category consists of other cities in the province; the deviation of the three industries is relatively large, and they are all characterized by an imbalance between the two industries within the three industries. As an illustration, in Shaoguan, Heyuan, Meizhou, Shanwei, Yangjiang, Zhanjiang, Maoming, Zhaoqing, and Yunfu, the deviation value of the primary industry is positive, while the deviation value of the tertiary industry is negative, indicating that the tertiary industry is labor-intensive, but the output value contribution is low, and the primary industry lacks labor support. Huizhou, Dongguan, and Zhongshan, on the other hand,

ISSN: 2688-9323

are characterized by an uneven development between the secondary and tertiary industries; they are also located in the same Pearl River Delta regional cities as Shenzhen and Zhuhai; however, the deviation value is greater and the imbalance between the secondary and tertiary industries is more severe. Jiangmen is the only city with unequal development of primary and secondary industries. The deviation of the three industries and the growth rate of the total output value of each city demonstrate an inverse relationship: the deviation of the three industries is small, the development of the three industries is coordinated, and the output value growth rate is the highest; The deviation of the three industries is moderate, the development of the three industries is not coordinated, and the growth rate is moderate;

Under the influence of the new crown epidemic, the industrial employment bias in various cities is more complex and diverse. This paper analyzes the structural stability of industrial employment in each city by calculating the expectations and variance of the deviation change value for each city over the past five years. During the impact of the epidemic, the stability of the industrial employment structure has been maintained by the relative strength of the primary industrial structure, the smallness of the overall fluctuation, and the variance of the deviation change value over the past five years, which is less than 10. The stability of the second industrial structure is poor, and the overall fluctuation is the greatest; however, Zhuhai, Shantou, and Heyuan maintain good stability with a variance of deviation value of less than ten, while the rest of the cities experience large fluctuations and are severely affected by the epidemic. The employment structure of the tertiary industry is relatively stable, the overall fluctuation is moderate, and it has maintained a relatively stable trend despite the influence of the epidemic.

4. Professional Environments

In 2022, Guangdong Province will establish a total of 105 vocational colleges, including 85 colleges and 20 undergraduate colleges with vocational majors, with a total of 475 majors and an overall coverage rate of 63.84 percent. From the perspective of professional categories, those with the highest professional coverage rate are electronics and information categories, education and sports, tourism, civil engineering and architecture, and news and communications. The coverage rate for majors exceeded 80 percent, with electronic and information majors reaching 91.89 percent. Culture and the arts, transportation, education, and sports are the categories with the highest number of majors. The overall situation reveals that in Guangdong Province, electronic and information professional settings and Guangdong Province's strategic pillar industries and strategic emerging industries planning degree matching is high, forming strong talent support; however, in a manufacturing province, manufacturing-related professional coverage and the number of open majors does not match.

From a regional perspective, the province has 105 colleges and universities, 80 of which are in the Pearl River Delta region, and Guangzhou, an important education center, has 50 colleges and universities, accounting for 47.62 percent. High distribution concentrations exist in the west wing of the coastal economic belt, the east wing of the coastal economic belt, and the northern ecological development zone, with 8, 7, and 10 colleges and universities, respectively. The major categories with the highest professional coverage rate in the Pearl River Delta region are electronics and information, civil engineering and architecture, news and communication, and culture and art the highest majors. The opening of majors is consistent with the positioning of the core area of high-end manufacturing, but the support of manufacturing-related majors is weak, and the major with the highest number of majors has a low correlation with the core area. The west wing of the coastal economic belt and the east wing of the coastal economic belt has the highest concentration of majors in electronics and information, which is consistent with the riverside economic belt's development orientation.

ISSN: 2688-9323

Superior production in the core industry. Electronics and information, banking, business and trade, and equipment manufacturing have the highest coverage rate in the Northern Ecological Development Zone, which is misaligned with its development posture.

Based on the total number of colleges and universities, the repetition of the professional opening is calculated to measure the duplication of majors, and it is concluded through statistical data that the majors with the highest degree of repetition in Guangdong Province are big data and accounting, e-commerce, marketing, and business English, with 74.29 percent and 70.48 percent respectively 62.86 percent and 62.86 percent, setting the degree of repetition for certain majors [4]. The average recurrence rate of professional openings is 7.54 percent, the standard deviation is 1.39 percent, and professional openings are dispersed, making it difficult to build beneficial professional clusters to support the growth of industrial clusters.

5. Matching Analysis

In the "14th Five-Year Plan of Guangdong," it is proposed to adhere to overall planning, classification guidance, and coordinated advancement, to build the core area of the high-end manufacturing industry in the Pearl River Delta, the coastal manufacturing expansion belt in the east and west wings, and the green manufacturing development zone in the north, and to take the high-quality development of the industrial park as the starting point to build the province's "one nuclear, one chemical, and one biotechnology" industrial park. System plan industrial layout and the system for industrial cooperation. We will scientifically coordinate the productivity distribution bureaus in the Pearl River Delta region and the eastern Guangdong and western Guangdong regions, promote the optimization of production and ecological space in the province, and transform the core area of high-end manufacturing in the Pearl River Delta into the world's leading advanced manufacturing development base.

Create a high-end manufacturing hub in the Pearl River Delta. Build an electronic information industry belt on the east bank of the Pearl River and an advanced equipment manufacturing industry belt on the west bank of the Pearl River, and establish a high-end industrial agglomeration development zone. Concentrate on the development of a new generation of electronic information, biomedicine and health, artificial intelligence, cutting-edge new materials, and other emerging industries to establish a high-end manufacturing hub. From the perspective of professional settings, electronic information industry, artificial intelligence industry corresponding to the electronic and information professional categories, the Pearl River Delta region the coverage rate of domain professional settings is 86.49 percent, which is highly compatible with industrial development and can form a talent support chain. The number of professional settings is small, the coverage rate is low, the degree of matching is low, and the support for industrial development is low. According to the "Annual Report on the Quality of Higher Vocational Education in Eastern Province (2019)", the proportion of students in the electronic information category is 16.24 percent on the scale of professional students. By the output value and industrial plan, the percentage of biology and chemical engineering majors is 1.01 percent, making it difficult to support the cluster development of biomedicine and health, cutting-edge new materials, and other strategic developing sectors.

Create an east-west manufacturing expansion corridor along the shore. Give full play to the advantages of "bay + district + belt metallurgical linkage, provinces and cities collaborate, cross-city linkage, rely on major development platforms such as industrial parks at or above the provincial level to develop coastal large industries, make overall plans for the construction of the east and west wings of the coastal manufacturing industry expansion belt, and establish a new growth pole for the high-quality development of the province's manufacturing industry. Accelerate the development of green petrochemical, new energy, new energy vehicles, and other industries in eastern Guangdong, and support the cooperation of cities in western

ISSN: 2688-9323

Guangdong in the fields of the industrial economy, logistics and trade, and scientific and technological research and development. Innovative development "Enclave economic smelting, explore the construction of a cross-regional transfer of benefits sharing mechanism, and actively engage in the transfer of advanced products in the core area of the Pearl River Delta with a long industrial chain and strong industrial driving force." The coverage distribution of the professional settings in the east and west wings is 37.84% and 40.546%, respectively, for the new generation of electronic information. The number of professional settings is small, the coverage rate is poor, the degree of matching is low, and industrial development receives minimal support.

Construct a green manufacturing zone in the north. Practicing the concept of green water and green mountains is the concept of Jinshan Yinshan. By the development and deployment of ecological industrialization and industrial ecology, carry out spatial planning adjustments and industrial space cleaning and rectification, as well as make comprehensive plans for the construction of the northern green manufacturing development zone. Restriction and elimination of polluting industries, emphasis on the development of eco-friendly industries, and vigorous development of modern agriculture and food, new materials, new energy, biomedicine and health, and other distinctive industries. Actively promote the industrial docking of the northern ecological development zone and the Pearl River Delta region. Explore and cultivate new models of industrial development of large farms, large gardens, large factories, and large cities. Reduce carbon emissions Featuring green development, the development of agriculture and food and other industries, agriculture and food industry corresponding to agriculture, forestry, animal husbandry, and fishery, the coverage rate of professional settings in the northern region is 14.58 percent, and the coverage rate of professional settings in the province is 52.08 percent, the number of professional settings is small, and the support for green development is weak. The category of electronic and information professionals has the highest professional coverage rate in the northern region, which does not align with the strategic positioning of the green manufacturing development zone in the northern region.

6. Conclusion

One nuclear, one belt, and one region rely on the status quo and characteristics of industrial development in various parts of Guangdong to lay out and plan the main efficiency of each city in the overall economic situation of the province. However, the overall structure, connotation construction, talent quality output, and professional and technologist output remain the same as in the past. Based on the dimension of expanding the flexibility of vocational education, this study believes that the professional building of higher education in Guangdong can focus on creating breakthroughs from the following four elements.

Enhance cross-regional planning and investigate new professional setting mechanisms. Establish provincial organizations for general education cooperation, as well as approval systems for science majors. It is established by the education cooperation organization in conjunction with regional industrial advantages and professional talent needs, and the professional distribution pattern is planned as a whole to reduce the duplication rate of settings while expanding the diversity of professional settings and enhancing the matching of professional industries. Establish a professional assessment and early warning mechanism, regularly evaluate the opening of majors, assess from the perspectives of professional talent cultivation and professional docking, and publish the assessment and early warning list; implement a dynamic adjustment and withdrawal mechanism for majors; and require colleges and universities to cultivate professionals scientifically, standardized, and of high quality.

ISSN: 2688-9323

Establish a platform for the interchange of information between the government, businesses, and schools to increase the mobility of talent, technology, and data. Establish a government-supervised, market-driven information exchange platform. The institution formulates the professional setting plan based on the needs of the enterprise, combined with the regional and professional advantages of the university, and submits an application for approval, accurately connects the enterprise, and enhances the degree of professional setting matching.

Explore the mechanism of industry and education integration and aggressively implement a new model of school-business cooperation. Encourage businesses and universities to engage in in-depth collaboration and to actively participate in the collaborative development of professional settings, school management concepts, educational models, education and instruction, and professional practice. To develop enterprise brand majors, enterprises collaborate with colleges and universities to substitute the teaching process into the enterprise management model, using real work scenarios as teaching tools, accurately cultivating the talents required by enterprises, and seamlessly connecting the industrial chain.

Adhere to the dislocation of growth to establish a group of professional specialties with distinctive benefits. Regional industrial development and geographic location are significantly distinct, and the pillar industries are also distinct; therefore, it is necessary to adhere to the dislocation of development, inter-regional coordination and complementarity, and the establishment of distinctive majors to establish advantageous professional groups. By the "one nuclear, one belt, and one region" pattern plan, the Pearl River Delta region will be developed into a high-end manufacturing core area, and the east and west wings will plan to construct a coastal manufacturing expansion belt to promote the green manufacturing development zone in the north. In conjunction with geographical and industrial advantages, establish distinctive majors to create a coordinated and healthy growth pattern.

Acknowledgments

This research work was supported by the fund of Guangdong Higher Education Association "14th Five-Year Plan" 2021 Annual Higher Education Research Project, "Research on the Professional Layout of Higher Education Disciplines and the High-quality Development of Service Economy and Society", (Project No. 21GQN765).

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