

Study on the Integration and Development Mechanism between Advanced Manufacturing Industries in Guangdong, Hong Kong and Macao Greater Bay Area and County Industrial Chains in Guangdong Province under the Perspective of "Double Hundred Actions"

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Abstract

This paper takes the advanced manufacturing industry in Guangdong, Hong Kong and Macao Greater Bay Area and the integrated development of county industrial chain in Guangdong Province as the research object, and takes Tai Po County as the case study to analyse the mechanism of the integrated development of the industrial chain in depth. By exploring the mechanisms of industrial docking and synergistic development, technological innovation and industrial upgrading, infrastructure construction and public service optimisation, policy support and government guidance, as well as enterprise exchange and cooperation and collaborative innovation, it reveals its driving effect on the high-quality development of the regional economy. The results of the study show that the mechanisms of industrial docking, technological innovation, and infrastructure construction have been remarkably effective in promoting the integration and development of the advanced manufacturing industry in the Greater Bay Area and the county industrial chain in Guangdong Province, providing useful reference for other regions in Guangdong Province. With the acceleration of the integration process of the Greater Bay Area, more opportunities will be ushered in the development of county industries in Guangdong Province, and it is of great significance to continue to deepen the integration of the industry chain and promote the development of county industries in the direction of high-end, green and intelligent.

Keywords

Guangdong-Hong Kong-Macao Greater Bay Area; Advanced Manufacturing Industry; Guangdong Provincial County Industry Chain; Integrated Development Mechanism; Tai Po County.

1. Introduction

1.1. Research Background

(1) The National Strategic Position and Regional Development Significance of the Construction of the Guangdong-Hong Kong-Macao Greater Bay Area

The construction of the Guangdong-Hong Kong-Macao Greater Bay Area is a major national strategy personally planned, deployed and promoted by General Secretary Xi Jinping, aiming to create an international science and technology innovation centre and a world-class city cluster with global influence by deepening cooperation among Guangdong, Hong Kong and Macao, promoting coordinated development in the region, and constructing a new open economic system. With its unique geographical advantages, economic strength and innovation resources, the Greater Bay Area has become an important window for China's opening up to the outside world and a demonstration site for high-quality development. 2023 General Secretary Xi Jinping has emphasised the need to make the Guangdong-Hong Kong-Macao Greater Bay Area a strategic fulcrum of the new development pattern, a demonstration site for high-quality development, and a leading site for Chinese-style modernisation. This positioning further highlights the important strategic position of the Greater Bay Area in the overall national development, requiring it to play a leading role in promoting high-quality economic development, fostering scientific and technological innovation, and deepening reform and opening up.

(2) The Role and Characteristics of Guangdong's County Economies in the Province's Economic Development

The economy of the counties of Guangdong Province has an important position in the economic development of the province. County areas are an important part of the economy of Guangdong Province, carrying a large number of industries and populations, and are of great significance to the stable growth and coordinated development of the province's economy. The county economies of Guangdong Province have the following characteristics: firstly, the industrial base is relatively weak, but with certain characteristics and advantages, such as ceramics, tea, agricultural products processing and other traditional industries; secondly, they are not innovative enough, lack of high-end technology and brands, small enterprises, limited capital and technical strength; thirdly, the infrastructure of transport, logistics and other infrastructure is relatively weak, which affects the development of the industry and the inter-regional economic links. Therefore, how to promote the integration and development of the county economy of Guangdong Province with the advanced manufacturing industry in the Greater Bay Area, and realise the coordinated development of the regional economy, is an important issue facing us now.

(3) The driving role of integrated industrial chain development on the high-quality development of the regional economy

The integrated development of the industrial chain is an important engine for promoting the high-quality development of the regional economy. Through the promotion of industrial collaborative innovation, cooperation and exchanges between upstream and downstream enterprises can be strengthened to achieve resource sharing and complementary advantages, and to promote technological innovation and industrial upgrading. For example, the integration and development of advanced manufacturing industries in the Greater Bay Area of Guangdong, Hong Kong and Macao with the speciality industries in the counties of Guangdong Province can leverage the scientific research resources and innovation capabilities of the Greater Bay Area to enhance the technological level of the county's industries and the added value of their products. At the same time, the integrated development of the industrial chain can help build a more perfect industrial ecology, improve the overall competitiveness of the industry, promote

the integrated development of the regional economy, and strengthen the economic ties and cooperation between different regions. Therefore, it is of great significance to promote the integrated development of industrial chain to achieve the high-quality development of regional economy.

(4) Introducing the "Two Hundred Actions" and the theme of this study

The "Double Hundred Actions" is an important initiative implemented by Guangdong Province to promote the coordinated development of the region and the transformation and upgrading of industries, aiming to promote the integration and development of the advanced manufacturing industry in the Greater Bay Area with the county industrial chain in Guangdong Province by means of policy guidance and resource support. This study takes Tai Po County as a case study to explore the mechanism of integration and development of advanced manufacturing industry in Guangdong, Hong Kong and Macao Greater Bay Area and county industrial chain in Guangdong Province, and analyse its significance for other regions in Guangdong Province, so as to provide theoretical support and practical guidance for the coordinated development of regional economy.

1.2. Purpose and Significance of the Study

(1) Purpose of Exploring the Mechanism for the Integration and Development of Advanced Manufacturing Industries in the Guangdong, Hong Kong and Macao Greater Bay Area with the County Industrial Chains in Guangdong Province

This study aims to explore the mechanisms for the integration and development of advanced manufacturing industries in the Greater Bay Area of Guangdong, Hong Kong and Macao with the county industrial chains in Guangdong Province, and to reveal the inherent rules and key factors for the integration and development of industrial chains by analysing the case of Tai Po County. Specifically, the study will focus on industrial docking and synergistic development, technological innovation and industrial upgrading, infrastructure construction and public service optimisation, policy support and government guidance, etc. It will explore how to promote the deep integration of the advanced manufacturing industry in the Greater Bay Area and the county industrial chain in Guangdong Province through these mechanisms, and to promote the high-quality development of the regional economy.

(2) Providing theoretical support and practical guidance for coordinated regional economic development

Through this study, it is hoped that it can provide theoretical support and practical guidance for the coordinated development of regional economy. On the one hand, the study will summarise the successful experiences and practices of Tai Po County in the integrated development of the industrial chain to provide reference and learnings for other regions in Guangdong Province; on the other hand, the study will put forward specific policy suggestions and measures to provide practical guidance for the government and enterprises to promote the integrated development of the industrial chain. Through the combination of theory and practice, this study aims to provide useful references and lessons for the coordinated development of regional economy in Guangdong Province and even the whole country.

(3) The significance of using Tai Po County as a case study

As an important county in Guangdong Province, Tai Po County has rich natural resources and a unique industrial base, but it also faces problems such as an imperfect industrial chain and insufficient innovation capacity. By taking Tai Po County as a case study and examining its integration and development mechanism with the advanced manufacturing industry in Guangdong, Hong Kong and Macao Bay Area, we can gain a deeper understanding of the advantages and disadvantages of the county economy in the integration of industrial chain and explore the path and mode suitable for the development of the county economy. At the same time, the case of Tai Po County has strong representativeness and reference significance, which

can provide useful references and inspiration for other regions in Guangdong Province, and promote the coordinated development and industrial upgrading of county economies in the province.

2. Overview of the "Double Hundred Initiative"

2.1. Meaning and Objectives of the "Two Hundredths Initiative"

(1) Connotation of the "Two Hundred Actions"

The "Double Hundred Actions" is an important initiative implemented by Guangdong Province to promote coordinated regional development and industrial transformation and upgrading. The specific content of the "Double Hundred Actions" includes two aspects: first, the "Hundred Counties, Thousand Towns and Ten Thousand Villages High-Quality Development Project", which aims to promote the high-quality development of the province's county economy by strengthening the development of the county, town and village levels; and secondly "School-Land Cooperation Agreement on Hundred Schools Associated with One Hundred Counties to Assist the 'Hundred Counties, Thousand Towns and Ten Thousand Villages High-Quality Development Project'", which aims to provide talents, technology and intellectual support for the economic development of the counties through the co-operation between colleges and universities and the county-level governments.

(2) Background to the implementation of the "Two Hundred Actions"

The implementation of the "Double Hundred Actions" is an important initiative of Guangdong Province to promote coordinated regional development and rural revitalisation strategy. As the leader of China's economic development, Guangdong Province has been facing the problem of unbalanced regional development. As an important part of the province's economy, the level of development of the county economy is directly related to the coordinated development of the province's economy and the implementation of the rural revitalisation strategy. Therefore, through the "Double Hundred Actions", the Guangdong Provincial Government aims to strengthen the development of counties, towns and villages, to promote the high-quality development of the county economy, and to realise the coordinated development of the province's economy.

(3) Objectives and expected outcomes of the "Two Hundred Actions" in promoting industrial development

"The goal of the Double Hundred Initiative in promoting industrial development is to promote the high-quality development of county economies through the strengthening of development at the county, town and village levels, and to achieve coordinated development of the province's economy. Specifically, the first is to enhance the overall strength and competitiveness of county economies and promote the high-quality development of county economies through strengthening the development of the county, township and village levels; the second is to promote the transformation and upgrading of county economies through the co-operation between universities and county governments by providing talents, technology and intellectual support for the development of county economies; the third is to achieve the economic transformation and upgrading of the province's economy through the "Double Hundred Actions"; and the third is to achieve the economic development of the province through the "Double Hundred Actions". Thirdly, through the "Double Hundred Actions", the coordinated development of the province's economy will be achieved, the regional development gap will be narrowed, and the implementation of the strategy of rural revitalisation will be promoted.

2.2. The Role of the "Double Hundred Initiative" in Promoting Industrial Integration and Development

(1) Policy guidance

"The Double Hundred Initiative promotes the integration and development of the advanced manufacturing industry in the Greater Bay Area of Guangdong, Hong Kong and Macao with the industrial chain in the counties of Guangdong Province through policy guidance. First, through the formulation of industrial policies, to guide advanced manufacturing enterprises in the Greater Bay Area to cooperate with enterprises in counties in Guangdong Province, and to promote the docking and synergistic development of the industrial chain; second, through the formulation of talent policies, to attract high-end talents from the Greater Bay Area to work in counties in Guangdong Province, and to provide talent support for the economic development of counties; and third, through the formulation of science and technology policies, to encourage scientific research institutes in the Greater Bay Area to cooperate with enterprises in counties in Guangdong Province, and to promote technological innovation and industrial upgrading.

(2) Resource support

The "Double Hundred Initiative" promotes the integration of advanced manufacturing industries in the Guangdong, Hong Kong and Macao Greater Bay Area with the industrial chain in the counties of Guangdong Province through resource support. Firstly, through the integration of financial resources, to increase investment in the development of county industries in Guangdong Province, and to support county enterprises to carry out technological innovation and industrial upgrading; secondly, through the integration of human resources, to provide talent support for the development of county economies in Guangdong Province, and to promote the high-quality development of county economies; thirdly, through the integration of scientific and technological resources, to provide technological support for the development of county economies in Guangdong Province, and to promote the transformation and upgrading of county economies.

(3) Platform construction

"The Double Hundred Initiative promotes the integration and development of the advanced manufacturing industry in the Greater Bay Area of Guangdong, Hong Kong and Macao with the industrial chain in the counties of Guangdong Province through the establishment of a co-operation platform. First, through building an industrial cooperation platform, promote cooperation between advanced manufacturing enterprises in the Greater Bay Area and county enterprises in Guangdong Province, and promote the docking and synergistic development of the industrial chain; second, through building a talent cooperation platform, promote cooperation between universities in the Greater Bay Area and county governments in Guangdong Province, and provide talent support for the economic development of the counties; and third, through building a science and technology cooperation platform, promote cooperation between scientific research institutions in the Greater Bay Area and county enterprises in Guangdong Province, and promote technological innovation and industrial upgrading. Thirdly, to promote co-operation between scientific research institutions in the Greater Bay Area and enterprises in the counties of Guangdong Province through the establishment of a platform for scientific and technological co-operation, so as to promote technological innovation and industrial upgrade.

(4) Project implementation

"The Double Hundred Initiative promotes the integration and development of the advanced manufacturing industry in the Greater Bay Area of Guangdong, Hong Kong and Macao with the industrial chain in the counties of Guangdong Province through the implementation of specific projects. Firstly, through the implementation of industrial cooperation projects, to promote cooperation between advanced manufacturing enterprises in the Greater Bay Area and county enterprises in Guangdong Province, and to promote the docking and synergistic development of the industrial chain; secondly, through the implementation of talent cooperation projects, to promote cooperation between universities in the Greater Bay Area and county governments in

Guangdong Province, and to provide talent support for the economic development of the counties; thirdly, through the implementation of science and technology cooperation projects, to promote cooperation between scientific research institutions in the Greater Bay Area and county enterprises in Guangdong Province, and to promote technological innovation and industrial upgrading. Thirdly, through the implementation of science and technology cooperation projects, to promote co-operation between scientific research institutions in the Greater Bay Area and enterprises in the counties of Guangdong Province, to promote technological innovation and industrial upgrading.

3. Current Situation and Characteristics of the Development of Advanced Manufacturing Industry in Guangdong, Hong Kong and Macao Greater Bay Area

3.1. Industry Size and Structure

(1) Gross manufacturing output and share of GDP

The Guangdong-Hong Kong-Macao Greater Bay Area is an important manufacturing base in China, with a large manufacturing sector that plays an important supporting role in the development of the regional economy. According to relevant data, the total output value of the manufacturing industry in the Guangdong-Hong Kong-Macao Greater Bay Area in 2022 will reach several trillion yuan. Specifically, the value added of industry in Guangdong Province will reach RMB 4.8 trillion in 2022, ranking second in the country, with the value added of industry in the nine cities in the PRD accounting for more than 80% of the province's total. This huge total manufacturing output value not only reflects the strong strength of the Greater Bay Area in the manufacturing sector, but also highlights its important position in the development of the national manufacturing sector. The manufacturing sector accounts for a significant portion of the economy of the Greater Bay Area. In 2022, the value added of industry in the nine cities of the PRD accounted for 38.0% of GDP, much higher than that of other key regions. This share not only reflects the importance of the manufacturing sector in the Greater Bay Area economy, but also its strong contribution to economic growth. The high share of manufacturing provides a solid material foundation for the economic development of the Greater Bay Area, and at the same time creates a broad space for employment, technological innovation and industrial upgrading in the region.

(2) Distribution of major manufacturing industries and dominant industries

The manufacturing industries in the Greater Bay Area of Guangdong, Hong Kong and Macao are widely distributed, forming a number of dominant industrial clusters with national and even global competitiveness. Among them, electronic information, electrical machinery and automobile manufacturing are the top three pillar industries in the Greater Bay Area, with a combined planned output value of about RMB 7.6 trillion in 2022, accounting for about 52.6% of the planned manufacturing industries in the PRD. These industries not only dominate in terms of scale, but also have a strong leading role in terms of technological innovation and market competitiveness.

Electronic information industry: Shenzhen, Dongguan, Huizhou and Guangzhou are the mainstays. Shenzhen and Guangzhou have continued their efforts in the R&D sector, with globally renowned technology companies such as Huawei and Tencent, which are global leaders in the fields of communications equipment, computers and the Internet. Dongguan and Huizhou, on the other hand, dominate in the field of smart terminals, forming a complete industrial chain from parts manufacturing to complete machine assembly. For example, Huawei's smartphone production base is located in Dongguan, providing a large number of high-quality smart terminal products for the global market.

Electrical machinery industry: It is the second pillar industry in the Greater Bay Area, with a number of segments such as home appliances, lighting, and power transmission and distribution equipment all developing favourably. Foshan, Zhongshan and Zhuhai lead the country in the smart home appliance industry, with well-known brands such as Midea and Gree. These companies not only occupy an important share of the domestic market, but are also actively expanding into the international market. For example, Midea Group has become a leading global home appliance manufacturer through technological innovation and brand building. In addition, Zhuhai's power transmission and distribution equipment manufacturing industry is also highly competitive, with products widely used in power systems and large-scale projects.

Automobile manufacturing industry: large scale and strong growth momentum, forming an industrial pattern with vehicle manufacturing in Guangzhou and Shenzhen as the core, and parts and components supporting synergies in Foshan, Zhaoqing and Huizhou. Guangzhou's Guangzhou Automobile Group is an important domestic automobile manufacturer with a complete automobile R&D, production and sales system. Shenzhen's BYD has made remarkable achievements in the field of new energy vehicles, becoming the world's leading electric vehicle manufacturer. Auto parts and components enterprises in Foshan and Zhaoqing provide strong support for vehicle manufacturing, forming a relatively complete automotive industry chain.

In addition, the textile and apparel industry, although shrinking in overall size, is accelerating its transformation towards high-end, branding and digitalisation, led by headline cities such as Guangzhou. Guangzhou's apparel wholesale market is one of the largest apparel distribution centres in China, attracting many domestic and international brands. At the same time, some local apparel brands are also improving their design level and brand influence, and gradually marching into the high-end market. For example, Guangzhou's Exception Clothing has won consumer recognition through innovative design and brand building.

(3) Industrial division of labour and synergistic development

There is a clear division of labour within the Greater Bay Area, with each city forming a complementary industrial pattern based on its own strengths. For example, Shenzhen has strong R&D and innovation capabilities in areas such as electronic information and artificial intelligence, Guangzhou has advantages in automobile manufacturing and biomedicine, while Dongguan and Huizhou have formed a complete industrial chain in areas such as electronic information manufacturing and intelligent terminals. This division of labour and collaboration promotes the optimal allocation of resources, improves production efficiency and enhances the overall competitiveness of the manufacturing industry in the Greater Bay Area. At the same time, enterprises in the Greater Bay Area have formed a good situation of co-innovation and co-development through close co-operation upstream and downstream of the industrial chain, further promoting the high-quality development of the manufacturing industry.

3.2. Technological Innovation and R&D Capabilities

(1) R&D investment and patent output

As an important highland for technological innovation in China, the Guangdong-Hong Kong-Macao Greater Bay Area has been enhancing its technological innovation and R&D capabilities in the manufacturing sector. In recent years, manufacturing enterprises in the Greater Bay Area have increased their R&D investment to promote technological innovation and product upgrading. According to statistics, the intensity of R&D investment (i.e. the ratio of R&D expenditure to operating revenue) in the manufacturing sector in the Greater Bay Area has been increasing year by year, reaching 3.4% in 2023, which is higher than the level of Germany and Japan in 2022 and close to the level of the United States in 2022. For example, in Shenzhen, the R&D investment of the whole society will reach RMB 188.049 billion in 2023, accounting for 5.81% of the regional GDP, which has already reached the international advanced level. The

R&D investment intensity of some key enterprises has even reached the international advanced level. For example, high-tech enterprises such as Huawei have maintained a high proportion of R&D investment over a long period of time, which has provided a strong guarantee for their technological innovations in areas such as communications equipment and smartphones.

Meanwhile, the patent output of the manufacturing industry in the Greater Bay Area has also shown rapid growth, with the number of patents granted and the number of invention patents granted ranking among the top in the country. By the end of 2023, the number of invention patents in force in the Guangdong, Hong Kong and Macao Greater Bay Area stood at 672,000, a year-on-year increase of 23.2 per cent, accounting for 13.5 per cent of the domestic total. These patents cover a wide range of fields such as electronic information, electrical machinery, new materials, etc., and provide a wealth of innovations for technological advancement and industrial upgrading in the manufacturing sector. For example, in the field of electronic information, the patents applied by enterprises in the Greater Bay Area cover a wide range of areas such as chip design, new display technology, intelligent terminal applications, etc., which have promoted the development of the industry in the direction of high-end and intelligentisation. In addition, the Greater Bay Area accounted for seven of the top 50 PCT patent applications in the world, with Huawei's applications being the world's largest for many consecutive years, which further highlights the Greater Bay Area's important position in global innovation competition.

(2) Construction of Innovation Platforms and Research Institutions

In order to further enhance the innovation capacity of the manufacturing industry, the Guangdong-Hong Kong-Macao Greater Bay Area has vigorously promoted the construction of innovation platforms and research institutions. A number of national and provincial manufacturing innovation centres have been established in the region, such as the National Innovation Centre for High Performance Medical Devices and the Guangdong Intelligent Robotics Research Institute. These innovation centres focus on the research and development of key common technologies and industrial applications, and provide technical support and services to manufacturing enterprises. For example, the National Innovation Centre for New Energy Storage was set up in Guangzhou, focusing on large-capacity, high-security, long-life and high-efficiency large-scale energy storage technologies and equipment. In addition, the National Innovation Centre for Molecular Drugs was set up in Shenzhen to build key common technology R&D platforms for drug proof-of-concept, micro-ecology, high-end preparations, biotechnology drugs and other key technologies for the development needs in the fields of chemical drugs, biopharmaceuticals and high-end preparations.

At the same time, the Greater Bay Area is also home to many high-level scientific research institutions and institutions of higher learning, such as the Shenzhen Institutes of Advanced Technology of the Chinese Academy of Sciences, the Hong Kong University of Science and Technology and Sun Yat-sen University. These organisations have strong strength in basic and applied research, providing a steady stream of intellectual support for technological innovation in the manufacturing industry. For example, the Hong Kong University of Science and Technology is an international leader in research in areas such as artificial intelligence and biotechnology. In addition, think-tank institutions such as the Guangdong-Hong Kong-Macao Greater Bay Area Strategy Institute also provide decision-making support for regional innovation and development by conducting research on science and technology strategies and science and technology policies.

In addition, the Greater Bay Area also actively promotes co-operation among industries, universities and research institutes, and has established a number of industry-university-research alliances and collaborative innovation platforms to facilitate the transformation and application of scientific research results. For example, platforms such as the Shenzhen Virtual University Park, which gathers the resources of many universities and scientific research

institutions, work closely with enterprises to promote the industrialisation of scientific and technological achievements. Through the construction of these innovation platforms and scientific research institutes, the manufacturing technology innovation system in the Greater Bay Area has been continuously improved, and the innovation capacity has been significantly enhanced, providing strong support for the high-quality development of the regional economy.

3.3. Industrial Layout and Regional Synergies

(1) Characteristics of the Manufacturing Layout in the Nine Cities of the Pearl River Delta (PRD)

The manufacturing layout of the nine cities in the PRD is characterised by "one super city with multiple strengths and synergistic division of labour". Shenzhen, as the core city, is in a leading position in the country in terms of manufacturing scale and innovation capacity, with the output value of the on-board manufacturing industry reaching RMB 4.3 trillion in 2022, accounting for close to 30 per cent of the weight of the Pearl River Delta (PRD). Shenzhen's electronics and information industry is particularly prominent, forming a complete industrial chain from R&D to manufacturing, and possessing leading global technology enterprises such as Huawei and Tencent, which are at the forefront of communication equipment, computers, the Internet and other fields. Guangzhou, Foshan and Dongguan are as the second echelon, each with its own characteristics: Guangzhou has obvious advantages in automobile manufacturing and petrochemical industry, with large-scale automobile manufacturing enterprises such as Guangzhou Automobile Group, whose automobile output ranks top in the country; Foshan's household appliances and ceramics industry is renowned in the country, and household appliance enterprises such as Midea and Gree have a high reputation and market share in the global market; Dongguan is dominated by electronics, information and electrical machinery, with a complete electronic information industry chain formed. Dongguan, on the other hand, focuses on electronic information and electrical machinery and has formed a complete electronic information industry chain, and is an important production base for electronic products in the world.

In addition, Huizhou, Zhongshan, Zhuhai, Jiangmen, Zhaoqing and other cities, though relatively small in scale, have formed their own industrial advantages in specific areas. Huizhou's petrochemical industry and electronic information industry have strong competitiveness, with large petrochemical enterprises such as China Shipping Shell; Zhongshan's lighting industry occupies an important position in the country, forming a complete lighting industry chain; Zhuhai's biomedicine and aerospace industries are developing rapidly, attracting a number of well-known enterprises; Jiangmen's hardware and food processing industries have a certain scale and influence; Zhaoqing is showing good development potential in the Zhuhai's biomedical and aerospace industries are developing rapidly, attracting a number of well-known enterprises; Jiangmen's hardware products and food processing industries have a certain scale and influence; and Zhaoqing's new energy automobile and electronic information industries have shown good development potential. On the whole, the manufacturing layout of the nine cities in the PRD has formed a pattern with Shenzhen as the core and other cities supporting it at various points. There is strong synergy in the division of labour among the cities, which has jointly promoted the high-quality development of the regional economy.

(2) Mode of co-operation between Hong Kong and Macao and the Mainland manufacturing sector

The modes of co-operation between Hong Kong and Macao and the mainland manufacturing sector are varied and fruitful. As an international financial, trade and shipping centre, Hong Kong has a well-developed service industry, which has provided the mainland manufacturing industry with support in various aspects, including capital, technology and market channels. For example, Hong Kong's financial institutions have provided a large number of financing services to mainland manufacturing enterprises, helping them to raise funds and make

investments in the capital market and promoting the rapid development of the manufacturing industry. At the same time, Hong Kong's scientific research institutes and tertiary institutions also co-operate with mainland manufacturing enterprises in technology research and development and innovation, thereby upgrading the technological level of the manufacturing industry. In addition, organisations such as the Hong Kong Productivity Council have assisted mainland enterprises in upgrading and restructuring through the provision of services such as technology consultancy, management consultancy and automation upgrading.

Macao, on the other hand, has relied on its tourism and leisure industry to co-operate with the mainland manufacturing industry in areas such as cultural creativity and tourism product development. For example, Macao's tourism industry has co-operated with mainland manufacturing enterprises in the development of tourism souvenirs and cultural and creative products, which has enriched the variety and cultural connotation of tourism products. In addition, Macao also actively participates in the construction and management of industrial parks in the Mainland, introducing advanced management experience and technology to the Mainland, thus facilitating the upgrading and transformation of the Mainland's manufacturing industries.

On the whole, the mode of co-operation between the manufacturing industries in Hong Kong and Macao and the Mainland has continued to deepen, providing strong support for the synergistic development of the regional economy. Through such co-operation, mainland manufacturing enterprises have not only obtained financial and technical support, but also expanded their market channels and enhanced their competitiveness and innovation capability. At the same time, Hong Kong and Macao have also leveraged on the development of the Mainland's manufacturing sector to achieve diversified and sustainable development of their own economies, further promoting the overall development of the Guangdong-Hong Kong-Macao Greater Bay Area.

4. The Current Situation and Characteristics of the Development of the County Industry Chain in Guangdong Province

4.1. Overview of the Industry in Tai Po County, for Example

(1) Ceramic Industry

The ceramic industry in Tai Po County has a long history and is one of its important pillar industries. Known as the "Hometown of Chinese Celadon Porcelain", Tai Po County has a history of more than 800 years of ceramic production. According to relevant data, the ceramics industry in Tai Po County is large in scale, with numerous ceramics production enterprises covering a complete industrial chain from raw material processing to finished product manufacturing. These enterprises not only have a profound accumulation in traditional ceramic production, but also continue to make progress in the application of modern production equipment and technology.

We have a wide range of products, mainly including daily-use ceramics, architectural ceramics, sanitary ceramics and art ceramics. Among them, daily-use ceramics, with its exquisite craftsmanship and unique design, are loved by consumers at home and abroad. Tai Po blue and white porcelain has become the leader in daily-use ceramics with its beautiful shape, crystal glaze and pure nature. Architectural ceramics and sanitary ceramics are widely used in the field of architectural decoration and home renovation, and the product range includes tiles and sanitary ware of various specifications. Art ceramics, with its unique artistic value and collection value, has become a popular product in the high-end market.

Market distribution, Tai Po County ceramic products not only in the domestic market share, but also exported to Southeast Asia, Europe and the United States and other international markets,

with high visibility and influence. Tai Po ceramic products are exported to 110 countries and regions in Europe, America, the Middle East and Southeast Asia. In recent years, with the "Belt and Road" initiative to promote, Tai Po ceramics in the emerging market share is also expanding. In addition, Tai Po County also actively explore the online market, through e-commerce platforms and cross-border e-commerce and other channels, further expanding the sales channels of ceramic products.

(2) Agricultural products processing industry

The agricultural product processing industry in Tai Po County is dominated by honeydew and tea processing. For honeydew processing, Tai Po County has rich honeydew resources and is the largest red-fleshed honeydew planting base in the country. Processing enterprises mainly focus on the cleaning, grading, packaging and deep processing of honeydew. In recent years, as consumers' demand for healthy food increases, honeydew deep-processed products such as honeydew juice and honeydew preserves have gradually become popular in the market. For example, through co-operation with universities, Guangdong Tongmei Food Co., Ltd. has developed more than 100 types of pomelo processing from food to daily necessities and cosmetics. In addition, pomelo peel is also widely used to make pomelo tea, pomelo wine and other products. These deep-processed products not only increase the added value of pomelo, but also increase the income of local farmers.

In terms of tea processing, the tea processing industry in Tai Po County also has a certain scale, and the main processing products include green tea, black tea and oolong tea. Enterprises continue to improve the processing quality and added value of tea through the introduction of advanced processing technology and equipment. For example, modernised tea-making techniques are adopted to ensure the aroma and taste of tea to meet the needs of different consumers. In addition, Tai Po County also actively explores the development mode of combining the processing of agricultural products with cultural tourism, such as developing rural tourism projects with the theme of honeydew, to further expand the development space of the agricultural products processing industry. Through these efforts, the agricultural product processing industry in Tai Po County has not only enhanced the market competitiveness of its products, but also injected new vigour into the local economic development.

(3) Other manufacturing

Apart from the ceramic industry and the agricultural product processing industry, Tai Po County also has some other manufacturing industries, such as rare earth mining and processing and electronic components. For rare earth mining and processing, Tai Po County has rich rare earth resources and is one of the important rare earth production bases in Guangdong Province. In recent years, with the state's emphasis on rare earth resources and policy support, the rare earth mining and processing industry in Tai Po County has developed rapidly. Enterprises continue to increase technological innovation to improve the mining efficiency and processing level of rare earth resources, promoting the transformation and upgrading of the rare earth industry. Electronic components manufacturing industry, Tai Po County, although the electronic components industry started late, but the development momentum is good. Enterprises mainly produce chip multilayer ceramic capacitors (MLCC), resistors, inductors and other electronic components products, which are widely used in consumer electronics, communications, automotive electronics and other fields. With the rapid development of the global electronics industry, the electronic components industry in Tai Po County is facing broad market opportunities and development space. Enterprises continue to improve the quality and performance of their products by introducing advanced production equipment and technology to meet market demand. At the same time, Tai Po County also actively attracts and cultivates related enterprises in the electronic components industry to form an industrial cluster effect and further promote the development of the industry.

4.2. Industry Chain Structure and Links

(1) Supply of upstream raw materials

In the industrial chain of Tai Po County, the upstream link mainly involves the supply of raw materials. For the ceramic industry, upstream enterprises are mainly responsible for providing basic raw materials such as clay and glaze. Tai Po County has rich clay resources, providing a solid foundation for the development of the ceramic industry. With its unique composition and excellent physicochemical properties, the clay resources in Tai Po County are suitable for making high-quality ceramic products. However, the mining and supply of raw materials also faces a number of challenges, such as the sustainability of the resources, the cost of mining, and environmental requirements. With the increasing awareness of environmental protection and the strict enforcement of relevant regulations, companies need to pay more attention to environmental protection and the rational use of resources in the mining process.

In the agro-processing industry, the upstream segment includes the cultivation and harvesting of honeydew and tea. Tai Po County is rich in agricultural resources and is the "Hometown of China's Honeydew Pomelo", with the area planted and output of honeydew pomelo ranking among the top in the country. 2023, the area planted with honeydew pomelo in Tai Po County reached 173,400 acres, with an output of 175,900 tonnes. 2024 The county is also the largest producer of tea in the world. In addition, the tea planting area in Tai Po County is more than 100,000 mu, mainly planting oolong tea and other varieties. These rich agricultural resources provide sufficient raw materials for the processing industry. However, seasonal fluctuations and quality control of agricultural products are also issues that need attention in the upstream segment. For example, the picking period of honeydew is concentrated, and the picking and initial processing need to be completed within a short period of time to ensure the quality of the products. Meanwhile, the quality of tea is affected by various factors such as climate and soil, requiring strict quality control and standardised planting management.

(2) Characteristics of the midstream manufacturing chain

The midstream link is the core part of the industry chain in Tai Po County, mainly responsible for processing the raw materials provided by the upstream into semi-finished or finished products. In the ceramics industry, midstream enterprises process raw materials such as clay into a variety of ceramic products through advanced production equipment and technology. These enterprises usually focus on technological innovation and optimisation of production processes to improve product quality and productivity. For example, ceramic enterprises in Tai Po County have continuously introduced modern production equipment and automation technology to improve the precision and stability of the production process. In addition, the enterprises also enhance the added value and market competitiveness of their products by developing new ceramic materials and improving production processes.

In the agricultural products processing industry, the midstream segment includes the cleaning, grading, packaging and deep processing of honeydew and tea leaves. Enterprises continue to enhance the added value and market competitiveness of their products through the introduction of modern processing equipment and techniques. For example, honey pomelo processing enterprises in Tai Po County use advanced cleaning and grading equipment to ensure the quality and consistency of honey pomelo products. Meanwhile, tea processing enterprises also focus on upgrading processing technology and product quality, producing high-quality tea products through standardised production processes and strict quality control.

In addition, other manufacturing industries in Tai Po County, such as rare earth mining and processing and electronic component manufacturing, also play an important role in the midstream segment. Rare-earth mining and processing enterprises improve the efficiency of rare-earth resource utilisation by adopting environmentally friendly and efficient mining technologies. Electronic component manufacturing enterprises, on the other hand, continue to

introduce advanced production equipment and testing technologies to improve the performance and reliability of their products. The development of these midstream manufacturing segments has provided strong support for economic growth and industrial upgrading in Tai Po County.

(3) Downstream product sales and market development

The downstream link is mainly responsible for product sales and market expansion. The ceramic products of Tai Po County have a certain degree of popularity and influence in the domestic and international markets, and the enterprises actively expand their markets by participating in various exhibitions and establishing online and offline sales channels. For example, ceramic enterprises in Tai Po County often participate in ceramic expositions and trade fairs at home and abroad, such as the Guangzhou International Ceramic Industry Exhibition, Jingdezhen International Ceramic Expo, etc., to display their products and technologies, and communicate and cooperate with domestic and foreign buyers and customers. At the same time, the enterprise also actively expand online sales channels, using e-commerce platforms such as Alibaba, Jingdong, etc., to sell their products to all over the country and even overseas markets. In addition, the enterprise also focuses on brand building and innovation in marketing strategies to meet the needs of different consumers. For example, by building brand image, enhancing product design and packaging, and launching advertising and promotional activities, they enhance brand awareness and reputation to attract more consumers.

In the agricultural product processing industry, downstream enterprises promote products such as honey pomelo and tea to a wider market through co-operation with supermarkets and e-commerce platforms. For example, agricultural product processing enterprises in Tai Po County have established co-operative relationships with large supermarkets such as Walmart and Carrefour, supplying their products directly to the shelves of the supermarkets for consumers' convenience. At the same time, enterprises are also actively using e-commerce platforms for sales, such as opening flagship shops on Taobao, Pinduoduo and other platforms, and carrying out online promotions to expand the sales range and market share of their products. In addition, enterprises also actively explore the mode of combining cultural tourism and agricultural products sales, and develop tourism projects themed on agricultural products, such as honey pomelo picking experience, tea culture experience, etc., to attract tourists to come to visit and buy, and further enhance the market value and brand influence of products. Through these measures, agricultural product processing enterprises in Tai Po County have not only broadened their sales channels, but also improved the added value and competitiveness of their products.

4.3. Industrial Strengths and Weaknesses

(1) Resource endowment and industrial base advantages

Tai Po County has significant advantages in terms of resource endowment and industrial foundation. First of all, Tai Po County has rich natural resources, especially clay resources needed for ceramic industry, which provides a solid foundation for the development of ceramic industry. The clay resources in Tai Po County are not only rich in reserves, but also of excellent quality, with good plasticity and sintering properties, which are very suitable for making a variety of ceramic products. The abundance of these resources gives Tai Po County a natural cost advantage in the production of ceramics, enabling it to obtain high-quality raw materials at a lower cost, thereby increasing the market competitiveness of its products. In addition, Tai Po County's favourable geographical location at the junction of Guangdong, Fujian and Jiangxi provinces and its convenient transport facilitates the transportation of raw materials and the sale of products, which further enhances the advantages of the development of the ceramics industry.

Secondly, Tai Po County is rich in agricultural resources, with a vast area planted with agricultural products such as honeydew and tea, providing ample raw materials for the agricultural products processing industry. Tai Po County is known as the "Hometown of China's Honeydew", and the planting area and output of honeydew rank among the top in the country. In 2023, the planting area of honeydew will reach 173,400 acres, and the output will be 175,900 tonnes. These high-quality honeydew resources provide a solid foundation for the development of the honeydew processing industry, and enterprises can take materials locally to produce a variety of honeydew deep-processed products, such as honeydew juice and honeydew preserved fruit. At the same time, the tea planting area of Tai Po County is also more than 100,000 mu, mainly planting oolong tea and other varieties of tea, tea quality is excellent, with unique aroma and taste, for the development of the tea processing industry provides a wealth of raw materials. Enterprises can make use of these high-quality tea resources to produce a variety of high-quality tea products to meet market demand.

In addition, Tai Po County is also relatively rich in rare earth resources, providing a resource guarantee for the development of the rare earth mining and processing industry. Rare earth is an important strategic resource, widely used in high-tech fields and emerging industries, with broad market prospects. Tai Po County has large reserves of rare earth resources, and the distribution is relatively centralised, making it easy to mine and utilise. Enterprises can rely on these resource advantages to carry out mining and processing of rare earths and produce a variety of rare earth functional materials and products to support the development of related industries.

In terms of industrial foundation, the ceramic industry in Tai Po County has a long history, with a relatively perfect industrial chain and rich production experience. From the mining and processing of raw materials to product design and manufacturing, and then to sales and services, the ceramic industry in Tai Po County has formed a complete industrial chain. Enterprises have accumulated a large number of professional and technical talents and skilled workers, who are experienced and highly skilled in all aspects of ceramic production, and are able to produce a variety of high-quality ceramic products. At the same time, the ceramic industry in Tai Po County also focuses on technological innovation and product research and development, and constantly introduces new products and technologies to enhance the added value and market competitiveness of products.

At the same time, the agricultural product processing industry has formed a certain scale and brand influence after years of development. Through the introduction of advanced processing technology and equipment, agricultural product processing enterprises in Tai Po County have continued to improve the quality and added value of their products, producing a variety of high-quality agricultural product processing products. Enterprises also focus on brand building, creating a number of brands with high visibility and reputation, such as "Tai Po Honey Pomelo", which enhances the market competitiveness and brand value of their products. In addition, the agricultural product processing industry in Tai Po County has also actively explored diversified development modes, such as combining cultural tourism and e-commerce, to expand product sales channels and market space, further enhancing the development potential and competitiveness of the industry.

(2) Disadvantages such as small scale of industry and low level of technology

Although Tai Po County has advantages in terms of resource endowment and industrial foundation, the problems of its small industrial scale and low technological level are also more prominent. Firstly, the scale of industry in Tai Po County is relatively small, and most enterprises in the ceramic industry and the agricultural products processing industry are small and medium-sized enterprises, with an insignificant scale effect. For example, although the number of ceramic enterprises in Tai Po County is large, but most of the enterprises are small in scale, the lack of large-scale leading enterprises to drive, unable to form a strong industrial

cluster effect. This leads to enterprises in the market competition is in an unfavourable position, difficult to compete with large enterprises, in obtaining orders, negotiating prices, brand promotion and other aspects of the lack of advantage. At the same time, the smaller scale also limits the financial strength and risk-resistant ability of enterprises, in the face of market fluctuations and operational difficulties, enterprises are prone to capital chain breakage, poor management and other problems, affecting the stable development of the industry.

Secondly, the level of technology is relatively low, especially in terms of technological innovation. Many enterprises still use traditional processes and technologies in their production processes and lack the introduction and application of new technologies. For example, in the field of agricultural product processing, key enzyme preparations and ingredients rely on imports, and domestic independent R&D and production capacity is weak, resulting in higher production costs and lower added value of products. There are also shortcomings in the loss-reducing preservation technology and intelligent cold-chain logistics technology for fresh agricultural products, and agricultural products are prone to loss and quality degradation during transport and storage, affecting the market competitiveness of products and consumer experience. In addition, although the rare earth mining and processing industry has a certain technical foundation, the environmental protection and efficiency of the smelting and separation process still needs to be improved. The traditional smelting and separation process has high energy consumption and heavy pollution, which is not in line with the requirements of modern environmental protection and sustainable development, and the production efficiency is low, which can't meet the market demand for high-quality rare earth products. The lack of technological level limits the further development and competitiveness of the industry in Tai Po County. It is difficult for enterprises to achieve product upgrading and industrial upgrading through technological innovation, and also difficult to attract high-end talents and investment, which restricts the sustainable development and high-quality development of the industry.

5. Current Situation and Problems of the Integration and Development of Advanced Manufacturing Industries in Guangdong, Hong Kong and Macao Greater Bay Area with the Industrial Chain of Tai Po County

5.1. Status of Integration

(1) Industrial cooperation projects

In recent years, the integration and development of the advanced manufacturing industry in the Greater Bay Area of Guangdong, Hong Kong and Macao with the industrial chain of Tai Po County has made some progress, and some representative industrial co-operation projects have emerged. For example, ceramic enterprises in Tai Po County have carried out extensive co-operation with advanced manufacturing enterprises in the Greater Bay Area. Through the introduction of advanced production equipment and technology from the Greater Bay Area, ceramic enterprises in Tai Po County have not only improved the quality and production efficiency of their products, but also broadened their sales channels and enhanced their brand influence. In addition, agricultural product processing enterprises in Tai Po County have also established co-operative relationships with sales enterprises in the Greater Bay Area to promote local high-quality agricultural products to a wider market.

(2) Business Cases

Taking ceramic enterprises in Tai Po County as an example, some of them have realised industrial transformation and upgrading through cooperation with advanced manufacturing enterprises in the Greater Bay Area. For example, a ceramic enterprise has introduced advanced production equipment from the Greater Bay Area to improve the quality and

production efficiency of its products. At the same time, through cooperation with the design team from the Greater Bay Area, it has developed a series of ceramic products with innovative designs to meet the market demand for personalised and high-quality products. In addition, the enterprise has also promoted its products to the international market through co-operation with sales enterprises in the Greater Bay Area, enhancing the brand's popularity and influence.

(3) Initial results of upstream and downstream convergence of the industrial chain

In terms of upstream and downstream convergence of the industrial chain, the integration and development of Tai Po County with the Greater Bay Area of Guangdong, Hong Kong and Macao has also achieved certain results. For example, ceramic enterprises in Tai Po County have established stable cooperative relationships with raw material suppliers in the Greater Bay Area, ensuring a stable supply of raw materials and quality control. Meanwhile, agricultural product processing enterprises in Tai Po County have established close co-operative relationships with sales enterprises in the Greater Bay Area, ensuring stable sales channels and prices for agricultural products through order farming and contract purchasing. These co-operations have not only improved the synergy effect of the industrial chain, but also promoted the stable development of the industry in Tai Po County.

5.2. Problems

(1) Imperfect industry chain synergy mechanism

Although the integration and development of advanced manufacturing industries in Guangdong, Hong Kong and Macao Greater Bay Area with the industry chain of Tai Po County has made some progress, the industry chain synergy mechanism is still imperfect. There is a lack of effective coordination bodies and cooperation platforms between the regions, which leads to insufficient cooperation between enterprises in various segments and makes it difficult to form synergies. For example, there is a lack of regular communication and exchange mechanisms between enterprises in Tai Po County and upstream and downstream enterprises in the Greater Bay Area, making it difficult to understand each other's needs and dynamics in a timely manner, which affects the synergistic operation of the industry chain. In addition, the information sharing mechanism is not sound, and the information barriers between enterprises are high, resulting in market information, technical information, policy information, etc. not being able to be transmitted and shared in a timely manner, which affects the decision-making and innovation of enterprises.

(2) Poor communication of information

Poor information communication is an important issue that restricts the integration and development of advanced manufacturing industries in the Greater Bay Area of Guangdong, Hong Kong and Macao with the industrial chain of Tai Po County. Due to the lack of an effective information exchange platform and communication mechanism, enterprises in Tai Po County have difficulties in obtaining timely market information, technical information and policy information from the Greater Bay Area, resulting in blindness in market positioning, product development and technological innovation. At the same time, enterprises in the Greater Bay Area also find it difficult to understand the production capacity and product characteristics of enterprises in Tai Po County, which affects the efficiency and effectiveness of cooperation between the two sides. Poor information communication not only increases the operating costs of enterprises, but also reduces the synergistic effect of the industrial chain and restricts the integration and development of industries.

(3) Inadequate technological innovation capacity

Insufficient technological innovation capability is the shortcoming of Tai Po County's industrial development and an important factor restricting its integration with the advanced manufacturing industry in the Guangdong-Hong Kong-Macao Greater Bay Area. Enterprises in Tai Po County have weak R&D strength of their own, insufficient investment in R&D, and lack

of professional R&D teams and advanced R&D equipment, resulting in insufficient technological innovation capability. For example, some ceramic enterprises have invested less in product design and process innovation, resulting in serious product homogenisation and difficulty in meeting market demand for personalised and high-quality products. In addition, the industry-university-research co-operation is not close enough, the innovation resources of universities and research institutions have not been effectively transformed into the productivity of enterprises, affecting the enterprise's technological innovation and product upgrading.

(4) Low value-added products

Due to the lack of technological innovation capacity, the added value of products in Tai Po County is generally low. The products of enterprises are mostly based on traditional crafts and low-end products, lacking innovative products with high added value. For example, the products of ceramic enterprises are mainly daily-use ceramics, lacking high-end artistic ceramics and functional ceramic products; the products of agricultural products processing enterprises are mainly primary processing, lacking deep processing and high value-added products. Low value-added products not only limit the profitability of enterprises, but also affect the competitiveness of enterprises in the market, restricting the integration and development of industries.

(5) Implications for inclusive development

The above problems have adversely affected the integration and development of the advanced manufacturing industry in the Guangdong-Hong Kong-Macao Greater Bay Area and the industrial chain in Tai Po County. The imperfect industry chain synergy mechanism and poor information communication increase the operating costs of enterprises, reduce the synergy effect of the industry chain, and affect the decision-making and innovation of enterprises. Insufficient technological innovation capacity and low value-added products limit the profitability and development space of enterprises, affect their competitiveness in the market, and restrict the integrated development of industries. The existence of these problems not only affects the development of industries in Tai Po County, but also the deep integration of advanced manufacturing industries in Guangdong, Hong Kong and Macao Greater Bay Area with the industrial chain in Tai Po County, which needs to be paid attention to and effective measures should be taken to solve.

6. Analysis of the Mechanism for the Integration and Development of Advanced Manufacturing Industries in Guangdong, Hong Kong and Macao Greater Bay Area and the County Industry Chain of Guangdong Province

6.1. Mechanisms for Industry Interface and Synergistic Development

(1) Leveraging the resource advantages of the counties in Guangdong Province

County areas in Guangdong Province have rich natural resources and unique industrial bases, such as the ceramics industry and agricultural product processing industry in Tai Po County. These resources provide the basis for the integration and development of county industries with advanced manufacturing industries in the Greater Bay Area. For example, the ceramic industry in Tai Po County can rely on its rich clay resources and long history of pottery production to co-operate with advanced manufacturing enterprises in the Greater Bay Area to jointly develop high-end ceramic products and enhance the added value and market competitiveness of the products.

(2) Establishment of stable co-operation

In order to promote the integration of county industries into the industrial chain division of labour system of the Greater Bay Area, it is necessary to establish a stable cooperative

relationship. On the one hand, the government can build a cooperation platform and organise docking activities between county enterprises and enterprises in the Greater Bay Area to promote cooperation between the two sides in terms of technology, market and resources. For example, activities such as industrial co-operation fairs and project docking sessions can be organised to provide enterprises with opportunities for exchanges and co-operation. On the other hand, enterprises from the Greater Bay Area are encouraged to invest in the county area and participate in the development of local industries. Through investment attraction, advanced manufacturing enterprises from the Greater Bay Area will be introduced to set up production bases or R&D centres in the county areas, which will drive the development of related industries in the county areas and form industrial cluster effects.

(3) Promote the integration of county industries into the industrial chain division of labour system of the Greater Bay Area

County industries should actively participate in the industrial division of labour in the Greater Bay Area, define their own positioning and development direction, and enhance the added value of the industrial chain. For example, the ceramic industry in Tai Po County can co-operate with home furnishing and decoration industries in the Greater Bay Area to develop high-end ceramic products and enhance the added value and market competitiveness of products. At the same time, county enterprises should strengthen technological innovation and product research and development to improve the technological content and added value of their products to meet the needs of the Greater Bay Area market. Through technological innovation, county enterprises can develop more high-quality products that meet market demand and enhance their core competitiveness.

6.2. Technological Innovation and Industrial Upgrading Mechanisms

(1) Guiding research institutions in the Greater Bay Area to co-operate with county enterprises in technology research and development

The Government can, through policy guidance, encourage scientific research institutions in the Greater Bay Area to carry out technological R&D co-operation with enterprises in the county. For example, special funds should be set up to support co-operation between scientific research institutions and enterprises in carrying out technological R&D projects and jointly tackling technological problems. At the same time, an industry-university-research co-operation platform has been established to promote information exchange and resource sharing between research institutions and enterprises. Through these platforms, enterprises can keep abreast of the research dynamics and technological needs of scientific research institutes, and scientific research institutes can learn about the technological problems and market demands of enterprises, thus realising mutual benefits and win-win situations for both sides.

(2) Supporting county enterprises to introduce advanced equipment and technology

The government should introduce relevant policies to support county enterprises in introducing advanced equipment and technology and upgrading the level of production and manufacturing. For example, through tax incentives, it can reduce the cost of equipment acquisition for enterprises. At the same time, special subsidies or incentives should be set up to provide financial support to enterprises that introduce advanced equipment and technology. In addition, the government can organise technical training and exchange activities to help enterprises improve the efficiency of equipment use and maintenance levels, ensuring the normal operation of equipment and the improvement of production efficiency.

(3) Enhancing the technological innovation capacity of county enterprises

The Government should strengthen its support for technological innovation in county enterprises and enhance their capacity for independent innovation. For example, it should set up special funds for technological innovation to support enterprises in carrying out technological R&D and innovation projects. At the same time, enterprises are encouraged to co-

operate with universities and scientific research institutions to establish technological innovation alliances and jointly carry out technological R&D and innovation activities. In addition, the Government can also provide support for the introduction and training of talents to help enterprises attract and train technological innovation talents and enhance their technological innovation capability.

6.3. Mechanisms for Infrastructure Development and Public Service Optimisation

(1) Strengthening transport, logistics and other infrastructures

In order to reduce the operating costs of enterprises and enhance the competitiveness of industries, it is necessary to strengthen the construction of transport, logistics and other infrastructures. On the one hand, it is necessary to increase investment in transport infrastructure, improve the road and railway networks in the region, and enhance the efficiency of transport connections with cities in the Greater Bay Area. For example, accelerate the construction of transport routes such as highways and railways from the county to major cities in the Greater Bay Area to shorten transport time and reduce logistics costs. On the other hand, the modern logistics industry will be developed and modern logistics parks and distribution centres will be built to improve the efficiency and quality of logistics services. Through the introduction of advanced logistics management technology and equipment, real-time collection, processing and sharing of logistics information will be realised, and the level of automation and intelligence of logistics operations will be improved, so as to reduce logistics costs and improve logistics efficiency.

(2) Upgrading financial services

In order to improve the level of financial services, the Government should strengthen cooperation with financial institutions, innovate financial products and services, and provide diversified financing channels for county enterprises. For example, it should develop credit products suitable for small and medium-sized enterprises, lower the threshold and cost of financing, and meet the capital needs of enterprises at different stages. At the same time, venture capital and equity investment institutions are encouraged to enter county areas to provide financial support for innovative enterprises and promote their technological innovation and industrial upgrading. In addition, the government can establish a financial service platform to provide financial counselling, financing docking and other services to help enterprises solve financing problems.

(3) Enhancement of talent training

In order to improve the talent quality of county enterprises, the government should strengthen talent training. On the one hand, it should establish a perfect talent training system, strengthen cooperation with colleges and universities and vocational colleges, and carry out targeted talent training programmes to improve the skill level and comprehensive quality of the local labour force. For example, cooperate with colleges and universities to open professional courses such as ceramic craft, agricultural product processing, etc., to cultivate professional and technical talents who can adapt to the needs of the county's industrial development. On the other hand, formulate preferential policies to attract high-quality talents from the Greater Bay Area and neighbouring regions to work and start businesses in the county area, so as to provide talent security for industrial development. For example, preferential policies such as housing subsidies, children's education and medical protection are provided to attract high-calibre talents to work and start businesses in the county areas.

6.4. Policy Support and Government-Led Mechanisms

(1) Formulation of special support policies

The Government should formulate special support policies and increase financial inputs for the development of county industries. For example, special funds for industrial development should be set up to support the development of technological innovation, equipment upgrading and market expansion of county enterprises. These special funds can be used for the enterprise's technology research and development projects, equipment purchase and upgrading, market development and brand building, etc., to help enterprises to solve the financial bottleneck problem, and enhance the enterprise's innovation ability and market competitiveness. At the same time, the Government can also reduce the financing costs of enterprises through financial interest subsidies and loan guarantees, so as to solve the problems of difficult and expensive financing for enterprises.

(2) Establishment of a coordinating mechanism for synergistic industrial development

In order to promote the synergistic development of industries in the Greater Bay Area and the counties, the Government should establish a coordinating mechanism for the synergistic development of industries. On the one hand, a joint meeting system for industrial cooperation between the Greater Bay Area and the counties should be established, and regular meetings should be held to coordinate and solve major problems and cooperation matters in industrial cooperation. The joint meeting can be participated by relevant government departments, industry associations, enterprise representatives, etc. of the Greater Bay Area and counties. Through regular communication and exchange, the joint meeting can keep abreast of the dynamics of industrial development and cooperation needs of the two sides, coordinate and solve the problems encountered in the process of cooperation in the areas of policy, capital, technology and talents, etc., so as to promote the smooth progress of industrial cooperation. On the other hand, industrial planning and policy coordination within the region will be strengthened to ensure that the direction and focus of industrial development in the Greater Bay Area and the county are in line with each other, to avoid homogeneous industrial competition and to achieve complementary and synergistic development of industries.

(3) Strengthening government guidance

The government should strengthen its guiding role and promote the integration and development of industries in the Greater Bay Area and the counties. On the one hand, the government can clarify the direction and focus of the development of county industries through the formulation of industrial development plans, and guide enterprises to make reasonable layouts and investments. On the other hand, the government can encourage enterprises to carry out technological innovation and product research and development through policy guidance, so as to enhance their core competitiveness. In addition, the government can also help enterprises expand market channels and enhance their market influence by organising them to participate in various industrial expositions, investment fairs and other activities.

6.5. Mechanisms for Enterprise Exchange and Cooperation and Collaborative Innovation

(1) Organise enterprises to participate in various activities in the Greater Bay Area

The government should actively organise county enterprises to participate in various industrial fairs, investment fairs and other activities held in the Greater Bay Area. These activities are important platforms for enterprises to display their products, technologies and services, and also important opportunities for enterprises to find partners and expand their markets. By participating in these activities, county enterprises can establish contact with buyers, distributors, agents, etc. in the Greater Bay Area, understand market demand and industry dynamics, and obtain order information and cooperation opportunities. For example, the government can organise the county's ceramic enterprises to participate in the Greater Bay Area's home building materials expositions, ceramic art exhibitions and other activities, to

show the unique charm and advantages of the county's ceramic products, to attract the attention of consumers in the Greater Bay Area and purchase.

(2) Encourage enterprises to carry out technical exchanges and market co-operation

The government should encourage county enterprises and enterprises in the Greater Bay Area to carry out technical exchanges, market co-operation and other aspects of co-operation. On the one hand, in terms of technical exchanges, the government can set up a technical exchange platform and organise technical exchanges and seminars between county enterprises and enterprises in the Greater Bay Area, so as to promote exchanges and cooperation between the two sides in terms of technology. For example, technical experts from the Greater Bay Area can be invited to county enterprises for technical guidance and training to help them solve technical problems and improve their technical level. On the other hand, in terms of market co-operation, the government can guide county enterprises to establish market co-operation with enterprises in the Greater Bay Area to jointly explore the market. For example, county enterprises can be encouraged to establish co-operative relationships with sales enterprises and e-commerce platforms in the Greater Bay Area, so as to make use of the market channels and sales networks of the Greater Bay Area to push the county's products to a broader market.

(3) Promoting collaborative innovation among enterprises

The government should promote collaborative innovation between enterprises in the county and those in the Greater Bay Area. On the one hand, the government can encourage enterprises to jointly carry out technological research and development and innovation projects through policy guidance, and to jointly overcome technological difficulties. For example, it can set up special funds for co-innovation to support enterprises to carry out co-innovation projects and promote technological innovation and product upgrading. On the other hand, the government can establish collaborative innovation platforms to promote information exchange and resource sharing among enterprises. Through these platforms, enterprises can keep abreast of market dynamics and technological development trends, formulate scientific technological development strategies and innovation plans, and enhance their technological innovation capabilities and core competitiveness.

7. The Significance of Industry Chain Integration Development in Tai Po County for Other Regions in Guangdong Province

7.1. Experiences in Industrial Docking and Synergistic Development

(1) Relying on resource advantages to find the entry point of cooperation

In terms of industrial docking and collaborative development, Tai Po County, relying on its own resource advantages, has identified an entry point for co-operation with advanced manufacturing enterprises in Guangdong, Hong Kong and Macao Greater Bay Area. Tai Po County has rich ceramic resources and a long history of pottery making, and its ceramic industry has a certain scale and foundation. Through the cooperation with the advanced manufacturing enterprises in the Greater Bay Area, the ceramic enterprises in Tai Po County have introduced advanced production equipment and technology to improve product quality and production efficiency, and at the same time, through the cooperation with the design team in the Greater Bay Area, a series of ceramic products with innovative designs have been developed to meet the market demand for personalised and high-quality products. This practice of relying on resource advantages to find the entry point of cooperation provides a useful reference for other regions. Other regions can combine their own resource advantages, find the entry point of cooperation with the advanced manufacturing enterprises in the Greater Bay Area, to promote the synergistic development of industry.

(2) Strengthening Co-operation with Enterprises in the Greater Bay Area

In terms of industrial docking and synergistic development, Tai Po County focuses on strengthening co-operation with enterprises in the Greater Bay Area. Through co-operation with enterprises in the Greater Bay Area, ceramic enterprises in Tai Po County have not only improved the quality and production efficiency of their products, but also broadened their sales channels and enhanced their brand influence. At the same time, agricultural product processing enterprises in Tai Po County have also established co-operative relationships with sales enterprises in the Greater Bay Area, pushing local high-quality agricultural products to a wider market. This practice of strengthening co-operation with enterprises in the Greater Bay Area provides useful reference for other regions. Other regions can promote synergistic development of industries and achieve mutual benefits by strengthening co-operation with enterprises in the Greater Bay Area.

7.2. Technology Innovation and Industrial Upgrading Path Reference

(1) Introduction of advanced technology and equipment

In terms of technological innovation and industrial upgrading, Tai Po County focuses on the introduction of advanced technological equipment. Through the introduction of advanced production equipment from the Greater Bay Area, ceramic enterprises in Tai Po County have improved the quality and production efficiency of their products. At the same time, through co-operation with the design team from the Greater Bay Area, they have developed a series of ceramic products with innovative designs to meet the market demand for personalised and high-quality products. This introduction of advanced technology and equipment provides a useful reference for other regions. Other regions can introduce advanced technology and equipment to enhance the production and manufacturing level of enterprises and promote technological innovation and upgrading of the industry.

(2) Strengthening cooperation with scientific research institutions

In terms of technological innovation and industrial upgrading, Tai Po County focuses on strengthening cooperation with scientific research institutions. Through co-operation with scientific research institutions in the Greater Bay Area, enterprises in Tai Po County have carried out technological research and development and innovation projects, worked together to overcome technological problems, and promoted technological progress and upgrading of industries. This practice of strengthening co-operation with scientific research institutions provides useful reference for other regions. Other regions can enhance the technological innovation capability of enterprises and promote technological innovation and upgrading of industries by strengthening cooperation with scientific research institutions.

7.3. Infrastructure Development and Public Service Optimisation Revelations

(1) Improvement of transport and logistics facilities

Tai Po County has focused on improving transport and logistics facilities in terms of infrastructure development and public service optimisation. By strengthening transport infrastructure, Tai Po County has improved the efficiency of its transport connections with cities in the Greater Bay Area, reduced logistics costs for enterprises and improved the competitiveness of its industries. This practice of improving transport and logistics facilities provides useful reference for other regions. Other regions can reduce the operating costs of enterprises and improve the competitiveness of their industries by improving transport and logistics facilities.

(2) Upgrading financial services

Tai Po County has focused on improving its financial services in terms of infrastructure development and public service optimisation. By strengthening cooperation with financial institutions, Tai Po County has provided enterprises with diversified financing channels, reduced their financing costs and solved the problems of difficult and expensive financing. This

practice of upgrading the level of financial services provides a useful reference for other regions. Other regions can provide better financial support to enterprises and promote the development of industries by upgrading the level of financial services.

7.4. Policy Support and Government Leadership

(1) Developing supportive policies

In terms of policy support and guidance, the Tai Po County Government has focused on formulating supportive policies. Through the formulation of special support policies, the Tai Po County Government has increased its financial investment in the development of the county's industries and supported the development of technological innovation, equipment upgrading and market expansion of enterprises. This practice of formulating supportive policies provides a useful reference for other regions. Other regions can increase their support for industrial development by formulating support policies to promote industrial development.

(2) Establishment of coordination mechanisms

The Tai Po County Government has focused on establishing a coordination mechanism in terms of policy support and guidance. Through the establishment of a coordinating mechanism for the collaborative development of industries, the Tai Po County Government has strengthened communication and coordination with government departments in the Greater Bay Area and promoted the collaborative development of industries. This practice of establishing a coordination mechanism provides a useful reference for other regions. Other regions can strengthen communication and coordination with government departments in the Greater Bay Area through the establishment of coordination mechanisms to promote synergistic development of industries.

8. Conclusion and Outlook

8.1. Conclusions of the Study

This study explores the effectiveness of the mechanisms of industrial docking, technological innovation, and infrastructure construction through in-depth analysis of the mechanisms of integration and development of advanced manufacturing industries in Guangdong, Hong Kong and Macao Greater Bay Area and county industrial chains in Guangdong Province, using Tai Po County as a case study. The results of the study show that the integration and development of advanced manufacturing industries in the Guangdong-Hong Kong-Macao Greater Bay Area with county industrial chains in Guangdong Province is of great significance.

(1) Effectiveness of the mechanism for industrial docking and synergistic development

Relying on its own resource advantages, Tai Po County has established stable cooperative relationships with advanced manufacturing enterprises in the Greater Bay Area, promoting the integration of county industries into the industrial chain division of labour system of the Greater Bay Area. Through the cooperation with the enterprises in the Greater Bay Area, the ceramic enterprises in Tai Po County have introduced advanced production equipment and technology to improve the quality and production efficiency of their products, and at the same time, through the co-operation with the design team in the Greater Bay Area, they have developed a series of ceramic products with innovative designs to satisfy the market's demand for personalised and high-quality products. This mechanism of industrial docking and synergistic development not only improves the competitiveness of industries in Tai Po County, but also provides useful reference for other regions.

(2) Effectiveness of technological innovation and industrial upgrading mechanisms

Through the introduction of advanced technological equipment and the strengthening of co-operation with scientific research institutions, Tai Po County has enhanced the technological innovation capability of its enterprises and promoted the upgrading of its industries. For

example, ceramic enterprises in Tai Po County have introduced advanced production equipment from the Greater Bay Area to improve the quality and production efficiency of their products. At the same time, through co-operation with the design team from the Greater Bay Area, they have developed a series of ceramic products with innovative designs to meet the market demand for personalised and high-quality products. This mechanism of technological innovation and industrial upgrading not only improves the added value of the industry in Tai Po County, but also provides a reference for other regions to promote industrial technological innovation.

(3) Effectiveness of mechanisms for infrastructure development and public service optimisation

By strengthening transport, logistics and other infrastructures, Tai Po County has reduced the operating costs of enterprises and improved the competitiveness of industries. At the same time, Tai Po County has also provided a better development environment for enterprises by upgrading financial services, talent training and other public services. For example, by improving transport and logistics facilities, Tai Po County has improved the efficiency of transport connections with cities in the Greater Bay Area, reduced logistics costs for enterprises and improved the competitiveness of industries. This mechanism of infrastructure development and public service optimisation not only improves the industrial development environment in Tai Po County, but also provides useful insights for other regions.

8.2. Future Prospects

With the acceleration of the integration process of Guangdong-Hong Kong-Macao Greater Bay Area, the development of county industries in Guangdong Province will usher in more opportunities. In the future, county industries in Guangdong Province should continue to deepen the integration of industrial chains and promote the development of industries in the direction of high-end, green and intelligent.

(1) Continuously deepen industry chain integration

County industries in Guangdong Province should continue to strengthen their co-operation with advanced manufacturing enterprises in the Greater Bay Area to deepen industrial chain integration. Through cooperation with enterprises in the Greater Bay Area, county industries can introduce advanced production equipment and technologies to enhance their manufacturing level, while developing more products with innovative designs to meet market demand for personalised and high-quality products through cooperation with design teams in the Greater Bay Area. This continuous deepening of industry chain integration will help improve the competitiveness of county industries and promote the development of the county economy.

(2) Promote the development of the industry in the direction of high-end, green, intelligent

County industries in Guangdong Province should actively promote the development of industries in the direction of high-end, green and intelligent. Through the introduction of advanced production equipment and technology, the production and manufacturing level of enterprises should be upgraded to promote the development of industries in the direction of high-endisation. At the same time, the county industry should pay attention to environmental protection and resource conservation, promote green production technology and techniques, reduce pollution to the environment and waste of resources, and promote the development of the industry in the direction of greening. In addition, the county industry should also accelerate the deep integration of information technology and industry, promote the intelligent transformation and upgrading of the industry, improve the automation and intelligent level of production, and promote the development of the industry in the direction of intelligence. This approach of promoting the development of industries in the direction of high-end, green and

intelligent will help improve the added value and market competitiveness of county industries and promote the high-quality development of county economies.

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