

Research on the development of Fujian electronic information industry under the new situation

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Abstract: *Electronic information industry is a key pillar industry in Fujian Province. At present, the scale of Fujian's electronic information industry has been in the forefront of the country, the industrial structure has been further optimized, and the industrial cluster effect is obvious, but there are also problems such as small industrial scale, competitiveness to be strengthened and insufficient factor support. Under the new situation, it is necessary to accelerate the transformation and upgrading of Fujian's electronic information industry, strengthen the ability to improve independent innovation, strengthen the cooperation between Fujian and Taiwan, and improve the ability to support factors, so as to promote the high-quality development of Fujian's electronic information industry.*

Keywords: *Electronic information industry; Industrial structure; Countermeasures and suggestions; Fujian (Province)*

1. Introduction

Electronic information industry is the pillar industry of Fujian Province. In recent years, Fujian Province attaches great importance to the development of electronic information industry, which has achieved rapid development, but also faces many difficulties. Under the new situation, continuously optimizing the structure of electronic information industry and strengthening the cooperation of Fujian and Taiwan electronic information industry are conducive to continuously promoting the expansion and strengthening of Fujian's electronic information industry.

2. Fujian electronic information industry development status

2.1 General information

Electronic information industry is one of the three pillar industries in Fujian Province, which has made great contributions to the economic development of Fujian Province in recent years. Since the reform and opening up, due to the support of various policies, Fujian's electronic information industry has continued to grow at a rate of more than twice the GDP growth rate. In 2021, the operating income of Fujian's electronic information industry reached 880 billion yuan, and the scale rose from the eighth to the fifth place. The industrial added value of the electronic information manufacturing industry increased by 22%, the sales output value increased by 24.4%, and the export delivery value increased by 18.5%. It will grow by an average of 11.2% in 2020 and 2021^[1]. According to the relevant data of the Ministry of Industry and Information Technology, Fujian's electronic information manufacturing industry ranks fifth in the country.

2.2 Overview of industrial structure development

2.2.1 Integrated circuit

At present, it has made rapid development in chip design, wafer manufacturing, packaging and testing, material equipment and other fields. In terms of chip design, there are about 100 design enterprises in Fujian Province, mainly concentrated in Xiamen and Fuzhou areas, among which the larger enterprises are Ruixinwei, Xinyi, Yixinyuan, Xingchen, Youxun, etc. Ruixinwei has become a leading domestic AIoT chip design company, Xingchen Technology mainly focuses on the field of video surveillance chips. In terms of wafer manufacturing, Fujian Province has about 70 IC manufacturing enterprises, among which Xiamen IC industry is developing rapidly, Xiamen Lianxin 12-inch wafer foundry, with the ability to foundry logic chips, driver chips and other chips; Quanzhou

Jinhua Tower has established the leading DRAM production line in China and is one of the three major storage bases in China. In terms of packaging and testing, Fujian Province currently has about 10 packaging and testing enterprises, mainly Fushun Semiconductor and Heshun Microelectronics and other discrete device packaging and testing manufacturers. In terms of materials and equipment, the current photoresist, light mask, deposition equipment and other related materials and equipment have been localized.

2.2.2 New display

Fujian Province's new display industry began in 1990, with China's display industry growth, development results are remarkable, the industrial chain is gradually improved, the industry is mainly divided into upstream materials and equipment, midstream panel and module manufacturing, downstream terminal and machine three links. Upstream has realized the localization of glass substrate, backlight, polarizer, process gas, FPC and other materials, supporting the introduction of Fuzhou Dongxu Optoelectronics and Xiamen Electric nitrate two G8.5 glass substrate projects, can achieve an annual output of 8.7 million substrate. At present, the middle reaches have a-Si LCD, LTPS, IGZO and other display technologies, among which Fuzhou BOE 8.5-generation line was put into production in April 2017, Xiamen Tianma Microelectronics LTPS TFT-LCD5.5 and 6-generation line production capacity continues to rise and achieve full production and sales, while accelerating the layout of flexible AMOLED display. The downstream products are mainly small and medium-sized electronic products such as smart payment terminals, mobile communications, and all-in-one machines. In 2019, the shipments of Liandi and New Land ranked the top three in China, and Centen Information occupied the first place in the Asia-Pacific market share of thin clients for six consecutive years.

2.2.3 Photoelectric devices

Fujian Province has hundreds of enterprises with an output value of more than 10 million yuan in the field of optical components, optical lenses and optical communication devices, and is the strongest, largest and most complete production base of LED epitaxial chips in the country. In the field of epitaxial chips and chips, Sanan Optoelectronics, dry lighting Optoelectronics, megatron Optoelectronics ranks at the forefront of China's LED competitiveness, Sanan Optoelectronics extends the substrate link upward, forming a competitive situation of substrate, epitaxial, and chip in one, and maintains the world's first market share; In the field of packaging, Hualian Electronics is the country's leading LED seal test enterprise, the main products are luminous LED, backlight, display, etc. Tiandian Optoelectronics mainly focuses on lighting high-power LED devices and optocoupler packaging; In the field of display and lighting applications, Riedaxin and Tonstar were selected as the top ten enterprises in China's lighting and electrical industry, and Xiamen Power Giant is in the lead in the indoor and outdoor full-color industry, and extends its business to foreign countries.

2.2.4 Software and information technology services

At present, Fujian Province has formed an industrial chain in the field of industrial software, mainly including production control industrial software, manufacturing execution system software, industrial Internet platform. In the field of big data, the development of Fujian's big data industry has begun to take shape, and it is the leading province in the country. There are nearly a thousand related enterprises, forming a group of leading enterprises with an annual output value of more than 100 million in the fields of big data hardware equipment and application service software. In 2022, the core output value of the Internet of Things in Fujian Province reached 163.898 billion yuan, and the industrial scale ranked first in the country, with more than 1,500 core enterprises and a national iot industrial base, and enterprises such as New Land and Guomei Group formed the core of iot application in Fujian Province. In terms of artificial intelligence, Fujian Province's industrial chain is mainly concentrated in hardware (AI chips, sensors) and artificial intelligence algorithms, artificial intelligence applications, in 2022, Fuzhou "God operator" Fuzhou artificial intelligence computing Center started construction, planning to build 300P artificial intelligence computing power, to create the first large-scale artificial intelligence computing power cluster in southeast China. The Fujian Intelligent Vision AI Open Platform, Xiamen Kunpeng Supercomputing Center, Quanzhou Advanced Computing Center and other AI infrastructure construction accelerated.

2.3 Overview of industrial agglomeration development

At present, the electronic information industry in Fujian Province has formed an industrial development pattern with parks as the main body and backbone enterprises as the leader. The total industrial output value of the information product manufacturing industry in the five coastal cities of

Fu-Xiamen accounts for 97% of the province, among which the total industrial output value of the information product manufacturing industry in Fuzhou and Xiamen accounts for 85%. The scale of software industry in Fuzhou and Xiamen accounts for 96% of the province^[2]. Flat panel display industrial cluster mainly in Xiamen Torch Park, Fuqing Rongqiao Park and Fuzhou Mawei Park; The software industry cluster with Fuzhou Software Park and Xiamen Software Park as the main body.

3. The challenges facing the development of Fujian's electronic information industry under the new situation

3.1 The industrial scale is small

Although the scale of electronic information manufacturing industry in Fujian Province has been in the forefront of the country for many years, the overall scale of enterprises is relatively small, more than 90% of enterprises are small and medium-sized enterprises, foreign and private small and medium-sized enterprises are still the main body of the information industry in our province, and the enterprises with an output value of more than 10 billion yuan are mainly foreign-funded enterprises, and mainly in the lower reaches of the industrial chain, which is not enough to support and guide the industry. The industrial pattern of "two ends outside" has not been greatly improved, the degree of external dependence is high, and the development is easily affected by the international environment and external economies.

3.2 Insufficient capacity for independent innovation

Insufficient capacity of independent innovation. Fujian's electronic information industry has a relatively weak technical foundation, lacks core technologies, and mainly stays in the processing and assembly stage. In terms of core materials and equipment, it is highly dependent on imports from the United States, Japan, South Korea, Germany and other countries. Key materials such as driving ICs, organic light-emitting materials, exposure machines, and evaporators are vulnerable to the international environment.

3.3 Insufficient resource elements

Compared with the Yangtze River Delta, Pearl River Delta and other places, Fujian Province has disadvantages in industrial base, technical personnel, capital support and so on. At the same time, the advantages of Fujian province's proximity to Taiwan have not been fully utilized, and most of the core teams and research and development centers of Taiwan-funded enterprises are in Taiwan.

4. The countermeasures to accelerate the development of Fujian electronic information industry

4.1 Intensify efforts to promote the transformation and upgrading of the electronic information industry

4.1.1 Integrated circuits

We will accelerate the formation of an agglomeration development pattern of "one belt, two cores and multiple parks". We will give full play to the role of key enterprises, accelerate the development of high-end chips, break through advanced processes below 28 nanometers, and promote the completion and operation of MEMS sensor production lines. We will promote the construction of major projects, and improve the manufacturing processes of high-speed chips, high-power chips, 5G radio frequency chips, and 5G power amplifier chips.

4.1.2 New type of display

We will strengthen and optimize the whole industry chain of new display, such as glass substrate, panel, module and complete machine. Focusing on the development of cutting-edge display technology and market demand, we will strengthen the research and independent development of core basic materials such as liquid crystal and photoresist. We will guide key enterprises to accelerate development, focus on a number of key technologies such as OLED evaporation process, color electronic paper and Mini/Micro LED, and accelerate the research and development of new display technologies such as 3D display and laser display.

4.1.3 Computer and network communications

We will give full play to the role of key enterprises in developing the computer and server industries, new mobile terminal equipment, and communication industries and equipment with 5G as the focus. We will promote the manufacturing and production of domestic machine and server, and drive the coordinated development of relevant key components and core components. We will promote the construction of Datang 5G Southeast Industrial Base and Yongding National Mobile Communication Industrial Base, strengthen the development and industrialization of 5G core device products such as core chips, display screens, base station antennas, and radio frequency components, develop 5G micro-base stations, smart phones, financial intelligent POS machines, and various communication equipment and terminals, and promote the R & D and production of AR/VR terminal products.

4.1.4 Industrial software and big data

We will improve the development level of industrial software and promote the deep integration of industrial software, big data and manufacturing industry. We will give full play to Fuzhou's advantages as the second node of the national industrial Internet and the new data exchange port in China, and promote the coordinated development of industrial software and industrial Internet. We will break through key technology bottlenecks such as data integration, platform management, development tools, micro service framework, and modeling analysis, develop industrial software products and application solutions for the whole life cycle management of industrial R&D design, three-dimensional CAD, production, operation and management, and services, and vigorously promote the application of industrial software with independent technology. We will deeply tap the value of data, accelerate the research and development of big data technologies such as data storage, cleaning, mining and analysis, and natural language undchain and ecosystem. We will promote the development and application of industrial big data, and accelerate the digital transformation and upgrading of the manufacturing industry.

4.2 Strengthening and improving our capacity for independent innovation

4.2.1 Build an advanced technology innovation platform

We will promote the development of the Fuxia-Quan National Innovation Demonstration Zone, encourage regional co-construction of collaborative innovation platforms, build Southeast China (Fujian) Science City, Xiamen Science City, Quanzhou space-time Science and Innovation Base, and strengthen basic and applied research. We will build an innovative laboratory system at a high level, and build a laboratory in Fujian Province around advanced sealing technologies such as optoelectronic materials, flexible electronics, memory packaging, system-level packaging, and wafer-level packaging. We will build a high-level industrial technology research and development platform, focusing on scientific and technological innovation cooperation with large enterprises, large groups, universities and other domestic and foreign enterprises. To strengthen scientific and technological innovation cooperation with the Yangtze River Delta, the Guangdong-Hong Kong-Macao Greater Bay Area, Taiwan and other places, and build scientific and technological innovation research and development bases.

4.2.2 Give play to market initiative

We will establish a new mechanism for enterprise-led R&D in industrial technology, support enterprises in setting up joint laboratories with universities and research institutes, strengthen basic research and applied research, enhance the deep integration of industry, academia and research led by enterprises, and help enterprises grow into national high-tech enterprises. We will take advantageous areas such as electronic information and equipment manufacturing as breakthrough points, support leading enterprises in tackling bottleneck technologies, and enhance their voice in the international community. In key areas such as artificial intelligence, integrated circuits, advanced manufacturing, and new materials, we will foster specialized, special, and new "little giants," "gazelles," and "unicorns," and guide enterprises to increase investment in innovation. We will establish a system for cultivating individual champions in the manufacturing industry, guide leading enterprises in the industry to increase R&D and innovation, and enhance their core competitiveness.

4.2.3 Strengthen the training and introduction of innovative talents

We will upgrade provincial-level talent projects such as Fujian Province's "One Hundred People Plan" and "Eight Fujian Talents", encourage qualified localities to introduce policies for the introduction of high-end talents, strengthen joint cooperation with domestic and foreign universities

and research institutes to cooperate with high-end talents, and promote international talent introduction and education^[3]. Focusing on key industrial areas in Fujian, the introduction of chief scientists will be intensified. We will vigorously support the development of new forms of research and development such as "scientists + entrepreneurs + investors", and introduce and cultivate strategic scientific and technological talents, leading scientific and technological talents and innovation teams. We will establish a scientific evaluation system for scientific and technological talents, explore green channels for evaluating and hiring professional titles, and encourage enterprises to flexibly hire scientific and creative talents. We will improve supporting services for innovative talents, increase the proportion of graduates from universities in Fujian, and attract talents from home and abroad to Fujian to work and start businesses.

4.3 Strengthening cooperation in the electronic information industry between Fujian and Taiwan

4.3.1 Strengthen cooperation on research and development of new technologies

Fujian and Taiwan will jointly develop and industrialize advanced packaging and testing technologies, including memory packaging, system-level packaging, and wafer-level packaging, to enhance the production capacity and technical level of enterprises. We will jointly develop a distinctive integrated circuit design industry, focusing on the R&D of next-generation information technology application chips, such as intelligent Internet of Things (IoT), promote the migration and use of domestic software tools by integrated circuit enterprises and R&D institutions, guide the integration of chip design and application, and strive to enhance the competitiveness of chip design in the consumer electronics sector. We will enhance the local supporting and service capacity for integrated circuit materials and equipment, and support the R&D and industrialization of large-size silicon wafers, photoresist, electronic gases, etching equipment, and semiconductor testing equipment.

4.3.2 Jointly build a platform for cooperation and development

Fujian and Taiwan will accelerate the construction of cross-Straits IC industry cooperation pilot zones, Fujian and Taiwan Cross-Strait software and IC industry cooperation bases, cross-Straits collaborative innovation platforms and other carriers. Fujian and Taiwan will jointly build core technology laboratories and research and development platforms for the Fujian-Taiwan electronic information industry, and work together to formulate cross-Straits standards for the electronic information industry, so as to promote industrial cooperation to a higher level.

4.3.3 Cultivate professionals together

We will give full play to the role of industry associations, make use of the advanced management experience and concepts in the field of electronic information industry in Taiwan, establish Fujian-Taiwan electronic information industry personnel training bases, and regularly carry out personnel training and exchange activities. We will support the joint education of talents in Fujian and Taiwan universities, actively introduce teachers in the field of electronic information industry from Taiwan to Fujian universities, encourage all kinds of universities and enterprises to carry out various forms of work, and vigorously train high-level talents, innovative talents and high-skilled talents needed by enterprises.

4.4 Improving the supporting capacity of factors of production

4.4.1 Improve the land use efficiency of the park

We will release flexible planning space, add requirements for industrial integration management (labeled M0) to industrial land, and allow mixed allocation of industrial, research and development, storage, and public service supporting uses. We will innovate the way of supplying comprehensive industrial land, manage it according to the leading use, and ensure that it serves the real economy. We will allow compatible use of industrial research and development according to the production needs of different stages. To meet the demand for land for "specialized, specialized, innovative" industrial projects, we will study and introduce targeted and operational policies and measures. We will do a good job in revitalizing idle factories, stock land resources, and low-efficiency enterprises by increasing the floor area ratio of factories, attracting investment and equity, attracting enterprises by enterprises, mergers and acquisitions, and further optimize the spatial layout and allocation of factor resources.

4.4.2 Increase support for loan funds

We will increase innovation in financial products and services for the electronic information

industry, implement preferential measures such as interest-discount loans, electricity price reductions, and special subsidies, and strive to include more high-quality industrial projects in the national major project loan support. We will further support the coordinated development of small and medium-sized enterprises in the electronic information industry supply chain.

5. Discussion

The research found that in recent years, Fujian's electronic information industry has achieved rapid development, the industrial structure has been gradually optimized, and the industrial agglomeration effect is obvious. In particular, the cooperation between Fujian and Taiwan's electronic information industry is increasingly close, and the electronic information industry chain of Fujian and Taiwan has become an important part of China's electronic information industry chain. Under the new situation, Fujian should seize the opportunity period of the current global electronic information industry chain restructuring, give full play to the leading advantage of Fujian in building cross-strait integrated development demonstration zones, deepen the cooperation between Fujian and Taiwan's electronic information industry, and promote the high-quality development of Fujian's electronic information industry.

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