

Analysis of the Current Situation, Challenges and Countermeasures of The Development of The Digital Economy in Dongguan City

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Abstract. The digital economy, as an important driving force for efficiency improvement and economic structure optimisation, is increasingly becoming a new engine for global economic development. The digital economy, through the use of a new generation of information technology, enables the collection, analysis, application and sharing of data, thereby promoting the transformation, upgrading and innovative development of various industries. Dongguan's digital economy accounts for the second largest share of GDP in Guangdong Province, second only to Shenzhen, and digital transformation is accelerating to empower the development of the industry. After the study, it was found that, in terms of digital economy policies, the top-level design of the Dongguan government has been optimised, and the towns and districts have been making great efforts to strengthen the advantageous digital industry sectors in their own towns and districts to make concerted progress, which opens up a wider space for the development of the digital economy in Dongguan City. In order to further correspond to the national call to promote economic transformation and upgrading and sustainable development, Dongguan City can take such initiatives as actively cultivating new industries, optimising the service chain for digital transformation of small and medium-sized enterprises (SMEs), accelerating the introduction of digital talents, and encouraging towns and districts to develop the digital economy in accordance with their local conditions to accelerate the high-quality development of Dongguan City's digital economy, and to further enhance its competitiveness in the field of digital economy.

Keywords: Digital Economy, Digital Infrastructure, Digital Enablement

1 Introduction

With the rapid development of digital technologies such as big data, Internet of Things (IoT), Artificial Intelligence (AI), and blockchain, the digital economy has become the "new engine" of national economic growth^[1]. Digital economy is an economic activity with digital information as the key resource, Internet platform as the main carrier, digital technology innovation as the core driving force, and a series of new modes and new business forms as the form of expression^[2]. Grasping the opportunities for the development of the digital economy, deepening industrial structural adjustment, and accelerating the construction of a modern industrial system is the key to promoting a new breakthrough in the coordinated development of the regional economy^[3].

The comprehensive development of the digital economy helps to provide new kinetic energy

for economic growth in the new development stage, fits the current needs of China's economic and social development and strategic tasks, and is an important way to achieve Chinese-style modernisation^[4]. China's economic development is characterised by digitalisation, informatisation, technologisation and intelligence^[5]. In the study of the digital economy, it is found that the digital economy, as the most innovative economic form in today's era^[6], promotes the development of network technology, facilitates production and life, and is also the core driving force to promote the transformation of the economy from high-speed to high-quality development^[7]. The digital economy has a significant effect on the promotion of economic development^[8], China's economic development has made remarkable achievements, but at the same time also exposed the problem of unbalanced regional economic development^[9]. With the rapid development of the digital economy in recent years, many scholars have begun to explore the impact of the digital economy on regional economic development^[8].

As a nationally renowned manufacturing city, Dongguan's digital economy development is unique and representative. Through an in-depth analysis of the scale and structure of Dongguan's digital economy, it can reveal the advantages and shortcomings of Dongguan's digital economy development, and the digital economy is an important support and power source of urban development, and a key factor in enhancing the comprehensive competitiveness of the city. By proposing a series of initiatives to accelerate the further high-quality development of Dongguan's digital economy, it will help optimise the policy environment for the development of the digital economy in Dongguan, enhance the modernisation of the industrial chain and supply chain, attract more investment and talent resources, further enhance Dongguan's visibility and influence across the country and even globally, and push forward the comprehensive economic and social development of the city.

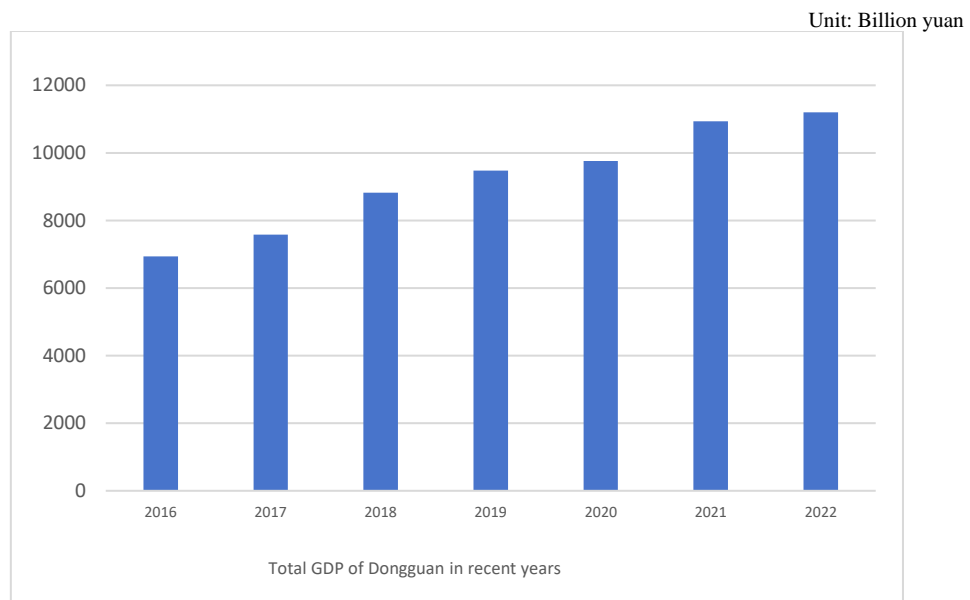


Figure 1. Total GDP of Dongguan from 2016-2022.via Dongguan Bureau of Statistics.

2 Current Situation of Digital Economy Development in Dongguan

2.1 The Scale of The Digital Economy Continues to Grow

Dongguan is located in the geometric centre of the Guangdong-Hong Kong-Macao Greater Bay Area, the frontier of reform and opening up and the "factory of the world"^[10]. 2012 to 2022, Dongguan's economic scale has grown significantly, leaping to become the fourth trillion-dollar GDP city in Guangdong Province (Figure 1). This significant achievement stems from Dongguan's solid manufacturing base.

According to the Digital China Index Report released by Tencent Research Institute in September 2020, Dongguan was ranked among the 7th city in the Digital China Index. 2023 Dongguan was successfully selected as one of the first (30) pilot cities for digital transformation of small and medium-sized enterprises (SMEs) in the country, with only two cities in Guangdong Province, namely Dongguan and Shenzhen, being selected. Dongguan has 1.39 million market entities and a total of 198,000 industrial enterprises. Dongguan is using automation, digitalisation, networking, intelligence and other new technologies as a means to guide enterprises to create intelligent workshops and build digital factories, empowering them with digital transformation to help the development of traditional industries such as textile and garment, food and beverage processing, and paper products, etc. The city's industrial enterprises have spent close to 20 billion yuan annually on digitisation and informatisation. 2012 onwards, Dongguan has stepped up its efforts to organise enterprises to carry out scientific research, and the investment in R&D by industrial enterprises has increased year by year (Figure 2).

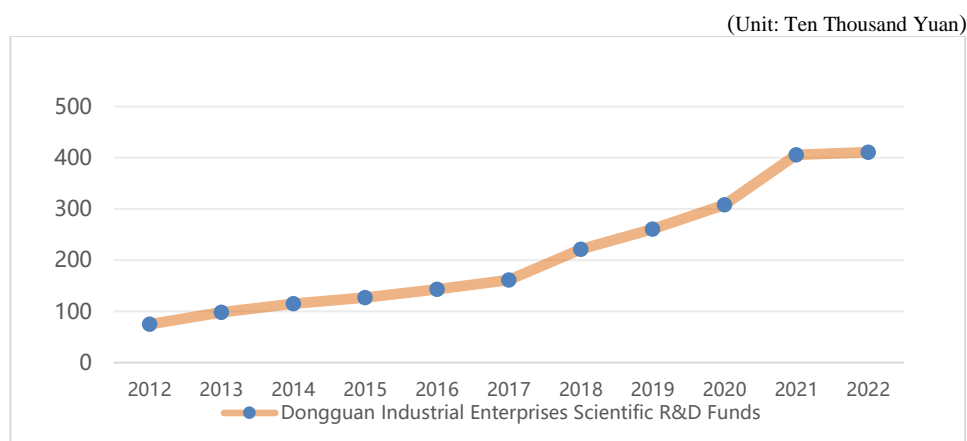


Figure 2. Dongguan Industrial Enterprises Scientific R&D Funds from 2012-2022. via Dongguan Bureau of Statistics.

2.2 Continuous Optimisation of Top-Level Design

To effectively explore and apply the economic ideologies of Xi Jinping, alongside the General Secretary's pivotal insights on digital economy growth, Dongguan has initiated precise measures in alignment with directives from both the central and local governments aimed at

fostering the digital economy's superior advancement. These efforts are evident in Dongguan's strategic planning and policy formulation, such as the "Dongguan Digital Economy Development Plan (2022-2025)", "Action Plan for Dongguan's Industrial Digital Transformation", "Policies and Strategies by the Dongguan Municipal People's Government for Enhancing the Digital Economy's Quality Development", and "Guidelines for Elevating the Quality Growth of Strategic New Industries in Dongguan (2021)". Further, Dongguan has introduced the "Framework for Advancing Dongguan's Digital Economy's High-Quality Development", and "Regulations on Special Support for the Premium Development of the Digital Economy Sector in Dongguan", among other policy initiatives, to spur the rapid and substantial growth of its digital economy.

2.3 Digital Infrastructure Continues to Extend

With the continuous development of the digital economy, the concept of digital infrastructure continues to expand and extend, and 5G, artificial intelligence, industrial Internet, Internet of Things and so on have become important infrastructures for economic activities. Digital infrastructure gradually realises the connection from the real world to the virtual world and back again. Digital infrastructure refers to the infrastructure that contains information technology in at least one part, and digital infrastructure provides the necessary basic conditions for the development of the digital economy, creates a new industry environment for society, and promotes the high-quality development of the economy and society. Digital infrastructure construction can significantly reduce the urban economic gap^[11], promote regional high-quality development^[12], digital infrastructure as a support base for the regional digital innovation ecosystem, can reduce the cost of enterprise innovation and product development in the region^[13], to promote the digital transformation of enterprises and productivity enhancement^[14], optimize the way of value creation in the industry, accelerate the upgrading of industrial structure^[15].

Dongguan City continues to improve the digital infrastructure construction, as of 2023, Dongguan has promoted Huawei, SAP (SAP) 2 empowerment centre into operation, successfully for 171 local industrial enterprises digital empowerment services. It has also successively issued management measures for the recognition of smart factories and smart workshops, recognised 32 smart factories (workshops), established a cultivation pool of 129 key enterprises, and cumulatively promoted the digital transformation of 5,191 regulated industrial enterprises.

In order to make the digital industry segment bigger and stronger, Dongguan has selected the Water Township Functional Area to build an industrial base for the integrated development of the digital economy, integrating the development of the digital economy and the manufacturing industry, actively docking with the Guangzhou Economic Development Zone, the Artificial Intelligence and Digital Economy Pilot Zone, and carrying out industrial and technological co-operation, with a focus on the 5G industry and the industrial Internet, vigorously constructing the 5G infrastructure, and actively carrying out the testing of the application scenarios of the 5G technology, to create a Aggregation Area for Integrated Development of Digital Economy. Songshan Lake has gathered a number of leading enterprises, chain master enterprises, as well as a number of specialised and new enterprises, high-growth innovative enterprises, covering the fields of chips, base stations, equipment, terminals, applications, etc., forming a relatively complete and comprehensive industry chain

of new-generation information technology.

2.4 Synergy Among Towns and Districts

By the end of 2023, Dongguan has 32 towns (streets) under its jurisdiction, including 4 streets; 28 towns. In order to promote the development of digital economy, Dongguan City has set up a municipal leading group for the development of digital economy, headed by the main leader of the municipal government, responsible for co-ordinating the city's special planning for the development of digital economy. The towns and streets (parks), with reference to the organisational structure at the municipal level, have set up town-level leading groups for the development of the digital economy to coordinate and promote the implementation of the work.

Taking four streets as an example, there are more than 300 national high-tech enterprises under the jurisdiction of Nancheng, four national-level science and technology business incubators, and more than 1 million square metres of science and technology parks above the municipal level have been identified. There are a total of about 700 software and information technology service enterprises, and 40 above-scale Internet and related services, software and information technology service enterprises. Dongcheng Street has introduced 38 policy initiatives to promote high-quality economic development from 2022 to 2023, and will arrange 300 million yuan of financial support in two years, focusing on the development of strategic emerging industries represented by the digital economy, and joining hands with the CIMC International Digital City project to build a demonstration base for the digital economy industry in Dongcheng Street. Guancheng Street, as a veteran street, mainly to build a manufacturing digital transformation empowerment centre to participate in the depth of Dongguan city's industrial digitization work for the development of Guancheng Street service outsourcing, cross-border e-commerce, digital finance, intelligent manufacturing, data analysis and other digital economy industries to provide effective empowerment. Wanjiang Street in recent years, industrial research investment in the four streets with the fastest growth rate, there are currently seven top 100 innovative enterprises, the national speciality and new "small giants" 7 enterprises, the provincial "speciality and new" 56 enterprises (Table 1).

Table 1. Research investment in industrial enterprises in 4 streets of Dongguan, 2017-2022.via Dongguan Bureau of Statistics

(Unit: Ten Thousand Yuan)

Region \ Year	2017	2018	2019	2020	2021	2022
Dongguan City	1614225	2212356	2605714	3084248	4056145	4109992
Wanjiang Street	17451	25156	33052	33977	52008	57886
Nancheng Street	7205	14330	10790	13304	17959	16481
Dongcheng Street	69945	82036	109151	92446	130282	148559
Guancheng Street	3795	7955	8109	8282	8221	7022

3 Opportunities for the Development of Digital Economy in Dongguan

3.1 Strong Government Policy Support

Guangdong attaches great importance to the digital transformation of the manufacturing industry, and is the first in the country to introduce policy measures to support the digital transformation of the manufacturing industry. Currently, Guangdong is vigorously promoting the digital transformation of provincial and municipal cities to support Guangzhou, Shenzhen, Foshan, Dongguan and other places to create a model city for the digital transformation of manufacturing. In recent years, the Dongguan municipal government has formulated a series of targeted policies to promote the rapid development of the digital economy (Table 2). These policies cover a wide range of aspects such as upper-level planning and financial support, providing a strong policy impetus for the development of the digital economy in Dongguan. The introduction of these policies has not only lowered the threshold for enterprises to enter the digital economy, but also encouraged more innovation and investment, laying a solid foundation for the long-term development of the digital economy.

Table 2. Summary of policies related to the development of Dongguan's digital economy since 2018

Year	Name of Policy Report/Conference/Policy	Relevant Content
2018	Dongguan High-tech Enterprises Standard Setting and Quality Improvement Action Plan (2018-2020)	Strengthen the supply of policies, technologies, talents, education, land, capital, services and other elemental resources for high-tech enterprises, guide high-tech enterprises to set standards and improve quality, and promote the development of high-tech industry agglomeration.
2019	Dongguan "Digital Government" Construction Master Plan (2019-2021)	Creating a "digital government" government data brain, innovating the "online shopping" government service experience, and creating a new mode of "digital government" construction.
2020	Industry and information technology special funds for the development of information technology thematic project implementation rules of Dongguan	The industrial Internet application projects with obvious results in the pilot work of industrial cluster industrial interconnection and digital transformation carried out by the province and the city will be rewarded and subsidised. The projects in the field of 5G+ industrial Internet and 5G+ social applications will be rewarded and subsidised. Rental subsidies for the field of pilot parks for digital industry clusters, and incremental rewards for local contribution of software enterprises.

2020	Dongguan Digital Government Reform and Construction "14th Five-Year Plan".	<p>Reduce the institutional transaction costs of digital economy market players and effectively maintain the digital economy market order. Comprehensively enhance digital innovation services, accelerate the cultivation of data industries, promote the innovative development of digital economy industry clusters, and help build a pilot area for high-quality development of digital economy and a model city for digital transformation of manufacturing industry.</p> <p>Promote the interoperability of data resources and the sharing of digital development capabilities among various industries and enterprises, and empower the innovative development of the digital society.</p>
2020	The 14th Five-Year Plan for the High-Quality Development of the Manufacturing Industry in Dongguan	Accelerating the digital transformation of the manufacturing industry. Accelerate the deep integration of the digital economy and the real economy, and deeply implement the digital, intelligent and networked transformation of the manufacturing industry.
2020	The 14th Five-Year Plan for the Development of Dongguan's Service Industry	<p>Vigorously promote the digital empowerment project, promote the digital transformation of the traditional service industry and the innovative development of the digital service industry.</p> <p>Strengthen the digital economy empowerment, attract and cultivate new business forms of digital economy service industry, promote the software park, animation park to accelerate the transformation of digital parks to create a new ecosystem for digital economy development.</p>
2021	Several measures on promoting the high-quality development of Dongguan's digital economy industrial base	<p>Accelerating the planning and construction of the Dongguan Digital Economy Industrial Base.</p> <p>Focus on supporting the development of 5G, artificial intelligence, industrial Internet, Internet of Things, big data, cloud computing, blockchain, digital manufacturing, digital creativity, digital design and other areas.</p>
2022	Implementing Rules for Special Support Measures for High-Quality Development of Dongguan Digital Economy Industrial Base	The enterprises (units) listed in the implementation rules for this special support and rewards shall be registered for business and taxation within the scope of the Dongguan Digital Economy Industrial Base, and have independent legal personality and implement independent accounting of the digital economy enterprises in the fields of 5G, artificial intelligence, industrial Internet, Internet of Things, big data, cloud computing, blockchain, digital manufacturing, digital creativity, digital design, and so on.
2022	Dongguan Digital Economy Development Plan (2022-2025)	By 2025, the digital transformation and upgrading of enterprises will be fully covered, and an internationally renowned digital economy city and a national manufacturing digital transformation demonstration city will be built at a high level.

2022	Policy Measures of the People's Government of Dongguan Municipality on Promoting the High-Quality Development of the Digital Economy	Support leading enterprises to implement pilot demonstrations of digital transformation of the manufacturing industry. Introducing special support policies for the high-quality development of "speciality, speciality and new" enterprises, increasing policy support for the digital transformation of key enterprises. Formulated a roadmap for the digital transformation of key industrial clusters, constructed a multi-level, three-dimensional and full-coverage service system for the digital transformation of the manufacturing industry, and made every effort to promote the construction of a manufacturing digital transformation empowerment centre.
2023	Dongguan Municipality Promotes the Implementation of Digital Transformation of Industries	Focus on building a public service platform for empowerment centres, actively constructing a multi-level digital transformation empowerment system, and carefully building digital benchmarking demonstration projects. Reduce the cost of digital transformation of the manufacturing industry by "the government makes up a little, the platform makes up a little, and enterprises contribute a little". Coordinate three-year 10 billion yuan of funds to support the development of the digital economy, and encourage and guide industrial funds to tilt towards the field of digital transformation of the manufacturing industry.

3.2 Strong Industrial Base

Dongguan City is globally renowned for its strong manufacturing strength, with a well-established industrial chain and strong production capacity. With the advancement of science and technology, the traditional manufacturing industry is undergoing a profound transformation led by the wave of digitization. Taking this as an opportunity, Dongguan City has vigorously carried out the digital upgrading of its manufacturing industry, seamlessly integrating digital technology into the production process. This integration has given rise to the transformation of traditional manufacturing to intelligent manufacturing and smart manufacturing, as witnessed by the rapid rise of the electronic information manufacturing industry, led by smartphones (Figure 3). The convergence of digital technologies not only improves productivity and quality, but also opens up new avenues for innovation and growth. The city of Dongguan will capitalize on the opportunities presented by the digital economy to further consolidate its position as a global manufacturing hub and move toward a future of smart manufacturing.

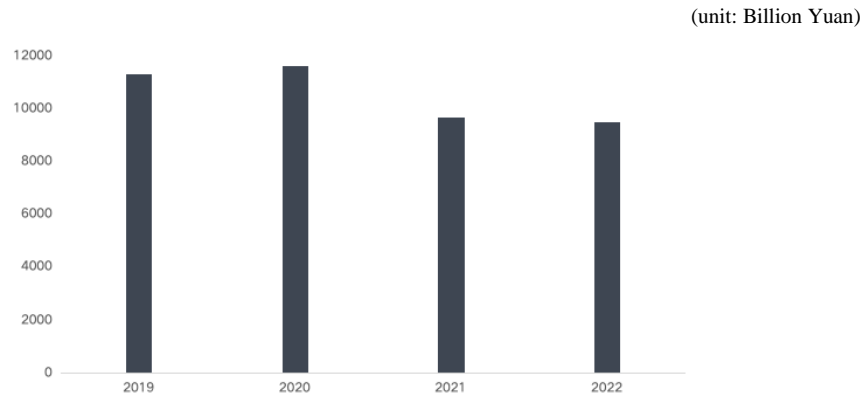


Figure 3. Gross industrial output value of the electronic information manufacturing industry from 2019-2022.via Dongguan Bureau of Statistics.

4 Accelerating Further High-Quality Development Initiatives for Dongguan's Digital Economy

4.1 Actively Cultivate Emerging Industries

In 2019-2022, the added value of Dongguan's on-board electronic information manufacturing industry accounted for 30% of the city's on-board industry on a sustained basis, which brings Dongguan the opportunity to take off again, but is also prone to the pitfalls of a high proportion and the pressure of sustained strength. 2022, the added value of Dongguan's electronic information manufacturing industry declined by 6.3%, the city's economic growth rate is at the bottom of the list among the prefectural-level cities of Guangdong, and Dongguan's economic development is facing a major test.

In the face of this major challenge, the Dongguan municipal government and relevant departments are actively taking measures to cope with the impact of the decline in the value added of the electronic information manufacturing industry.

Relying on Dongguan's location advantages and industrial foundation, we will scientifically position and cultivate emerging pillar industries with high development potential, including new energy, new materials, biomedicine and other emerging industries. The strategic focus is on the development of cutting-edge industries such as new energy storage, core components of new energy vehicles, semiconductors and integrated circuits, and new materials. Through careful planning and coordination of these efforts, we seek to accelerate the development of related industries and foster a diversified industrial landscape with multiple engines of growth.

To further strengthen this ecosystem, investment will be stepped up to attract leading enterprises in new pillar industries and promote the upgrading and evolution of new industrial chains. At the same time, the government should strengthen cooperation with local research institutes and universities to promote scientific and technological innovation and the transformation of research results. Such cooperation will provide strong scientific and technological support for the development of new industries and ensure that Dongguan

remains at the forefront of scientific and technological progress and industrial transformation.

4.2 Optimise the Service Chain for Digital Transformation of SMEs

According to the data, Dongguan City, the number of small and medium-sized micro-enterprises nearly 700,000, of which the number of smaller micro-enterprises accounted for more than 50 per cent. The survey shows that SMEs "don't want to turn" and "won't turn" to digital transformation. The reason for this is that digital transformation requires innovation in products and processes as well as re-planning of business strategies, but the reality is that SMEs have limited economic budgets and they need to survive first before they will fully consider their future goals. In order to accelerate the speed of SMEs' digital transformation, it is necessary to conduct in-depth enterprise research, analyse and diagnose the difficulties faced by enterprises in digital transformation, and help SMEs find the possibility of realising digital transformation through the provision of professional consulting and technical service providers. In terms of financing for SMEs, in addition to government support and self-financing, market-based investment institutions can be introduced to co-invest in order to provide long-term capital protection for science and technology R&D enterprises.

4.3 Accelerate the Introduction of Digital Talents

Attract more digital talents to Dongguan City by formulating preferential policies, such as providing a high-quality working environment, offering generous remuneration packages and providing comprehensive welfare protection. At the same time, various channels and platforms, such as job fairs, talent markets and online platforms, can be utilised to widely attract outstanding talents from home and abroad.

Increase the cultivation and training of local talents, and cooperate with local universities in Dongguan to launch targeted training programmes and courses to improve the digital literacy and skill levels of talents. At the same time, enterprises can be encouraged to strengthen digital training for their employees, improve their digital awareness and capabilities, promote the deep integration of industry, academia, research and application, and facilitate the transformation and application of scientific and technological achievements.

Establish innovation platforms and incubators in the field of digitisation to provide entrepreneurs and start-ups with a full range of support and services, such as capital, technology and markets, so as to attract more entrepreneurs and start-ups to Dongguan City and promote the innovation and development of the digital economy.

4.4 Encourage Towns and Districts to Develop the Digital Economy According to Local Conditions

Due to different locations, different towns and districts have different industrial bases, resource advantages and development strategies. In order to promote the overall improvement of the scale of the digital economy in Dongguan, each area needs to find suitable application scenarios and entry points according to the development process of its own digital economy and the characteristics of its industrial structure type. By focusing on the development of intelligent manufacturing equipment, production efficiency and product quality will be improved; enterprises will be encouraged to strengthen the application of digital design technology to improve the level of design and innovation; and the in-depth integration of

cultural creativity and digital technology will be promoted to create digital creative industries with local characteristics. At the same time, advantages are combined to promote cooperation and resource sharing among enterprises through policy guidance and industrial alliances to jointly promote the rapid development of the digital economy.

5. Conclusion

This study provides a comprehensive overview of the scale, top-level design, infrastructure, and synergy of the digital economy in Dongguan City, pointing out that strong support from government policies and a strong industrial foundation are two major opportunities for the development of the digital economy in Dongguan City, and proposes specific development initiatives in various aspects, such as fostering new industries, optimising the service chain for the digital transformation of small and medium-sized enterprises (SMEs), introducing digital talents, and encouraging the development of the digital economy in various towns and districts in accordance with local conditions. Specific development initiatives are proposed, which are of great significance in promoting the high-quality development of the digital economy in Dongguan City. However, there are some shortcomings in this paper, although the paper on the current situation of the digital economy in Dongguan City has been sorted out, in the analysis of the development opportunities of the digital economy and the development of high-quality initiatives, you can seek to more intuitively demonstrate the effectiveness of the development of the digital economy of specific case studies. The main focus on the current status of the development of the digital economy in Dongguan City, opportunities and initiatives, but may be insufficient to predict the future development trend of the digital economy, lack of in-depth exploration of the challenges and opportunities that may arise in the future.

In the subsequent writing of the paper, the content of the paper can be further enriched to improve the quality and depth of the paper. At the same time, the thesis can also be updated and improved by taking into account the latest research developments and data.

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