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Research on the Current Status of Transformation and Upgrading of Dongguan's Manufacturing Industry under the Background of the Digital Economy

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Abstract:
The digital economy is a driving force behind the new wave of technological revolution and industrial transformation. It has emerged as a crucial catalyst for economic and social transformation and a key enabler of high-quality economic growth. Dongguan, renowned as the "World Factory," has traditionally been reliant on industries characterized by low- tech content, meager product, and high consumption of basic production factors. In the era of the booming global digital economy, Dongguan's manufacturing sector is presented with novel opportunities for transformation and upgrading. However, it also has to grapple with the pressures and challenges that come with this transformation.This study focuses on the transformation and upgrading of Dongguan's manufacturing industry. It delves into the development of Dongguan's digital economy, the current state of the manufacturing industry's transformation and upgrading, and the progress of its digital transformation. The aim is to gain a comprehensive understanding of the manufacturing industry's transformation in the digital-economy context and offer practical recommendations to facilitate its upgrade.

Keywords:
Digital Economy; Manufacturing Industry; Transformation and Upgrading

1.Introduction

In recent years, with the development of science and technology and the application of digital technologies such as artificial intelligence, the Internet of Things, big data and cloud computing, the economic development has shown in a new form.[1] The integration of traditional manufacturing industry and the digital economy has become an urgent task. The continuous emergence of new technologies will prompt the traditional manufacturing industry to transform from low - value - added, low - efficiency and mechanization to high - value - added and intelligentization, so as to better meet the needs of consumers and achieve high - quality economic development. It can be seen that the digital economy, as an emerging economic form, is gradually

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becoming a new driving force for economic development.[2] Although Dongguan has unique geographical location and industrial foundation, under the impact of the digital economy, Dongguan's manufacturing industry also faces many challenges and opportunities. This paper explores the current situation of the transformation and upgrading of Dongguan's manufacturing industry in the context of the digital economy, which is helpful for Dongguan's manufacturing industry to achieve digital transformation, improve production efficiency, reduce production costs, improve product quality.

2.The Development Status of Dongguan's Digital Economy

In the first year of the "14th Five - Year Plan", Dongguan seized the critical period of digital economy development, strengthened the basic position of the electronic information manufacturing industry, improved the software and information technology service capabilities, and promoted the cultivation of emerging technologies and industries.[3] The digital economy industry covers many fields such as electronic information manufacturing, software services, and e - commerce. The electronic information manufacturing industry is the leading industry, with an output value of 947.02 billion yuan in 2022. The government has increased its support for new - generation information technology, artificial intelligence and other fields, promoting the upgrading of the digital economy industrial structure. According to the data in the "Dongguan Digital Economy Development Report (2022)", in 2022, the operating income of above - scale Internet and related service industries, software and information technology service industries in Dongguan reached 35.574 billion yuan, with the Internet and related service industries and software and information technology service industries accounting for 13.77% and 86.23% respectively. In terms of industrial carrier construction, Dongguan has actively implemented the big data development strategy. Through the development idea of "pilot demonstration leading and large - park aggregation", it has continuously improved the data service industry system. Songshan Lake Industrial Park, Everbright We Valley Industrial Park, and the Cloud Computing Park of the Chinese Academy of Sciences have all been approved as provincial big data industrial parks or innovation and entrepreneurship incubation parks.

Dongguan has actively promoted the in - depth integration of the digital economy and the real economy, vigorously promoted the transformation and upgrading of traditional advantageous industries, and improved the quality level. At the same time, Dongguan has guided the expansion and application of digital technologies in many fields such as manufacturing and services, actively created application scenarios for digital technology innovation, and promoted the in - depth development of the digital economy and consolidated the foundation. As of 2022, 5,191 above - scale industrial enterprises in Dongguan had launched digital transformation, demonstrating the city's active promotion and remarkable achievements in digital transformation. [3]

3.The Current Situation of the Transformation and Upgrading of Dongguan's Manufacturing Industry

3.1. The Process of the Transformation and Upgrading of the Manufacturing Industry

The Pre - transformation Stage of the Manufacturing Industry (Before 2008): After the reform and opening

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up, Dongguan welcomed China's first processing - with - supplied - materials factory, the Pacific Handbag Factory, and the unique "Dongguan Model" came into being. With the efficient collaboration of the "Dongguan Model", Dongguan embarked on the magical path of "the world runs out of stock when Dongguan is congested". In just over 20 years, more than 20,000 factories were spread all over the villages and towns of Dongguan. However, in 2008, the global financial crisis hit Dongguan, known as the "World Factory", hard. In 2009, its manufacturing industry suffered a loss of nearly 40%, and witnessed the withdrawal of 1,600 Taiwanese - funded enterprises and 2,000 Hong Kong - funded enterprises. In the next six years, more than 4,000 enterprises closed down. This was a heavy blow to Dongguan, which was highly dependent on foreign trade. In 2009, Dongguan's GDP growth rate dropped to 5.3%, the lowest since 1980. At the same time, with the withdrawal of well - known foreign enterprises such as Samsung, Nokia, Panasonic, Sharp, and Foxconn, and the closure of two factories in Dongguan by Hutchison Whampoa, one of the world's largest toy OEMs, the prospects of Dongguan's manufacturing industry were pessimistic. This crisis accelerated Dongguan's determination and pace of transformation. In fact, as early as 2006, the Dongguan government had recognized the serious problems in the "Dongguan Model": low - end industries, meager profits, excessive dependence on foreign trade, and lack of motivation for upgrading. Therefore, in that year, Dongguan put forward the trade transformation strategy.

The Initial Transformation Stage (2008 - 2013): From 2008 to 2013, the proportion of export of processing - with - supplied - materials enterprises in Dongguan decreased significantly, from 37.1% to 14.7%. At the same time, the proportion of enterprise's domestic sales in the total domestic and foreign sales increased, from 26% to 34%. By the end of 2013, nearly half of Dongguan's processing trade export products were high - tech products, accounting for about 49.45%, and another 23.3% of the export products were products of emerging industries. These changes clearly indicated the optimization of Dongguan's export product structure and marked the successful completion of the first stage of Dongguan's industrial transformation.

The Machine - replacing - Manpower Stage (2014 - 2016): In 2014, Dongguan entered the stage of replacing manual labor with machine production. From 2014 to August 2016, the effect of the machine - replacing - man - power stage was remarkable, driving the total investment in technological transformation of the whole city to increase by 85.6%, the average unit product cost to decrease by 9.8%, and the average labor productivity to increase by 68.6%. During this period, the government also issued a series of policies to support the transformation of the manufacturing industry. In 2014, the Dongguan Municipal Government issued the "Dongguan City's Action Plan for Promoting Enterprise Intelligent Manufacturing 2014 - 2016" and promoted the machine - replacing - man - power plan. In 2016, the Dongguan Municipal Government issued the "Opinions on Vigorously Developing the Robot Intelligent Equipment Industry and Building a Globally Influential Advanced Manufacturing Base" and supporting implementation plans, which triggered a boom in intelligent manufacturing.

The Stage of Launching the Enterprise Doubling Plan (2017 - Present): In 2017, the Dongguan Municipal Government launched the enterprise scale and efficiency doubling plan to stimulate the motivation for enterprises to transform and upgrade, and let excellent enterprises lead the transformation and upgrading of the city's manufacturing industry.

The Stage of High - quality Development of the Manufacturing Industry (2019 - 2022): In 2019, the Dong-

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guan Municipal Government launched a three - year manufacturing quality reform plan, issued the "Opinions on Implementing the Dongguan Manufacturing Quality Reform Strategy", and clarified seven tasks and 28 detailed measures to provide policy support for the high - quality development of the manufacturing industry.

3.2. The Scale of Dongguan's Manufacturing Enterprises

This paper mainly selects the five pillar industries and four characteristic industries in Dongguan to illustrate the relevant situation of manufacturing enterprises. The development of these industries will promote the clustering, high - end, digital, branded and green development of Dongguan's manufacturing industry, provide support for Dongguan to build a "hundred - billion, thousand - billion, trillion - billion" - level cluster development echelon, and enhance Dongguan's industrial competitiveness in China and even globally. (i.e., Figure 1 or Table 1)

Table 1. Number of Traditional Manufacturing Enterprises in Dongguan from 2018 to 2022

Industry	**2018**	**2019**	**2020**	**2021**	**2022**
Electronic Information Manufacturing	1301	1648	1836	2087	2222
Electrical Machinery and Equipment Manufacturing	1909	2771	3094	3567	3860
Textile, Clothing, Shoes and Hats Manufacturing	920	1152	1147	1078	1165
Food and Beverage Processing and Manufacturing	129	146	162	180	205
Papermaking and Paper Products Industry	260	371	381	408	418
Toy and Cultural and Sports Goods Manufacturing	325	409	426	465	557
Furniture Manufacturing	377	460	443	405	375
Chemical Products Manufacturing	274	360	384	438	494
Packaging and Printing	166	224	232	269	280

Source: Dongguan Statistical Yearbook

From the data in Table 3 - 1, during 2018 - 2022, the electrical machinery and equipment manufacturing industry and the electronic information manufacturing industry in Dongguan's advantageous manufacturing industries increased relatively more and steadily. Both industries showed a stable growth trend from 2018 to 2022, although the growth rate fluctuated. The number of enterprises in the electrical machinery and equipment manufacturing industry was higher than that in the electronic information manufacturing industry throughout the period, and the gap widened year by year. The development of these two industries benefited from the relevant departments in Dongguan formulating corresponding industrial implementation plans based on the actual situation, taking these two industries as important supports for promoting the upgrading of the city's industrial foundation, modernization of the industrial chain, enhancing the competitiveness of the manufacturing industry, and building a modern industrial system, and accelerating the transformation from "Made in Dongguan" to "Created in Dongguan" for high - quality development.

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In addition, during 2018 - 2022, except for the furniture manufacturing industry, the number of most enterprises was increasing. The electrical machinery and equipment manufacturing industry had the fastest growth rate, with an increase rate of 102% from 2018 to 2022. This was mainly because during 2018 - 2022, affected by the COVID - 19 pandemic, the China - US trade friction, and the Russia - Ukraine conflict, Dongguan's pillar industries such as the textile, clothing, shoes and hats manufacturing industry, furniture manufacturing industry, and toy manufacturing industry were hit hard. Phenomena such as overseas imported raw materials being stranded at ports, enterprises' raw and auxiliary materials not being available in time, and tight product export logistics occurred frequently. In addition, in the early stage, some expressway entrances and exits and toll stations were closed due to epidemic prevention and control in many places. The logistics led to a shortage of raw materials and an increase in transportation costs, which also increased the procurement costs of enterprises. They faced multiple difficulties.

3.3. The Industrial Added Value of Dongguan's Manufacturing Industry

The economic indicator of industrial added value can reflect the value - added ability of a manufacturing industry. A high industrial added value indicates that the manufacturing industry can effectively increase the added value of products. The industrial added value can also reflect the innovation and technology level of enterprises.

Table 2. Industrial Added Value of Dongguan's Manufacturing Industry from 2018 to 2022

Industry	2018	2019	2020	2021	2022
Electronic Information Manufacturing	13,742,739	14,966,133	15,376,884	16,763,966	16,772,320
Electrical Machinery and Equipment Manufacturing	7,296,020	8,274,116	9,738,083	11,799,473	12,027,314
Textile, Clothing, Shoes and Hats Manufacturing	2,815,593	2,958,478	2,271,133	2,533,542	2,448,504
Food and Beverage Processing and Manufacturing	1,107,905	1,016,322	1,152,023	1,392,756	1,401,291
Papermaking and Paper Products Industry	2,104,998	1,863,563	2,036,024	2,086,830	1,493,412
Toy and Cultural and Sports Goods Manufacturing	1,229,474	1,240,037	1,174,634	1,521,126	1,606,150
Furniture Manufacturing	867,744	902,693	1,002,821	1,237,673	1,055,096
Chemical Products Manufacturing	706,119	847,551	995,587	1,204,677	987,294
Packaging and Printing	601,002	756,631	739,165	831,776	852,894

Source: Dongguan Statistical Yearbook

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From the data in Table 3 - 2, there is a large gap in the industrial added value of Dongguan's traditional manufacturing industries. From 2018 to 2022, the industrial added value of the electronic information manufacturing industry was the highest, with the highest value every year, while the packaging and printing industry had the lowest. Although the industrial added value of most industries showed an increasing trend, the textile, clothing, shoes and hats manufacturing industry and the papermaking and paper products industry experienced a decline from 2019 to 2020. This decline may be due to the impact of the China - US trade friction on exports, the impact of the global trade tension on market demand, and the obstruction of production and logistics caused by the outbreak of the COVID - 19 pandemic. The restructuring of the global supply chain may also have an impact on the supply chain and output value of these industries. The decline in data and the frictional situation of the global trade situation well illustrate that these industries are greatly affected by external fluctuations. Therefore, in the future, Dongguan's textile, clothing, shoes and hats manufacturing industry should focus on the whole industrial chain links including R & D and design, production and processing, raw and auxiliary material supply, machinery and equipment, logistics and trade, talent training, production services, and information consultation. It should focus on promoting the digital transformation and intelligent reconstruction of the textile, clothing, shoes and hats manufacturing industry and the papermaking and paper products industry, integrate high - quality resources, and create characteristic brands. From 2018 to 2021, the industrial added value of the electrical machinery and equipment manufacturing industry grew rapidly, showing a stable development trend.

3.4. The Operating Conditions of Dongguan's Manufacturing Industry

As can be seen from the data in Table 3 - 3, from 2018 to 2022, Dongguan's manufacturing industry generally showed an upward trend. However, the operating income of some industries declined in 2020 and 2021 due to the impact of the pandemic. For example, the operating income of the textile, clothing, shoes and hats manufacturing industry in 2020 was only 80,655,750,000 yuan, a 24.24% decrease compared with 2019. This was mainly because Dongguan implemented measures such as work stoppage and production suspension to prevent and control the pandemic during that period. The operating income of the toy and cultural and sports goods manufacturing industry also declined in 2020 but rebounded significantly in 2021. Although the operating income of individual industries fluctuated in some years, overall, the operating conditions of Dongguan's manufacturing industry were good, showing a continuous growth trend.

Table 3.Operating Revenue of Dongguan's Manufacturing Industry from 2018 to 2022

Industry	**2018**	**2019**	**2020**	**2021**	**2022**
Electronic Information Manufacturing	95,151,436	102,580,547	112,701,631	110,368,352	106,162,686
Electrical Machinery and Equipment Manufacturing	30,694,662	34,210,162	38,194,817	46,929,901	48,321,196
Textile, Clothing, Shoes and Hats Manufacturing	9,254,616	10,647,529	8,065,575	9,070,044	9,475,691

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Food and Beverage Processing and Manufacturing	8,664,413	9,381,036	10,663,325	12,821,160	13,858,582
Papermaking and Paper Products Industry	8,897,018	8,739,882	8,879,379	10,027,350	9,054,888
Toy and Cultural and Sports Goods Manufacturing	4,276,817	4,199,468	3,945,634	5,203,287	5,511,445
Furniture Manufacturing	3,056,483	3,361,931	3,533,789	4,066,953	3,659,433
Chemical Products Manufacturing	3,492,029	3,957,282	4,486,579	6,029,889	6,218,173
Packaging and Printing	2,243,178	2,534,112	2,612,810	3,298,521	3,217,080

Source: Dongguan Statistical Yearbook

As can be seen from the data in Table 3 - 4, from 2018 to 2022, the total profit of the electrical machinery and equipment manufacturing industry in Dongguan's manufacturing industry showed a stable growth trend, but the total profit of the electronic information manufacturing industry declined significantly in 2022. In contrast, the total profit of the textile, clothing, shoes and hats manufacturing industry declined greatly, facing a significant decline in 2020 but recovering in 2021 and increasing rapidly in 2022. The toy and cultural and sports goods manufacturing industry was in a similar situation. It even had a negative profit in 2020 but rebounded in 2021. The profit of the chemical products manufacturing industry also decreased slightly in 2021. These data reflect the diversified characteristics of Dongguan's manufacturing industry and the differences in profitability among various industries. At the same time, they also highlight the important position and profitability of the electronic information manufacturing industry and the electrical machinery and equipment manufacturing industry in Dongguan's manufacturing industry.

Table 4. The total industrial profits of Dongguan's manufacturing industry from 2018 to 2022

Industry	**2018**	**2019**	**2020**	**2021**	**2022**
Electronic Information Manufacturing	2,162,541	3,543,320	2,915,953	6,344,973	3,901,625
Electrical Machinery and Equipment Manufacturing	1,274,659	1,438,853	2,021,744	2,184,712	2,501,342
Textile, Clothing, Shoes and Hats Manufacturing	282,141	266,907	26,997	89,039	218,766
Food and Beverage Processing and Manufacturing	349,296	265,154	357,191	385,024	404,476
Papermaking and Paper Products Industry	645,831	454,115	612,254	498,931	25,486

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Toy and Cultural and Sports Goods Manufacturing	93,234	19,380	-14,695	90,940	140,977
Furniture Manufacturing	86,870	120,200	137,497	163,975	181,417
Chemical Products Manufacturing	153,546	244,209	294,534	294,172	188,500
Packaging and Printing	98,069	134,310	116,568	93,454	101,918

Source: Dongguan Statistical Yearbook

Dongguan's manufacturing industry is constantly transforming. Judging from the five pillar industries and four characteristic industries, the electronic information manufacturing industry and the electrical machinery and equipment manufacturing industry are far ahead in terms of the number of enterprises, industrial added value, operating income and operating profit. They are also less affected by the pandemic. From 2018 to 2022, they basically showed an upward trend. However, the textile, clothing, shoes and hats manufacturing industry and other industries were greatly affected by the pandemic. They could achieve growth before 2020, but their profitability was poor starting from 2020. However, they all recovered to some extent after the pandemic. Generally speaking, with the support of the policies of the Dongguan Municipal Government, the transformation of Dongguan's manufacturing industry has been working hard and has achieved certain results.

4.Conclusions

The digital economy is the main economic form after agriculture and industry. With digital information as the core and the network as the bridge, under the development of information and communication technology and the integration of the financial economy, the digital economy will play a crucial role in the transformation and upgrading of the manufacturing industry.[4] Digital transformation has become the only way for the transformation and upgrading of Dongguan's manufacturing industry. This paper collects data of Dongguan's manufacturing enterprises to understand the scale and added value of the local nine traditional manufacturing industries in recent years and promote the development of the digital transformation of the manufacturing industry.

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