Research on the Pathways for the Digital Economy to Drive High-Quality Development in Zhenjiang's Manufacturing Sector

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Abstract: Manufacturing serves as the foundation of the national economy. The paper of the 20th CPC National Congress calls for advancing manufacturing toward intelligent, green, and high-end development. Therefore, the deep integration of the digital economy with the real economy gives new driving force to the high-quality development of the manufacturing industry. This paper takes Zhenjiang City as the research object, discusses how the digital economy drives the transformation and upgrading of its manufacturing sector through five pathways: innovation, coordination, green development, openness, and sharing. Research results show that while the digital economy promotes efficiency, optimizes resource allocation, boosts innovation capabilities, and advances green development, it also faces challenges like unbalanced development, insufficient industrial support, data utilization and protection issues, and transformation outcomes not reaching expectations. Accordingly, this paper proposes recommendations to promote industrial structure optimization and upgrading, establish a unified and open market for data as a factor of production, strengthen government digital governance services, and improve the supply of digital transformation services. These measures aim to strengthen policy guidance and market mechanisms, thereby supporting Zhenjiang's manufacturing sector in achieving high-quality sustainable development.

1. Introduction

A thriving industry leads to a thriving city; a strong industry leads to a strong city. For Zhenjiang, manufacturing is not merely a pillar industry but the core engine driving its "Industrial Strength" strategy. In 2023, the increased value of the manufacturing industry part of Zhenjiang has achieved a 6% growth when compared with the same period last year, which takes up 39.6% of the whole GDP of this city. In the past few years, Zhenjiang has actively carried out its strategy to reinforce the industrial field, issuing key policy documents such as the Zhenjiang Action Scheme for Made in China 2025 and the Leading Suggestions on Boosting a Powerful Industrial City. These measures have yielded positive economic outcomes, adjusted the industry structure, and promoted the development of industrial clusters. However, the manufacturing sector still confronts problems, which include insufficient innovation capacity, low efficiency and profit earning ability, and a significant gap in R&D investment compared with more developed areas. These problems have thus obstructed the high-quality progress of this sector. To find out the pathways that let Zhenjiang's manufacturing sector get further high-quality development is still a complicated problem. To advance this development, this paper explores specific pathways through the lens of the digital economy.

Scholars first explored the concept of industrial digitalization. Bharadwaj et al. (2013)[1] and Sebastian et al. (2017)[2] put forward the argument that digital transformation stands for an all-round revolution in the ways of working, organizational structures, and business models of manufacturing enterprises. This process is pushed by digital technologies and includes the integration and using of many kinds of technologies. Kim et al. (2019)[3] hold the argument that in the "Industry 4.0" era, the digital economy promotes the creation of an industrial ecological system. Within this ecosystem,

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manufacturing processes are interconnected and interact through digital networks, significantly enhancing production capacity.

The emergence of the digital economy has greatly promoted the high-quality development of manufacturing, bringing unprecedented change and innovation to enterprises. An analysis of related literature reveals that studies concerning the influence of the digital economy upon the growth of the manufacturing industry mainly concentrate on the following aspects: (1) Digital "new infrastructure" solidifies the foundation for the high-quality growth of the manufacturing industry. Chen Xinyuan et al. (2021)[4] point out that "new infrastructure", represented by the industrial internet and 5G, acts as a powerful lever for unleashing domestic demand potential and pushing forward the dual circulation strategy. Liu Xinxin et al. (2021)[5] have found that although the high initial investment of the digital economy may deter some enterprises, decreasing marginal costs and increasing profits will hence encourage more investment toward digital technologies. (2) Data-driven elements drive new models of flexible manufacturing. Hui Ning et al. (2020)[6] argue that the digital economy brings about closer integration between production terminal and sales terminal, thus driving three major transformations in the manufacturing industry: demand-oriented production for solving excess production capacity, elastic production for satisfying individual demands, and distinction-based production for creating higher additional value. (3) Intelligent manufacturing can break through low-end constraints. Li Yingjie et al. (2021)[7] demonstrate that intelligent transformation is a key pathway for manufacturing to ascend global value chains. Tang Xiaohua et al. (2021)[8] further propose that intelligent transformation mainly achieves this through optimizing labor force structures, enhancing production efficiency, and improving product quality. (4) The digital economy drives high-quality development through multiple dimensions. Xu Xing et al. (2023)[9] demonstrate this driving effect of the digital economy from two perspectives: technical innovation efficiency and geographic spillover effects. Yang Yi et al. (2023)[10] contend that the digital economy drives the high-quality development of manufacturing via increasing the efficiency of resource distribution, promoting the ways of production, reshaping the structures of employment, and making supply and demand reach a balance.

In summary, the existing academic papers mainly concentrate on investigating the influence of the digital economy on the whole Chinese manufacturing industry, with insufficient attention paid to pathways for high-quality development in individual regional manufacturing sectors. Furthermore, scholars have not paid enough attention to the total top logic that pushes the high-quality progress of Zhenjiang's manufacturing industry. In light of current economic fluctuations, it is more and more necessary to study ways that digital economy helps high-quality manufacture development which matches Zhenjiang's special local features.

2. Definition of Relevant Concepts and Theoretical Foundations

2.1. Digital Economy

The digital economy includes economic activities characterized by the use of digital knowledge and information as key production elements, reliance on modern information networks as the carrier, and the application of information and communication technologies is taken as as the core driving force for efficiency promotion. Its scope covers four major fields: digital industrialization, industrial digitalization, digital governance, and data valorization. Among these fields, data valorization emphasizes the important function of data as a core production element and is the basic engine which promotes the growth of the digital economy. Although its conceptual definitions and classifications have not yet reached complete standardization, a wide agreement holds that the digital economy's development is the inevitable result of enhancing innovation-driven growth, utilizing information infrastructure, endowing traditional industries with power through digital technologies, and cultivating new business models. This reflects the organic integration of new productive forces and new relations of production.

2.2. Theoretical Foundations

High-quality development is one core demand which China's economic and social progress must

satisfy in the new era. Under the guidance of the doctrines of high-quality development, the digital economy affects the high-quality progression of manufacturing via five key pathways. The concrete theoretical frame is illustrated in Figure 1.

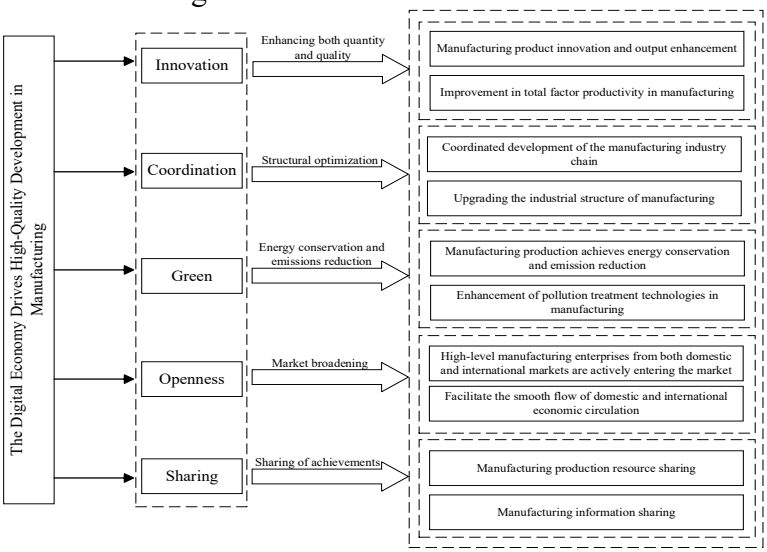

Figure 1 Theoretical Foundations of Digital Economy Driving High-Quality Development in Zhenjiang's Manufacturing Sector

2.2.1. The Digital Economy Drives Innovative Development in the Manufacturing Sector

High-quality development must put innovation-driving growth at the first place, whose core target is to push manufacturing to change from depending on traditional elements to a data-driving transformation. The digital economy unlocks data value and uses information flows to drive the mobility of capital and talent, hence promoting total factor productivity. Meanwhile, digital transformation unleashes technological innovation and reshapes the entire manufacturing process through technologies such as the Industrial Internet and artificial intelligence. This brings fundamental changes to production modes and industrial structures, promotes product creative improvement, and thus increases production output. The instance of Zhenjiang City makes this point clear. Its three-year implementation plan (2022-2024) for the intelligent upgrading and digital transformation of the manufacturing industry establishes goals that have already exceeded national average levels. Specifically, this plan sets the goal that by 2024, the penetration rate of digital R&D design tools will reach nearly 90%, and the numerical control rate of key processes will reach 65%, and the corresponding national average numbers are 79.6% and 62.2% respectively. This can prove its exemplary leadership, thereby injecting robust innovative momentum into the high-quality development of the manufacturing sector.

2.2.2. The Digital Economy Drives Coordinated Development in the Manufacturing Sector

High-quality development requires holistic coordination and balance. The digital economy plays an important role in promoting collaboration across manufacturing supply chains and bridging the gaps between upper-stream and lower-stream industries. By means of technologies such as big data and cloud computing, digital transformation lets manufacturing enterprises realize intelligent production and promote efficiency and quality. Meanwhile, digital technologies can promote transparency and coordination in supply chain management. Through the utilization of information share and real-time data analysis, they are enabled to carry out accurate demand prediction, inventory optimization, and cost reduction. Furthermore, digital flat platforms give enterprises extra market entry passages, thereby promoting tighter cooperation across the entire industrial chain. This gives rise to new business models, including customized production, remote operation and maintenance services. So it pushes the manufacturing sector toward a higher degree of flexibility. On the whole, the digital economy injects new vitality into industrial chains, promotes structural optimization and competitiveness enhancement, and serves as an important pillar which is used for realizing high-

quality development in the manufacturing industry.

2.2.3. The Digital Economy Drives Green Development in the Manufacturing Sector

Green development is a composition part of high-quality manufacturing advancement. However, high energy consumption and emissions are long-lasting problems that hinder this development. The digital economy can not only can promote production efficiency but also can effectively promote energy saving and carbon decreasing in manufacturing industry. During the design phase, the application of artificial intelligence, 3D printing, and digital design platforms optimizes product solutions, shortens R&D cycles, lowers trial-and-error costs, and thereby promotes green development. In the production phase, through utilizing industrial internet and IoT technologies, it is enabled for enterprises that they conduct real-time monitoring of energy consumption, optimize workflows, reduce waste, and promote the efficiency of resource utilization. In conclusion, the digital economy empowers both design and production, thus serving as a key pathway for realizing high-end, intelligent, and green development in the manufacturing industry.

2.2.4. The Digital Economy Drives Open Development in the Manufacturing Sector

High-quality development must adapt to the new development stage, thereby fostering a robust "dual circulation" of the domestic and international economies. Digital technologies can promote the work of government service, thus helping people to construct a business environment which is market-oriented, law-based, and internationalized. Governments may utilize huge data to streamline administrative procedures, refine industrial safety inspection systems, and systematically broaden market access in the manufacturing sector to attract more high-quality enterprises. Zhenjiang has built up strategy cooperation relationships with big technology companies such as Huawei, which deepens the integration of digital technology and the manufacturing industry, thereby accelerating industrial innovation and upgrading. Meanwhile, the digital economy lets enterprises more easily carry out integration into global supply chains and sales networks. By harnessing e-commerce and cloud platforms, they expand markets, realize the global arrangement of products and services, and flexibly respond to changes in international demand, ultimately enhancing their dynamic adaptive capability.

2.2.5. The Digital Economy Drives Shared Development in the Manufacturing Sector

High-quality development requires that its benefits be shared among the people, thereby satisfying their aspirations for a better life. Driven by the digital economy, shared manufacturing is emerging as a key direction for the transformation and upgrading of the manufacturing industry. Shared manufacture platforms put many different interested parties together to help information interact, resources work together, and central arrangement go on, hence they separate "ownership" and "usage rights" of manufacture resources. Enterprises do not any longer need to own resources directly; on the contrary, they purchase usage rights on demand, which greatly lowers R&D and production costs and at the same time activates idle and scattered manufacturing resources. With the deepening application of technologies such as the Industrial Internet, IoT, blockchain, and artificial intelligence, the openness and centralization of manufacturing resources — including raw materials and equipment—within platforms will be further enhanced, thereby driving the manufacturing industry toward a more high-efficiency and inclusive sharing-based development.

3. An Analysis of the Operational Status of Digital Economy and Manufacturing in Zhenjiang City

3.1. Analysis of the Development Level of the Digital Economy in Zhenjiang City

The development of the digital economy of Zhenjiang may be carried out analysis from four dimensions: digital infrastructure construction, digital industry development, digital government management, and data value realization.

In the realm of digital infrastructure construction, as shown in Figure2, the number of internet users in Zhenjiang rose from 432, 200 in 2010 to 1, 823, 800 in 2022, which expresses an increasing

rate of 322%. By the end of 2022, the whole population of Zhenjiang was 2, 668, 600, among which internet users take up 68% of the population. This shows that more than two-thirds of local citizens were on the internet. The year-on-year growth rate remained high from 2014 to 2018, and reached its highest point during this period. From 2018 to 2022, the speed of growth first rose and then fell, eventually turning negative by 2022. This trend indicates that the user base has reached saturation. And it emphasizes the outstanding accomplishments which Zhenjiang has made in the development and popularization of digital infrastructure. Meanwhile, the Zhenjiang government has built 1, 000 new 5G base stations and has arranged 10-gigabit passive optical network devices, for the building of "10-gigabit campuses". These endeavors unceasingly reinforce the network and calculation ability support, therefore laying a solid digital base foundation for the high-quality progress of the manufacturing industry.

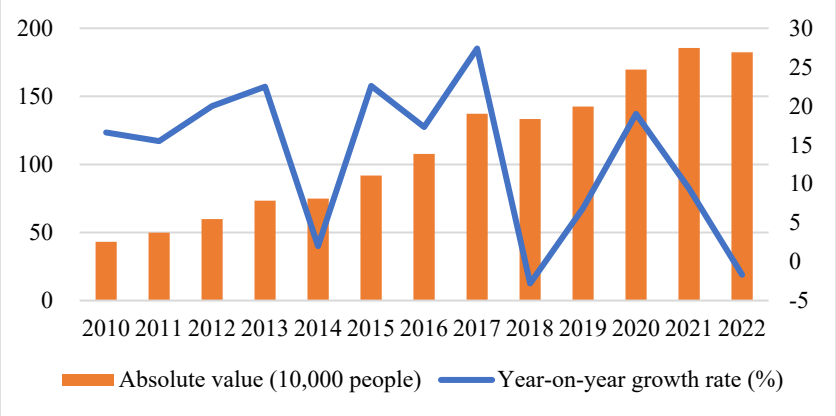

Figure 2: Number of Internet Users in Zhenjiang City

In the realm of digital industry development, the 2024 Key Tasks for Digital Zhenjiang Development outlines the city's plan to reach more than 80 billion yuan of yearly income from core digital economy industries through one year of concentrated work. This contains implementing 200 intelligent upgrading and digital transformation projects and building a total of 150 provincial-level or intelligent manufacturing demonstration factories. In addition, Zhenjiang's postal and telecommunications revenue has presented stable increase in the past years. As shown in Figure3, this revenue increased from 2.54 billion yuan in 2010 to 7.80 billion yuan in 2022. This reflects a notable growth rate which is 207%. From 2010 to 2022, the year-on-year growth rate remained positive, and it has maintained a particularly high level in recent years. This indicates the rapid development of the digital industry. From 2019 to 2021, the year-on-year growth rate even surpassed 10%. Although postal service revenue within the sector decreased due to the pandemic, the overall revenue from telecommunications and postal services still achieved stable increase. This demonstrates the robust economic momentum of Zhenjiang's digital industries.

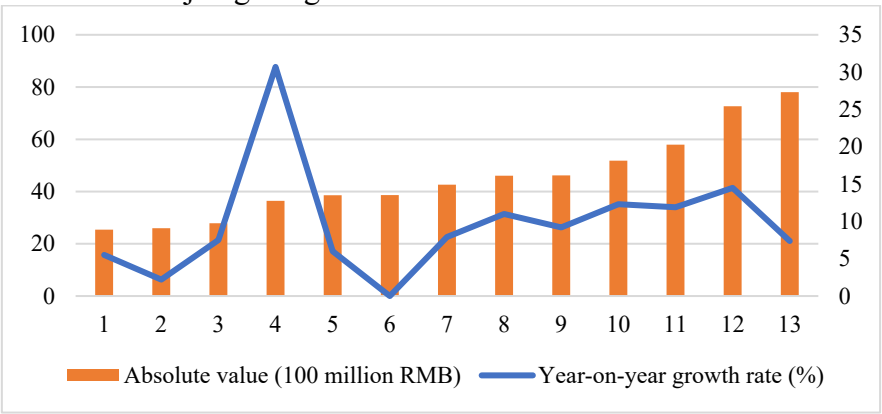

Figure 3: Revenue from Postal and Telecommunications Services in Zhenjiang City

In the realm of digital governance management, Zhenjiang has put into practice a sequence of creative measures to promote government service effectiveness and urban administration levels. First

of all, the city has reinforced the construction of its "One-Stop Government Service Network", through digital methods it integrates all kinds of government service resources. This therefore has caused the all-round digital transformation of government services, thus improving both convenience degree and transparency degree. Second, the city has pushed forward the "One-Stop Service for Enterprises·Zhenjiang Satisfaction" comprehensive service system. This item makes use of digital tools to give directional policy suggestions and provide precisely tailored services, hence giving enterprises personalized support. Besides, Zhenjiang has pushed forward the "SuFu Code" for all people to use and has built a "document-free city". Through the use of electronic certificates and identity verification technologies, the city has reduced the need for paper documents, thereby simplifying administrative procedures. Finally, Zhenjiang has reinforced oversight of data security, carried out a Chief Data Officer management system, cultivated digital talent, and enhanced its abilities in digital innovation and security protection.

In the realm of data value realization, Zhenjiang has established a framework for data resource management through the construction of foundational data systems, thus promoting the high-quality supply and deep usage of data resources. This therefore not only gives convenience to concentrated management and high-efficiency usage of data, but also hence lays a solid foundation for advanced data analysis and application items. Besides, Zhenjiang emphasizes using data to give power to public services and social management, promoting the quality and efficiency of public services by way of digital methods. For example, programs like the "Digital Life Festival" have popularized smart living services, while the construction of smart cities and digital villages utilizes data to promote urban management levels and rural development quality, thereby realizing the value of data in promoting public welfare. Furthermore, Zhenjiang has witnessed rapid growth in the added value of its core digital economy industries, with notable increases in the output of emerging industrial products like like monocrystalline silicon chips and new energy motor vehicles. These development situations directly reflect the worth of data in the progress of industry.

3.2. Analysis of the High-Quality Development Level of Manufacturing in Zhenjiang City

The high-quality progress of Zhenjiang's manufacturing industry is displayed in four key aspects: industrial system construction, green industrial development, technological transformation, and leading position in high-end industries.

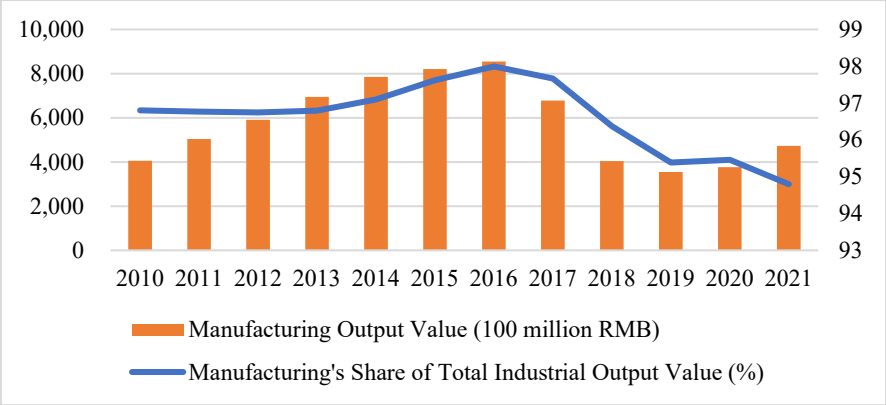

Figure 4: Total Output Value of Manufacturing in Zhenjiang City and Its Share of Total Industrial Output Value

In terms of industrial system construction, as shown in Figure 4, manufacturing has continuously occupied more than 90% of the whole total output value of industry. This point makes clear that the manufacturing industry is the core composition of Zhenjiang's industrial economy, and it occupies a leading position not only in industrial output value but also in the development of the region's economy. From 2010 to 2016, manufacturing output steadily increased. However, an obvious drop took place between 2017 and 2018. This was mainly because the carry-out of 411 air pollution prevention projects in order to satisfy national environmental policies and promote industrial upgrading. Although these methods have good effects on environmental protection, they caused the

temporary closure or restructuring of some highly polluting manufacturing enterprises, thereby directly affecting total output. From 2019 to 2021, manufacturing output has started a slow recovery, this shows that, after navigating the challenges brought by environmental policy adjustments and industrial upgrading, Zhenjiang's manufacturing industry is steadily getting back its growing impetus.

In terms of green industrial development, in order to actively align with the national "Carbon Peaking and Carbon Neutrality" strategy, Zhenjiang has with great effort pushed forward the building of a green manufacturing system, and has committed itself to constructing an industrial ecosystem that is high-efficiency, clean, low-carbon and circular. By 2024, the number of green manufacturing units in Zhenjiang is expected to continue growing. According to the statistical data, the city has already established 20 national-level green factories and 39 provincial-level green factories. Therefore, the total count of green factories at city level and higher has reached 159. This reflects significant progress in advancing corporate green transformation. In addition, the Government of Zhenjiang City has released the "Implementation Plan for Constructing a Green Manufacturing System in Zhenjiang in the 14th Five-Year Plan Period," which sets out specific targets and steps for energy-conservation projects in green manufacturing in the coming five years. This scheme takes the increase of about 40 new city-level green factories and 5 city-level green industrial parks in the 14th Five-Year Plan stage as the goal, thereby further promoting the whole green making ability of this area.

In terms of technological transformation, Zhenjiang has implemented a sequence of active measures to advance technological innovation in manufacturing, aiming to enhance the industry's quality and efficiency through intelligent upgrading and digital transformation. Guided by the Three-Year Implementation Plan for Intelligent Upgrading and Digital Transformation in Manufacturing (2022–2024), the city has taken smart manufacture as the first important task, with great effort pushing the creative usage of industrial internet technologies. By 2024, more than 600 industrial enterprises above designated size had already undergone "intelligent upgrading, digital transformation, and network integration". Through the introduction of automated production lines, IoT, and big data technologies, these enterprises have effectively improved manufacturing efficiency, product quality, and market competitiveness. Concurrently, Zhenjiang place the key point on constructing a number of big industry groups, which include high-end equipment make, new material, and new energy automobile. The projects inside these industry fields take up almost 90% of this city's key manufacturing plans, and they are made in order to build industry groups that own core competitive ability.

In terms of leading position in high-end industries, Zhenjiang has made remarkable progress in advancing its manufacturing industry, with high-end equipment manufacturing becoming a key driver of local industrial development. In 2023, enterprises above designated size within Zhenjiang's high-end equipment manufacturing cluster generated 175.62 billion yuan in sales. This represents a year-on-year increase of 22.7%—outpacing the city's overall industrial growth by 14.8 percentage points. This achievement not only proves Zhenjiang's solid ability in facing the impact of economic decline but also shows that the high-end equipment manufacturing industry occupies an extremely important place in the local economy's growth. For further pushing the progress of this field, Zhenjiang has established a sales target that exceeds 240 billion yuan for its high-end equipment manufacturing industry in 2024.And this shows that the importance of this industry in the economy is increasing. Concurrently, the sales contribution from high-end equipment manufacturing to the "Four Clusters and Eight Chains" (i. e., four industrial clusters and eight core industrial chains) is projected to increase by over one percentage point, thus it emphasized key function in the progress of industry.

4. Analysis of Issues in Promoting High-Quality Development of Zhenjiang's Manufacturing Sector Through the Digital Economy

4.1. Uneven Development of the Digital Economy

Although Zhenjiang has got notable advancement in its digital economy and manufacturing transformation, it still faces long-lasting unbalances among all its sectors. Breakthroughs on the side

of technological innovation are now taking place in high-end equipment manufacturing, new materials, and new energy vehicles, whereas traditional fields such as textiles, chemicals, and machinery processing are encountering problems that include insufficient resource distribution, backward technology promotion, and a lack of talented persons. Small and medium-sized enterprises (SMEs) within these sectors find the high costs of transformation prohibitive due to severe constraints in capital, technology, and talent. Conversely, large enterprises leverage their scale and resource advantages to secure support more easily, thereby exacerbating the unbalanced industrial landscape. This structural contradiction has trapped traditional manufacturing in a dilemma of being "unwilling, afraid, and unable to transform", ultimately hindering the overall high-quality development of the manufacturing sector.

4.2. Industrial Support Capacity Needs to Be Strengthened

In 2023, Zhenjiang recorded a regional GDP of 526.40billion yuan, to which the secondary industry contributed a value-added of 250.73 billion yuan, representing a growth rate of 6%. The secondary industry accounted for 47.60% of the total GDP. Further deeper analysis makes clear that, in 2022, the number of industrial enterprises above designated size reached 2, 534, among which 1, 791 were heavy industrial enterprises, accounting for 70.7% of the total. The total assets of industrial enterprises above designated size reached 666.35 billion yuan, with heavy industry assets totaling 488.66 billion yuan, or 73.30% of total assets. Although specific heavy industry data for 2023 is not yet available, the sector's 7.20% growth rate indicates that heavy industry maintains its leading position within the secondary sector. This comparatively high ratio shows that the industrial structure has not got balance, hence people excessively rely on traditional category industries. Overly intense industry readjustment may duplicate the manufacturing production drop that was undergone from 2017 to 2018, which is caused by environment policy changes.

4.3. Data Utilization and Protection Require Improvement

Zhenjiang has obtained obvious achievement in constructing basic data systems, thus providing firm legal and technical guarantee for data gathering, preservation, handling, and utilization. However, challenges still exist in the deeper-level development and usage of data, particularly when exploring how to better use data for raising the level of public services and social governance. Along with the accelerating progress of digitalization, the guarantee of data security and the guard of personal information becomes a more and more significant problem. Although Zhenjiang has proposed enhancing internet data security supervision, implementing a Chief Data Officer (CDO) system, and training digital talented people, detailed information regarding specific supervisory measures, their effectiveness, and their impact on enterprises remains insufficient. Especially, effective data management and the prevention of leaks are crucial to operationalizing the CDO system. Improper handling of data security issues can compromise corporate reputation and business operations. It will restrict the potential of digital economy for pushing forward the progress of manufacturing industry.

4.4. The Actual Results of Digital Transformation Fell Short of Expectations

In the middle of many kinds of challenges, which include the tendency of deglobalization and the COVID-19 pandemic, many manufacturing business units regard digital transformation as one effective solution. Governments generally have pushed this change through administrative mandates and policy incentives, leading to a certain degree to a superficial understanding of digital transformation and a blind pursuit of digital applications. On the one hand, enterprises hurry into transformation when they have not completely thought over their own actual situations, pushed by policy pressures or the chasing for policy benefits. This "compelled" approach frequently yields minimal results and may may even make enterprises feel overburdened, thereby pushing them towards a crisis. On the other hand, enterprises frequently establish excessively ambitious objectives in the process of digital transformation, this leads to prolonged implementation cycles, increased costs, and elevated error rates, ultimately weakening the efficacy of their efforts. To correct this "putting the cart before the horse" approach in digital transformation, enterprises must recognize that digitalization is not the ultimate goal but a means to an end, with the true objective being operational

sustainability.

5. Policy Recommendations for Promoting High-Quality Development of Zhenjiang's Manufacturing Sector Through the Digital Economy

5.1. Promote the Optimization and Upgrading of the Industrial Structure

Zhenjiang City ought to use the digital economy as its core pushing force to push forward industrial structure adjustment and narrow the gap between traditional and emerging industries. First, the city should hold the chances of the digital era. It is imperative to prioritize the commercialization of scientific research results by removing barriers to technology transfer, thereby strengthening the development and application of digital technologies in strategic emerging industries. Second, the integration of digital technologies with traditional manufacturing ought to be strengthened to cultivate innovative business models. The key work emphases include advancing data assetization and the market-oriented operation of data resources to promote industrial upgrading. In addition, targeted support for SMEs—such as subsidies, tax incentives, and skills training—is essential to reduce the costs of digital transformation. Thirdly, the governmental organ ought to promote the building of cooperative relations between large-scale enterprises and SMEs. By means of mechanisms such as technology sharing and resource coordination, the city has the goal to narrow the digital gap between enterprises with different scales, and hence help them get over resource and technique obstacles on the road of digital transformation.

5.2. Establish a Unified and Open Market for Data Elements

Zhenjiang should establish a unified and open data element market to optimize data utilization. On the one hand, the government should facilitate cooperation between enterprises to advance data classification and hierarchical management, collaboratively explore data circulation frameworks like the building of data space, and urge enterprises to reinforce value management in the whole data life cycle, thereby promoting seamless information interconnection. On the other hand, it is essential to accelerate the development of the data market, optimize the supply of data resources, and build a unified data-sharing platform. This work includes pushing forward data sharing among government platforms and all kinds of fields to start up data supply, making an overall catalog of data resources, and building robust data sharing platforms. Through training and external expertise, enterprises—particularly SMEs—should strengthen their data management abilities to guarantee both effective use and safety. While constructing a unified and open market for data elements, it is also very important to make clear the rules of data use and reinforce the supervision of data security, therefore to guarantee the reasonable protection of personal information and business secrets.

5.3. Enhance the Level of Government Digital Governance Services

To enable the digital economy to continuously empower the high-quality development of the manufacturing industry, Zhenjiang should enhance its government's digital governance services. Government agencies must develop a sophisticated understanding of the digital economy. While advancing intelligent upgrading and digital transformation, the government should not only focus on development targets but also refine the legal and regulatory framework, adjust organizational structures, and innovate governance concepts, so as to realize the coordinated development of technological application and institutional innovation. Meanwhile, a people-centered approach should be upheld to foster a compassionate digital governance environment. The government should prioritize the needs of practitioners and continuously leverage the advantages of digital technology, thereby enhancing efficiency while demonstrating humanistic care. Furthermore, cross-department collaboration must be strengthened to construct a unified policy talking system. Custom-made policy explanations ought to be made for the manufacturing industry's special features, thus guaranteeing consistent and effective policy spreading-out. This will provide sturdy institutional guard measures and environment guarantee for the transformation and promotion of manufacturing industry.

5.4. Enhance the Supply of Digital Transformation Services

Digital transformation is a means, not the ultimate goal. From the perspective of the government, to enhance service provision for manufacturing enterprises undergoing digital transformation, its role should be “facilitating” rather than “mandatory”. It is necessary to be established communication channels between enterprises and government, collect feedback and proposals during the transformation process, and step by step guide enterprises that they make clear their roads toward intelligent promotion and digital transformation. Meanwhile, the government should strengthen financial support, leverage fiscal special funds, and ensure the effective implementation of assistance policies. Enterprises, based on their actual conditions, should escape the blind chase for scale and overall completeness. They may build transformation evaluation systems to push innovation in management, products and business models, and therefore dynamically adjust strategy goals. In addition, they should strengthen the innovative application of digital technologies, construct open innovation platforms and user-interactive platforms, and improve real-time connectivity between enterprises and users. This lets the effective combination of user resources be realized, and hence obtains the continuous digital transformation.

6. Conclusion

This paper investigates the role of the digital economy in driving the high-quality development of Zhenjiang’s manufacturing industry, focusing on specific pathways and empirical outcomes regarding industrial innovation, coordination, green development, openness, and sharing. The research results indicate that the rapid development of the digital economy has created unprecedented opportunities for transformation within the sector. Through digital transformation, the manufacturing industry has achieved notable improvements in production efficiency, resource allocation, innovation capabilities, and green development. However, challenges persist, including the uneven development of the digital economy, insufficient industrial support, issues in data utilization and security, and transformation outcomes that fall short of expectations. These bottlenecks continue to hinder the high-quality advancement of the sector.

To address these challenges, this paper proposes the following measures: First, the government should facilitate the optimization and upgrading of the industrial structure. Emphasis must be placed on enhancing the application of digital technologies in traditional manufacturing and bridging the digital divide between enterprises of varying sizes. Second, relevant authorities need to establish a unified and open market for data elements. Priority should be given to improving the efficiency of data utilization and the security of data assets. Third, government agencies should enhance the quality of digital governance services, aiming to foster an inclusive and citizen-centric digital governance environment. Finally, policymakers must improve the provision of digital transformation services. Specifically, they are advised to guide enterprises in rationally planning their transformation pathways, strengthen financial and technical support, and effectively improve the performance of digital transformation.

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