Research on the Mechanism and Path of Digital Economy Enabling the High-quality Development of Manufacturing Industry

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Abstract

Under the penetration of information technology development, digital economy has gradually become a new driving force to promote the high-quality development of manufacturing industry. On the digital economy on the development of manufacturing high quality basic logic, theory connotation, on the basis of further discusses the development of the digital economy can assign the intrinsic mechanism of manufacturing quality, it is concluded that the digital economy can realize the supply side structural reform precision matching, fu can data sharing to realize economic benefit multiplier effect, assigned to the core technology level to achieve total factor productivity, fu can the development model change to realize sustainable economic development, etc. However, due to the construction of digital infrastructure of manufacturing industry, professional digital talents, the gap in enabling areas, the utilization rate of digital technology and the imperfect data protection system, it is difficult to bring the advantages of its role mechanism to play. Therefore, in order to realize the high-quality development of digital economy, it is necessary to focus on the improvement of digital infrastructure of manufacturing industry, actively cultivate digital talents, narrow the regional digital divide, promote the application of digital technology in manufacturing industry, and strengthen the support and protection of laws and regulations for digital manufacturing industry.

Keywords

Digital economy; Manufacturing; High-quality development; Realization path.

1. Introduction

Digital economy is a new economic form that is different from agricultural and industrial economic forms and realizes the integrated development of various industries with the help of the sharing of data resources, prompting resource elements to break the constraints of time and space and realize free flow. Digital economy is the trend of future development. General Secretary Xi Jinping has stressed for many times that we should take data as the key factor to build the digital economy, adhere to the main line of supply-side structural reform, and accelerate the transformation of new drivers of economic development. With the rapid development of digital economy in recent years, the boundary scope of factors has expanded, data has become a new factor of production function, and production factors such as resources, labor and capital jointly on the production and development of manufacturing industry [1], Raised the level of contribution to the economy. The party's 20th annual report clearly stated: "We will carry out industrial infrastructure reengineering projects and major technical and equipment research projects, support the development of specialized, special and new enterprises, and promote the development of high-end, intelligent and green manufacturing industries." This is not only an important part of deepening supply-side structural reform to

achieve high-quality economic development, but also an objective requirement for building a great modern socialist country in an all-round way. Therefore, it is of great significance to study the digital economy enabling manufacturing industry to achieve high-quality development.

2. Literature Review

The research of scholars at home and abroad on how the digital economy affects the development of the manufacturing industry mainly focuses on three levels. The first level is that the digital economy has become a new driving force for the development of the manufacturing industry, promoting the transformation and upgrading of the manufacturing industry. Qi Yudong believes that the digital economy takes digital technology as the key support, and carries out an all-round, all-angle and whole-chain digital transformation of traditional industries [2], promote the reform of industrial structure and the structural improvement of productivity through the diffusion, spillover and permeability effect [3]. Domestic and foreign scholars also used different panel data for empirical analysis, and concluded that the development and application of the digital economy does have an obvious positive role in promoting the transformation and upgrading of the manufacturing industry. The second level is to optimize the allocation of resources, reduce the mismatch of resource elements, and improve the total factor productivity of manufacturing. Yu Wentao confirmed that the digital economy will affect the input proportion of production factors, which can reduce the mismatch of factors and improve the efficiency of factor allocation [4]. The third level is that the digital economy can save money on manufacturing production costs. And Jones C. I. and Tonetti C. believed that due to the non-competitive characteristics of digital information, the value will not weaken or disappear after use, but will realize the value appreciation of digital information itself [5]. Through the analysis of big data, resource allocation is optimized, organizational efficiency can be improved, and the input cost will be greatly reduced, so as to increase economic benefits [6]. The existing literature at home and abroad explores how the digital economy affects the development of the manufacturing industry, and promotes the research on the high-quality development of the digital economy enabling manufacturing industry in terms of basic logic and theoretical connotation. However, with the continuous development of emerging information and communication technology, the digital economy continues to extend to the manufacturing industry, and the internal mechanism of the digital economy enabling the high-quality development of the manufacturing industry is not yet clear. Accordingly, this paper deeply analyzes the internal mechanism of digital economy enabling the high-quality development of manufacturing industry, in order to clarify the logical relationship between the two. On this basis, the paper discusses the shortcomings of the high-quality development of the digital economy enabling manufacturing industry, and puts forward the realization path of the high-quality development of the digital economy enabling manufacturing industry, so as to promote the high-quality development of the manufacturing industry.

3. The Internal Mechanism of the Digital Economy to Enable the High-quality Development of the Manufacturing Industry

With big data, block chain, 5G represented by a new generation of information and communication technology to speed up the penetration of manufacturing, digital economy and manufacturing development has a strong fit, the plight of the traditional manufacturing development process in the original development mode is difficult to break through, and use the digital economy can break the development bottleneck, assign new development model of traditional manufacturing, improve the use efficiency of elements, reduce the production and operation costs, realize the improvement of economic benefit and product quality, digital economy to accelerate the development of high quality. The internal mechanism of digital

economy enabling the high-quality development of manufacturing industry is shown in Figure 1.
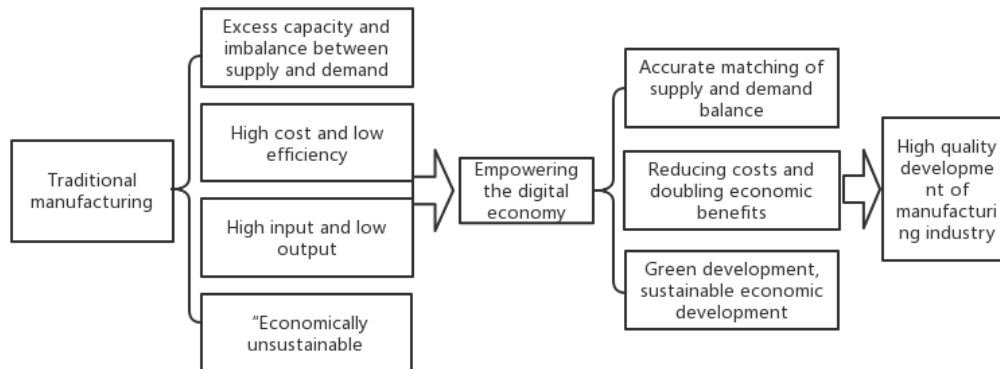
Figure 1. The internal mechanism of digital economy enabling the high-quality development of manufacturing industry

3.1. The digital economy enables supply-side structural reform to achieve precise matching between supply and demand

The emergence of the digital economy to implement the supply side structural reform policy, digital economy with the advantages of its digital, networked, intelligent, using big data, improve the manufacturing information in the process of production capture ability, accurate production data, accurately grasp the manufacturing demand for a certain product, so as to produce matching products. Through the precise grasp of the demand of manufacturing products, the digital economy promotes the "precise" production of the manufacturing industry and makes full use of production factors to produce the products needed by the society. If it is blindly produced, it will not only cause the waste of factors, but also unsalable finished products, and eventually fall into the dilemma of overcapacity. To promote the high-quality development of manufacturing industry is to optimize the allocation of resources through the supply-side structural reform of digital economy, promote the transformation and upgrading of industrial structure, reasonably adjust the industrial layout, change the imbalance between supply and demand of traditional manufacturing industry, and finally achieve the precise matching of supply and demand.

3.2. The digital economy enables core technologies to achieve the improvement of total factor productivity

China's industrialization started late and the technological level developed slowly. In the early stage, developed countries used the demographic dividend to obtain cheap labor force and transferred some products to China for processing and manufacturing. However, this processing and manufacturing method could only get a small amount of processing profits, and most of the product profits were seized by developed countries. Want to change this situation, will promote made in China to China, China speed to China quality, manufacturing power to manufacturing power, need to improve the traditional manufacturing core technology ability, master the core technology of the product, so not only can compete with other countries, also can get high technology content of the value of value. Digital economy also breaks the limitation of factors in time and space, promotes the free flow of factors, realizes the reallocation of resource elements, and makes the factors flow from the inefficient production sector to the efficient production sector. Because digital economy is highly dependent on information

technology level, and total factor productivity and technology level is also closely related, there is also a link between digital economy and total factor productivity [7]. With the continuous development of economy and society and the continuous improvement of technical level, the total factor productivity also generally rises. The empowerment of the digital economy not only improves the utilization rate of factors, but also increases the contribution of total factors to economic growth.

3.3. Changing the enabling development model of the digital economy to achieve sustainable economic development

At present, China is still the largest emission of carbon dioxide, sulfur dioxide and nitrogen oxides in the world. The traditional manufacturing industry is a development model of extensive, resource consumption and environmental pollution with high input, high energy consumption and environmental pollution. The extensive development mode of the traditional manufacturing industry speeds up the consumption of resources and increases the unreasonable utilization of resources, which is not conducive to the long-term sustainable development of the industry by relying on resources. The production development mode of the manufacturing industry can improve the utilization rate of resource factors, promote the recycling of factors, take the digital economy as the basis, scientifically, reasonably and accurately calculate the factor input of manufacturing products in the production process, reduce the dependence on resources, and promote the sustainable development strategy of the manufacturing industry. Foshan manufacturing enterprises, represented by Midea Group and Mona Lisa Tiles, pay more attention to environmental interests while seeking profit. By using emerging digital economic means such as the Internet of Things and artificial intelligence, they build intelligent and advanced factories to realize green and clean production and reduce resource consumption. To realize the high-quality development of manufacturing industry, it is necessary to accelerate the establishment of resource-saving and environment-friendly industrial model, improve the efficiency of resource utilization, coordinate the relationship between economic benefits and environmental benefits, and realize the "low-carbon revolution" of high efficiency and low emission, which is also the embodiment of the green concept in the new development concept. The transformation of the enabling development model of the digital economy will also contribute to the early realization of the "two-carbon" goal.

4. The Digital Economy Enables the High-quality Development of the Manufacturing Industry

Digital economy can enhance the internal driving force of high-quality development, give birth to new business forms, new models and new patterns of the manufacturing industry, and bring more opportunities for the development of the manufacturing industry [8]. The development of digital economy provides a better platform for promoting the high-quality development of the manufacturing industry. However, in the process of enabling the manufacturing industry, there are also problems such as weak digital infrastructure, lack of professional talents, large digital empowerment gap between regions, low utilization rate of digital economy technology, and imperfect data property rights protection system.

4.1. Manufacturing digital infrastructure construction is weak

Digital infrastructure is the core of the new infrastructure, which can provide basic support for industrial digital transformation and upgrading. The construction of digital infrastructure is of great significance to the high-quality development of the manufacturing industry in the digital economy. The high-quality development of the manufacturing industry is based on digital infrastructure, giving new drivers to the high-quality development of the manufacturing

industry, giving play to the radiating and driving role of the digital economy, and radiating the vitality of the traditional manufacturing industry. However, in the process of promoting the high-quality development of the manufacturing industry, China has the characteristics of weak digital infrastructure construction. The weak digital infrastructure fails to provide a good platform for manufacturing enterprises to explore the value of digital resources, thus not fully highlighting the value of digital technology; the imperfection of digital infrastructure leads to the formation of the development model relying on digital economy, which restricts the process of high-quality development of digital economy.

4.2. Lack of digital professionals in the manufacturing industry

Talent is the core and foundation of the high-quality development of the manufacturing industry enabled by the digital economy. Human resources are placed in the primary place of the high-quality development of the manufacturing industry. Only by attracting excellent talents can the manufacturing industry see hope and realize the transformation of China's manufacturing industry from a "manufacturing power" to a "manufacturing power". On the one hand, China's manufacturing talent team is mainly low-professional personnel, and the proportion of high-level professional personnel is relatively low. Although China's manufacturing industry is in continuous development, represented by big data, chain blocks, 5G emerging information communication technology is also in progress, but the manufacturing technology personnel training system did not keep up with, support the digital economy can assign professional and technical personnel gap, performance for manufacturing workers lack of digital thinking, unaware of digital economy can promote the transformation and upgrading of manufacturing, and manufacturing workers lack knowledge of digital economy, how to use the digital economy to the manufacturing production process, inhibit the release of the digital dividend effect. On the other hand, although the professional talent training system of manufacturing enterprises is backward, they have cultivated certain digital talents in the social environment. However, the results of a survey of 100 enterprises by People's Daily show [9]. The manufacturing industry is facing the "three no" dilemma, that is, "can not find, can not recruit, can not stay". Visible even if digital economy accelerated, the lack of professional talents as an engine hindered the understanding of the role of digital economy, difficult to digital economy as a new kinetic energy applied to practice, also can't be digital technology and manufacturing fully fusion, inhibit the digital economy "1 + 1 > 2" role, which influence the effect of the development of digital fu manufacturing quality.

4.3. There is a large digital empowerment gap between manufacturing regions

Due to the differences in China's economic development level among regions, the scale of digital economy construction is also different among regions, leading to the effect of digital economy on the high quality of manufacturing empowerment between regions. Guangdong, Jiangsu, Zhejiang, Beijing, Shandong, Shanghai, Fujian, Hubei, Hunan and Anhui became the top 10 provinces in terms of high-quality manufacturing development in 2019, with seven of these provinces in the eastern region and three in the central region. Compared with the top 10 provinces in high-quality manufacturing development in 2015, three central provinces, namely Hubei, Hunan and Anhui, were added in 2019. It can be seen from the relevant data that most regions with high level of economic development also have high digital economy development index, while the development level of manufacturing industry in regions with high digital economy development index is also high, indicating that the development level of regional manufacturing industry is strongly related to the regional economic development level and the development of digital economy [10]. After years of continuous development and improvement of the manufacturing industry, the gap between regions in the infrastructure relying on the traditional manufacturing industry has decreased, and the regional gap in promoting the development of the manufacturing industry is also decreasing. But with the development of a

new generation of communication technology such as 5G, the eastern coastal areas with strong economic foundation, technical personnel quantity advantage, digital infrastructure construction is relatively perfect, can make full use of the digital economy can promote the development of the regional manufacturing quality, and the western region in various aspects, digital economy development ability is not strong, difficult to play to the role of the development of manufacturing quality, cause the regional digital divide, prompting digital economy can assign manufacturing quality development on the region of the weak.

4.4. Low utilization rate of digital economy and technology in the manufacturing industry

The digital economy optimizes and integrates resources through big data, builds digital production, operation and management systems, stimulates the vitality of the traditional manufacturing industry, and accelerates the transformation of new growth drivers [11]. With big data, block chain, 5G represented by a new generation of information communication technology rapid development, influenced by the traditional manufacturing production ideas, manufacturing enterprises bring low awareness of the advantages of digital technology, low utilization rate of digital economy technology, still stay in the original production "comfort zone", digital economy dividend is not all. In the digital economy can assign manufacturing in the process of high quality development, the ideas, knowledge reserve, policy incentives, the influence of infrastructure construction, manufacturing digital technology utilization is low, the low level of digital economy technology utilization not only cause the waste of technology, also can not dig deeper into data product added value, improve the quality of products, create more economic benefits, at the same time with the developed countries due to the digital technology utilization of the digital divide. Manufacturing enterprises also lack the subjective initiative and enthusiasm to use the digital economy to promote the high-quality development of the industry, resulting in the slow process of high-quality development of the manufacturing industry.

4.5. The manufacturing industry data property rights protection system is not perfect

At present, the rapid development of digital economy makes data sharing a reality, and data has gradually become public goods. Public goods have obvious non-exclusive and non-competitive characteristics, which is easy to lead to the problem of "free riding". From the national level, one is the digital economy gradually developed in recent years, the lack of data property rights related laws, regulations and systems, such as block chain technology governance rules, data transmission and access principles and moral problems need to be clear from the legal level, the absence of data property rights protection system makes some organic enterprise exploit legal loopholes, cause economic losses to other enterprises. Second, a standardized system has not yet been established for data collection, review and utilization, providing a "hotbed" for the improper use and illegal disclosure of data. Lack of data protection of property rights system, data for zero cost "free ride" phenomenon will appear, data value can not get due protection, manufacturing enterprises will not choose to use digital economy, data premium effect is suppressed, thus make the role of the digital economy can assign to play, eventually manufacturing high quality development is difficult to achieve.

5. The Digital Economy Enables the Realization Path of the High-quality Development of the Manufacturing Industry

Digital economy fu can to realize the effective cycle of manufacturing production factors, practice of "binary" new development pattern, but the digital economy in the process of manufacturing problems can also need to improve, from the solid digital infrastructure construction, digital talent training, narrow the digital divide between regions, improve the

efficiency of digital technology and improve the data protection system of five dimensions to get rid of obstacles, to give full play to the digital can assign, truly realize manufacturing high quality development.

5.1. Consolidate the construction of digital infrastructure for the manufacturing industry

Now is the era of digital economy, under the background of globalization, seize the opportunity of manufacturing digital economy to achieve the commanding heights of the manufacturing development, and digital infrastructure construction is the foundation of the digital economy development and prerequisite, is also a digital economy can assign high quality important platform of manufacturing development, to realize the digital economy can assign manufacturing high quality development provides an important guarantee. Accordingly, in order to solve the problem of weak manufacturing digital infrastructure construction, first of all, need relevant departments of digital manufacturing policy, encourage and guide the social capital investment manufacturing digital infrastructure construction, establish perfect infrastructure system, improve the efficiency of manufacturing production, speed up the process of digital manufacturing. Secondly, the infrastructure of the traditional manufacturing industry will be transformed and upgraded. Due to the frequent changes of information and communication technology, the digital infrastructure should also be continuously developed and improved to conform to the development trend of the digital economy era. Solid digital infrastructure construction, is conducive to promote the free flow of production factors, accelerate the optimization and upgrading of manufacturing industrial structure, realize the accurate matching of product supply and demand, promote the original only pay attention to the "quantity" of manufacturing to high quality manufacturing, also conforms to China's economy from high speed development stage to high quality development stage of national conditions.

5.2. Strengthen the training of digital talents in the manufacturing industry to promote the manufacturing industry

High-quality development is inseparable from the cultivation of digital talents. The cultivation of digital talents is the internal driving force for the transformation, optimization and upgrading of the manufacturing industry structure, and also the top priority of high-quality development. Strengthening the training of professionals in the digital economy will help apply the digital economy to the manufacturing industry, give new drivers to the development of the manufacturing industry, activate the development of the manufacturing industry, unleash the potential of the digital economy, and promote the manufacturing industry toward the goal of high-quality development. From the national level, the government should adhere to the talent development strategy, with the demand of advanced manufacturing vane, attaches great importance to the enterprise required high level and high quality talent training, increase the education institutions and scientific research institutions of professional digital talent training funding, at the same time, also want to create a good environment for talent development, for Chinese manufacturing future quality development reserves enough human capital, for "made in China" into "created in China". From the enterprise level, strengthening the training of professional digital talents can start from two aspects. Firstly, the manufacturing workers should be trained in the industry to improve the systematic understanding of the digital economy, enhance the practice ability of the application of digital economy in the high-quality development of the manufacturing industry; secondly, the manufacturing enterprises should implement the talent introduction policy, improve the welfare level, show the future development prospect, attract more outstanding talents to join the manufacturing industry and input professional human capital for the manufacturing industry. In general, to achieve the

high-quality development of digital economy enabling manufacturing industry is to adhere to the development strategy of "digital economy + talent".

5.3. Narrowing the digital divide between the regions

The digital divide is largely due to the large gap in the level of economic development between regions. The level of economic development affects the amount of available funds, which also affects the degree of digital investment of manufacturing enterprises. To narrow the widening digital divide between regions is to narrow the economic development gap between regions and balance the level of economic development. From the national level, firstly optimize the policy environment for the development of manufacturing enterprises, the government policy should be inclined to the underdeveloped areas, provide financial support and preferential policy support; secondly, strengthen the coverage of digital infrastructure construction and reverse the shortage of digital infrastructure construction; finally, the government should also play a role in software, such as the government sends professional personnel to guide manufacturing enterprises in the underdeveloped areas, strengthen the digital awareness of enterprises, improve the digital knowledge literacy, and fully understand the long-term role of digital economy in the high-quality development of manufacturing industry. From the enterprise level, the eastern, central and western regions need coordinated efforts. On the one hand, manufacturing enterprises in eastern region should continue to strengthen the leading role of digital economy leading the high-quality development of manufacturing industry, comprehensively develop digital economy and play the radiation diffusion role; secondly, manufacturing enterprises in central China and western regions should play the role of digital economy in promoting the transformation and upgrading of manufacturing industrial structure, improve the digitalization, networking and intelligent level, accelerate the pace of digital advancement and bridge the digital divide with developed regions.

5.4. Improve the utilization efficiency of digital technology

At present, China's economy has reached a critical stage of industrial transformation and upgrading. Manufacturing enterprises should assess the situation, seize the opportunity, actively absorb and draw lessons from the innovative achievements of emerging digital technologies, and accelerate the pace of digital transformation ［12］. Through the digital embedded manufacturing production process, and with the help of "Internet +" and other advanced information and communication technology, promote manufacturing each link of digital, digital manufacturing upstream and downstream enterprises, digital dividends, full release the advantages of digital platform for digital economy can assign manufacturing high quality development. In order to solve the problem of low utilization rate of digital technology, the government can also learn from the experience of developed countries and encourage manufacturing enterprises to improve the utilization efficiency of the digital economy. Promote the development of manufacturing quality not only need to use the digital advantage, speed up the pace of digital society construction, create a good digital development environment, fit the goal of digital China, but also depends on the national digital economy development strategy, from the national level to establish digital economy can assign the top design of high quality manufacturing development, overall government, market, manufacturing and manufacturing related enterprises, digital economy can manufacturing development of high quality.

5.5. Improve the legal system for data protection

Data has gradually become the core element to promote the development of the digital economy era. However, at the present stage, a complete legal system has not been formed, and it is still in the exploratory stage. Only a perfect data protection system can provide legal guarantee for manufacturing enterprises to use the digital economy, which requires the country to do something. The state should not only intervene in the data theft behavior, but also

gradually establish a comprehensive data security protection system. The national legal department can draw lessons from the successful experience of foreign data protection, for example, the President of the United States issued the small enterprise data security protection law, enterprises relying on the national standards and technology research institute of standards and technical advantages to deal with data attack ability, and requires federal standards and technology research institute for free network security defense standards and tools, protect enterprises from network attacks, the Chinese government should also speed up the enterprise data protection legal system, for the enterprise through legal way to solve the problem. Can also draw lessons from other domestic complete laws and regulations for corresponding processing, the behavior of related manufacturing enterprises embezzle data punishment, curb market competition behavior, avoid improper means to disrupt the normal market order, using legalization means to protect the legitimate rights and interests of manufacturing enterprises, encourage enterprises to use the advantage of digital economy brings confidence, create a good environment for the development of digital economy manufacturing industry.

Acknowledgments

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