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The Impact of the Digital Economy on the Manufacturing Industry

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Abstract: As an emerging industry, the digital economy has had an increasingly significant impact on the three major industries. Starting with the influence of digital economy on the secondary industry, this paper analyzes the influence of digital economy on the transformation of traditional industries and the power of digital economy on emerging industries. Digital economy is of great significance to the transformation of traditional industries. Through the application of digital technology, traditional industries can realize the upgrading of production, operation and management. Second, the digital economy can help emerging industries. The development of the digital economy is closely related to the development of emerging industries. The application of digital technology has enabled emerging industries to grow rapidly, while also laying a solid foundation for their future development.

Keywords: Digital economy, secondary industry, traditional industry, emerging industry.

1. Introduction

1.1. Industrial Internet applications

Industrial Internet is based on Internet technology, industrial application scenarios oriented, the construction of industrial ecology. It digitizes industrial infrastructure, production systems, products and services, industrial chain innovation, geographic information and other aspects of information, establishes various kinds of Internet of Things connections, and realizes data collection, storage, processing and analysis. Industrial Internet application plays an important role in the industrial upgrading and intelligent manufacturing promotion of the secondary industry. Industrial Internet applications mainly have the following aspects: First, industrial Internet applications can digitize the production process. Through the Internet of Things technology, data can be collected from each link on the production line, and the data can be transmitted to the cloud for processing and analysis, so as to obtain key production indicators, such as equipment operation status, production efficiency, etc. , which can help enterprises realize digital management of the production process. Second, industrial Internet applications can improve productivity and efficiency. Through key data analysis and prediction, enterprises can optimize and adjust to improve manufacturing efficiency. Industrial Internet applications can also realize the whole process of supervision and control, reduce human intervention, and improve manufacturing accuracy and consistency. Thirdly, the industrial Internet application can realize the intelligence of the equipment. Through the Internet of Things technology, devices can exchange information with each other to achieve independent collaboration. Such devices can better adapt to different production environments, and improve production efficiency and quality. We will guide the industry to improve its capacity for key network technologies, innovate and application, and supply resources[1]. Finally, the industrial Internet application can realize the innovation of the business model. In combination with Internet technology, enterprises can realize the integration of online and offline businesses, and such an innovative model can drive the upgrading of the whole industrial chain of the manufacturing industry.

1.2. Promotion of intelligent manufacturing

The advent of the digital economy era has accelerated the transformation and upgrading of the industrial sector. Intelligent manufacturing is one of the important development directions in the era of digital economy, and it is also the only way to realize industrial upgrading, enhance the competitiveness of enterprises and accelerate the healthy development of manufacturing industry. The essence of intelligent manufacturing is to organically integrate information technology and production technology, and realize a high degree of automation and intelligent manufacturing process, so as to improve production efficiency, improve product quality and reduce costs. Intelligent manufacturing is a new development mode of manufacturing industry in the digital era. It is a new manufacturing mode innovated by digital technology and Internet technology, which is characterized by high automation and intelligence[2]. It mainly uses the Internet of Things, artificial intelligence, cloud computing, big data and other technical means to achieve the intelligent upgrading of equipment, products, processes, services and other aspects.

2. The Digital Economy and The Secondary Industry

2.1. Application of intelligent manufacturing

Intelligent manufacturing has a wide range of applications, mainly focusing on design, manufacturing, management, service and other aspects. Intelligent manufacturing has begun to be used in various fields. (1)Automobile manufacturing: Intelligent vehicle manufacturing is an important application field of intelligent manufacturing. Using intelligent technology to optimize automobile manufacturing, improve automobile standardization and large-scale production, and also strengthen the management and service support for the whole life cycle of automobile. (2)

Construction machinery manufacturing: Construction machinery is one of the important application fields of intelligent manufacturing. Through intelligent technology, the remote control and detection management of construction machinery can be realized, which greatly improves the safety and reliability. (3) Electronic manufacturing: Electronic manufacturing is an important manufacturing field in the era of digital economy. The use of intelligent technology can realize the digital standardization of electronic manufacturing chain and improve product quality and production efficiency.

2.2. Development opportunities for intelligent manufacturing

Intelligent manufacturing is a new development mode of manufacturing industry in the era of digital economy, and it is also the only way to realize the transformation and upgrading of manufacturing industry. The development opportunity of intelligent manufacturing is huge, mainly manifested in the following aspects:(1) Improve production efficiency: Intelligent manufacturing can improve production efficiency, reduce production costs and shorten the delivery time, thus enhancing the competitiveness of enterprises. (2) Improve product quality: Intelligent manufacturing can greatly improve product quality, and the fine management of products through digital technology can provide customized products in line with the market demand. (3) Optimize resource allocation: Through the optimized production scheduling and quality management of intelligent manufacturing, better resource allocation benefits can be obtained. (4) Promoting industrial upgrading: The continuous advancement of digital technology and Internet technology provides a broad space for the development of intelligent manufacturing, and can promote the transformation and upgrading of traditional industries to digital industries.

3. Transformation of Industrial Innovation Mode

With the rapid development of digital economy, modern enterprises are facing unprecedented opportunities and challenges. The traditional model has been unable to meet the needs of consumers, and the transformation of the industrial innovation model has become a top priority. Digital economy provides new technologies and methods, such as cloud computing, big data, artificial intelligence, etc. , which can promote enterprises to make industrial structure adjustment and model transformation, and then improve their competitiveness. The transformation of industrial innovation mode plays a key role in the development of digital economy.

3.1. Rise of innovative enterprises

The emergence of the digital economy has promoted the rise of innovative enterprises, which usually adopt emerging technologies to innovate their production and operation methods, and create products and services with high added value, so as to gain advantages. These enterprises not only change the market pattern, but also promote the development of the market model.

3.2. Collaborative innovation to promote industrial upgrading

The development of digital economy can promote collaborative innovation among different industries and promote industrial upgrading. The various new technologies and innovative models provided by the digital economy can be used to integrate the superior resources of different industries to achieve efficient collaboration. For the resource-based industrial clusters in other life cycle stages, industrial transfer will not only improve the production capacity of the transferred industries transferred to the zone, but also transform and upgrade the traditional resource-based industrial clusters through the transmission and diffusion mechanism[3]. For example, the Internet of Things, industrial Internet and other technologies involved in intelligent manufacturing can closely connect the production process of the factory with the supply chain, sales chain and other links, so as to realize collaborative innovation.

3.3. Collaborative innovation in the industrial chain

With the rise of the digital economy, the production, circulation, sales and other links in the traditional industrial chain have undergone significant changes. At the same time, the rise of the digital economy has also spawned close cooperation among stakeholders in the industrial chain. To deepen this cooperation, the advantages of various enterprises can be more effectively displayed, improve production efficiency and economic benefits, so as to optimize the overall benefits of the industrial chain. Nowadays, the value chain of most enterprises has changed from the traditional chain production mode to the user-centered ring structure. Correspondingly, the market conditions have also experienced the necessary adjustments, making the niche market more prosperous[4].

4. Example analysis- -Take Midea Group as an example

Midea Group is a large comprehensive modern enterprise group mainly in home appliance industry and involved in logistics and other fields. With three listed companies and four industrial groups, it is a strong production base of white goods in China. Midea Group has actively applied digital technology to help the digital transformation of enterprises, and has achieved remarkable results.

4.1. Action analysis

In 2011, Midea put forward the three major strategic axes of "product leading, efficiency driven and global management". Officially open the road of digital transformation. Based on this, this paper will take 2011-2021 as the sample period to analyze Midea Group's initiatives and digital transformation.

(1) The 1.0 Era, 2012- -2015. Establish a unified information system throughout the group and introduce big data, mobile, intelligent manufacturing and other technologies to realize the digitalization of products and management.

(2) The 2.0 Era, 2016- -2017. Establish the C2M model, reconstruct the manufacturing process and the supply chain, and realize the flexible manufacturing.

(3) The 3.0 era, 2018- -2020. Layout the industrial Internet to realize the integration of hardware and software. It mainly introduces the industrial Internet, realizes the interconnection of industrial production equipment through the IoT of equipment, realizes the extension and coverage of digitalization from software to hardware, and pulls on the business value chain from the consumer end to the production

end.

(4) The 4.0 era, 2021-present. Comprehensive digital, comprehensive intelligent, to create the second curve. Upgrade the three major strategic axes to four major strategic axes —— "leading technology, direct users, digital intelligence drive, global breakthrough".

4.2. Effectiveness analysis

4.2.1. Significantly reduce costs and increase efficiency

After the end of the 1. 0 era, the ratio of labor cost to 6% in 2015 was 12. 7% in 2011; the net profit of the Group was 12. 7 billion, up nearly 74% from 7. 3 billion in 2013; the cash flow from operating activities increased significantly from 10 billion in 2013 to 26. 7 billion in 2015.

4.2.2. Formation of home appliance Kingdom

In 2012, Midea was already one of the three major home appliances in China, with the operating income of 102. 5 billion yuan, but the profit was only 3. 25 billion yuan, and the net profit margin was less than 4%, and the gross profit margin was declining year after year. In 2021, the market value of Midea Group exceeded 700 billion yuan, with operating income of 341. 2 billion yuan and net profit of 28. 5 billion yuan. It entered the World Fortune 500 for six consecutive years and was selected as Forbes China's top 10 industrial digital transformation enterprises in 2021. After 10 years of digital transformation, Midea Group has achieved a radical change.

4.2.3. The enterprise has stable operation and increasing revenue.

According to the analysis of the financial data of the group pipe network, from 2013 to 2015, the operating income of Midea Group was relatively stable, which was mainly in the early construction stage of digitalization. Since 2016, the results of digital transformation have been prominent, and the operating revenue has grown rapidly and increased year by year.

5. Result

As shown in Figure 1, through the analysis of the correlation heatmap, it is observed that there exists a moderate positive correlation between Midea Group's net profit and operating revenue, and the size of the digital economy. This implies that as the digital economy's scale increases, Midea Group's net profit and operating revenue also exhibit an increasing trend. These correlations underscore the potential influence of digital economy growth, industrialization, and digitization on the financial performance of the manufacturing sector.

```
library(dplyr)
library(ggplot2)
data <- data.frame(
Year = c(2017, 2018, 2019, 2020, 2021, 2022),
DigitEconomySize = c(27.2, 31.3, 35.8, 39.2, 45.5, 50.2),
GDPProportion = c(0.3269, 0.3405, 0.3629, 0.3858, 0.3978, 0.4150),
GrowthRate = c(0.203, 0.209, 0.156, 0.097, 0.162, 0.103),
Digitization = c(21, 24.9, 28.8, 31.7, 37.2, 41),
Digitalization = c(6.2, 6.4, 7.1, 7.5, 8.4, 9.2),
Revenue = c(2419.19, 2618.2, 2793.81, 2857.1, 3433.61, 3457.09),
NetProfit = c(172.84, 202.31, 242.11, 272.33, 285.74, 295.54)
ggplot(data, aes(x = DigitEconomySize)) +
geom_point(aes(y = Revenue), color = "blue", shape = 16, size = 3, alpha = 0.7) +
geom_point(aes(y = NetProfit), color = "red", shape = 17, size = 3, alpha = 0.7) +
geom_smooth(aes(y = Revenue), method = "lm", se = FALSE, color = "blue", linetype = "dashed") +
geom_smooth(aes(y = NetProfit), method = "lm", se = FALSE, color = "red", linetype = "dashed") +
labs(x = "Digit Economy Size", y = "Value", title = "Relationship between Digit Economy Size and Values") +
scale_shape_manual(values = c(16, 17)) +
scale_color_manual(values = c("blue", "red")) +
theme_minimal()
```

As depicted in Figure 2, the scatter plot with blue points representing operating revenue and the associated trend line reveal a steady growth trend in operating revenue as the digital economy's scale increases. This outcome suggests that with the expansion of the digital economy's scale, Midea Group's operating revenue might experience a certain degree of enhancement. The scatter plot also features red points denoting net profit and an accompanying trend line, demonstrating a positive correlation between the increase in digital economy's scale and net profit. Although the correlation is not as pronounced as in the case of operating revenue, it still indicates the potential positive impact of an enlarged digital economy's scale on enterprise net profit. This further confirms the influence of the digital economy on manufacturing sector enterprises.

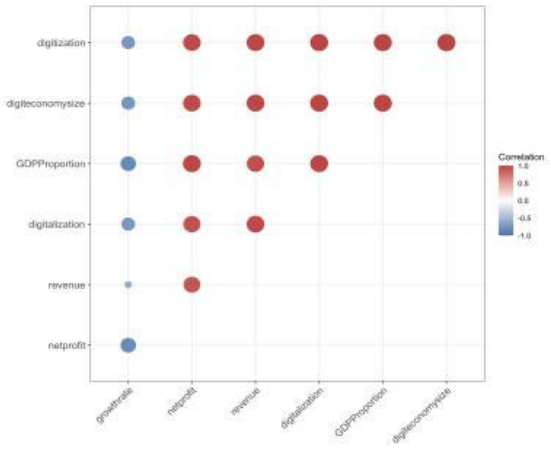

Figure 1. Correlation Heatmap

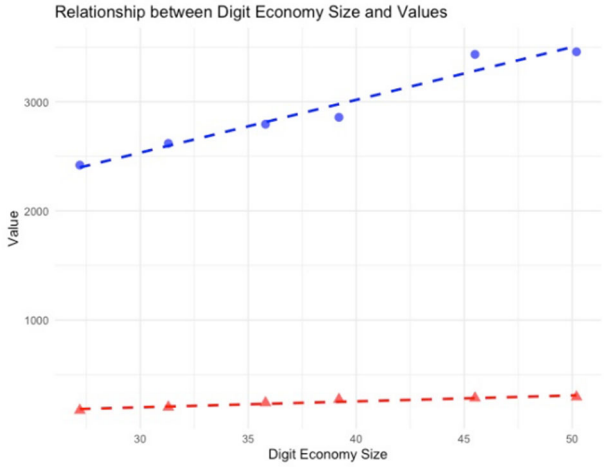

Figure 2. Relationship between Digit Economy Size

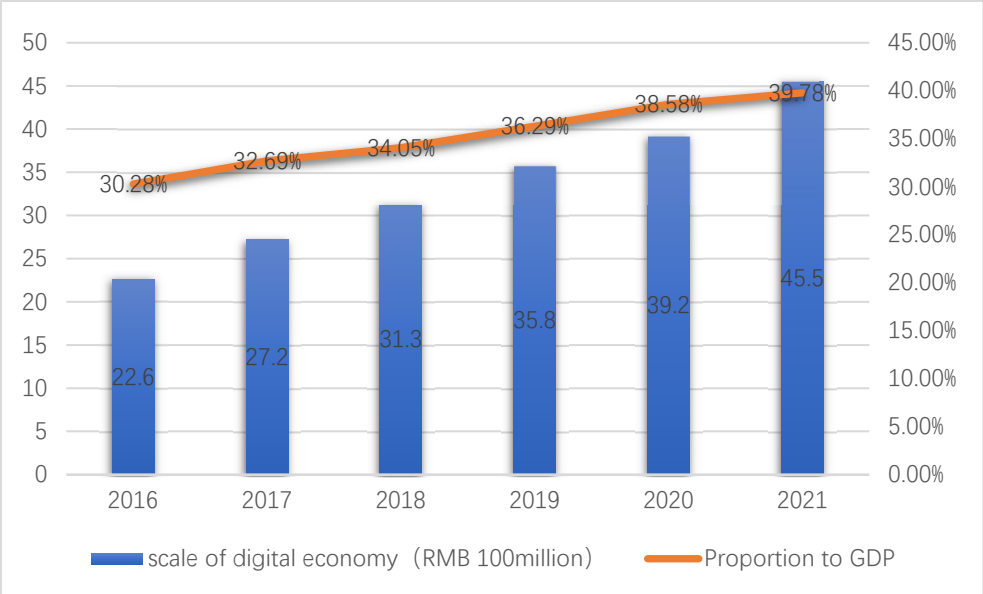

Figure 3. The scale and proportion of China's digital economy in GDP in 2017-2022

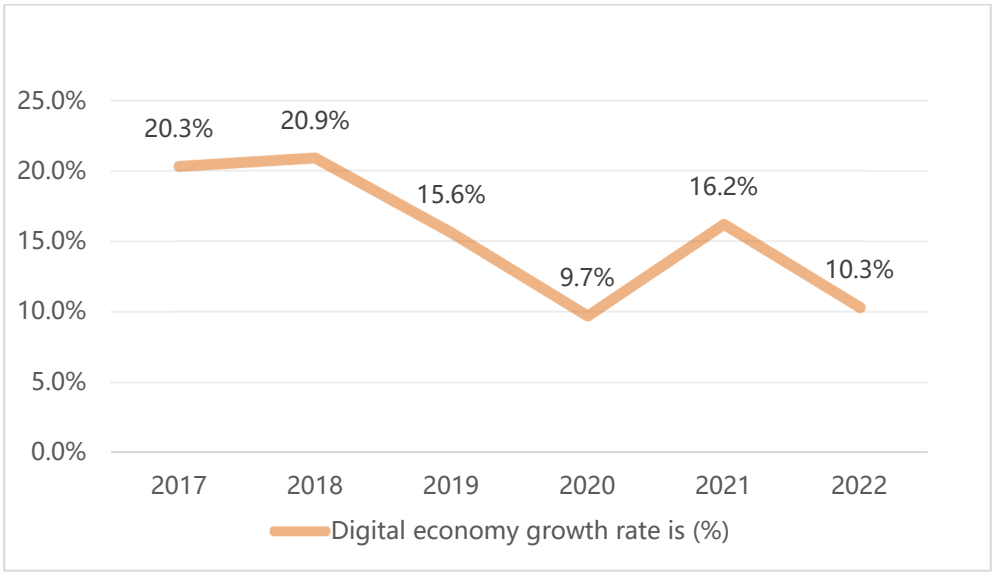

Figure 4. Growth rate of China's digital economy from 2017 to 2022

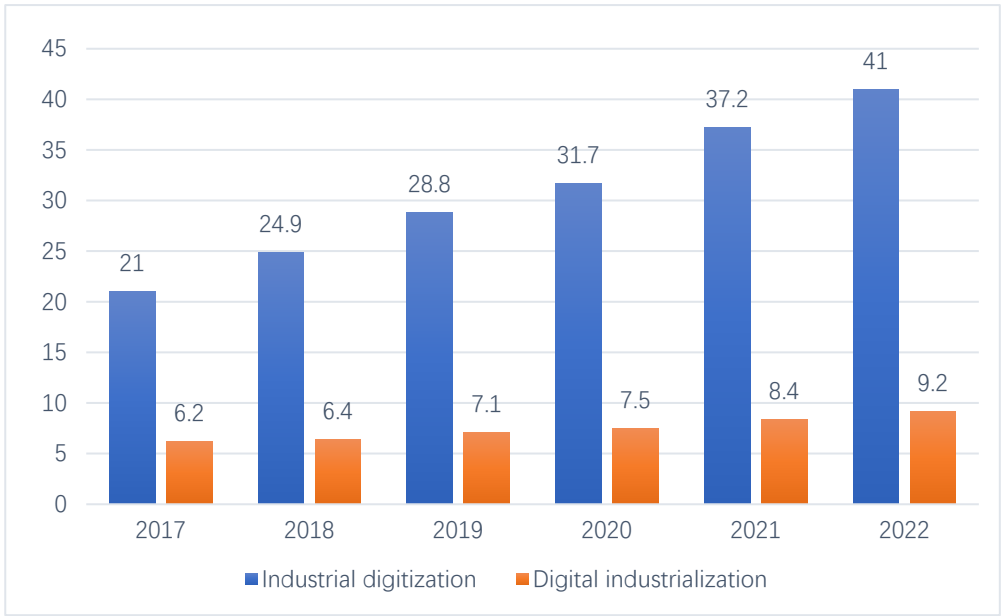

Figure 5. The Internal structure of China's digital economy in 2017-2022

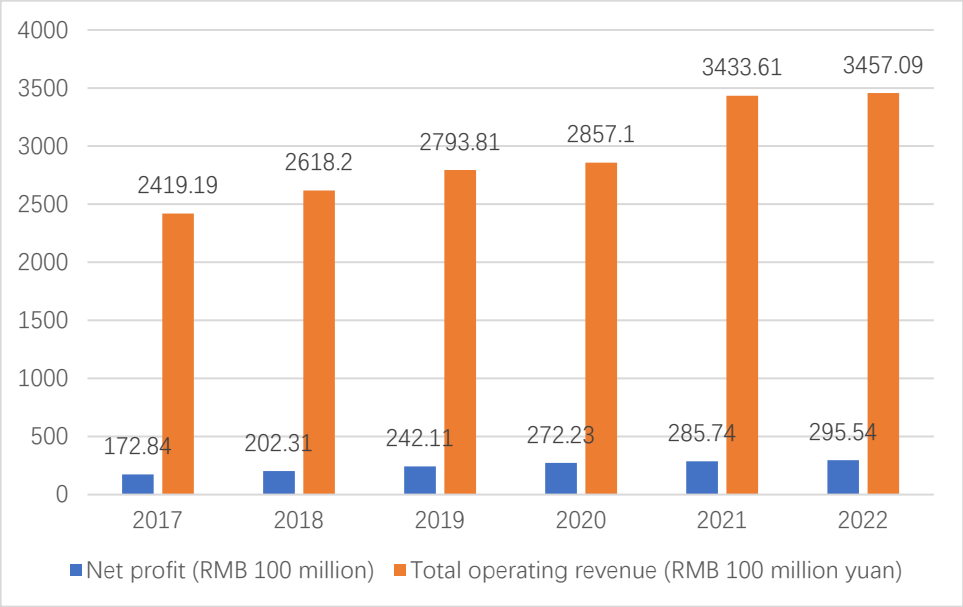

Figure 6. 2017-2022 Midea Group net profit and operating income

(Data source: https: / / www. dongfangqb. Com)

6. Conclusion

In general, the digital economy has a huge impact on the secondary industry. It is promoting the digital transformation and innovation of the industry, bringing new opportunities and prospects for economic development. The impact of the digital economy on the manufacturing industry is mainly reflected in the digitalization and intelligentization of the production process, the optimization of the supply chain, the realization of personalized customization and the improvement of product quality. Through the application of the Internet of Things, big data analysis, artificial intelligence and other technologies, the manufacturing industry can realize the intelligence and automation of the production process, and improve the production efficiency and product quality. Digital technology also promotes the collaborative optimization of the supply chain, realizes personalized customization and flexible production, to meet the personalized needs of consumers.

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