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# Effect and Influencing Factors of Digital Transformation of Manufacturing Industry

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**ABSTRACT**
Digital transformation is an inevitable trend of the continuous development of the manufacturing industry. Digitalization has a great impact on digital innovation, precision marketing, and digital decision-making of the manufacturing industry. There is still huge room for development in the digital transformation of the manufacturing industry. Digitalization in different industries is quite different, and digitalization has spawned new business models. It is of great significance for the sustained and healthy development of the global economy to continue to maintain the proportion of the manufacturing industry in GDP. First of all, the theoretical analysis part combs the relevant literature research of previous scholars. Based on this, this paper analyzes the influencing factors of digital transformation of the manufacturing industry and the mechanism of improving enterprise efficiency, constructs the overall logical framework of this paper, puts forward theoretical assumptions, and thinks that realizing the digital transformation of the manufacturing industry can improve enterprise efficiency. Secondly, in the part of empirical analysis, on the one hand, it explores the development status of the global manufacturing industry, the process of supporting the digital transformation of the manufacturing industry in recent years and its existing problems, and finally provides relevant suggestions for enterprises to realize the digital transformation of the manufacturing industry. This paper finds that digital transformation can improve the automation and intelligence of the product manufacturing process, help enterprises realize accurate marketing and business model innovation through the combination of production and use, and then help adjust the industrial structure and decision-making mechanism, to finally achieve the purpose of improving industrial efficiency.

***Keywords:*** *Manufacturing industry; Digital technology; Digital transformation; Enterprise production efficiency; Digital transformation of enterprises.*

## 1. INTRODUCTION

The global manufacturing industry has achieved unprecedented rapid development, and the scale of manufacturing industry has leapt to the forefront of the world. At present, in view of the gradual slowdown of the global economy, complicated economic environment, rising uncertainties and downward pressure on economic development, the manufacturing industry is in and will be in a period of critical strategic opportunities for a long time. With the extensive and in-depth application of information and communication technology and the emergence of new models and formats, the production and lifestyle of human society is undergoing profound changes, and a digital world is accelerating the construction process. By developing the physical world from gradual simulation to full mirror image, the ability of human beings to develop the digital world and transform the physical world can be greatly improved. The transformation from industrial economy to digital economy is characterized by reconstructing production factors with data as the core, and promoting the transformation from economic development mode focusing on material production and material services to economic development mode focusing on information production and information services. This paper will start from the analysis that digital transformation significantly improves the production efficiency of enterprises, emphasize the importance of digital transformation in enterprises, and finally provide relevant suggestions for enterprises to realize digital transformation of manufacturing industry. This study aims to enhance manufacturing's understanding of the entire disruptive

and dramatic change process underway and provide direction for the development and implementation of digital transformation in the future. It has practical reference significance and enhances the overall strength of the country while enhancing the economic efficiency of enterprises.

## 2. PRODUCTION EFFICIENCY OF ENTERPRISES IMPROVED BY DIGITAL TRANSFORMATION

Manufacturing digitalization mainly refers to the process of digital upgrading, transformation and reengineering of all elements in the upstream and downstream of the industrial chain with data as the key element, value release as the core and data empowerment as the main line under the support and guidance of the new generation of digital technology. In this process, manufacturing enterprises that are good at deeply applying digital technology will win significant competitive advantages. It is necessary to promote the digitalization of industries, transform traditional industries in all directions, from all angles and in the whole chain by using new technologies and applications of the Internet, improve total factor productivity, and release the amplification, superposition and multiplication of numbers on economic development[6]. Digital transformation of manufacturing industry can significantly improve the production efficiency of manufacturing enterprises in the following aspects.

### *2.1 Improvement of automation and intelligence of product manufacturing process*

Digital technology can improve the automation and intelligence of product manufacturing process, reduce product research and development and manufacturing costs, and improve production efficiency.

The integration and development of the new generation of digital technology represented by big data, Internet of Things, artificial intelligence and cloud computing and traditional manufacturing industry has significantly improved the agility and flexibility of manufacturing enterprises, enhanced their adaptability to changes in the external environment, and improved their performance to a certain extent[5]. At the same time, with the rapid development of digital economy, data begins to exist as a key factor of production. Enterprises strengthen their support for production and management decisions through data analysis, which brings about the improvement of automation and intelligence in manufacturing, thus promoting the improvement of production efficiency. For example, the industrial big data solution based on Lenovo LEAP can ensure efficient connectivity and automatic integration of internal and external data of enterprises, and realize online monitoring and analysis, with an overall coverage rate of over 98%[4]. At the same time, with the help of machine learning and knowledge map, this solution can accurately predict the downstream market demand, and effectively reduce the scheduling pressure and inventory cost[1].

### *2.2 Combination of production and use*

Relying on the industrial Internet platform, manufacturing enterprises can realize the combination of production and use, flexible supply and demand, flexible docking and flexible production, thus enhancing the competitiveness of enterprises.

With the development of economy, the traditional rigid production mode at the expense of product characteristics can no longer meet the diversified consumption demand. Modularization and flexibility gradually replace the single and batch production mode, and can produce high-quality products required by users more flexibly [7]. The empowerment of digital technologies such as big data can reshape the way of resource allocation and production organization, and make the process of production and innovation more flexible. Especially by embedding the big data analysis and modeling department in the industrial Internet platform. At the same time, with the rapid development of digital economy, it also makes data begin to exist as a key factor of production, real-time perception of running state of flexible production process can be realized, the converted data is used to optimize production, allowing enterprises to scientifically and reasonably evaluate new production schemes in different extreme situations, and developing new modes such as customization on demand, user participation in design, and large-scale personalized customization, so as to promote flexible and efficient matching between supply and demand, improve production efficiency, and reduce and optimize production costs.

### *2.3 Achievement of accurate marketing and business model innovation*

Through big data analysis, enterprises can be helped to achieve accurate marketing and business model innovation, thus reducing the cost of sales and service.

The application of digital technology has subtly changed the logic of enterprise value creation, which makes enterprises constantly innovate their business models. For example, big data analysis redefines the relationship between enterprises and consumers, improves the service attributes of enterprises, and it is increasingly important to rely on accurate marketing models. This is because extensive and large-scale advertising under the traditional mode can not meet the rapid changes of users' needs, and through big data analysis, enterprises can make their marketing mode more accurate and effective, reduce users' information noise and provide more convenient services. Therefore,

when enterprises carry out product marketing, through the digital marketing system, the data of search, browsing, purchase and comment generated by users' past purchasing behavior can be collected, which can form user portraits of consumers' purchasing power, needs and preferences, and carry out accurate marketing delivery for different types of consumers, so as to improve the transformation efficiency.

### *2.4 Reshaping of industrial processes and decision-making mechanisms*

Digitalization can reshape industrial processes and decision-making mechanisms, improve industrial efficiency and change cost structure, achieve scale coverage by reducing marginal costs, and form scale effect and network effect.

As early as 2005, Haier locked in the emerging personalized needs of users in the digital age ahead of time, and began to reshape the organizational vitality. In this year, Haier initiated the “one person” model, which put the value of employees (makers) in the value created for users, and transferred the decision-making power, human rights and distribution rights to makers. The role of employees changed from top-down level executors to self-driven innovation contributors. In 2013, Haier split the whole process of R&D, design, production and sales and all departments into thousands of small and micro enterprises that start their own businesses and operate independently. These small and micro enterprises flow freely and communicate horizontally, and establish two-way creative contact with external contributors to form a nonlinear network full of dynamic factors. In the digital economy, the Internet of things supports machine-to-machine communication and generates unprecedented data volume through hyperconnection of devices, sensors and systems; Data analysis uses new algorithms of machine learning, data exploration and market intelligence; Cloud computing allows more information to be stored and processed at a more affordable cost[3]. All these support Haier's digital transformation process without exception. Generally speaking, the emerging digital technology can help reduce the operating costs of the internal value chain of the company, and realize the cost reduction and efficiency increase of the enterprise.

## 3. POLICY SUGGESTIONS ON PROMOTING DIGITAL TRANSFORMATION OF MANUFACTURING ENTERPRISES

At present, the digital economy is in the ascendant, and digital technology is constantly transforming all aspects of social life. From the perspective of transformation expectations, digitalization can have a significant impact on manufacturing enterprises, including: digital economies of scale; Lower operating and transaction costs; Reduce information asymmetry; Improve the ability of product differentiation, business intelligence or automation; Increase customers and expand markets. However, relatively speaking, the digital transformation of global manufacturing industry is still in its initial stage, and there are big shortcomings in both the penetration rate of digital infrastructure and the utilization rate of industrial supporting software, so it is impossible to significantly observe the positive impact brought by digitalization. Therefore, in order to speed up the digital transformation of manufacturing industry, we should focus on the following aspects:

### *3.1 Active development of industrial Internet*

Traditional manufacturing industry is in urgent need of transformation and upgrading, and it is timely to develop industrial Internet platform. The essence of industrial Internet is to connect the whole process of enterprise production through digital technology, based on the link of raw materials, control system and managers. Through real-time collection, analysis, processing and modeling analysis of various industrial data collected by sensors, the optimization in the manufacturing process and the change of production mode are realized, thus effectively improving the production efficiency of enterprises. At the same time, industrial Internet can help enterprises achieve flexible production, better cope with changes in market demand, and match more orders for enterprises, thus expanding market space. In the synergy between industrial chain and value chain, the emergence of industrial Internet can also enhance the synergy between upstream and downstream enterprises, and enhance the ability of enterprises to schedule resources in the production process. From a practical point of view, the transformation and upgrading of global traditional industries has a huge demand for the industrial Internet to solve the pain points such as mismatch between supply and demand, uncoordinated resources, and low quality and efficiency; On the other hand, the global consumer market has a broad development space, and Internet application innovation is very active, which provides a deep soil for the better development of the industrial Internet platform [8] Therefore, we should increase the construction of platform facilities represented by industrial Internet, build the basic capabilities of enterprise interconnection and digital intelligence, and lay a good foundation for the digital transformation of manufacturing enterprises.

### *3.2 Implement of digital training for enterprises.*

Increase internal and external cooperation and digital talent construction. Digital transformation itself is a new concept and new thing, and it is difficult to realize the original intention of transformation only by the exploration of enterprises themselves. Therefore, it is necessary to encourage large-scale manufacturing

enterprises with good digital foundation and advanced transformation concept to actively adopt the new generation of digital technology to explore new modes such as industrial interconnection and intelligent manufacturing. Companies strengthen the interconnection between government and enterprises, school-enterprise intercommunication, and improve the ability of enterprises in transformation mode, transformation concept and transformation path, so that they can use digital technology to collect multidimensional data, integrate and analyze these data information, form automatic learning decision-making, and promote resource sharing and ability collaboration. In addition, enterprises with mature digitalization and advanced transformation experience should be encouraged to open their internal industrial Internet platform to small and medium-sized enterprises, and improve the digitalization level of the whole manufacturing industry through the experience output and training of mature enterprises to the latecomers of digital transformation. At the same time, the success or failure of digital transformation depends to a great extent on the cultivation and construction of talents. With the deepening of manufacturing transformation, the demand for talents with high information literacy and digital technology is also increasing. Therefore, manufacturing enterprises need to constantly improve the training system of digital talents, build a learning organization, and promote the overall digital level of enterprises.

### *3.3 Stronger construction of digital infrastructure*

It is necessary to strengthen the construction of digital infrastructure and promote the combination with application scenarios. Digital infrastructure construction is an important starting point for cultivating new business models and exploring new development formats in the manufacturing sector, and it is also an important guarantee for promoting the transformation of old and new kinetic energy in the manufacturing industry in the new development stage. With the support of digital infrastructure, it can effectively promote the transformation and upgrading of traditional manufacturing industry, reduce costs and increase efficiency by using digital technology, and enhance development performance and market competitiveness [4]. Therefore, we should promote the construction of digital infrastructure based on emerging digital technologies, pay attention to the unification of construction standards, lead the coordinated advancement of the needs of all parties, meet the needs of digital transformation in terms of standard formulation, clear functions and facility exchange, and provide basic solutions for the improvement of production efficiency and production process reform of enterprises.

In addition, we should promote the combination of digital infrastructure and practical application scenarios of enterprises[2]. Digital infrastructure can not play its role without the combination with application scenarios. Taking COVID-19 pandemic as an example, new formats and models such as telecommuting, telemedicine and cloud classroom developed under the background of epidemic situation need the support of corresponding digital infrastructure, and are expected to promote the two-way promotion of facility construction and scene application. Therefore, it is necessary to adhere to the business needs of enterprises, realize digital process reengineering in the fields of R&D, production, circulation and consumption of manufacturing enterprises, and promote the digital and intelligent transformation of enterprises; At the same time, we should also speed up the collaborative research and development of core technologies and application technologies of digital infrastructure, promote the service collaboration and industrial extension of traditional manufacturing industries, and realize the ability building of innovative development and intelligent operation. In this way, it can improve the construction of enterprise information sharing platform, and realize the interconnection and commonality of information between and within enterprises. With the concept of Internet open source sharing gradually affecting the manufacturing field, the way to build an open information sharing platform, form an application development ecology that can face various business scenarios, and realize the interconnection of enterprise information has become the demand of the whole manufacturing industry. In fact, enterprise information sharing and collaboration are the basis of supporting the digital transformation of enterprises and the development of related applications of industrial Internet platforms, by building an enterprise data sharing platform, the data chain between different stages of the enterprise life cycle can be connected; By establishing the rules of enterprise information sharing, the coordination between different enterprises and various departments within enterprises can be realized, and the overall transformation efficiency of manufacturing industry can be improved.

## 4. CONCLUSION

Through the research above, the paper finds that the world is undergoing the transition from industrial economy to digital economy, and the manufacturing industry is in the historical stage of digital transformation and development for a long time, and is constantly jumping along the stage of digitalization, networking and intelligence.

At present, the manufacturing industry is in a critical period of accelerating from the digital stage to the network stage. The development theory, methods, tools, solutions and value models of the manufacturing industry

are about to undergo systematic and systematic changes, promoting the digital transformation of the manufacturing industry faces important opportunities and challenges. Therefore, it is extremely urgent to promote the digital transformation of the manufacturing industry.The digital transformation of manufacturing industry faces the following problems: low penetration rate of digital infrastructure and low utilization rate of industrial supporting software. It is recommended that the government actively develop the industrial Internet, implement digital training for enterprises, and strengthen the construction of digital infrastructure. The promulgation of relevant policies can play a role in promoting the digital transformation of manufacturing enterprises.

However, the deficiency of this paper is that the data involved are only the data of listed manufacturing companies from 2013 to 2018, but not the data of 2019 and 2020, which cannot reflect the impact on the digital transformation of manufacturing industry under the new background of epidemic impact and economic internal circulation.

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