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LEGAL BASIS FOR THE DEVELOPMENT OF AN INDUSTRIAL INTERNET PLATFORM IN THE CONTEXT OF DIGITAL TRANSFORMATION

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Abstract

Objective: The purpose of this study is to analyze the experience of using industrial Internet platforms in China and its impact on the regulation of production services of enterprises. The study analyzes the concept of global value chains and examines the distribution of benefits among participating countries as a result of the deepening of the international division of labor.

Methods: A combination of research methods, including factorial, comparative, and structural analysis, was used to achieve the research objectives. The main research material consisted of Russian and international statistical data, Russian and international legal frameworks, and comparative legal analysis.

Results: Industrial Internet platforms not only promote cooperation between the production party and upstream and downstream enterprises in the value chain but also increase the added value of the production party and smoothen the smile curve.

Conclusion: The article combines the concept of proactive artificial intelligence and suggests an innovative direction for the industrial Internet. The development of industrial Internet platforms plays a crucial role in the digital transformation of production processes. This requires a comprehensive legal and regulatory framework to ensure data confidentiality, intellectual property protection, and secure cross-border data transfer.

Keywords: Legal basis. Internet platform. Digital transformation

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1. INTRODUCTION

The world economy has entered its era with the development of a new generation of digital technologies, and enterprises have tried to carry out a digital transformation to reduce costs and increase the efficiency of their activities. Innovations and the digital revolution in China are expressed in the rapid spread of the Internet from the sphere of consumption to the sphere of production and from the virtual economy to the real economy. As a result of these processes, the industrial economy is being transformed from general digitalization to intellectual digitalization. The industrial Internet is increasingly becoming an important basis for deepening interaction according to the formula "Internet + advanced production" as a product of deep integration of new-generation IT and production [1].

The development of digital transformation of production is an international consensus. International competition in the development of industrial Internet and digital transformation is becoming increasingly fierce; countries consider the digital transformation of industry as the key to the transition to a qualitatively new level of economic and technological development. The US, Germany, Japan, the UK, France, and other industrialized countries promote the development of the industrial Internet through investment projects, research subsidies, tax incentives, etc., supporting scientific and technical funds, innovation centers, and research institutes.

With advantages in the field of cloud computing, artificial intelligence, chips, intelligent sensors and the innovative activities of other leading manufacturing companies such as General Electric, the US has accelerated the deep integration of the Internet in the development of advanced manufacturing and is striving to maintain its industry leadership in the processes of digital transformation. The EU launched the Industry 4.0 strategy in 2013, considering the promotion of industrial digitalization as an important tool for taking initiative in global technological competition. It is planned that three-quarters of EU manufacturing enterprises will be using cloud computing services and applying big data and AI by 2030, and over 90% of SMEs will have reached at least a basic level of digitalization [2]. The German Industry 4.0 strategy focuses on

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smart factories and production based on CPS ("countries partnership strategies", the World Bank's term). The Industrial Strategy of Germany until 2030 proposes to strengthen support for digital innovation and implement a comprehensive digital transformation of the manufacturing industry through innovation [3]. When designing the economic system, Japan relies on the development of robots, the Internet of Things, and the industrial value chain through the development of an interconnected industry, paying special attention to the development of AI, digital talents, and sustainable ultra-fast data exchange. It also implements the digital transformation of production through innovation [4].

METHODS

Industrial Internet platforms and their impact on the regulation of a company's production services were studied. The main research objective was to analyze the concept of global value chains (GVC) and the distribution of benefits among participating countries by deepening the international division of labor.

To achieve these goals, we used a combination of research methods, including a case study and factorial, comparative, and structural analysis. Russian and international statistical data, legal frameworks, case studies, and comparative legal analysis were used as the main material of the study. We also analyzed legal requirements for cross-border data transfer, intellectual property protection, privacy, and security issues.

RESULTS

Active development of an industrial Internet platform in China

An industrial Internet platform is an industrial cloud platform that meets the digital, network, and intellectual needs of the manufacturing industry, builds an industrial service system based on the collection and analysis of big data, supports the connection and supply of various resources, and implements efficient resource allocation [5].

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In May 2015, the State Council of the People's Republic of China published the Made in China 2025 action plan, which presents a detailed roadmap for the first decade of China's implementation of the production capacity development strategy. The main task of Made in China 2025 is the implementation of digital production with deep integration of information and production technologies. This plan includes eight basic strategic countermeasures: the introduction of digital networked intelligent production, improvement of product design capabilities, improvement of the innovation system in production technologies, strengthening of the production base, improvement of product quality, promotion of environmentally friendly production, development of globally competitive enterprise groups and profitable industries, and development of modern production services [6].

China and the West are engaged in fierce competition in the field of digital technologies in the context of the rapid development of the global digital economy. The 14th Five-Year Plan for Deep Integration of Informatization and Industrialization Development issued by the Ministry of Industry and Information Technology of China, clearly states that by 2025 the penetration rate of industrial Internet platforms in China will have reached 45%. Thus, the industrial Internet still has a high potential for development in China.

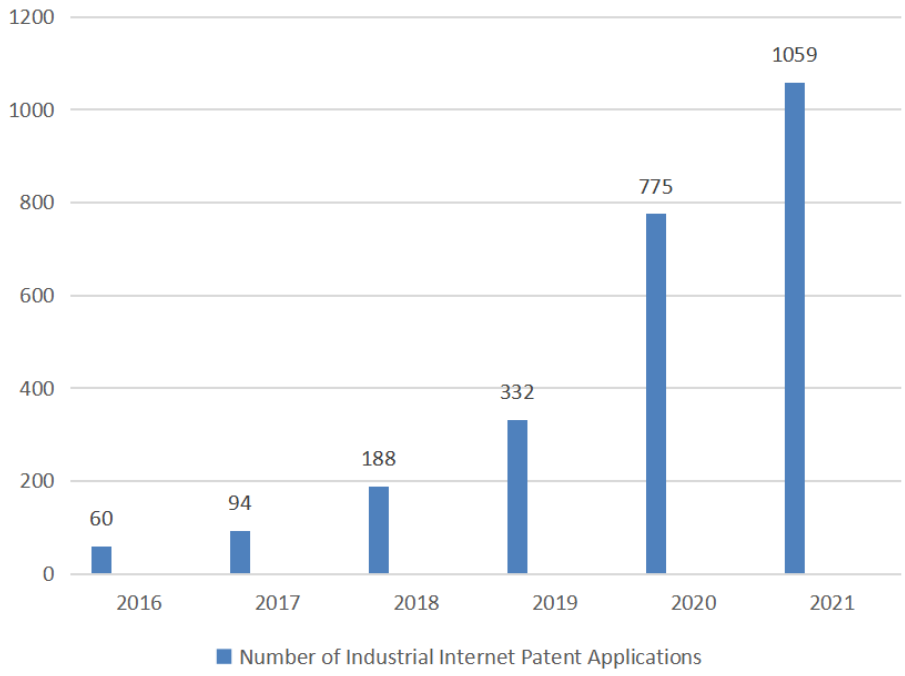

Fig. 1. The number of patent applications for China's industrial Internet, 2016-2021

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According to data released by the World Conference on Artificial Intelligence in 2021, China's industrial Internet platforms are developing rapidly. The construction of more than 100 platforms has been completed, and the total number of connected industrial equipment has reached 73 million sets. In addition, the number of patent applications for the design and connection of industrial Internet in China in 2021 amounted to 1,059 units, which is 36.6% more than in the previous year [7].

The Industrial Internet platform is a comprehensive modernization of traditional industrial IT. This technological solution combines cloud computing, big data, AI, and other basic technologies for collecting and analyzing enterprise production data (Fig. 2),and also integrates third-party service platforms (for example, logistics companies, financial institutions, etc.) to provide enterprises with shared resources.

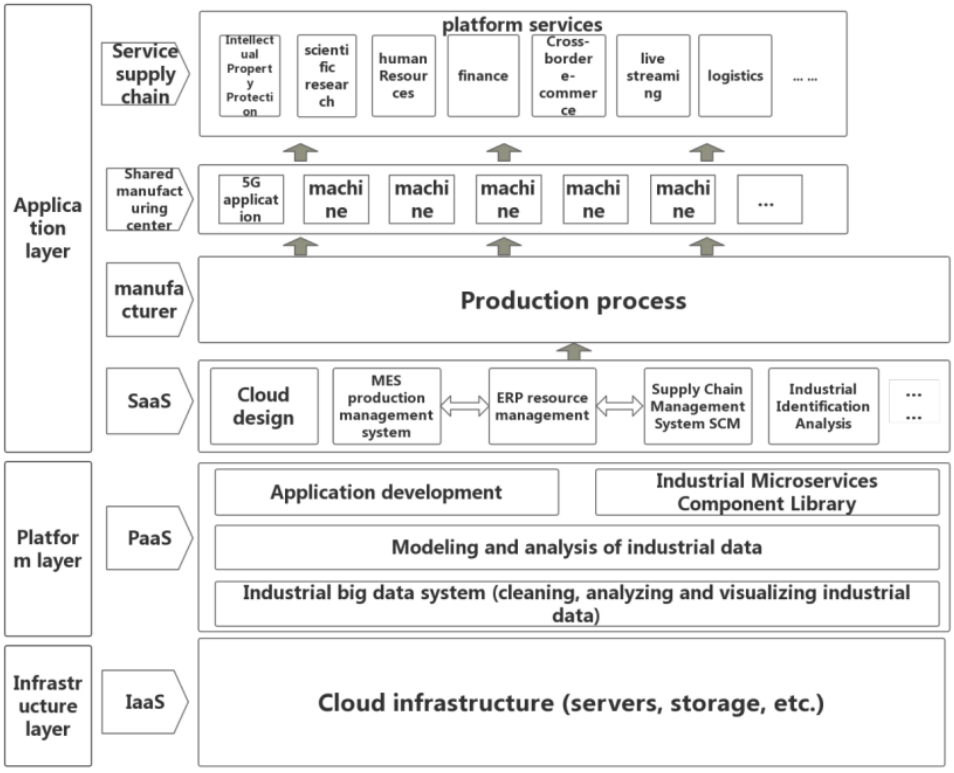

Fig. 2. Architecture diagram of an industrial Internet platform

Compared to the traditional production model, industrial Internet platforms have been significantly improved in terms of technical structure and data value.

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Strengthening the position of an industrial Internet platform in the production value chain

The value chain was first described by M. Porter in 1985 [8]. Initially, it was used in business management and strategic management, and later it was implemented in the research of the production chain and the international division of labor. The value chain theory assumes that throughout the entire process from the purchase of raw materials to design, production, sales, delivery, and after-sales service, enterprises must capture the key links of high value and increase their competitiveness in the market [9].

In the industry, related enterprises in the upper, middle, and lower links of the production chain are interdependent and influence each other, these enterprises form a production value chain, and the added value of enterprises with different marketing positions in the chain differs from each other. The production value chain is the integration of the value chain and the production chain. The production value chain has a cluster effect. After the cluster of the industrial value chain is formed, it has a self-reinforcing internal mechanism that contributes to its further growth, which not only increases the competitiveness of an individual enterprise in the production value chain but also increases the competitiveness of various industrial value chains. A unique competitive advantage also arises between them [10].

The smile curve was first proposed in 1992 by Shi Zhengrong, Chairman of the Board of the Acer Group [11]. The smile curve is a curve with both ends facing up and the middle down. The value added is marked on the ordinate axis, and the distribution of the production chain is represented on the abscissa axis. The front part of the curve is the upper part of the production chain with high added value, that is, R&D, design, procurement of raw materials, etc. The middle part of the curve refers to the middle part of the production chain, that is, production, where the added value of the production chain is the lowest. The last part of the curve refers to the downstream production chain, i.e. sales, after-sales service, etc., which have a high added value. Thus, the general shape of the curve has a U-shaped shape [12].

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An industrial Internet platform can connect enterprises in all parts of the production chain and form an industrial cluster and optimize the production value chain. It receives data from all enterprises, connecting design companies, raw material suppliers, research institutes, logistics companies, banks, trading companies, etc., to deliver service orders from manufacturing enterprises, and it also significantly reduces the cost of manufacturing enterprises and increases production efficiency. As empirical studies in China and other countries confirm, an industrial Internet platform increases the added value of producers in the value chain.

With the traditional way of enterprise collaboration, especially for small and medium-sized enterprises, it is difficult to collect business information and data and transaction costs are very high. According to the theory of the smile curve, the added value of the manufacturer is of low importance. Due to the industrial Internet platform, many resources are shared, service providers and distributors form industrial clusters, transaction costs are reduced and databases are created for product design, packaging, logistics, storage, sales, services, etc. Data exchange makes cooperation between enterprises more efficient and solves the problem of information asymmetry.

Manufacturers can use software such as ERP (enterprise resource planning), a resource management system, an automated price offer, and a list of BOM (bill of material) production materials supported by an industrial Internet platform to increase production efficiency and reduce management costs. In addition, manufacturers can also use common services in clusters, such as Internet finance and general logistics, accurately receive customer needs through an industrial Internet platform, and create cloud design, raw materials procurement systems, sales networks, after-sales service applications, etc.; with these processes, the added value of the manufacturer increases significantly (Fig. 3).

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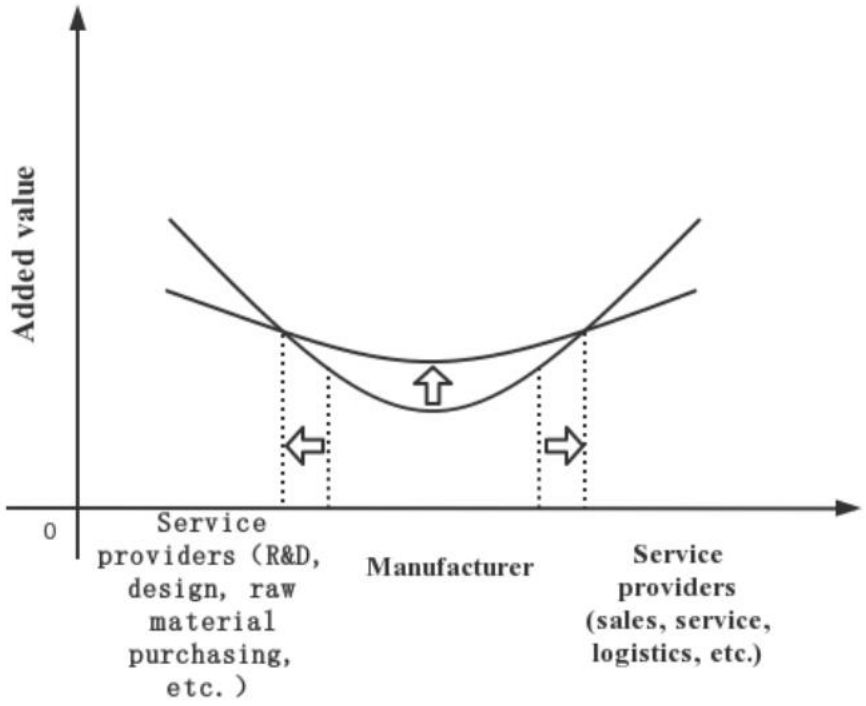

Fig. 3. The effect of smoothing the smile curve of the industrial value chain due to an industrial Internet platform

Due to the expansion of the capabilities of the industrial Internet platform on the smile curve, manufacturers demonstrate a tendency to simultaneously expand to the upper, left, and right sides of the coordinate system; the added value of the manufacturer expands.

Perspective and a new vector of development: an industrial internet platform combined with proactive ai

Due to the deep integration of AI technologies into various parts of production, the industrial Internet also needs to strengthen its integration with AI in data analysis, data value extraction, and resource allocation optimization.

Currently, ERP, CRM, and other systems are commonly used on industrial Internet platforms. Such an approach cannot be a feedback mechanism and management of economic processes of production in real-time, but gives the results of dead accounting. Therefore, if an industrial Internet platform can implement proactive AI, it may be possible to implement an automated control system to solve this problem.

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If we go back to the origins of the problem in the field of automation of economic management, we should recall the establishment of the Central Research Institute of Technical Management under the leadership of cyberneticist N.I. Veduta in 1962 in Minsk, USSR. This institute has implemented automated economic management systems at several large machine-building plants in the USSR. Veduta was a practitioner in the field of economic planning. However, its main success was the creation of the country's first automated management system, which resulted in a dynamic model of intersectoral balance. This model is a system of mathematical algorithms describing the process of matching end-user orders with the capabilities of manufacturers, including the procedure for adjusting the initial tasks to achieve an appropriate inter-industry balance [13]. This is how the concept of proactive AI finds implementation in automated economic management.

The modern scientific discourse considers the creation of proactive AI based on a dynamic model of intersectoral balance (MOSB), organizing information flows from economic entities on an industrial Internet platform to coordinate their activities in the direction of implementing strategic goals and accelerating the pace of development through the introduction of new technological methods of production. The principles of constructing a dynamic model of the MOSB are considered, assuming that it reflects the mechanisms of action of objective economic laws [14].

MOSB as a dynamic system is an iterative process of coordination of planned calculations, including the selection of effective technological methods of production and the adjustment of criteria values depending on the production capacity. The task of efficient distribution of production investments is solved in MOSB simultaneously with the task of optimizing the structure and volume of final non-production products [15]. There is no doubt that the introduction of this model will optimize the industrial Internet platform.

CONCLUSION

In conclusion, it should be noted that the development and prospects of an industrial Internet platform in the context of digital transformation present both opportunities and challenges for the manufacturing sector. The industrial Internet

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platform catalyzes collaboration, integration, and optimization in the industry value chain, facilitating the sharing of resources and data exchange between enterprises.

Currently, economists and engineers do not realize the critical importance of introducing proactive AI in combination with economic cybernetics into the industrial Internet platform. These data indicate that such a combination can become an innovative direction for the development of an industrial Internet platform.

However, the introduction of an industrial Internet platform also raises important issues in the field of law and regulation. The regulatory framework governing data protection, confidentiality, and cross-border data transfer plays a crucial role in ensuring the safe and ethical use of data on the platform.

Thus, the industrial Internet platform provides opportunities for the transformation of the manufacturing sector, allowing to increase the efficiency of cooperation. However, to fully realize its potential, an adaptive legal framework supporting regulations and strategic policy initiatives that promote innovation, protect data privacy, and create a favorable environment for the digital transformation of the manufacturing industry is needed.

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