Research on the Impact of Digital Technology on the Transformation and Upgrading of Manufacturing Industry

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Abstracts: In the ongoing evolution of the "double cycle," digital technology emerges as the principal catalyst for transforming and advancing the manufacturing sector. As economic globalization and technological advancements evolve, manufacturing companies confront novel challenges and pressures. Within this framework, adopting digital transformation has emerged as instrumental in bolstering business competitiveness, particularly through employing big data, artificial intelligence, the Internet of Things, and various other digital advancements, thereby greatly advancing production efficiency and market reaction speed. Pertaining to this, the article examines the underlying reasoning and execution route of how manufacturing firms achieve transformation and enhancement via digital technology, aimed at offering guidance for the advancement and transformation of manufacturing entities.

Keywords: Digital Technology; Manufacturing Enterprises; Transformation and Upgrading; Development Countermeasures

1. Introduction

Currently, amidst numerous domestic and international hurdles, China's economy continues to sustain a consistent growth trajectory, transitioning from rapid expansion to superior development. During this metamorphosis phase, the evolution and enhancement of the manufacturing sector are essential not just for guiding the industry towards advancement towards luxury, intelligence, and eco-friendliness, but a promise to boost global competitiveness and the privilege to discuss the domestic manufacturing sector. Promoting high-end, intelligent products necessitates hastening technological advancements, boosting production efficiency and product quality, extending operations upstream and downstream, and augmenting industrial synergy and integration capabilities, green growth in the manufacturing sector, aiming to elevate the manufacturing industry to intermediate and premium levels. The state attaches great importance to the development of the manufacturing industry and has introduced a series of policies, exemplified by initiatives like “Made in China 2025” and the “Innovation-driven Development Strategy,” targeting the advancement of the manufacturing sector towards luxury, intelligence, and eco-friendliness, thereby creating an ideal setting for the evolution and enhancement of the manufacturing sector. The evolution and enhancement of the manufacturing sector have yielded a more ideal institutional promise. The dynamic energy dynamics for changing and increasing China's manufacturing industry have become influenced heavily by the internal macro-cycle, encompassing both the transformation and enhancement.

Lately, the manufacturing sector in China has achieved significant advancements in areas like technological innovation, industrial enhancement, and brand development. Nonetheless, it confronts various obstacles, including escalating labor expenses, growing environmental strain, and limited fundamental technologies, among others, underscoring the critical need to establish a manufacturing environment fueled by technological advancements. The current phase of technological advancement is thriving, with technology, data, and various novel production elements emerging as pivotal in economic growth, while digital technology is transforming the manufacturing sector, transforming manufacturing. The industry's enhanced intelligence, efficiency, and adaptability offer businesses a diverse

competitive edge and a boost in value, and serves as an endless motivator for the comprehensive transformation and enhancement of the manufacturing sector. In the current economic climate, adhering to digital technology's developmental trajectory to hasten industrial advancement and change is crucial for fostering the manufacturing sector's transformation and enhancement.

Current studies indicate that factors like international industrial transfer, technological advancements, and the digital economy, among others, play a significant role in transforming and enhancing the manufacturing sector, with some research revealing that the development Enhancing the digital economy by boosting enterprise efficiency and the technological intricacy of both channels is key to achieving an increase in the worldwide manufacturing industry's production levels. Achieving an increase in manufacturing production demands ongoing enhancement of the technological intricacy of manufacturing exports, with the primary strategy being to augment the technological intricacy of manufacturing exports, capacity for industrial innovation, The advancement of digital technology aims to boost R&D efficiency, broaden innovation limits, foster joint innovation, etc., thereby bolstering industrial innovation capabilities and driving transformation, and the enhancement of the manufacturing sector. An examination of current scholarly works reveals that, currently, the academic sector has yielded research findings on digital technology's role in driving the evolution and enhancement of the manufacturing industry between the Outcomes of the study, However, the majority of current studies concentrate on the immediate effects of digital technology's evolution on the manufacturing sector, stemming from the unavoidable progression of digital technology to propel the ma's transformation and enhancement, the manufacturing sector, along with technological advancements, Examining the impact of consumer demand and transaction fees in theoretical investigations and practical experiments, we examine the trajectory of China's evolution in the manufacturing sector, steered by digital technology.

2. Literature Review

The pivotal elements in China's ongoing development are manufacturing transformation and upgrading, making the hastening of these processes a crucial subject among present scholars. Research in this field can be categorized into two distinct categories.

(1) Essential prerequisites for evolving and improving the manufacturing sector. Accelerating the development of a novel pattern will lead to changes in China's resource distribution and focal point, simultaneously altering the environment and scope of its manufacturing sector and the process of enhancement transform, introducing fresh stipulations regarding the trajectory and trajectory of the manufacturing industry's evolution and enhancement [1]. Yang and colleagues [2] argue that as China's economy transitions smoothly into a new era, changes and enhancements have emerged in the manufacturing sector to bolster market edge and sustainable growth. This sector stands as a cornerstone of China's digital economy. China's manufacturing sector stands as the primary arena for digital economic growth, with the digital economy playing a key role in shifting the nation's manufacturing from inflexible processing to a more adaptable and intelligent manufacturing style [3]. Liang Chao [4] highlighted industrial integration as a key driver for advancing the digital economy, noting it has spawned numerous new business types and models, and emphasizing the profound amalgamation of manufacturing and digital economic sectors.

(2) Discover methods to foster the evolution of the manufacturing sector by means of theoretical study and practical research. Ma et al [5] examined the challenges faced by the equipment production industry in the context of Internet+, proposing a reform and modernization approach for China's equipment production sector in this context, targeting the effective improvement of the compensation system. The scholar developed a foundational regression model, a mediating effect model, and a heterogeneity test for practical analysis, revealing that the digital economy is a catalyst for the evolution and improvement of the manufacturing sector via technological advancements [6].

The core of the digital economy lies in digital transformation efforts, where data dominates, digital technology plays a pivotal role, and the industrial sequence is made open, with both social and innovation motivations being

primary motivators.

The digital economy encompasses both the rise of tech advancements and narratives about evolving business methods, international market frameworks, educational encounters for humans, and the transforming societal and political systems [7]. The digital economy, propelled by national innovation, primarily shapes our approach. As the principal catalyst for supply-oriented structural reforms, it's transforming the industrial structure, with the manufacturing sector emerging as the central arena for digital economic evolution and transformation [8]. Research indicates that advancing the digital economy by increasing the productivity of companies and the technological intricacy of two sectors is the key to ascending the global value chain [9]. Regarding factor distribution, the digital economy has the potential to lessen the conventional manufacturing sector's overuse and reliance on resources and energy, and similarly, in the industrial sector, it can reconstruct the conventional spatial arrangement of human industrial chains. Construct a network utilizing digital components, harness the digital space to consolidate scattered resources from businesses, and subsequently distribute them to enhance the operational efficiency of the industrial network resources [10]. Concisely, the digital economy has the potential to amplify traditional manufacturing industry productivity, guide manufacturing activities, and thoroughly initiate the evolution and enhancement of the manufacturing sector.

3. Related Theories and Methods

3.1 Development Trend of Digital Technology

Initially, the use of cloud technology and big data enables efficient, adaptable, and economically viable data processing. With this technical aid, businesses can acquire substantial storage and computing power without significant initial costs, this significantly lowers the requirements for information technology; utilizing big data technology enables companies to derive essential information from extensive data, aiding in decision-making processes. Furthermore, advancements in artificial intelligence and machine learning technologies have slowly emerged as critical factors in corporate transformation. Artificial intelligence has the ability to replicate human cognitive activities, autonomously acquire knowledge and decide in complicated settings, thereby enhancing work productivity and precision; algorithms based on machine learning have the capability to forecast malfunctions in equipment and refine manufacturing procedures, thereby enhancing both product efficacy and innovation. Moreover, IT technology holds significant value in digitally invigorating manufacturing companies. For industrial purposes, the Internet of Things not only facilitates instantaneous tracking and upkeep of machinery but also integrates instantaneous data inputs to modify production strategies and manage inventory, and the effortless exchange of information and merging of data significantly enhances the operational effectiveness of companies.

3.2 Application Modes of Digitalization in Manufacturing Enterprises

The manufacturing sector's digitalization primarily revolves around smart production, tailored production, and fine-tuning supply chain management, three key approaches to bolster businesses' market edge. Intelligent manufacturing merges sophisticated technologies including the Internet of Things, large-scale data, cloud services, and more. By gathering and analyzing data in real-time, this tool can precisely manage every phase of production, foresee equipment breakdowns, and achieve preventive upkeep, significantly enhancing both production efficiency and the quality of products. When utilizing tailored production techniques, the widespread adoption of 3D printing and CAD/CAM software in both product design and manufacturing makes the transition from single-piece to small-lot manufacturing more adaptable and cost-effective. Customized requirements of consumers can be seamlessly incorporated into the production system, instantly modifying production conditions using algorithms to produce products tailored to each individual's preferences, thereby boosting customer contentment and brand loyalty. Conversely, the optimization of supply chain management is realized by employing sophisticated systems designed for the all-inclusive digital oversight and administration

of raw material acquisition, inventory regulation, logistics, and distribution. These systems are able to dynamically adjust supply chain strategies and optimize inventory according to market changes.

4. Problems and Development Countermeasures

Currently, digital technology, particularly the Internet, large-scale data, and AI, plays a crucial role in advancing the modernization sector of manufacturing. Despite the fact that numerous manufacturing companies in China have adopted digital solutions for productivity enhancement, they continue to confront numerous hurdles, including inadequate digital infrastructure building, illogical industrial frameworks, a shortage of technological innovation potential, and a deficit in advanced technical expertise. Consequently, this document suggests approaches to address the issue. (1) Generate industrial clusters that are both digitalized and scaled. The fundamental basis for evolving and enhancing the manufacturing sector lies in creating extensive industrial conglomerates. The industrial Internet platform enables tightly connected industry sectors in the cluster, facilitating the exchange of resources, cooperative endeavors, and business connections between the companies in the upstream and downstream sectors. Bolster the cluster industry's focus on digital services, technology, management, and operational aspects of collaboration and exchange, along with a thorough integration of R & D, production, management, and diverse manufacturing methodologies to ensure an ideal distribution of production elements. (2) Enhance the inherent creative capacities of crucial technologies. Technological evolution stands as the cornerstone for digitizing and smartly overhauling the manufacturing sector. The manufacturing sector predominantly occupies the mid to lower spectrum of the industry scale, necessitating the importation of key technology and essential components. With the resurgence of advanced manufacturing in developed nations, it's crucial for manufacturing companies to collaborate with universities and research bodies to address the primary challenges of digitalization and smart transformation. Achieve technological advancements and innovations, fostering a collaborative growth in industry, academia, and research. It's imperative for the conventional manufacturing sector to implement modern information technology in R & D, production, and management as well as other facets contributing to novel productivity development, thereby enabling the standard manufacturing to embrace digital and intelligent eco-friendly transformations and enhancements. Accelerate the profound assimilation between the digital economy and the manufacturing sector. Establish leading firms for the digital and smart evolution of the manufacturing sector, develop motivation among manufacturing businesses to venture into data excavation, and enable them to fully leverage the significant benefits offered by the digital economic realm. It is imperative for the government to hasten the building of digital frameworks to robustly back the digital, intelligent evolution of the manufacturing sector. The government ought to allocate specific funds to assist and motivate small and medium-sized manufacturing businesses experiencing digital changes to undertake technological advancements and transform their business models. (4) The initiation and instruction of digital skills. A lack of sufficient digital skills in the manufacturing sector is essential for its transformation and enhancement. We must address this issue promptly by not just introducing new capabilities, but also by effectively nurturing digital proficiency. Production companies can be structured via company instruction among others to excel in handling digital hardware, upkeep, and utilizing smart management systems. The entity also has the capability to collaborate with educational institutions, providing structured training for college attendees and universities, tailored to the requirements of the manufacturing sector, in developing programs for digital talent development, producing companies aimed at offering apprenticeships and internships for university students to enhance their digital proficiency and become proficient in new IT. Additionally, they are able to acquaint themselves with emerging information technologies, production methods, and the functioning of industrial Internet platforms. Conversely, when bringing in expertise, the pertinent government ought to develop an intricate strategy for integrating top-tier digital skills, alongside proactively adding

sophisticated tech R&D and digital management abilities, enabling a greater number of elite digital experts to establish themselves and contribute to the evolution and enhancement of the manufacturing sector.

5. Conclusion

Revamping and enhancing the manufacturing sector presents a multifaceted and demanding task within the digital economic landscape. By implementing thorough evaluations and implementing proficient strategies for technological innovation, optimizing management, and making relevant policy and environmental advice, the manufacturing sector can significantly enhance its operational efficiency. It's essential for businesses and governmental bodies to collaborate, concentrating not just on present technological advancements and market needs, but also on gearing up for future progress with a proactive approach. Through this approach, the manufacturing sector of China will sustain its competitive edge in the international arena and foster the economy's sustainable and robust growth.

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