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Research on the Impact of Digital Transformation on the High-Quality Development of Enterprises: A Case Study of the Manufacturing Industry

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Abstract: The manufacturing sector faces increasingly intense competitive pressures in its operational development. Adjusting production structures based on emerging technologies has become a crucial measure for the high-quality development of the manufacturing industry. It can activate the potential driven by big data elements to achieve economic transformation and innovative development in manufacturing. Digital transformation has brought new opportunities and challenges to the manufacturing industry. How to use digital technology to transform and upgrade cost management has become an urgent issue for the manufacturing sector. Based on this, this paper takes the manufacturing industry as an example, focusing on analyzing the impact of digital transformation on the high-quality development of enterprises and the optimization strategies.

Keywords: Digital Transformation, Manufacturing Industry, High-Quality Development, Impact Study

1. Introduction

Digital transformation benefits the manufacturing industry by reducing costs and improving efficiency, thereby enhancing economic benefits. Against the backdrop of a global economic slowdown and weak demand, the manufacturing sector must change its traditional development model and increase its focus on technology research and development as well as on scientific and technological innovation. Digital transformation can significantly reduce production costs in the manufacturing industry, enhance production efficiency, improve product quality and added value, optimize resource allocation, and improve customer experience. Taking the manufacturing industry as an example, digital transformation can help optimize supply chain management, achieve precise and customized production, reduce inventory and logistics costs, and increase equipment utilization and product quality. Enhancing the economic benefits of the manufacturing industry through digital transformation not only achieves the goals of cost reduction and efficiency improvement but also enhances the market competitiveness and risk resistance of the manufacturing sector.

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2. Analysis of the Impact of Digital Transformation on the High-Quality Development of the Manufacturing Industry

The digital transformation of the manufacturing industry aligns with the needs of technological progress and social development. Currently, the digital transformation value system in parts of the manufacturing industry has matured, and numerous industries and experts have verified the significant importance of digital transformation for the development of the manufacturing sector from both theoretical and practical perspectives. In the context of today's digital economy, to maintain innovation as a core pillar of modernization, digital transformation has become an essential path for upgrading business models. Digital transformation enables the manufacturing industry to break through spatial and temporal limitations, achieving collaborative industry chain integration and optimal resource allocation. Currently, due to constraints such as geographical location and information transmission, there is a significant issue of information asymmetry in resource allocation and technological R&D among upstream and downstream industries in the supply chain. This results in a lack of voice for the manufacturing industry within the supply chain, preventing effective engagement between upstream and downstream manufacturing sectors, thereby impacting product design and production. Digital transformation can leverage new-generation information technology to move traditional industry chain information from offline to online, breaking down information barriers between manufacturing sectors, enhancing the efficiency and alignment of inter-industry engagement, reducing costs, and achieving collaborative innovation among industries within the supply chain.

3. Problems with High-Quality Development of the Manufacturing Industry under Digital Transformation

3.1. Outdated Management Models in the Manufacturing Industry

The manufacturing industry can empower itself digitally by digitizing products and the institutional framework, further promoting innovation in digital products, technical services, and product services. This changes the traditional innovation model of the manufacturing industry and improves the overall level of technological innovation within the organization. However, there are issues with outdated associated models in the digital transformation of the manufacturing industry. Firstly, at the beginning, the promotion of digital management concepts in the manufacturing industry is insufficient, and a comprehensive management system that meets the needs of digital management has not been established, leading to chaos in the application of digital management models. Secondly, in the application of digital management models, the design of the digital transformation plans by the manufacturing industry is not reasonable, and the application of digital management models remains superficial, failing to play its due role. Thirdly, digital management and transformation in the manufacturing industry need to focus on three key areas: basic data management, network security protection, and digital ecosystem construction. However, reality shows that few manufacturers can design management models that match these three key areas based on their actual business, reducing the developmental benefits of the manufacturing industry [1].

3.2. Lack of Multifaceted Talent in the Manufacturing Industry Transformation

Currently, many manufacturers lack multifaceted technical talent, leading to flawed integration of digital technology in the manufacturing industry and hindering the efficiency and quality of digital transformation. On one hand, the cultivation and evaluation of internal talent within the manufacturing industry need to be optimized, with insufficient focus on the critical ability training of digital talent and a lack of assessment incentives, creating a gap between talent capabilities and the

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digital transformation needs of the manufacturing industry. On the other hand, in the context of digital transformation, the manufacturing industry has failed to establish an appropriate exit mechanism for talent management, resulting in an inflated workforce and limited effectiveness of the talent.

3.3. Weak Concept of Digital Transformation in the Manufacturing Industry

In the management operations of the manufacturing industry, some departments have a shallow understanding of the concept of digital transformation, not recognizing the necessity and significance of using digital technology. The attitude towards digital transformation work is not sufficiently proactive, leading to a mere superficial application of digital technology in governance, such as creating basic digital governance apps. However, there is not enough time and effort spent on exploring the rich resources within digital technology, not enough development of its many functions, and not fully leveraging the value of digital transformation in enhancing the high-quality development of the manufacturing industry, resulting in a lower level of digital application in the manufacturing industry's operations.

4. Strategies for High-Quality Development of the Manufacturing Industry Under Digital Transformation

4.1. Cultivating High-Quality Digital Talent

Digital transformation in the manufacturing industry requires advanced technology as support, with personnel being the primary operators of technology. In pushing forward with the digital transformation of the manufacturing industry, managers also need to pay attention to optimizing their talent introduction mechanisms. The essence of digital transformation in manufacturing is the digitization of business, digital business, and datafication of business, with the core lying in the application capability of digital technology. The manufacturing industry must possess a certain level of digital capabilities to better survive and develop in the digital era. To stand out in the era of digital transformation, the manufacturing industry must focus on training and educating employees, creating a high-quality talent pool. On one hand, the government should guide and support the manufacturing industry in establishing an employee training system, helping employees improve their digital literacy and skill levels, and increasing support for the cultivation of talents for digital transformation in manufacturing. On the other hand, the manufacturing industry should conduct employee training in various forms to enhance their understanding and application ability of digital transformation, and to stimulate employees' innovative and creative energy in the field of digital technology. At the same time, the manufacturing industry needs to actively carry out digital talent training, applying methods that combine theory + practice and business + skills to continually improve the comprehensive capabilities of digital talents in manufacturing. Additionally, after the completion of talent training and during business activities, active talent assessment and incentive measures should be implemented to maximize the proactive role of digital and composite talents. Furthermore, the manufacturing industry needs to establish a comprehensive exit management mechanism to phase out employees with low capabilities, streamline the organizational framework of the manufacturing industry, and better adapt to the real needs of digital and high-quality development in manufacturing [2].

4.2. Prioritizing Cost Expenditure and Vigorously Developing Industrial Software

Investment cost is also a key factor affecting the digital transformation and development of the manufacturing industry, and low-cost digital solutions can be promoted and applied more effectively and quickly. It is essential to vigorously promote the construction of national standards projects for

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manufacturing digital equipment to avoid and reduce barriers to interoperability of new technology products using corporate standards in the manufacturing industry, further enhancing actions such as the provision of industry information at competitive prices. First, actively cultivate industry application software in the manufacturing sector, focusing on the construction of domestic industry application software in auxiliary design, simulation modeling, industrial management, etc., to further address the shortcomings of domestic enterprise application software in various industries and links of the manufacturing sector. Second, actively explore R&D methods for manufacturing application software, encouraging leading enterprises in various industrial sectors to jointly fund and establish manufacturing application software R&D joint-stock companies, leveraging the technological process resource advantages of all parties to jointly promote technological innovation, testing applications, and engineering of manufacturing application software, thus enhancing work efficiency. Third, actively promote industry-academia-research collaborative efforts, guiding and assisting R&D enterprises of manufacturing application software to establish a technology interest community, proactively incorporating and integrating universities, research institutions, and industry experts to contribute to technology processes, computational models, and technical information, aiding in the technological development and enhancement of manufacturing application software. Fourth, increase policy support, comprehensively implement a certification system for the manufacturing industry, and adopt special financial and financing policies for companies recognized as industrial software companies, supporting the growth of the manufacturing sector [3].

4.3. Integrating Digital Technologies to Optimize Manufacturing Management Models

With the rapid technological advancements and the vigorous development of digital transformation, traditional cost management models appear inadequate when facing the challenges of modern manufacturing. To adapt to this change, modern manufacturing needs to seek more refined and intelligent cost management methods. For the manufacturing industry to successfully achieve digital transformation, it needs to comprehensively promote efficiency reform, keep pace with the times, and establish long-term mechanisms. Through technological innovation, internal resources can be optimized. Digital transformation enables the manufacturing industry to effectively demonstrate the value and advantages of efficiency reforms. The efficiency reforms driven by digital transformation achieve further enhancement of the manufacturing industry's competitiveness without increasing investment. The industry gains more scientific and effective technological means, leading to further reductions in labor and production costs, and achieving the goal of low-consumption production and operation. Realizing the digital development and transformation of the manufacturing industry requires optimizing management models. First, since digital transformation significantly impacts the manufacturing production management model, various digital technologies provide convenience for manufacturing personnel to engage in the design and production phases. At the same time, the use of big data can help the manufacturing industry conduct in-depth analysis of its production and basic customer requirements, beneficial for improving operational adaptability in products. Secondly, digital transformation gradually puts the manufacturing industry's business model on the path of reform. By utilizing digital means, the industry can effectively understand customer needs and formulate targeted marketing strategies, which plays an important role in enhancing operational efficiency. Lastly, digital transformation also plays a role in reforming the management decision-making model of the manufacturing industry. With the aid of the Internet of Things, it's possible to achieve orderly information transfer between different levels within the manufacturing industry, as well as precise information transfer. In the era of digital transformation, effective communication platforms enable managers to always be informed about the specific situation of the manufacturing industry, thereby providing favorable conditions for improving the quality and efficiency of manufacturing management.

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4.4. Innovating Manufacturing Production Technology to Enhance Product Services

Digital transformation has opened up more spaces for technological innovation in the manufacturing sector, allowing for the integration of more intelligent features into products and the combination of Internet of Things (IoT) technology. This transformation turns products from merely physical forms of usage into providing more digital, modern, and intelligent technical services for customers, realizing the integration of physical and digital aspects. It drives the continuous improvement of product quality, digital technology, and service levels, thereby further expanding the space for innovation and creation within the manufacturing industry. In the process of exploration, it continuously innovates and updates products and services, reduces costs, and maximizes the profits of the manufacturing industry. The changes and advancements in digital transformation expose the manufacturing industry to more complex and diverse environmental changes and fiercer competition, while the dynamic capabilities framework offers a beneficial perspective for researching manufacturing production strategies. Relying on new technologies such as big data, artificial intelligence, and the internet, digital technology intensifies the complexity and instability of the market competition environment in the era of innovation, change, and application. The manufacturing industry needs to continually organize, update, and reapply its resources to meet new technological requirements, enhancing its own innovation and creative capabilities. The dynamic capabilities of the manufacturing industry are essential for enterprises to respond to external environmental changes, continuously improve, enhance, and innovate, encompassing core aspects such as sensing ability, integration ability, and transformation ability. Innovative models have elevated the level of technological innovation in the manufacturing industry. The support of new technological conditions and methods effectively reduces the risks and costs of innovation in manufacturing, decreases the costs and barriers in information communication, and facilitates cross-regional exchange and sharing of innovative resources. At the same time, digital simulation and digital modeling technologies pre-emptively simulate problems in product R&D, significantly reducing the R&D and trial-and-error costs for the manufacturing industry. Through communication with industry professionals and feedback from product users, the manufacturing industry can promptly identify and improve product issues, accelerating the dissemination and sharing of digital information and technology. This creates new modes of mutual exchange between enterprises, and between enterprises and users, fostering multi-faceted collaboration, realizing the collective creation of overall value, and further enhancing the efficacy of product services.

5. Case Analysis of High-Quality Development in the Manufacturing Industry Under Digital Transformation

5.1. Jiangxi Copper Corporation Case Study

With the rapid development of information technology, digital transformation in manufacturing enterprises has become a key trend to enhance competitiveness and adapt to market demands. Digital transformation has become a hot topic in the manufacturing field, as it is seen as an essential path to enhance competitiveness, improve innovation capabilities, and meet market demands. Jiangxi Copper Corporation is a state-owned, high-tech enterprise (2023), established on January 24, 1997, located at 15 Metallurgical Avenue, Guixi City, Yingtan City, Jiangxi Province, with Siemens, a German industrial giant. Jiangxi Copper Corporation is a diversified manufacturing enterprise, covering multiple fields such as electricity, transportation, medical, digital factory, etc. The company's digital transformation has had a significant impact on its manufacturing sector.

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5.2. Digital Transformation Strategy of Jiangxi Copper Corporation

Digital Factory: Jiangxi Copper Corporation has adopted digital technology within its factory to establish a digital factory. Through IoT and sensor technology, they can monitor the operational status, production progress, and energy consumption of equipment in real time. This real-time data visualization helps them quickly identify problems, reduce downtime, and improve production efficiency.

Digital Design and Simulation: Jiangxi Copper Corporation uses digital design and simulation tools to simulate and optimize product design during the product development stage.

Supply Chain Digitalization: Jiangxi Copper Corporation has optimized its global supply chain using digital technology. They have established a supply chain visualization system that allows real-time tracking of the flow of raw materials, components, and finished products, thereby improving the reliability and transparency of the supply chain [4].

Data Analysis and Artificial Intelligence: Jiangxi Copper Corporation has invested heavily in data analysis and artificial intelligence. The company uses big data analysis to predict the maintenance needs of equipment to prevent unexpected downtime [5].

6. Conclusion

In summary, the digital transformation of the manufacturing industry is imperative. It is essential to continuously improve and perfect the policy and institutional environment, strengthen enterprises' comprehensive understanding of digital transformation, solidify the data support system, and persistently advance the digital transformation and reform of the manufacturing industry. Through the application of digital technology, the manufacturing industry can enhance production efficiency, improve quality control, optimize the supply chain, and better meet customer needs. Successful cases, such as Jiangxi Copper Corporation, have demonstrated the potential of comprehensive digital transformation, highlighting the importance of integrating digital technology into the value chain. Digital transformation is not merely a technological upgrade but also the future path for the manufacturing industry. In conclusion, digital transformation has become a new pathway for the manufacturing industry to achieve high-quality development. Digital innovation can drive the manufacturing industry to establish complementary and efficiency-oriented digital business models, aiding in the achievement of high-quality development in the manufacturing sector.

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